

RESOURCES REPORT

Planning for Sustainability in the Commonwealth of the Northern Mariana Islands



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DIRECTOR'S NOTE

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This Resources Report provides a snapshot of where CNMI is in terms of its natural, built, and socio-economic resources at the close of 2019. The data shared in this report has been selected to support continued assessment of planning elements outlined in Public Law 20-20. Ultimately this assessment effort provides a baseline of information to enable our planning team, comprised of the Planning and Development Advisory Council (PDAC) and supporting Taskforce groups to assess the current status of resources and discuss development goals. This process helps to inform where we want to go and what steps are necessary to get there.

This Resources Report reflects the combined expertise of fourteen CNMI cabinet members and agency heads and over 90 Taskforce members. The Resources Report has been shared in draft iterations publicly on September 30 and December 17, 2019, with associated surveys to collect public input. Comments received throughout this process were used to finalize the February 2020 final draft for PDAC approval. The meeting to approve the 2019-2020 Resources Report as final was scheduled for March 19, 2020. On March 15, 2020, Governor Torres issued Memorandum GOV20-106 shutting down all government offices and non-essential government functions due to the detection of Coronavirus (Covid19) on Saipan. On May 17, 2020, the Office of the Governor issued notice of the amendment of Directive 7 of the CNMI COVID-19 Emergency Directives of 2020 to reopen government offices for regular hours effective May 24, 2020. With this notice, I am transmitting this final report to the PDAC and publishing the document on our website for a final round of 30-day public comment.

We have worked hard to get this information right and will continue to work with our partners to track identified data points to help monitor our successes and identify challenges as we work towards shared growth objectives. Like many things, the Covid19 pandemic has already created challenges for this process, creating delays and causing us to “go digital”. It has certainly been an exercise in adaptive planning, but the Office of Planning and Development is committed to working with the PDAC, our Task Forces, and the community at large to continue to facilitate island-, village-, and resource-specific planning dialogs. I ask for your continued engagement, support, and flexibility as we strive to engage our elected officials, public servants, and the community at large to help CNMI envision what sustainable development means here and what we need to do to achieve it, and to capture these dialogs as we create our comprehensive sustainable development plan.

<Pending finalization upon publication>

Table of Contents

Executive Summary	1
Section 1: Readers Guide	12
Section 2: SWOT, Drivers, and Resource Pressures	16
Section 3: Resources Snapshots and SDG Tracking	25
Natural Resources – Overview	26
Natural Resources – Land Management	38
Natural Resources – Water Resources Management	61
Natural Resources – Biodiversity	75
Built Environment – Overview	91
Built Environment – Roads	98
Built Environment – Public Transportation	99
Built Environment – Ports / Airports	103
Built Environment – Energy	110
Built Environment – Water / Wastewater	118
Built Environment – Solid Waste	127
Built Environment – Housing / Development	131
Socio-Economic / DRR – Overview	144
Socio-Economic – Economic Trends	169
Socio-Economic – Health Systems	174
Socio-Economic – Employment and Social Services	184
Socio-Economic – Law Enforcement	193
Socio-Economic – Cultural Heritage and Historic Sites	198
Socio-Economic – Education	204
Socio-Economic / Disaster Risk Reduction – Mitigation of Vulnerability to Natural Hazards	212
Socio-Economic – DRR – Resource-Specific Hazard Mitigation Plans	220
Section 4: Summary and Recommended Next Steps	226
Appendix A – Plans and Reports Posted / Referenced as of Dec., 2019	229
Appendix B – SDGs Indicator Tracking for Trends Analysis	232
Appendix C – Smart, Safe Growth – Summary Recommendations	255
Appendix D – 2019 PIRCA Climate Science Summary	263
Appendix E – DLNR-DP&R Public Facilities List	265
Appendix F – DPL 1989 PLUP Goal, Objectives, and Implementing Policies	266
Appendix G – DPL 1989 PLUP Growth Projections and Planning Scenarios	269
Appendix H - DPL 2019 PLUP Growth Projections	279

Appendix I – Forecasts for Master Planning by DPL, Development and Forecast Model	284
Appendix J – 2019-2022 Strategic Parks and Recreation Plan	323
Appendix K – CNMI State of the Reefs Report	326
Appendix L – DPW Highway Maps, 2019	333
Appendix M - Tinian Harbor Master Plan	336
Appendix N - Rota Harbor Master Plan	360
Appendix O - CUC Power Distribution Maps, Saipan, Tinian, and Rota	380
Appendix P - CUC Utility Rates, July 2019	383
Appendix Q - Water Production Wells and Distribution Maps	384
Appendix R – 2010 Census Results – Population by Election District	387
Appendix S – 2011-2015 Historic Preservation Plan	388
Appendix T – PSS 2017 Readiness	413
Appendix U – NMC Strategic Plan	424
Appendix V - Reviewed Regulations	455

Executive Summary

The “CNMI Planning and Development Act of 2017”, Public Law 20-20, establishes the Office of Planning and Development (OPD). As directed by P.L. 20-20, it is OPD’s mission:

To increase the effectiveness of government and private actions, to improve coordination among different agencies and levels, of government, and to provide for wise use of resources and future development of the CNMI.

OPD is mandated to:

- Create a CNMI Comprehensive Sustainable Development Plan that shall serve as a guide for future long-range development using and improving on existing plans, maps, and other resources;
- Serve as a clearinghouse for all information related to development, planning, and resource use in CNMI; to identify objectives, policies, and priorities for the CNMI;
- Provide a basis for determining priorities and allocating resources; and
- Establish a system for plan formulation and program coordination to provide for an integration of all major CNMI and individual island activities.

This *Resources Report* provides baseline assessment “snapshots” of the eighteen resource management elements and subcategories outlined in Public Law 20-20.

Section 1 provides a reader’s guide and context for this report. **Section 2** discusses local and global drivers as well as analysis of “strengths, weaknesses, opportunities, and threats” as identified in the 2019 Comprehensive Economic Development Strategy Update (CEDS) to further frame natural resources management planning challenges and opportunities in the CNMI. **Section 3** provides resource “snapshots”, discussion of the status and responses of resource managers to existing conditions, and highlights initial recommendations made by the PDAC and provided through stakeholder comments to address planning objectives of each taskforce group – natural resources, the built environment, socio-economic resources, and disaster risk reduction – as well as a high-level “overview” of each of these sections in order to support the development of a vision, objectives, strategies, and prioritized next steps for the comprehensive sustainable development plan. **Section 4** summarizes key recommendations and next steps.

This assessment has been supported by the Planning and Development Advisory Council (PDAC) and planning partners spanning government, non-profit, and private interest groups. Together we have worked to develop resource summaries that answer the questions “*where are we now, where do we want to go, and how do we get there?*”

Because OPD is mandated to plan for comprehensive “sustainable development” principles of this goal - including environmental sustainability, economic prosperity, and social equity – are being discussed as the PDAC reviews this report and community feedback to identify priority steps forward to achieve shared sustainable development goals.



Figure 1 – Sustainable Development is often defined as “meeting the needs of the present without compromising the ability of future generations to meet theirs” and is envisioned using three main pillars: **economic, environmental, and social** as shown in the image above.

When discussing sustainability, the Agenda 2030 Sustainable Development Targets were identified as a framework for baseline data collection and trend tracking. There are 230 internationally accepted indicators for the set of 17 goals. This report includes discussion of areas where existing data correlates to selected indicators to further support identification of the “baseline” – where we are – and help the CNMI chart a path forward to achieve objectives such as reducing hunger, child mortality, and violence – indicators that relate to economic and environmental conditions of our society. By identifying relatable indicators we can set achievable goals to ensure social equity, economic growth, and environmental well-being now and for the future.

Summary of Resource Report Approach

As reflected by the figure above, “sustainable development” is often considered the “sweet spot” for resource management and development objectives. Using this framework, this **2019-2020 Resources Report** (Resources Report) for the Commonwealth of the Northern Mariana Islands (CNMI) provides a baseline assessment of the environment, broadly defined to include the biosphere, built, and socio-economic environments using the Drivers, Pressures, State, Impact and Response (DPSIR) model of reporting. The main aims of this report are to:

- Identify the key drivers and pressures behind the changing environment in CNMI;

- Compile baseline information to support comprehensive sustainable development planning through use of the best available information for seven key thematic areas: Atmosphere and Climate, Inland Waters, Land, Marine, Biodiversity, Culture and Heritage, and Built Environment as they relate to Sustainable Development Indicators;
- Document the social, economic and environmental impacts that result from changes in the state of the environment;
- Document current responses by CNMI to address changes in the state of the environment that better protect and manage resources; and
- Provide recommendations for CNMI to address key challenges and build on existing strengths, which are linked to actions that will be outlined and detailed further in the resulting comprehensive sustainable development plan for CNMI, slated for development and adoption by 2020.

After providing a “readers guide” in Section 1, this report is comprised of three discussions:

1. Drivers and Pressures in CNMI: A summary of the main points discussed in the Pressures and Drivers section of the report.
2. The State of Environment and Impacts on the Society, Economy, and Environment: Key findings for each of the three main resource categories.
3. Responses and Recommendations – Challenges in Moving from Policy to Action: This presents key responses, opportunities, challenges, and recommendations for next steps from resource management professionals and engaged community members.

Key Findings

Drivers and Pressures in the Commonwealth of the Northern Mariana Islands:

The CNMI is rapidly changing and so is the environment and the socio-economic resources that the biosphere supports. Changes are driven by broader social, economic, technological, and cultural forces referred to as “drivers”. These include population growth, urbanization, tourism, increased access to external markets, greater access to technology, and at times the clash of traditional and contemporary values. The drivers are a source of further pressure on the environment but they can also offer potential solutions to management challenges.

Themes reflected in discussion of resource pressures on the environment fall into three categories for the Resources Report:

- Natural Resources (land, water, biodiversity, climate/weather);
- Built Environment (infrastructure, transportation, housing); and
- Socio-economic (Health, education, risk reduction planning).

Defining “Sustainable Development” and “Resilience”

This assessment is intended to highlight key needs, gaps, and next steps to support “sustainable development” – or meet the needs of the present without compromising the needs of the future – and build “resilience” in the CNMI. Our formal definition for “resilience” in the formation of this strategy is “the ability to survive, adapt and thrive regardless of what shocks or stresses come our way.” Surveys were used to gauge perceptions around CNMI’s top shocks (events which occur

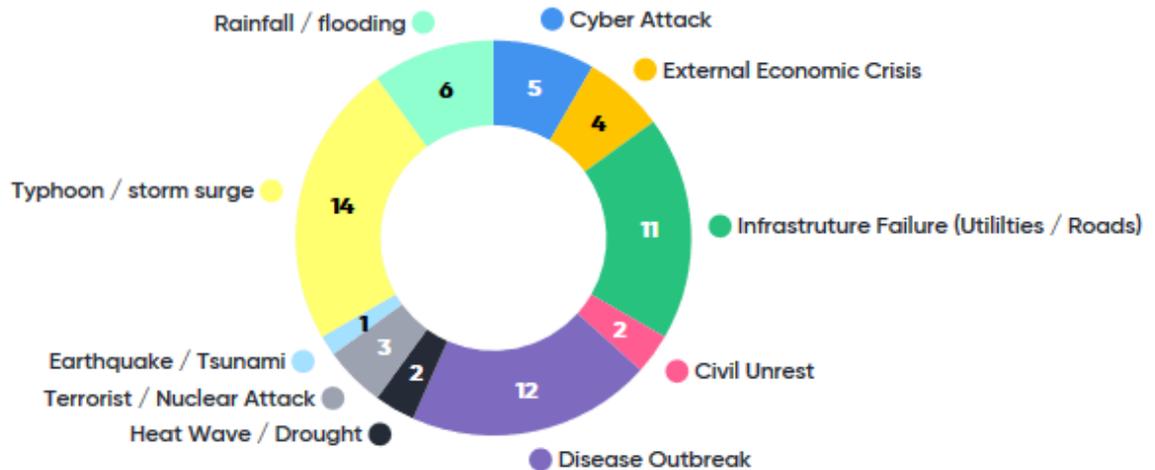
rapidly and unexpectedly) and stresses (on-going strains on society that gradually sap community strength) to identify drivers and pressures that frame our most urgent resilience challenges. Initial surveys of CNMI’s agency leadership have identified top five shocks as: Typhoons / Storm surge; Disease Outbreak; Infrastructure Failure; Cyber Attack (see Figure 2, below); and, External Economic Crisis. Respondents ranked CNMI’s top five stresses as: Labor Shortage, Climate change, Aging Infrastructure, Cost of Living, and Over-Reliance on Imports (see Figure 3, next page). These “resiliency surveys” will be repeated at community meetings to further gauge village-level priorities as the comprehensive sustainable development planning process moves forward. These efforts are intended to help build consensus regarding development goals which can be used to support the implementation of actions targeted to achieve these objectives.

Top 5 Shocks	Top 5 Stressors
Typhoon / storm surge (70%)	Labor Shortage(s) (76%)
Disease Outbreak (60%)	Climate change (57%)
Infrastructure Failure (55%)	Aging Infrastructure (48%)
Cyber Attack (25%)	Cost of Living (24%)
External Economic Crisis (20%)	Over-reliance on Imports (food, fuel, goods, etc.) (24%)

Note: Totals reflect engaged stakeholders’ responses to the questions “identify your top three shocks / stressors?” Percentages above are rounded to nearest % and indicate the portion of respondents who selected these highest ranked shocks or stressors within their top three choices and therefore do not total 100%

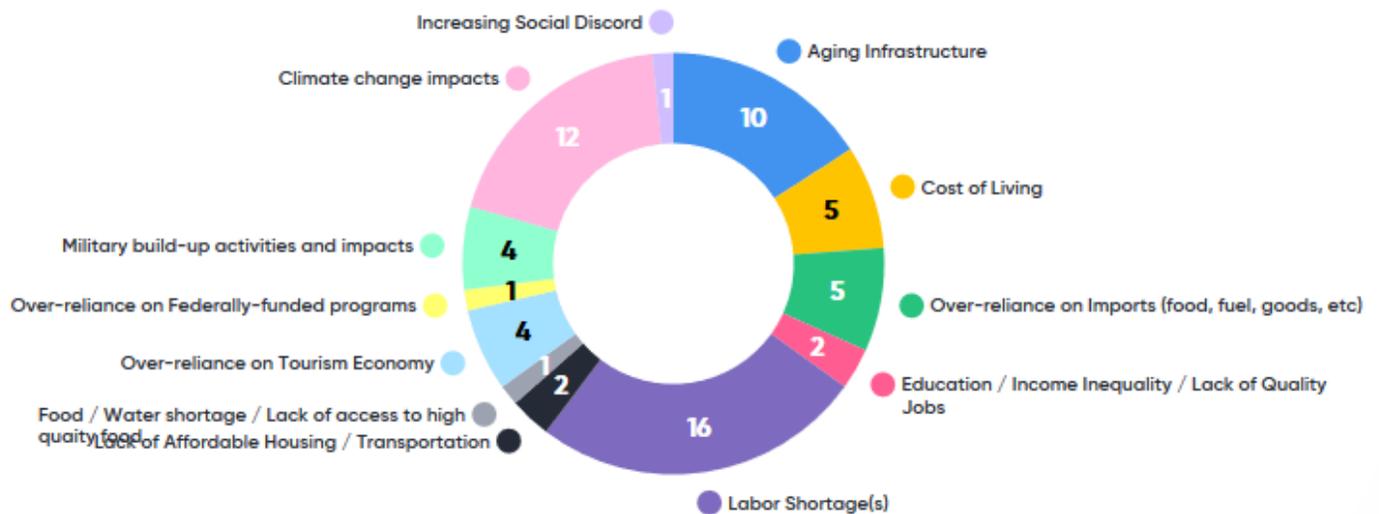
As the “top shocks and stressors” results highlight, both short-term disturbances and long-term stressors create challenges for sustainable development.

Figure 2- PDAC Shock Rankings, 2019



A shock is a sudden event that impacts the vulnerability of a system. In your view, what are the TOP 3 shocks that are MOST LIKELY to impact CNMI?

Figure 3 – PDAC Stressor Rankings, 2019



A stress is a pressure on a given system. In your view, what are the TOP 3 stressors that are MOST LIKELY to impact CNMI's long-term sustainability?

These survey responses demonstrate that while there are many important planning considerations, cross-cutting action areas such as increased job training and investment in infrastructure upgrades can address multiple threats. As such, OPD and the PDAC are working to identify areas where critical synergies exist applying principles of “Smart, Safe Growth” and sustainable development planning. As outlined further in discussion of next steps, an adaptive management planning approach will support the CNMI in setting goals to address priority development action areas and continue to gauge the progress we make towards these goals over time. The application of the Sustainable Development Goal planning framework is intended to further support this iterative planning and data assessment process.

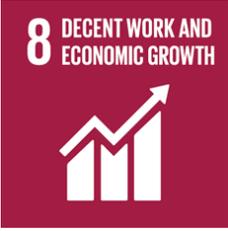
Taskforce Categories and Planning Elements

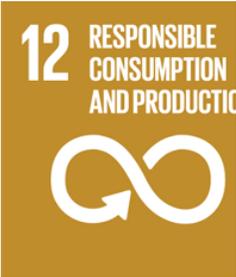
Planning elements have been divided between PDAC Taskforce groups to help organize information in this report, however, these sections also connect to and reinforce each other. Each section overview includes a brief summary of the contents of each section, a chart outlining alignment with sustainable development goal indicators, and cross-cutting recommendations.

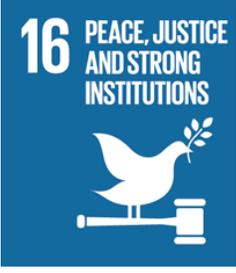
As of the publication of this final draft report on May 30, 20120 the PDAC has adopted refined Sustainable Development Goal statements and is continuing to work with OPD on further refinement of relevant objectives and indicators. Planning Taskforce meetings held in February, 2020, collected feedback from technical staff and PDAC members to incorporate their existing data and planning priorities into this framework. This process has allowed us to identify which CNMI agencies and partners are already leading action in progress towards specific sustainable development goals and incorporate their current planning priorities that align with SDG indicators. The chart that follows reflects Taskforce engagement and PDAC alignment and support of to these various goals and indicators. Indicators have been refined specifically to track existing data and plans, with CNMI-specific additions indicated by “Indicator#-NEW”. Updates to this list may be published as addendums to this report as they become available.

Goal	Description	Indicator(s)	Lead(s)	Supporting	PL 20-20 § 20176 Planning Element
	<p>“End poverty in all its forms”</p>	<p>1.2.1 – Proportion of population living below the national poverty line, by sex and age</p>	<p>Socio-Econ Taskforce</p>	<p>Commerce; NMHC</p>	<p>(N) Development Policy (P) Labor work force</p>
	<p>“End hunger, achieve food security and improved nutrition and promote sustainable agriculture”</p>	<p>2.4.1 Proportion of agricultural area under productive and sustainable agriculture 2.4.1-NEW – GDP from agriculture</p>	<p>Socio-Econ Taskforce</p>	<p>Commerce; NMHC, DCCA</p>	<p>(N) Development Policy</p>
	<p>“Ensure healthy lives and promote well-being for all at all ages”</p>	<p>3.1.1 – Maternal mortality ratio 3.1.2 – Proportion of births attended by skilled health professional 3.2.1 – Under-five mortality rate 3.2.2 – Neonatal mortality rate 3.3.1 – HIV infections rate 3.3.2 – Tuberculosis incidence rate 3.3.3 – Malaria incidence rate 3.3.4 – Hepatitis B incidence rate 3.6.1 – Death rate due to road traffic injuries 3.7.1 – Proportion of women of reproductive age (aged 15-49 years) who have their need for family planning satisfied with modern methods 3.7.2 – Adolescent birth rate (aged 10-14 years; aged 15-19 years) 3.d.1 – International Health Regulation 2005 capacity and health emergency preparedness 3.A-NEW Reduce mortality and morbidity and maintain WHO goal stable incidence rates of diabetes cases annually with a focus on preventing chronic disease through active</p>	<p>Socio-Econ Taskforce</p>	<p>CHCC, NMHC</p>	<p>(L) Safety (N) Development Policy (R) Other - Health</p>

Goal	Description	Indicator(s)	Lead(s)	Supporting	PL 20-20 § 20176 Planning Element
		transportation, increased availability of healthy locally food, through healthy community design and healthy community planning			
	“Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”	4.1.1 Proportion of children and young people: (a) in grades 2/3; (b) at the end of primary; and (c) at the end of lower secondary achieving at least a minimum proficiency level in (i) reading and (ii) mathematics, by sex	Socio-Econ Taskforce – Education Partners	NMC, NMTI, PSS	(N) Development Policy (R) Other - Education
	“Achieve gender equality and empowerment”	5.5.1 Proportion of seats held by women in national parliaments and local governments	Socio-Econ Taskforce	DCCA-WAO	(N) Development Policy
	“Ensure availability and sustainable management of water and sanitation for all”	6.1.1 – Proportion of population using safely managed drinking water services 6.3.1 – Proportion of wastewater safely treated 6.3.2 – Proportion of bodies of water with good ambient water quality	Built Environment TF Socio-Econ / DRR Taskforce Natural Resources Taskforce	CHCC-BEH, CUC, NMHC, BECQ	(L) Safety (O) Capital Improvements (N) Development Policy (R) Other - Health
	“Ensure access to affordable, reliable, sustainable and modern energy for all”	7.1.2 – Renewable energy share in the total final energy consumption	Built Environment Taskforce	CUC	(B) Community Design (O) Capital Improvements (N) Development Policy

Goal	Description	Indicator(s)	Lead(s)	Supporting	PL 20-20 § 20176 Planning Element
	<p>“Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all”</p>	<p>8.1.1 – Annual growth rate of real GDP per capita 8.5.2 – Unemployment rate, by sex, age and persons with disabilities 8.9.1 – Tourism direct GDP as a proportion of total GDP and in growth rate 8.9.2 – Number of jobs in tourism industries as a proportion of total jobs and growth rate of jobs, by sex</p>	<p>Socio-Econ Taskforce</p>	<p>Commerce, MVA, DCCA, NMHC</p>	<p>(N) Development Policy (P) Labor work force</p>
	<p>“Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation”</p>	<p>9.1.1 – Proportion of the rural population who live within 2 km of an all-season road 9.1.2 – Passenger and freight volumes, by mode of transport 9.c.1 – Proportion of population covered by a mobile network, by technology</p>	<p>Built Environment TF</p>	<p>DPW, CPA, COTA, Commerce</p>	<p>(L) Safety (N) Development Policy (R) Other - Health</p>
	<p>“Eliminate inequality”</p>	<p>10.2.1 – Proportion of people living below 50 per cent of median income, by age, sex and persons with disabilities</p>	<p>Socio-Econ Taskforce</p>	<p>Commerce, NMHC, DCCA</p>	<p>(N) Development Policy</p>
	<p>“Make cities and human settlements inclusive, safe, resilient and sustainable”</p>	<p>11.2.1 – Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities 11.4.1 – Total expenditure (public and private) per capita spent on the preservation, protection and conservation of all cultural and natural heritage, by type of heritage (cultural, natural, mixed and World Heritage Centre designation), level of government (national, regional and local/municipal),</p>	<p>Built Environment TF</p>	<p>COTA, HPO, DPL, DLNR</p>	<p>(B) Community Design (I) Redevelopment (J) Conservation (K) Recreation (L) Safety (M) Tourism (N) Development Policy</p>

Goal	Description	Indicator(s)	Lead(s)	Supporting	PL 20-20 § 20176 Planning Element
		<p>type of expenditure (operating expenditure/investment) and type of private funding (donations in kind, private non-profit sector and sponsorship)</p> <p>11.7.1 – Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities</p>			(O) Capital Improvements
	<p>“Ensure sustainable consumption and production patterns”</p>	<p>12.4.2 – Hazardous waste generated per capita and proportion of hazardous waste treated, by type of treatment</p> <p>12.5.1 – Recycling rate, tons of material recycled</p>	<p>Built Environment TF</p>	<p>BECQ, DPW</p>	<p>(B) Community Design</p> <p>(N) Development Policy</p>
	<p>“Take urgent action to combat climate change and its impacts”</p>	<p>13.1.1 – Number of <u>local</u> disaster risk reduction strategies</p> <p>13.2.1 – Number of climate change measures in <u>local</u> policies</p> <p>13.3.1 – Integration of mitigation, adaptation, and impact reduction into school curricula</p>	<p>Socio-Econ / DRR TF Natural Resources Taskforce</p>	<p>HSEM, HMGP, PSS, BECQ, DLNR</p>	<p>(B) Community Design</p> <p>(I) Redevelopment</p> <p>(J) Conservation</p> <p>(K) Recreation</p> <p>(L) Safety</p> <p>(M) Tourism</p> <p>(N) Development Policy</p>

Goal	Description	Indicator(s)	Lead(s)	Supporting	PL 20-20 § 20176 Planning Element
	<p>“Conserve and sustainably use the oceans, seas and marine resources for sustainable development”</p>	<p>14.4.1 – Proportion of fish stocks within biologically sustainable levels</p> <p>14.5.1 – Coverage of protected areas in relation to marine areas</p>	<p>Natural Resources Taskforce</p>	<p>DLNR, BECQ</p>	<p>(J) Conservation</p> <p>(K) Recreation</p> <p>(M) Tourism</p> <p>(N) Development Policy</p>
	<p>“Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss”</p>	<p>15.1.1 – Forest area as a proportion of total land area</p> <p>15.2 – Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type</p>	<p>Natural Resources Taskforce</p>	<p>DLNR, BECQ</p>	<p>(J) Conservation</p> <p>(K) Recreation</p> <p>(L) Safety</p> <p>(M) Tourism</p> <p>(N) Development Policy</p>
	<p>“Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels”</p>	<p>16.1.1 – Number of victims of intentional homicide per 100,000 population, by sex and age</p> <p>16.1.2 – Conflict-related deaths per 100,000 population, by sex, age and cause</p> <p>16.1.3 – Proportion of population subjected to physical, psychological or sexual violence in the previous 12 months</p>	<p>Socio-Econ Taskforce</p>	<p>DPS, CHCC</p>	<p>(N) Development Policy</p>

Goal	Description	Indicator(s)	Lead(s)	Supporting	PL 20-20 § 20176 Planning Element
	<p>“Strengthen the means of implementation and revitalize the global partnership for sustainable development”</p>	<p>17.1.1 – Total government revenue as a proportion of GDP, by source</p> <p>17.1.2 – Proportion of domestic budget funded by domestic taxes</p> <p>17.6.2 – Fixed Internet broadband subscriptions per 100 inhabitants, by speed</p>	<p>Socio-Econ Taskforce</p>	<p>Commerce</p>	<p>(N) Development Policy</p>

Summary of Next Steps and Recommendations

This Resources Report provides a snapshot of where CNMI is in terms of its natural, built, and socio-economic resources at the close of 2019. The data shared in this report has been selected to support continued assessment of these planning elements to help inform where we want to go and what steps are necessary to get there. Moving forward, these data points will be used to facilitate island-, village-, and resource-specific planning dialogs. As the recommendations discussion in each summary section and sub-section of this report highlight, there are many cross-cutting needs and much overlap between planning element areas – for example, equitable and effective education is needed to ensure increases in earning power and grow our economy, which will in turn support improved health and environmental outcomes. Analysis of recommendations and areas of synergy will be applied to identify “planning pillars” to help frame discussion of priority action areas and next steps to support this iterative and adaptive planning process. In the months ahead, OPD and the PDAC will work with elected officials, public servants, and the community at large to help CNMI envision what sustainable development means here and what we need to do to achieve it.

Section 1: Readers Guide

Resources Reporting in the CNMI

In 2017 the CNMI Legislature passed and the Honorable Governor Ralph Torres signed Public Law 20-20 establishing the Office of Planning and Development (OPD). This law aims to streamline planning efforts in CNMI and instructs OPD to work with the Planning and Development Advisory Council (PDAC) to develop a comprehensive sustainable development plan. Because environmental reporting and planning has been largely segmented across numerous resource management agencies and divisions in the past, this Resources Report represents the compilation and analysis of existing reports to identify data trends, data gaps, and establish comprehensive baseline information to inform planning efforts in the years ahead. A list of agencies and plans reviewed to support this process is included in Appendix A. This assessment is intended to provide a “snapshot” of where the CNMI is in terms of its natural, built, and socio-economic resources to help inform discussion about where we want to go and what steps are necessary to get there.

Purpose of the State of the Resources Report

The purpose of the CNMI Resources Report is to present the best available information about the current state of the environment as the basis for effective environmental management and planning. The SoR Report examines the major drivers of change to the environment that emerge from global, regional, and especially locally focused factors. The SoR Report evaluates the main environmental pressures created by these drivers, and examines their social, economic and environmental impacts.

Resources Reporting, also known as State of Environment (SoE) reporting is an internationally accepted method that analyzes the condition of a geographic area or jurisdiction’s environment – broadly defined to include built, economic, as well as ecosystems and associated natural resources. Leveraging the reporting framework deployed throughout the Pacific with support from the Secretariat of the Pacific Regional Environment Programme (SPREP), SoE Reports compile and analyze quantitative and qualitative data from a variety of local, national, regional, and international sources to provide a holistic picture of a location’s current state of the environment. Resources/SoE Reports also discuss drivers, pressures, and trends, including anthropogenic impacts to the environment. Through baseline assessments and trends analysis, Resources/SoE Reports enable prioritization and goal setting to work towards agreed upon outcomes or “visions” of a given location and identify issues that impact the state of the location’s natural, built, and socio-economic resources. Typically, and as seen here, these types of reports often include the condition of flora and fauna species as well as habitats such as native forests, marine and inland water bodies, soils, and vegetation cover as well as address key aspects of highly modified agricultural and built environments. This Resources Report aims to provide well-researched information to support local, state, and regional planning discussions in areas the “planning areas” identified in Public Law 20-20 and “resource elements” as detailed further below.

Resource Elements and Planning Areas

The Office of Planning and Development is mandated by Public Law 20-20 to “harmonize, improve, and assist in implementing comprehensive planning activities at all levels of government” and “ensure that the current planning programs and projects are consistent with the comprehensive development plan” and the policies of P.L. 20-20, which highlight coordination between the CNMI government as well as the private and nonprofit sectors. P.L. 20-20 Section 20176 instructs that the Comprehensive Sustainable Development Plan for the CNMI shall contain the following elements: (a) Land Use; (b) Community Design; (c) Transportation; (d) Regulations; (e) Public Facilities; (f) Public Lands; (g) Public

Buildings; (h) Housing; (i) Redevelopment; (j) Conservation; (k) Recreation; (l) Safety; (m) Tourism; (n) Development Policy; (o) Capital Improvements; (p) Labor Work Force; (q) Policy statements; and (r) Other Elements. To develop plans and supporting policies as required, comprehensive understanding of the state of the resources is required, a need which prompted the compilation of this report. The eighteen “planning areas” were further divided into “resource elements” within three taskforce planning groups: natural resources, the built environment, and socio-economic resources. These taskforces were established so that PDAC members and partners could convene targeted assessment and planning meetings to address particular subjects collaboratively. The chart below demonstrates these areas of alignment. Note, some resource elements address more than one planning area, with the bold “X” indicating the section of this document that primarily addresses the planning area / resource element.

Planning Area Public Law 20-20 § 20176	Resource Element Resources Report Category	Taskforce(s) (Primary Section Bold)					Description
		BE	NR	SE	DRR	Edu	
(A) Land Use	Land Management	x	X	x	x		Land use element including distribution, location, and extent of physical development
(B) Community Design	SSG	x		x	x		Standards and principles governing land use including design / redevelopment / siting recommendations
(C) Transportation	Roads Ports/Air Travel	x					Route circulation Ports / airports
(D) Regulations	Appendix V	X	x	x	x	x	Related to land use planning
(E) Public Facilities	Social Services DRR Energy Water / Wastewater Solid Waste	X		X		x	General plans for public services and facilities including sewage, refuse disposal, drainage, local utilities, ROW, etc.
(F) Public Lands	Land Management	X	x	x	x		Inventory of all CNMI and federal lands
(G) Public Buildings	Housing and Development	x					Civic buildings locations and arrangements <geospatial updates pending>,
(H) Housing	Housing and Development	X		x			Standards and plans for elimination of substandard dwelling conditions <coordinated planning ongoing with DPW/NMHC/DRR TF>, public housing and housing trends
(I) Redevelopment	Housing and Development	X		x			Address unsafe or blighted areas <coordinated planning ongoing with Zoning, DPL, DPW, NMHC>

Planning Area Public Law 20-20 § 20176	Resource Element Resources Report Category	Taskforce(s) (Primary Section Bold)					Description
		BE	NR	SE	DRR	Edu	
(J) Conservation	Land Management, Water Resources Management, Weather and Climate, Hazard Mitigation Cultural Resources	x	X	X	X		Broadly defined to include conservation, development, use of natural resources.
(K) Recreation	Land Management Cultural Resources		X	x		x	Broadly defined to include natural areas, archeological / historic, and other sites
(L) Safety	Law Enforcement Built Envt (All) Hazard Mitigation Social Services	X	x	X	x	X	Protection of the community from natural and man-made hazards including features necessary for such protection (mapping / design standards)
(M) Tourism	Socio-Economic Trends			X			Public and private sector collaboration for steady and regulated growth of visitor industry for steady employment and upward job mobility
(N) Development Policy	SSG Built Envt (All)	X	X	X	X		Short- and long-range socio-economic development strategy including solutions for health services, employment, education, elimination of poverty etc.
(O) Capital Improvements	DRR	x			x		Short- and long-range CIP
(P) Labor Work Force	Economic Trends			X		x	Workforce collaboration between public and private sector
(Q) Policy Statements	<In development>						<in development>
(R) Other Elements:							As approved by PDAC.
i. Education	Education	x		x		X	Referenced in (N)
ii. Healthcare	Public Health	x	x	X	x	x	Referenced in (N)
iii. Comprehensive Resiliency	SSG	x	x	x	x	x	Safe, Smart Growth (SSG) principles support sustainable development objectives – overarching policy framing

Together the Office of Planning and Development and the Planning and Development Advisory Council (members listed at right) are tasked with ensuring integration of these resource management planning areas and elements into a stakeholder supported comprehensive development plan that is linked to Sustainable Development Goals and metrics scaled for the CNMI.



Together we can achieve smart and sustainable growth that supports our community's vision, now and for the future!

Resources Reporting Process and Next Steps

This report was compiled by the Office of Planning and Development with support from the Planning and Development Advisory Council (PDAC) and other partners in the public and private sector. The aim of this report is to collect a “snapshot” of information that can be used to support comprehensive and resource- or sector-specific planning efforts. PDAC members and relevant partners reviewed initial “introduction” sections to confirm accuracy of collected information and provided suggestions for additions to the “impacts and status” and “responses and recommendations”. These initial drafts were then shared with the community at large – they were posted online on September 30, 2019, and shared at numerous stakeholder meetings. Through this process, draft sections were finalized and the subsequent section here on “drivers, pressures, state, impact, and response” recommendations were finalized. This analysis was presented to the PDAC for further revision and updates on October 31, 2019, and December 12, 2019, and approved the report as final for public distribution at the January 17, 2020 meeting, completing the initial assessment cycle. Moreover, at the October 31, 2019 PDAC meeting, members formally adopted the working definition of “sustainable development” and the application of the Sustainable Development Goal framework to support measurement of progress towards indicators for which data is already tracked in CNMI.

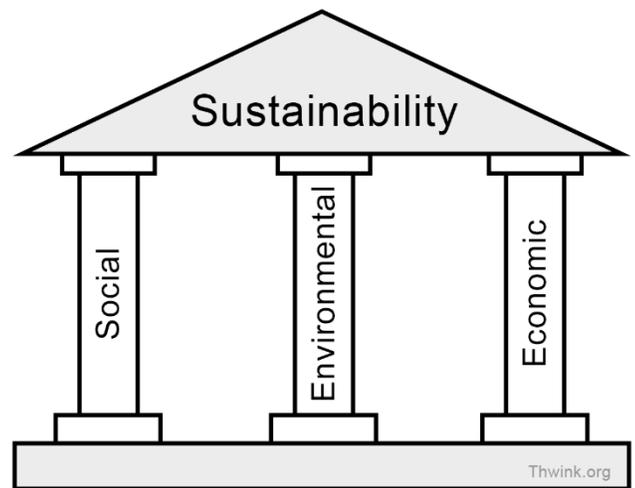


Figure 4 – Pillars of “Sustainable Development” which addresses environmental, economic, and social needs is the goal of the PDAC as we move forward in the comprehensive planning process.

Further elaboration of the “response” recommendations is necessary to support comprehensive sustainable development planning. To gain additional input, OPD will work with the Legislature to convene meetings in each precinct with the support of the PDAC and other public and private stakeholder groups. These meetings will involve a similar format as the Resources Report assessment drafting and review meetings, with resource- and sector-specific planning presentations and “tables of experts” to collect community feedback and answer questions about the state of the resources and the planning process. Responses from these “visioning sessions” and “stressor / shock resilience assessments” will be compiled to identify cross-cutting goals and objectives for comprehensive planning as well as resource- and sector-specific goals, which will be shared with the PDAC and partners for additional input.

Section 2: SWOT, Drivers, and Resource Pressures

This section summarizes local, regional, and global influences that act as “drivers” or resource pressures to the planning areas and resource elements examined in this report.

Strengths, Weaknesses, Opportunities, and Threats (SWOT)

The CNMI’s 2014 – 2019 Comprehensive Economic Development Strategy (CEDS) includes a SWOT analysis that identifies challenges to and opportunities in the CNMI. This analysis is being updated for the 2020 – 2025 CEDS planning cycle. The current SWOT and suggested updates received through partner feedback are included here to support additional discussion of drivers and resource pressures and the management implications they present. Socio-economic trends and projections are discussed more in corresponding subsections in the Section 3 resource summaries. What follows here is a high-level summary of SWOT themes.

The SWOT framework assesses the CNMI’s strengths through an evaluation of its current and anticipated assets, resources, benefits and opportunities comparative to other similarly situated jurisdictions. Weaknesses were evaluated as understanding the CNMI’s relative disadvantages in comparison to similarly situated jurisdictions. These were items such as an identified lack of resources, policy constraints, obligatory conditions which inhibit economic growth and/or sustainability. Opportunities were assessed through an evaluation of occasions or events unique to the jurisdiction which allow the CNMI to benefit economically. This included opportunities for the development of new enterprises established because of these occasions or events. Finally, the group assessed threats through an evaluation of occasions, events or circumstances which pose a negative impact on the CNMI’s ability to develop, promote or sustain economic health. While the identified elements of the SWOT are not exhaustive, they represent the most prominent dynamics agreed upon by the Commission in the 2014-2019, 2019 update, and subsequent review and update dialogs. These themes are summarized in the chart below.

Strengths	Weaknesses	Opportunities	Threats
<ul style="list-style-type: none">• New Industry Development• Attractive island environment with access to an expansive Asian marketplace• Supportive governance and regulatory structure• Stable US financial & legal system• Installation of new telecommunication infrastructure	<ul style="list-style-type: none">• Lack of exportable natural resources• Domestic labor pool availability & experience• Outdated and inadequate infrastructure• Supply chain infrastructure required for economic development• Land ownership challenges	<ul style="list-style-type: none">• Development of new industry in the CNMI• Access to federal programs (EB5, LIHTC, & NMTC)• Department of Defense realignment to the Marianas• Visa-free access to Chinese source markets• Local and federal support of resiliency initiatives	<ul style="list-style-type: none">• Access to a skilled domestic labor pool• Unresolved labor issues due to US PL 110-229• Potential of national policy restricting access to Asian source markets• Department of Defense realignment to Marianas• Exposure to climate impacts that can increase risks from natural hazards

Strengths

New Industry Development: Although the gaming industry has been in existence on the islands of Tinian and Rota, its introduction on the capital island of Saipan has supported a boom in tourism and presented significant economic opportunities in a variety of business sectors. Due to the magnitude of its development, the casino industry has prompted significant activity in the retail, finance, security, construction, information technology, and professional services sectors.

Access to an Expansive Asian Marketplace: The CNMI's appealing tropical setting and access to the Asian tourist marketplace is not unlike its regional neighbors, apart from its visa-free access to an expansive Chinese tourism market. The visa-free access for Chinese visitors serves as the lynchpin for the casino investment. Providing a safe, nearby location for investment, the CNMI presents an ideal setting for foreign investors seeking to generate revenue outside of their home country.

Supportive Governance Structure: Through the CEDS planning process, the CNMI is committed to leveraging its assets of cultural and natural resources to grow a diverse economy grounded in a sustainable workforce and resiliency in our built environment to assure a safe, healthy, and vibrant community for all. With a supportive local government structure, coupled with the protection and stability of the US financial and legal systems, the CNMI provides an ideal investment hub for Asian investors as well as local entrepreneurs. The community's small size provides access to community leaders, promoting a level of trust for investors. Through planning programs such as the CEDS and the ongoing comprehensive sustainable development plan, CNMI is working across the public and private sectors to achieve positive and sustainable economic development by driving market diversification, ensuring resilient infrastructure, and attaining an educated community through effective leadership, planning, community coordination, and partnership with all stakeholders.

Installation of New Telecommunications Infrastructure: The installation of a second fiber-optic undersea cable in the CNMI by Docomo Pacific presents a significant economic strength for the CNMI. Historically, the CNMI's telecommunication industry was monopolized through the sole provider of its lone telecommunication infrastructure, including its undersea fiber-optic cable and microwave infrastructure. It should be noted that as the Incumbent Local Exchange Carrier (ILEC), rates charged to competing organizations within the CNMI's telecommunications industry were reviewed and approved by the Federal Communications Commission (FCC). The historical monopolistic nature of the CNMI's telecommunications industry was simply a matter of competing firms not making an investment into the required infrastructure.

In 2015, a break in ILEC's undersea cable precipitated a crisis that private and public-sector organizations were not prepared for. The event crippled communication within and outside of the CNMI, impacting emergency response, financial systems, and travel. Although the event was resolved in a matter of days, the impact that the break had on the community prompted private sector investments to begin the installation of a second fiber optic cable to service the CNMI. The competition between the ILEC and competing firms is anticipated to impact consumer pricing and provide redundancy for the community in the event of another break in the cable. In April, 2017, the US Army Corps of Engineers announced the final regulatory permit approval for the Docomo Pacific ATISA submarine fiber-optic cable system, which spans approximately 279 kilometers or 173 miles, expanding connectivity in the Marianas.

Weaknesses

Lack of Exportable Natural Resources: Unlike many US states or island nations, the CNMI does not have ample land mass with rich in-demand resources which can be exported. While the CNMI covers an expansive ocean area and does benefit from use of marine resources, current policies and physical infrastructure would not support the viable exportation of these resources to provide meaningful economic contributions. Unlike the Philippines, where human resources outweigh natural resources, the CNMI's populous is not significant enough to provide labor export as a means for economic contribution.

Domestic Labor Pool Experience & Availability: As previously noted, the CNMI's domestic population itself presents a significant obstacle amid the current economic rebound. Its small populous has historically been a chokepoint in the CNMI's economic development, resulting in its reliance on an alien labor force. This dynamic has resulted in reduced availability of an experienced and trained domestic labor pool. While it can be argued that the CNMI government and its citizens have not taken initiative to supply the domestic labor pool, the same can be said of private sector firms who have historically opted to avail of lower-cost foreign labor as opposed to training a higher-cost domestic employee. With labor dynamics prompted by US Public Law 110-229, despite the 2029 phase-out extension, the CNMI must address a minimally available and often inexperienced domestic labor force.

Outdated & Inadequate Infrastructure: The CNMI's physical infrastructure is widely considered to be a source of weakness. With seaports, airports, power generation, and water distribution systems operating with aging facilities and equipment, government revenues have long been diverted from infrastructure upgrades and improvements to address other community needs. Critical infrastructure components have recognized issues of capacity when contending with an increased demand premised on the CNMI's economic upswing. While federal revenues are often seen as a source of relief for agencies tasked with infrastructure upkeep, greater effort is needed to overhaul and modernize critical infrastructure systems to meet current and forecasted demands through other revenue sources.

Supply Chain Infrastructure: A consequence of an aging infrastructure is the obstacle of expanding the CNMI's logistical supply line. As a remote island jurisdiction with limited natural resources, the CNMI is dependent on its logistical supply line to bring commodities to the islands. Antiquated seaport facilities serve as a stumbling block to accommodate cost effective shipping to the island of Saipan, but more importantly to the islands of Tinian and Rota. During a period of economic upswing, developers will require that materials and supplies be imported into the jurisdiction or local resources to meet these needs must be identified. The inability for shipping firms to utilize larger vessels due to the CNMI's infrastructure constraints impacts costs and completion schedules for development projects.

Land Ownership Challenges: Among the most critical issues of the CNMI's economic development are the land alienation provisions contained in the CNMI's Constitution. Commonly referred to as Article XII, this provision limits land ownership to individuals of Northern Marianas descent, which can serve as an obstacle for business development, and for commercial and consumer lending. Financial institutions within the CNMI are hesitant to provide lending due to their inability to own property, which is commonly used as a form of collateral. Institutional and individual investors can be reluctant to invest in the CNMI because of this provision and must contend with ensuring a return on investment within a specified lease period of the property on which their business operates. Discussions are ongoing regarding challenges of land ownership and possible realignment of lease terms on public and private property.

Opportunities

Development of New Industry in the CNMI: The development of the CNMI's gaming industry presents a significant opportunity for the jurisdiction. The industry's need for goods and services to aid in the construction and ongoing operations of the casino provide ample opportunities for established and new businesses alike. The need for critical infrastructure to support the industry also provides justification for the local government to begin its investment into these historically neglected facilities. As much of the current development investment is derived from foreign sources, the CNMI's union with the United States allows it to avail of various programs which are desired by many foreign investors. This includes programs such as the EB-5 Investment program, as well as the New Market Tax Credit (NMTC) program.

Department of Defense Realignment to the Marianas: Although the US Department of Defense's regional realignment has been identified as a potential threat, it also serves as an opportunity for the CNMI. The economic spending that is anticipated because of the realignment presents potential benefits for regional businesses and residents. The expansion of the military tourist segment on the island of Guam presents the opportunity for the CNMI to further strengthen its tourism diversification efforts. Opportunities, inclusive of hardening CNMI's infrastructure, are negotiation points between the Department of Defense and the local government, which can serve to benefit the community. Concessions including the build-out of a fuel farm at the identified Divert airfield can supplement efforts by the CNMI government to accommodate a larger flight schedule to support its tourism industry.

Visa-free Access to Chinese Source Markets: At the time of this 2019 update, tourism has held its place as the primary economic driver of the CNMI's economy today. As the Mariana Visitor's Authority's 2017 Tourism Development Sustainability and Feasibility Study notes, sector recovery began in 2014, with strong surges in demand from the Chinese and Korean markets in particular. As tourism serves as the CNMI's primary economic pillar, its visa-free access to the Chinese tourist markets present a significant opportunity in support of the emerging gaming industry. With the introduction of the Saipan casino project, the ability to capture a wider segment of both markets provides the CNMI with a unique opportunity to maximize revenues. This industry is expected to continue to have positive "multiplier effect" on businesses.

Local and Federal Support of Resiliency Initiatives: The 2019 CEDS update highlights how resiliency across resource management sectors is critical for sustainable development. The US Economic Development Administration acknowledges, "it is becoming increasingly apparent that regional economic prosperity is linked to an area's ability to prevent, withstand, and quickly recover from major disruptions (i.e., 'shocks') to its economic base. ... In the context of economic development, economic resilience becomes inclusive of three primary attributes: the ability to recovery quickly from a shock, the ability to withstand a shock, and the ability to avoid the shock altogether. Establishing economic resilience in a local or regional economy requires the ability to anticipate risk, evaluate how that risk can impact key economic assets, and build a responsive capacity." Despite the challenges presented by the active 2018 typhoon season, the impacts CNMI experienced have provided an infusion of resiliency planning and project implementation support at the local and federal level that can help reframe long-term development planning with an emphasis on increasing the ability of individuals and the community at large to recover from natural disasters and the economic shocks they deliver. After Super Typhoon Yutu the hashtag #Marianas Strong has rung a call of solidarity and resiliency support throughout the CNMI.

Threats

Access to a Skilled Domestic Labor Pool: The minimization and eventual elimination of the CNMI's foreign labor source by 2029 continues to present a significant threat for the CNMI's economic condition. The jurisdiction must contend with replacing thousands of workers in a market of which labor demand far exceeds its available supply. In previous periods of economic upturn, the CNMI could source labor from surrounding Asian markets at a low-cost, however provisions of US Public Law 110-229 prohibit the long-term use of this practice. The reduction of its foreign labor source coupled with increased economic activity, both in the CNMI and Guam, presents a dynamic that can escalate development costs in the CNMI. While Department of Defense projects within the region are anticipated to serve as a further pull on the CNMI's labor pool, this dynamic is mitigated through Congressional provisions to allocate H-2B slots for military-related projects in Guam and the CNMI.

Unresolved labor issues due to US Public Law 110-229: Despite the 2018 extension of the CW-1 program through 2029, a future foreign labor phase-out still provides uncertainty to current residents and for the overall workforce. Although the statutory expiration has been extended, it is unclear if the CNMI's current economic rebound will continue without additional relief. A workable and permanent solution to this threat to the CNMI's economic condition can only be achieved through Congressional action.

National Policy Shifts Restricting Source Market Access: While much of the CNMI's economic threat derives from federal provisions, the global political landscape also serves as a threat to the jurisdiction's economic outlook. Should diplomatic relations between the United States and nations that host CNMI's tourism market segments sour, the CNMI would be left to contend with replacing entire market segments without advanced warning or transition. The anticipated increase in Department of Defense assets within the region may serve to increase US restrictions, which can be detrimental to the CNMI's economy. Provisions which are well intentioned to protect US assets may also serve to the detriment to the CNMI's economic well-being by placing additional restrictions on source country travel and/or investment.

Department of Defense Realignment to the Marianas: The US Department of Defense's (DoD) regional realignment is both a threat and an opportunity. Despite anticipated economic spending, concerns regarding environmental impacts and possible negative impacts to the tourism economy from military build-up activities have been raised by community members. When the 2015 Commonwealth of the Northern Marianas Joint Training and Testing Draft Environmental Impact Statement was issued, community groups formed to protest the leasing of additional CNMI lands and the proposal of live fire testing on Tinian and the northern island of Pagan. Throughout public hearings community members frequently expressed the sentiment that CNMI is supportive of the military – in fact CNMI boasts one of the highest armed service rates per capita in the United States – however additional land restrictions and environmental impacts can be especially significant in a small island context. Additionally, military build-up activities can require the reallocation of limited local supplies and man power which can further impact the timelines and viability of other development projects. Together these challenges emphasize the importance on ongoing coordination and discussion of impact avoidance, minimization, and mitigation opportunities between the CNMI and the DoD to ensure all stakeholders are able to benefit from proposed build-up activities moving forward.

Drivers and Resource Pressures

In addition to local conditions reflected in the SWOT analysis above, global drivers also influence development and resource management trajectories. Drivers of significant socio-economic shifts in the Western Pacific include:

- Globalization and Geography
- Population and Migration
- Economic and Technological Development
- Traditional and Contemporary Values, Attitudes, Lifestyles and Governance
- Climate Change and Variability

These trends often result in resource pressures such as:

- Land Development
- Resource Extraction
- Consumption and Waste

Initial community surveys have identified economic development, environment, public health and safety, and hazard risk reduction as leading resource management issues that should be addressed to ensure a good quality of life in the CNMI. These topics will be further developed as planning efforts move forward.

The Drivers, Pressures, State, Impact and Response (DPSIR) model (Figure 5) is used in SoE reporting to identify threats and possible responses. The model is a global standard for State of Environment reporting and part of a systems approach that takes into account social, political, economic, and technological factors, as well as forces associated with the natural world.

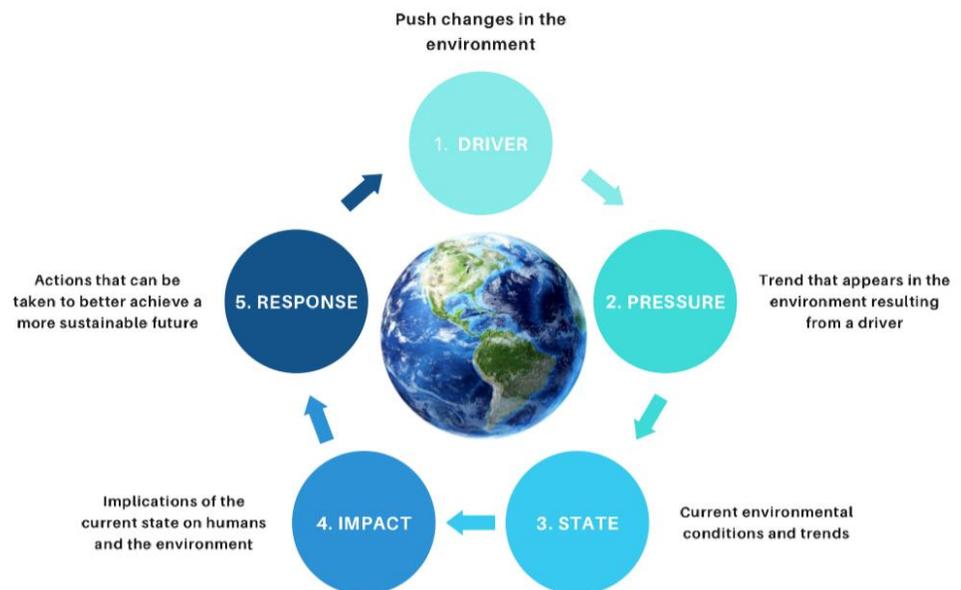


Figure 5 - SoE/SoR Report Framework (Modified DPSIR Model)

Summaries of drivers and pressures identified in this baseline assessment through the review of referenced reports and plans as well as from feedback provided by members of the PDAC and other relevant stakeholders through interviews and surveys are outlined in terms of the “planning areas” and “resource elements” that guided the assessment categories of this report in the table below (next page). The “State”, “Impact”, and “Response” are detailed further in the subsections of this report that follow in Section 3.

Planning Area Public Law 20-20 § 20176	Resource Element Resources Report Category	Driver	Pressure
(A) Land Use	Land Management	<ul style="list-style-type: none"> - Land Clearing / Development - No change in size of Marine Protected Areas but increasing use pressures (tourism, fishing, military) 	<ul style="list-style-type: none"> - Declining native limestone cover; - Degrading coral cover; biodiversity trends unclear; - Increasing access restrictions on military leased lands increasing fishing / hunting / gathering efforts - Land and water trends compounded by climate impacts to water quality, ocean and land temperatures, storm frequency, etc.
(B) Community Design	SSG	<ul style="list-style-type: none"> - Regular “variances” granted by Zoning on Saipan and permit conditions for large developments - 2009 International Building Code does not include “disaster resistant” building provisions - Updated Public Land Use Plan and Zoning maps not aligned with regulatory restrictions / constraints and existing infrastructure availability 	<ul style="list-style-type: none"> - Sprawling development which at times does not meet the pace of infrastructure upgrades or take into account environmental or other regulatory constraints upon an area (ex flood zones, ground water protection areas, <24/7 water service areas etc.) which may undermine key principles of SSG
(C) Transportation	Roads Ports/Air Travel	<ul style="list-style-type: none"> - Unpaved roads have been developed at times across private property - Limited funding to build and maintain paved roads 	<ul style="list-style-type: none"> - Jurisdiction over / ownership of roads is at times unclear, complicating resolution of hazardous road conditions which can pose dangers to people and the environment
(D) Regulations (E) Public Facilities	Appendix V Social Services DRR Energy Water / Wastewater Solid Waste	----- <ul style="list-style-type: none"> - Limited funding / support for non-emergency social services - Limited funding / support for renewable energy targets - Limited funding / support for upgrade of water systems - Limited funding / support for solid waste management - Disaster risk response (DRR) planning is not comprehensively integrated across planning sectors 	----- <ul style="list-style-type: none"> - Declining mental health trends evidenced by high rates of suicide / “self-harm” - 100% reliance on imported fossil fuels presents environmental and socio-economic concerns including high energy costs - Some areas lack access to 24/7 non-potable water, and high water loss rates result in high water distribution and maintenance costs - High costs of solid waste disposal or lack of access to landfill facility results in illegal and environmentally impactful waste disposal practices - Lack of DRR mainstreaming may allow for maladapted development in risk-prone areas
(F) Public Lands	Land Management	See “Land Use / Land Management”	See “Land Use / Land Management”
(G) Public Buildings	Housing and Development	<ul style="list-style-type: none"> - 2009 International Building Code does not include “disaster resistant” building provisions 	<ul style="list-style-type: none"> - Public facilities that are built to code may still not meet engineering requirements to ensure a disaster ready community, which may result in negative environmental and socio-economic impacts during future disaster events

Planning Area Public Law 20-20 § 20176	Resource Element Resources Report Category	Driver	Pressure
(H) Redevelopment	Housing and Development	<ul style="list-style-type: none"> - FEMA and HUD supported redevelopment post-disasters is required to meet 2018 IBC standards, however, these requirements are not in place for privately-funded redevelopment - Limited funding for Blighted Buildings reclamation efforts from Office of Zoning despite Legislative Mandate - Limited funding / support to identify and leverage redevelopment opportunities at potentially contaminated or abandoned properties - Redevelopment costs can be high and few mechanisms incentivize site reuse - No “Opportunity Zone Strategy” has been adopted for Saipan and Tinian, restricting access to funding for development studies and related planning support mechanisms 	<ul style="list-style-type: none"> - Privately funded disaster recovery projects may not meet IBC 2018 requirements which may result in negative environmental and socio-economic impacts during future disaster events - Blighted buildings continue to pose environmental and human health hazards which may further deter investment and redevelopment - High costs of redevelopment mean many developers would rather clear vegetated properties than rehabilitate or demolish existing structures, contributing to development driven land management pressures
(I) Conservation	Land Management, Water Resources Management, Weather and Climate, Hazard Mitigation Cultural Resources	<ul style="list-style-type: none"> - Island specific “water budgets” not available to support projections of “sustainable” extraction rates for environmental and human services - Ongoing development pressure complicates cultural resource management policy; Cultural resources management plan update pending with HPO - Hazard mitigation maps have not been updated since 2009 SSMP - See also “Land Management” 	<ul style="list-style-type: none"> - Salt water intrusion has been measured in wells on Saipan, but lack of “water budget” means it is unclear how much pumping can be done sustainably and how much water existing systems can supply without compromising freshwater lens on Saipan and Tinian or surface water supplies on Rota; the decline of these water resources may have negative environmental as well as socio-economic impacts - Currently limited data available regarding existing cultural resources and limited uniform guidance regarding mitigation of impacts to cultural resources - Use of old hazard mitigation data may enable development of projects and private investment in risk prone areas that could increase environmental and socio-economic vulnerabilities and frustrate long-term risk reduction planning efforts - See also “Land Management”

Planning Area Public Law 20-20 § 20176	Resource Element Resources Report Category	Driver	Pressure
(J) Safety	Law Enforcement Built Env't (All) Hazard Mitigation Social Services	- Limited funding / support for expansion of law enforcement positions or training - Limited funding / support for expansion of health and social services positions or training - Limited integration of hazard mitigation considerations in development planning	- High turn-over rates in law enforcement and social / health services results in capacity gaps and large work loads - Limited use of hazard mitigation data and limited updates to data may enable development of projects and private investment in risk prone areas that could increase environmental and socio-economic vulnerabilities and frustrate long-term risk reduction planning efforts
(K) Tourism	Socio-Economic Trends	- Increasing tourism numbers with limited investment in critical infrastructure and amenities or carrying capacity-based limitations to ensure high quality tourist experiences	- Some popular tourist sites have seen declining water quality, increasing solid waste management issues, and declining user experiences which may negatively impact the environment as well as the socio-economic viability of the industry
(L) Development Policy	SSG Built Env't (All)	- Regular "variances" granted by Zoning on Saipan and permit conditions for large developments - 2009 International Building Code does not include "disaster resistant" building provisions - Updated Public Land Use Plan and Zoning maps not aligned with regulatory restrictions / constraints and existing infrastructure availability	- Sprawling development which at times does not meet the pace of infrastructure upgrades or take into account environmental or other regulatory constraints upon an area (ex flood zones, ground water protection areas, <24/7 water service areas etc.) which may undermine key principles of SSG
(M) Capital Improvements	DRR	- Opportunistic application of Capital Improvement Program (CIP) funds	- Lack of long-term plan or application of SSG criteria in project selection may result in CIP-funded projects that do not fully support DRR / SSG objectives
(N) Labor Work Force	Economic Trends	- CNMI economy is heavily reliant on the tourism sector	- Disruptions such as Super Typhoon Yutu can have significant economic impacts that undermine sustainability objectives
(O) Policy Statements (P) Other Elements:	<In development>		
i. Education	Education	- Limited funding / support for expansion of education services	- Special education needs not comprehensively addressed; overall scholastic performance below national averages
ii. Healthcare	Public Health	- Limited funding / support for expansion of education services	- Medical referral program is costly and difficult to sustain economically while meeting medical needs of residents
iii. Comprehensive Resiliency	SSG		

Section 3: Resources Snapshots and SDG Tracking

Resources in this section are organized by primary Taskforce Category as identified in the summary chart on pages 12-13 of this report. “Snapshots” or introductory discussion based on best available data, plans, and reports, are provided and followed by discussion regarding the implications of this information and initial recommendations identified by taskforce review members. Reports, plans, and relevant documents that are relied on for data are listed in the references of each section and are hosted online in the resources library at www.opd.gov.mp/.

Tracking Progress with Sustainable Development Goals

The status of resource categories above connects closely to the aim to plan for socio-economic and ecological resilience in the CNMI. The concept of “sustainable development” is being pursued world-wide using well established goals, indicators, and metrics established by the United Nations. Data needed to monitor progress towards these Agenda 2030 sustainable development goals has been overlaid within this report based on assessment of information of data that CNMI is already collecting. As the chart below depicts, there is at least some data available for each of the 17 development goals; indicators with data trends available are highlighted in green, while indicators where trend data needs to be tracked further are highlighted in yellow. Using this data and the narratives outlined further in discussion within Section 3, OPD will continue to update this report every three years to support iterative comprehensive sustainable development planning. Indicators that were not relevant to CNMI or where no data was available were omitted from this chart, but may be added in follow-up updates should information become available in the future. Indicators in white indicate data gaps where agencies or other partners have indicated interest in modifying data collection to address data gaps moving forward. A chart of SDG indicators and relevant data already being tracked to support trends analysis are included in Appendix B, with key areas of alignment highlighted in the “Overview” of each assessment section. Aspects of these and supporting sustainable development objectives are incorporated into the principles of “Smart, Safe Growth” Guidance for CNMI. Excerpts of that CNMI, recovery-focused report are included in Appendix C.

SUSTAINABLE DEVELOPMENT GOALS



Natural Resources – Overview

Article XIV of the Commonwealth Constitution addresses Natural Resources specifically as follows:

- Section 1: Marine Resources. The marine resources in waters off the coast of the Commonwealth over which the Commonwealth now or hereafter may have any jurisdiction under United States law shall be managed, controlled, protected and preserved by the legislature for the benefit of the people.
- Section 2: Uninhabited Islands. The island of Managaha shall be maintained as an uninhabited place and used only for cultural and recreational purposes. The islands of Maug, Uracas, Asuncion, Guguan and other islands specified by law shall be maintained as uninhabited places and used only for the preservation and protection of natural resources, including but not limited to bird, wildlife and plant species.
- Section 3: Places and Things of Cultural and Historical Significance. Places of importance to the culture, traditions and history of the people of the Northern Mariana Islands shall be protected and preserved and public access to these places shall be maintained as provided by law. Artifacts and other things of cultural or historical significance shall be protected, preserved and maintained in the Commonwealth as provided by law.

Additional, Article I, Section 9 of the Constitution establishes the personal right to a “clean and healthful environment”, which ensures that:

Each person has the right to a clean and healthful public environment in all areas, including the land, air, and water. Harmful and unnecessary noise pollution, and the storage of nuclear or radioactive material and the dumping or storage of any type of nuclear waste within the surface or submerged lands and waters of the Northern Mariana Islands, are prohibited except as provided by law.

Together, these provisions can be read to establish a strong foundation to ensure sustainable stewardship for shared public goods and services our natural resources provide. As detailed further in this section, these Constitutional mandates are supported primarily through the administration of management programs under the Department of Lands and Natural Resources (DLNR), the Bureau of Environmental and Coastal Quality (BECQ), the Department of Public Lands (DPL) and to some extent the Office of Zoning, and their Divisions, as well as the Offices of the Mayors, who have been working together as the “PDAC Natural Resources Taskforce” (NR Taskforce).

The NR Taskforce has provided the bulk of the reports, publications, and recommendations of this section on the state of CNMI’s Natural Resources, which focuses on four main areas: Climate and Weather, Land Management, Water Resources Management, and Biodiversity / Invasive Species. This overview provides additional context and highlights key SDG targets and recommendations regarding the management goals and needs for sustainable use of natural resources in the CNMI.

CNMI in Context - Location

The islands of the Mariana Archipelago range in size from <1 km² (Noos/Farallon de Medinilla) to 544 km² (Guam). The largest island in the CNMI is Saipan, with a total land area of 119 km². In contrast, the land area for the ten islands north of Saipan combined (Noos to Uracas) is only about

160 km². Size, geology, and distance influence population densities and growth trends. As indicated in the insert below, CNMI is conveniently located within a 3-5 hour plane ride from Japan, Korea, and the Philippines (see Figure 6 below).



Saipan is 120 miles or almost 200 km north of Guam, 1,523 miles or 2,451 km southeast of Japan, 1,613 miles or 2,596 km east of the Philippines, 3,858 miles or 6,209 km west of Hawai'i, and 5,532 miles or 8,903 km southwest of Seattle.

Figure 6 – The Marianas in a global context.

Climate and Weather

In line with worldwide observations, warming land and sea temperatures, erratic precipitation patterns, and increasing storm frequency and intensity are influencing weather and climate patterns in the CNMI. Effects from more extreme weather can include increased coastal erosion and decreasing water quality, which can impact people and the environment. Predicted rising sea levels, altered precipitation patterns, higher temperatures and acidification of the ocean will increase these risks in the coming decades. These changes can jeopardize the livelihoods of the people, especially those engaged in tourism, agriculture, forestry, and fishing that are dependent on natural resources. Some regions are already experiencing economic and ecological impacts from changing climate conditions. While climate change is a global challenge, local actions can help communities “adapt” to reduce greenhouse gas contributions as well as “mitigate” to reduce risk, a topic discussed further in the “disaster risk reduction” element under the “socio-economic / DRR category.

Land Management

As detailed in Table 1 on page 38 of this report, approximately 89.5% of the 2010 population of the CNMI lives on Saipan, 5.8% lives on Tinian, and 4.7% lives on Rota, with a small number of inhabitants on Alamagan, Pagan, and Agrigan. Numerous legal mechanisms are in place to ensure management and protection of natural areas and guide development in CNMI, including protected conservation areas on land and in the water that are aimed at preserving habitat and supporting fishing, hunting, and other uses. According to the Division of Fish and Wildlife’s 2015-2025 State Wildlife Action Plan, “native forest” which provides habitat for numerous listed species is primarily found on Rota and in the southwest region of Tinian, and has declined between 2014 and 2018 on Saipan with only 12% of native limestone forest

cover recorded in the 2017 United States Fish and Wildlife Services' (USFWS) Vegetative Mapping of the Marianas. Managing invasive species and replanting native trees are identified as important management objectives to support native species conservation and recovery.

The Department of Lands and Natural Resources' (DLNR) Division of Parks and Recreation (DP&R) published their first strategic plan for Saipan in 2019. DP&R supports management of 49 sites on Saipan, Tinian, and Rota, with the vision to achieve a "parks and recreation system [that] is the pride of the Commonwealth" where the public is "given full access to enjoy nature at its best, availing opportunity to visit historical sites, structures and beaches that are significant to the Commonwealth of the Northern Mariana Islands." Goals to achieve this vision include providing excellent programs, services, places, and spaces; enhancing and conserving natural and historic areas; building community and promoting wellness and equal access for all; managing assets efficiently and effectively; and cultivating an effective and dynamic workforce. To further support these planning goals, DLNR has been engaged in the Statewide Comprehensive Outdoor Recreation Plan (SCORP) update which is slated for release in 2020. Additionally, the Division of Fish and Wildlife (DFW) manages conservation areas on land and in the water. On Saipan, DFW manages five protected areas; the Bird Island Wildlife Conservation Area and Kagman Wildlife Conservation Area, where the "take" of any plants or animal species is prohibited, as well as the Susupe Wetland, the Costco Park Wetland Mitigation Pond, and the Saipan Upland Mitigation Bank. On Rota there are three protected areas: Sabanna Heights, Wedding Cake, and l'Chenchon Park Bird Sanctuary, all of which are "no take" areas where collection of plants or animal species is prohibited.

The Department of Public Lands (DPL) manages public land resources of the CNMI. In 2019 DPL updated their agency mission and vision as well as their Public Land Use Plan – the first update since 1989. Today, DPL's mission is "to incorporate our strategic land use plan into effective management, use, disposition and development of public lands to promote cultural and economic growth for the benefit of our present and future generations of the Commonwealth." This mission is guiding implementation of the updated public land use plan.

The Office of Zoning and Zoning Board strive to administer the Saipan Zoning Law in a way that is transparent and user-friendly, and is integrated with other CNMI regulatory, land management, and development agencies. As of 2019, the Zoning Office continues to work on updates to zoning regulations. These updates include the text and map amendments to the Saipan Zoning Law of 2013, the Nuisance Abatement and Blighted Property Maintenance Act of 2018, and ATV/UTV/Motorcycle regulations. The proposed changes within the text amendments include increasing height restrictions and reducing landscaping and setback requirements across zoning districts. Together, these regulatory updates and ongoing planning, permitting, and enforcement programs aim to improve Saipan's economy and quality of life, as well as to conserve natural and historic resources.

The Division of Coastal Resources Management's guiding policies include encouraging land use master planning, floodplain management, and the development of zoning and building code legislation with a focus on reducing risks of coastal hazards to people and the environment. The 2016-2020 Section 309 Assessment and Strategy Report identified "wetlands", "coastal hazards", and "cumulative and secondary impacts" as high priority

enhancement areas. Highlights of current strategies to support management goals include:

- To address wetland stressors, DCRM has prioritized efforts to (1) adopt best management practices to protect and enhance wetlands, (2) establish conservation, protection, and restoration and enhancement tools, and (3) protect high-value wetlands through comprehensive watershed-based planning and management prioritization.
- To reduce risks of coastal hazards, identified management priorities include (1) adopt regulations and policies to reduce exposure to risk in coastal hazard areas, including shoreline setback requirements and buffer enhancement incentives in high-risk areas; (2) adopt policies and laws to incorporate coastal hazard considerations in the permitting process and enhance public support and awareness of these risks and potential solutions; and (3) develop policy support and incentives to facilitate protection of natural hazard mitigation features. A key strategy for the 2016-2020 planning cycle is to create a DCRM-specific coastal hazards guidance plan that will help DCRM better address and mitigate coastal hazards.
- To manage stressors associated with cumulative and secondary impacts, DCRM is supporting ongoing watershed management planning that incorporates best management practices (BMPs), especially in the increasingly developed Garapan Watershed, and protection of groundwater resources through improved wastewater management in unsewered areas. Implementation of BMPs in livestock management and reducing use of fire in hunting practices will further reduce nutrient loading and water quality exceedances in rural areas. A key strategy for the 2016-2020 planning cycle is to promote better building and development practices through DCRM Permit Incentives that (i) reduce the impacts of stormwater runoff and non-point source pollution on the CNMI's shoreline and coastal waters, and (ii) build and enhance the resiliency of the CNMI's environment and communities in the face of a changing climate.

Water Resources Management

Water resources include inland, coastal, and marine resources in the CNMI. Inland water resources are primarily wetland areas which include ephemeral and perennial rivers and stream, also discussed in the “land management” section. Although wetlands cover only 2% of the land area, they provide numerous ecosystem benefits including recharging aquifers, providing fish and wildlife habitat, and acting as buffers to storm surge during high wind and flooding events. CNMI has a “no net loss” wetlands policy to protect these rare and important ecosystems and the services they provide. Although wetlands are protected, the water quality of these systems is considered “impaired” in approximately 568.4 acres or 79% of the 717.8 acres of CNMI wetlands assessed due drainage or filling, flow alterations, and introduction of non-native organisms.

BECQ also monitors water quality of coastal waters, which includes shorelines and nearshore areas. Water quality is closely connected with overall ecosystem health and resiliency of aquatic systems. The 2018 Water Quality report found 42% of shorelines to be impaired for at least one designated use. Causes of impairment include presence of non-native species, high pH, low dissolved oxygen levels, and *E. coli* presence exceeding water quality limits. DLNR-DFW's 2015 – 2025 State Wildlife Action Plan (SWAP) emphasizes the importance of coastal systems in supporting wildlife functions and human resource uses.

With over a million nautical miles of “exclusive economic zone”, the CNMI is a big ocean state. The CNMI archipelago also boasts relatively high coral reef species diversity, with a total of over 5,600 known reef-associated species. Coral reefs in the northern islands are considerably less developed and host a lower number of species than those found in the older, larger, volcanically inactive southern islands. Despite less reef development and species richness, the marine communities are subjected to less human stress, notably fishing pressure and pollution. The southern islands and associated offshore banks lie atop much older, extinct volcanoes and are covered by carbonate formations, and the seafloor around the southern islands is typically more gently sloping than the northern islands, and with step-like limestone topography. These conditions yield a larger range of habitat types and a greater diversity of marine species, but with greater exposure to human stressors.

A 2019 updated ecoevaluation study of coral reefs and sea grass that considers benefits from tourism, habitat and fisheries, coastal protection, and other ecosystem benefits reports that together corals and seagrass provide an annual value of \$114.8 million. Throughout the Marianas chain, increasing ocean temperatures and acidification have caused increasing coral stress and large-scale bleaching events in the last decade; from 2013 to 2017 the CNMI had four major thermal stress and mass bleaching events, resulting in large-scale coral mortality and changes in community composition. Surveys in 2018 revealed a 66 percent reduction in overall coral cover since 2012, with over 90 percent staghorn *Acropora* spp. corals lost. Rising ocean temperatures and bleaching events combined with ocean acidification and local stressors, have been impacting the resilience of these systems. As reported by Maynard et al., some species and systems may be more likely to be resilient or “bounce back” from change than others. To support healthy coral reef ecosystems and the biodiversity they support, restoration strategies aim to build resiliency to bleaching and increasing acidification and to support watershed management planning to reduce stressors from land-based sources of pollution that influence water quality, especially in more developed areas of Saipan, Tinian, and Rota.

Wildlife and Biodiversity

As noted above, the introduction of non-native and potentially invasive species is a leading cause of impairment for water quality in CNMI. These non-native species can also compromise management efforts aimed at protecting native and endemic species and their critical habitats.

The 2015-2025 SWAP details threats to biodiversity and habitat in CNMI, including current invasive species, which include habitat modifiers, introduced ungulates, non-native predators, and invasive or nuisance marine species, as well as discusses threats of additional impacts due to development, climate change, military expansion, pollution, harvest, tourism and recreation, natural disasters, and sea transportation.

The SWAP outlines goals and strategies to reduce these pressures with a focus on:

- (i) preventing introduction of new invasive species and managing known invasive species;
- (ii) increasing resources for regulatory enforcement on all islands as well as public awareness of conservation regulations;

- (iii) increasing public support for conservation of species and habitats and conservation mechanisms such as Marine Protected Areas;
- (iv) supporting coral restoration and reduction of pollution from land-based sources of pollution; and
- (v) building staff capacity to support these objectives.

As reflected in the “Sustainable Development Goal Alignment and Relevant Indicators” section that follows demonstrates, these themes of adaptive planning, community engagement, and capacity building appear regularly across natural resource agency planning documents, highlighting opportunities for further collaboration to achieve beneficial outcomes for multiple management objectives.

SDG Alignment and Relevant Indicators

Adoption and application of sustainable development goals is an aspirational and adaptive process. The goals listed below reflect preliminary areas of data alignment. The colors in the “indicator status” column identify whether data is sufficient and CNMI is currently making progress towards a stated objective (green), if data or the objective itself are present but unclear or not adopted (yellow), or if data requests or objective setting remains pending at this time (red). These data points will regularly be updated and reassessed as comprehensive planning efforts continue.

Resource Category	SDG Target	Indicator / Status
Climate	13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries Goal: By 2030 "strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries".	13.1.1 Number of countries with national and local disaster risk reduction strategies – 1 - SSMP
Climate	13.2 Integrate climate change measures into national policies, strategies and planning Goal: By 2030 "integrate climate change measures into national policies, strategies and planning".	13.2.1 Establishment or operationalization of an integrated policy / strategy / plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other) 1 - Renewable energy standard adopted, currently no other emissions reductions policies / strategies / plans; no plans currently in place that implement strategies in line with Sendai framework
Climate	13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning Goal: By 2030 "improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning".	13.3.1 Integration of mitigation, adaptation, impact reduction and early warning into primary, secondary and tertiary curricula – <i>pending</i> PSS curricula developed by DCRM; implementation pending as of 2019

Resource Category	SDG Target	Indicator / Status
Land / Health / Food Security	<p>2.4: Sustainable food production and resilient agricultural practices</p> <p>Goal: By 2030 "ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality".</p>	<p>2.4.1 Proportion of agricultural area under productive and sustainable agriculture</p> <p><i>Listed as pending as CNMI target not yet established, but numerous agroforestry initiatives underway; DPW homesteading data available</i></p>
Land	<p>11.4: Protect cultural and natural heritage</p> <p>Goal: "Strengthen efforts to protect and safeguard the world's cultural and natural heritage" by 2030.</p>	<p>11.4.1 – Total expenditure (public and private) per capita spent on the preservation, protection and conservation of all cultural and natural heritage, by type of heritage, level of government, type of expenditure and type of private funding - totals pending review of CCR</p> <p><i>Listed as pending as CNMI target not yet established</i></p>
Land	<p>11.7: Provide access to safe and inclusive green and public spaces</p> <p>Goal: "Provide universal access to safe, inclusive and accessible, green and public spaces" by 2030.</p>	<p>11.7.1 – Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities</p> <p>Updated totals pending updated geospatial layers and 2020 Census results; currently ____</p> <p><i>Data validation pending and CNMI target not yet established</i></p>
Land	<p>15.1: Conserve and restore terrestrial and freshwater ecosystems</p> <p>Goal: "By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services."</p>	<p>15.1.1 – Forest area as a proportion of total land area – Saipan: 35%; Tinian: 24%; Rota: 62%</p> <p>Currently 11.76% (55.6 km² of 472.71km²) of terrestrial lands in "conserved" status;</p> <p><i>Listed as pending as CNMI target not yet established.</i></p>
Land / Water	<p>15.2: End deforestation and restore degraded forests</p> <p>Goal: "By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services."</p>	<p>15.2 – Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type – currently 100% of wetlands protected by "no net loss" policy and supporting regulations;</p> <p><i>Listed as pending as CNMI target not yet established</i></p>
Water	<p>14.5: Conserve coastal and marine areas</p> <p>Goal: "By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information."</p>	<p>14.5.1 – Coverage of protected areas in relation to marine areas – current area of "no-take" reserves is estimated at 9.63 km² while the total area of all MPAs is estimated at 12.32 km². The Marianas Trench Marine National Monument is approximately 246,608 km².</p>

Resource Category	SDG Target	Indicator / Status
		<i>Listed as pending as CNMI target not yet established</i>
Water / Species	Target 6.3: Improve water quality, wastewater treatment and safe reuse Goal: By 2030 "improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials".	6.3.2 – Proportion of bodies of water with good ambient water quality - Wetlands – 21% unimpaired; - Shorelines / Nearshore – 58% unimpaired <i>Listed as pending as CNMI target not yet established</i>

Key Natural Resources Management Planning Recommendations

Recommendations, goals, and management themes highlighted in this section are summarized below and include:

- Protect and enhance natural resources
- Support sustainable land management and improvement of open space
- Streamline land management / development for sustainability objectives
- Achieve community resilience and well-being
- Continue data collection and assessment to support adaptive management planning
- Ensure equitable access to open space and public recreational facilities by defining and mapping these areas for active management under the State Comprehensive Outdoor Recreation Plan process and through future planning revisions
- Enhance and conserve natural and historical resources
- Build capacity to restore and enhance coral reefs, especially in response to bleaching events
- Reduce runoff from land-based sources of pollution to protect marine ecosystems
- Fill data gaps to update ecosystem services assessments and support sustainability planning, including creation of detailed “water budgets”
- Prevent introduction of new invasive species to the CNMI
- Increase resources for enforcement on all islands; increase public awareness of conservation regulations
- Increase public support for conservation of species of greatest concern and habitats
- Increase the effectiveness of existing Marine Protected Areas
- Increase the educational level of professional and administrative staff working in conservation agencies; reduce turnover of professional staff
- Enhance the capability of CNMI conservation agencies and organizations to coordinate on proactive conservation efforts
- Plan for wide variations in population and economic growth presents land management challenges that may be most effectively addressed through flexible goal setting and iterative reassessment of development trends and trajectories in the CNMI.

Snapshot: Climate and Weather

Weather is what conditions of the atmosphere are over a short period of time, and climate is how the atmosphere "behaves" over relatively long periods of time. When we talk about climate change, we talk about changes in long-term averages of daily weather. As the 2018 Standard State Mitigation Plan (SSMP) describes, the climate of the CNMI can be characterized as possessing relatively high and uniform temperatures with an annual mean temperature of 83 degrees Fahrenheit (F). Average temperatures on Saipan range from 75 to 87 degrees F with the lowest and highest temperatures in the dry and wet seasons, respectively. The humidity is normally high with monthly averages between 79% and 86%, with the most intense humidity factor between the months of July and November. The mean annual rainfall is approximately 83.8 inches with intermittent variance throughout the year. The seasonal patterns are designated as dry and wet season, with greater rainfall experienced during the period of July and November. Heavy and prolonged rainfall usually is associated with tropical depressions and typhoons that pass over or near the islands.

Effects from more extreme weather can include increased coastal erosion and decreasing water quality, which can impact people and the environment. Predicted rising sea levels, altered precipitation patterns, higher temperatures and acidification of the ocean will increase these risks in the coming decades. These changes can jeopardize the livelihoods of the people, especially those engaged in tourism, agriculture, forestry, and fishing that are dependent on natural resources. Some regions are already experiencing economic and ecological impacts from changing climate conditions.

The most recent climate models and projections from the Intergovernmental Panel on Climate Change (IPCC) and the National Climate Assessment (NCA) suggest a wide range of changes to the global climate system over the next century and beyond. The potential impacts of these changes vary greatly across space and time and are by no means geographically uniform. However, there is a high level of confidence that the Western North Pacific will experience rising sea levels, increasing air and sea surface temperatures, and shifting precipitation patterns that will be different from the atmospheric and oceanic conditions that Micronesian Islands have built their economies, infrastructure, and natural heritage upon.

Status, Impacts, and Responses

The 2019 PIRCA Climate Science Summary for the CNMI is included in Appendix D. That report reviewed and summarized regional impacts in terms of observed and projected change. It highlighted the observations and projections in CNMI listed in the chart on the following page. Observed and projected changes include increases in hotter days, decreases in cold nights, changes in storm frequency and intensity, rising sea levels, hotter oceans, and increasing ocean acidity. These changes can have significant negative impacts upon natural systems as well as the built environment. Impacts to the economy, cultural, and societies are speculative and not well studied in the Marianas, however, some reports from other jurisdictions indicate that these conditions are already displacing people, leading to food and water scarcity, and increasing costs of living in the region. These and other impacts are likely to increase as climate impacts become more apparent.

The following discussions detail policy and planning responses to address climate impacts and reduce vulnerability of people, the environment, and our built environment and economic systems further.

Internationally these approaches are often framed in terms of “mitigation” actions which aim to reduce the sources or enhance the sinks of greenhouse gases, and “adaptation” which aims to adjust natural or human systems to a new or changing environment. Together these approaches can help reduce risks of impacts of continuing extreme climate change.

Climate Mitigation Planning

Through the greenhouse effect, the increase in the concentration of GHGs in the atmosphere has been shown to influence climate change, which results in more intense storms and droughts, and higher sea level and temperatures. Reducing contributions to GHG concentrations can help reduce global warming trends causing extreme climate change and erratic weather events. The CNMI has already taken decisive steps to be part of the global climate solution, however, progress towards meeting GHG reduction goals remains slow. The CNMI’s Renewable Portfolio Standard (RPS), adopted in 2006 via Public Law 15-23 set targets for increasing percentages of net electricity sales to be sourced from renewable energy, aiming for 20% of net electricity sales by the end of 2020, increasing to 50% by 2030. However, in 2014, the law was amended under Public Law 18-165 in part due to the fact that the prior goals had not been met, to specify the goal of 20% net energy production from electric utilities by 2016 and amending CUC’s regulations to instruct CUC to install net energy metering service for all eligible residential customer-generators. As of 2010, the Energy Transformation Initiative reported that several small renewable projects have been installed on government and school buildings, including solar photovoltaics (PV) with 74.5-kilowatt (kW) capacity and small wind turbines with 144-kW capacity. Despite these instalments, overall 0% percent of the CNMI’s energy comes from renewable sources. Therefore, it is necessary to prioritize the development of the renewable energy sector to meet the 2020 and 2030 renewable energy standard goals. According to the U.S. Energy Information Administration, the CNMI meets nearly 100% of its energy needs with imported petroleum products, including 22 million to 24 million gallons of diesel fuel annually for both electricity generation and transportation.

The CNMI has completed vulnerability assessments for Saipan, Tinian, and Rota. Climate adaptation is recognized as a need in the Saipan (2014) as well as Rota and Tinian (2015) vulnerability assessments. Despite 2015 and 2017 Executive Orders directing CNMI agencies to support climate adaptation and resilience planning, climate impact responsive planning deployment has been

CLIMATE CHANGE INDICATORS

	Current Change	Future Change
1. HOTTER DAYS	↑	↑
2. COLD NIGHTS	↓	↓
3. AVG. AIR TEMP.	↑	↑
4. AVG. RAINFALL	↔	↓
5. EXTREME RAINFALL DAYS	↔	↑
6. DROUGHT FREQUENCY	↔	↑
7. STORM FREQUENCY	↔	↓
8. STORM INTENSITY	↔	↑
9. SEA LEVEL	↑	↑
10. TIDAL FLOOD FREQUENCY	↑	↑
11. SEA SURFACE TEMP.	↑	↑
12. DEGREE HEATING WEEK (HEAT STRESS)	↑	↑
13. OCEAN ACIDIFICATION	↑	↑

Figure 7 – Summary of Observed and Projected Climate Impacts, modified PIRCA Climate Science Summary, 2019 Update (publication pending)

limited. The 2018 “Smart, Safe Growth Report” reviewed climate adaptive regulations for eight critical resource management agencies and identified key gaps summarized here in Appendix C.

Adaptation and Risk Reduction Planning

The islands within the Commonwealth are subject to numerous regularly recurring hazards, including typhoons, earthquakes, tsunamis, flash flooding, and drought. However, with data collection equipment limited to the airports and Saipan Harbor, little localized data is collected or available to reflect trends at a village or watershed level. The CNMI Homeland Security and Emergency Management Office’s hazards matrix, provided in the 2018-2019 SSMP, highlights numerous data gaps that would need to be filled to assess climate and hazard related vulnerabilities by jurisdiction or at the state facility level, suggesting a need for additional data collection to inform assessment of physical climate and climate trends. Localized data limitations aside, global observations present strong evidence of changing surface and sea temperatures as well as associated weather and climate patterns.

Emissions of greenhouse gases (GHGs) have increased worldwide since the Industrial Revolution, with exponential growth being observed over the past 20 years. Most GHG emissions are from the energy sector, with domestic aviation, solid and liquid waste management, agriculture and industrial coolants and solvents also significant sources of GHGs. According to the U.S. Energy Information Administration, the CNMI meets nearly 100% of its energy needs with imported petroleum products, including 22 million to 24 million gallons of diesel fuel annually for both electricity generation and transportation as of October 2018. Little localized data is available to provide CNMI-specific analysis of trends. Therefore, this indicator status reflects analysis of diesel consumption for Saipan, Tinian, and Rota as measured by the Commonwealth Utilities Corporation. Although little localized data is available to provide CNMI-specific analysis of trends, we know that GHGs have increased worldwide over the past 150 years, with exponential growth measured over the past 20 years. Most GHG emissions are from the energy sector, with domestic aviation, solid and liquid waste management, agriculture and industrial coolants and solvents also significant sources of GHGs. In the CNMI, impacts of key climate indicators are already being observed. As the Pacific Regional Integrated Sciences & Assessments (RISA) Program summarized in their July 2019 presentation at the BECQ-DCRM facilitated Climate Adaptation Planning Workshop, key issues for CNMI include: dramatic increases in hot days and decreases in cold nights; fewer but stronger typhoons and storms; coral reef bleaching and loss; and sea level rise. These changes can have significant impacts for people, the environment, and society as a whole. For example, increasing temperatures can present health risks especially to vulnerable populations such as the elderly and people with asthma, increasing energy demand to cool buildings and associated cooling costs. Despite ongoing support from the Office of the Governor expressed in the 2017 Resilience Work Group directive instructing agencies to participate in the CNMI Resilience Work Group, progress towards meaningful outcomes in terms of adaptation and mitigation planning has been slow.

Internationally, “climate action” is addressed in Sustainable Development Goal 13. At the national level, the United States has adopted and implemented disaster risk management strategies in line with the Sendai Framework for Disaster Risk Reduction (Indicator 13.1.2), and, as discussed further in the disaster risk reduction subsection, the CNMI has also adopted and is implementing local disaster risk reduction strategies in line with national disaster risk reduction strategies (Indicator 13.1.3), however, beyond renewable energy standard goals, CNMI has not established or operationalized an integrated policy, strategy, or plan which increases their ability to adapt to the adverse impacts of climate change and foster climate resilience and lower greenhouse gas emissions development (Indicator 13.2.1). In terms of Target 13.3 to “improve education, awareness-raising, and human and institutional capacity on climate change mitigation, adaptation,

impact reduction, and early warning” by 2030 (Indicator 13.3.1), the Division of Coastal Resources Management has developed climate-specific curriculum for fourth and ninth graders in partnership with the Public School System, however this curriculum has not been fully implemented as of the writing of this report. Primary efforts to build institutional, systemic, and individual capacity to implement adaptation, mitigation, and technology transfer, and development actions” focus on disaster risk reduction (Indicator 13.3.2). Because these indicators do not have numeric targets, CNMI’s current progress is summarized below in terms of presence or absence of these mechanisms at the state level in the chart included in the “Natural Resources” overview that summarizes impacts, responses, and recommendations for this resource assessment section.

Experienced and potential impacts of natural hazard scenarios are detailed in the Threat and Hazard Identification and Risk Assessment for the CNMI. The 2015 and 2018 typhoon seasons produced Super Typhoons that caused significant impacts to the islands of the Commonwealth. Flooding, drought, and wildfires as well as earthquakes and volcanic eruptions have also been periodically reported. and risk profile maps are included in the SSMP. However, with the exception of high hazard coastal flood zones identified by FEMA, which trigger additional permitting requirements with the Departments of Public Works and Coastal Resources Management, have been incorporated into large-scale development planning and risk mitigation discussions.

Recommendations

Recommendations to support climate adaptation planning include:

- Consider incorporating climate impacts and adaptation planning across sector and resource specific resource plans and plan updates;
- Apply Smart, Safe Growth criteria for plan and project prioritization review purposes;
- Develop and implement actions to communicate and strengthen institutional, systemic, and individual capacity building to further mainstream climate considerations across resource management planning and project development dialogs;
- CNMI should continue to prioritize climate adaptation projects, and should further integrate climate proofing into future infrastructure development and policy requirements such as EIAs / EISs for major siting developments. There is good progress with vulnerability assessments across the region. Many climate adaptation options are likely to vary from island to island. Where possible, Ecosystem-based Adaptation (EbA) approaches should be prioritized to ensure long term adaptive, financial and environmental sustainability of adaptation projects;
- Climate models should be updated at regional resolution and “climate impact scenarios” should be identified and adopted to incorporated planning horizons for new development (ex. 50 year planning horizon for all new buildings, 30 years for critical infrastructure, etc.) to support and inform siting and long-term planning.

References

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Snapshot – Land Management

The geology and population trends throughout the CNMI present management opportunities for numerous use outcomes. This section provides additional background of land use and conservation status for wildlife, public land, and Zoning as reflected in resource-specific management plans from the Department of Lands and Natural Resources' Division of Fish and Wildlife in the 2015 – 2025 State Wildlife Action Plan, the 2019 Department of Public Lands' Public Land Use Plan Update, and Zoning requirements reflected in the 2013 Zoning Regulations and Map (2018-2019 update pending) for the island of Saipan as well as the Bureau of Environmental and Coastal Quality's Division of Coastal Resources Management's Areas of Particular Concern on Tinian, Rota, and the Northern Islands. This State of the Resources section assesses current use trends within the context of these plans.

The islands of the Mariana Archipelago range in size from <1 km² (Noos/Farallon de Medinilla) to 544 km² (Guam). The largest island in the CNMI is Saipan, with a total land area of 119 km². In contrast, the land area for the ten islands north of Saipan combined (Noos to Uracas) is only about 160 km². Size, geology, and distance influence population densities and growth trends.

Island	Land Area (km ²)	% of Total Area	Maximum Elevation (m)	2010 Population	% of Total Population
Rota	85.13	18.0	496	2,527	4.69
Aguiguan	7.01	1.5	57	Uninhabited	
Tinian	101.22	21.4	187	3,136	5.82
Saipan	118.98	25.2	474	48,220	89.46
Noos (FDM)	0.74	0.2	25	Uninhabited	
Anatahan	33.91	7.2	788	Uninhabited	
Sarigan	4.47	0.9	538	Uninhabited	
Guguan	4.24	0.9	287	Uninhabited	
Alamagan	12.96	2.7	744	<10	<.02
Pagan	47.75	10.1	570	<20	<.04
Agrigan	44.05	9.3	965	<10	<.02
Asuncion	7.86	1.7	857	Uninhabited	
Maug	2.14	0.5	227	Uninhabited	
Uracas	2.25	0.5	360	Uninhabited	
TOTAL	472.71			~53,900	

Table 1 - Area, elevation, and population of CNMI islands. Source for area and elevation, Brainard et al. 2012, except Noos, Camp et al. 2015. Source for human population figures for Rota, Tinian, and Saipan U.S. Census Bureau; northern island populations are estimates (DFW 2015 State Wildlife Action Plan).

Geology

Geologically, the archipelago is the southern extension of the 2,800 km-long Izu-Bonin-Mariana arc system, which extends from near Tokyo, Japan, southward beyond the island of Guam. The islands represent the summits of volcanic mountains that emerged from the subsidence of the Pacific plate under the Philippine plate. The Mariana Archipelago can be divided into two geologic groups: the older southern islands which were formed 15-30 million years ago (Ma), which include Guam, Rota, Aguiguan, Tinian, Saipan, and Noos (FDM), and the younger (0-5 Ma) northern islands, which include Anatahan, Sarigan, Guguan, Alamagan, Pagan, Agrigan, Asuncion, Maug, and Uracas (also called Farallon de Pajaros). The six southern islands are part of the frontal arc, or fore-arc, of the Mariana arc-trench system, and although they are volcanic in origin the islands have rifted eastward from the active arc system, and are mostly covered by uplifted, layered limestone surfaces. The northern nine islands remain as part of the active Mariana Arc. All of the northern

islands, which span from Anatahan to Uracas, are stratovolcanoes comprised of hardened lava, tephra and volcanic ash, and are characterized by steeply sloping topography, both above and below the ocean's surface (Brainard et al. 2012). Periodic, explosive volcanic eruptions occur on the islands, with the most recent major eruptions occurring at Uracas in 1967, Pagan in 1981, and Anatahan in 2003 (Global Volcanism Program 2013). Rainfall plays an important role in weathering processes in karst-limestone formations; hydrology is discussed in the “water resources” section of this report.

Impacts, Status, and Responses

Numerous legal mechanisms are in place to ensure management and protection of natural areas and guide development in CNMI. The Commonwealth of the Northern Mariana Islands Department of Lands and Natural Resources (DLNR) was established by Public Law 1-8, Chapter 13, on August 10, 1978 (1 CMC § 2651). DLNR is responsible for the protection and enhancement of the natural resources of the islands, including wildlife and marine resources, forests and agriculture (1 CMC § 2653). DLNR is responsible for the protection and enhancement of natural resources including the marine environment, wildlife resources, forests and agriculture. DLNR is also responsible for the management, use and disposition of three miles of the submerged lands off the coast of the Commonwealth, pursuant to the Submerged Lands Act and U.S. Public Law 113-34. 2 CMC §§ 1201, et seq.; 1 CMC §2653(k). DLNR’s mandate is carried out by the Division of Fish and Wildlife; Division of Agriculture; Division of Lands Registration and Survey; Division of Parks and Recreation; and the Soil and Water Conservation Districts. DLNR is headed by the Secretary of the Department of Lands and Natural Resources. The Division of Fish and Wildlife (DFW) was created by Public Law 2-51 “Fish, Game, and Endangered Species Act” on October 19, 1981, to protect the fish, game, and endangered species of the CNMI (2 CMC §§ 5101, et seq). The Director of DFW is responsible for the day-to-day administration and enforcement of the CNMI Fish, Game, and Endangered Species Act. Together, these divisions work to ensure protection and enhancement of CNMI’s natural resources through the administration of protected areas, forest and wildfire management, and development and maintenance of open spaces and recreational facilities.

Developed Areas

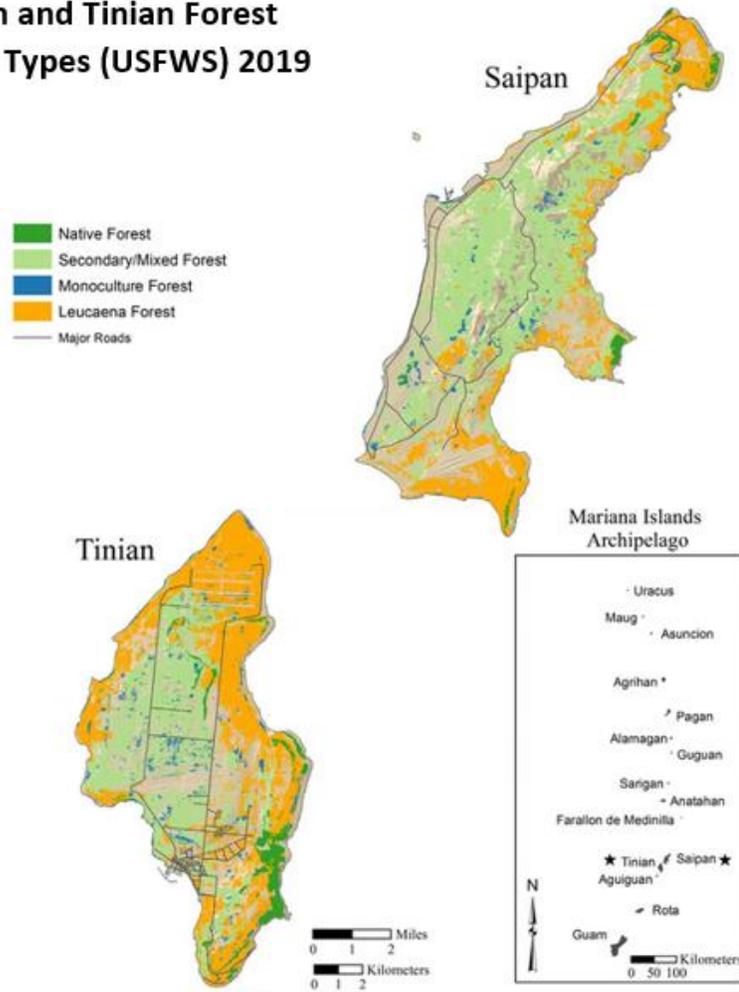
Developed areas are a land cover type used by the U.S. Forest Service to show areas of urban growth, cropland, and other uses characterized by impervious land cover. These areas are vital for economic growth and social services. The Coastal Change Analysis Program (C-CAP) High Resolution Land Cover database (NLCD2011) helps to track changes in land use over time. Although the totals below reflect less than 10% developed land cover on Saipan, Tinian, and Rota, *Site Planning for Urban Stream Protection*, by the Center for Watershed Protection cites research conducted in many geographic areas has yielded a conclusion that stream degradation occurs at relatively low levels of imperviousness of 10% to 20%. Due to the risk of negative water quality impacts and land degradation, zoning and land cover laws are in place to guide wise development and reduce risks to CNMI’s land and water resources.

<i>USFS Mapped Class</i>	<i>Acres</i>	<i>% Total Land Area</i>	<i>USFS Mapped Class</i>	<i>Acres</i>	<i>% Total Land Area</i>	<i>USFS Mapped Class</i>	<i>Acres</i>	<i>% Total Land Area</i>
Saipan - Developed/Urban	2511	8.53%	Tinian - Developed	1917.54	7.67%	Rota - Developed	761.1	3.62%
Saipan - Cropland	233.7	0.79%	Tinian - Cropland	331.12	1.33%	Rota - Cropland	352.5	1.68%
Saipan - Agroforest	400.7	1.36%	Total "Developed"	2248.66	9.00%	Rota - Urban Other	629.1	2.99%
Total "Developed"	3145.4	10.69%	Tinian Acres Total	24989.76		Total "Developed"	1742.7	8.29%
Saipan Acres Total	29420.7					Rota Acres Total	21,010.80	

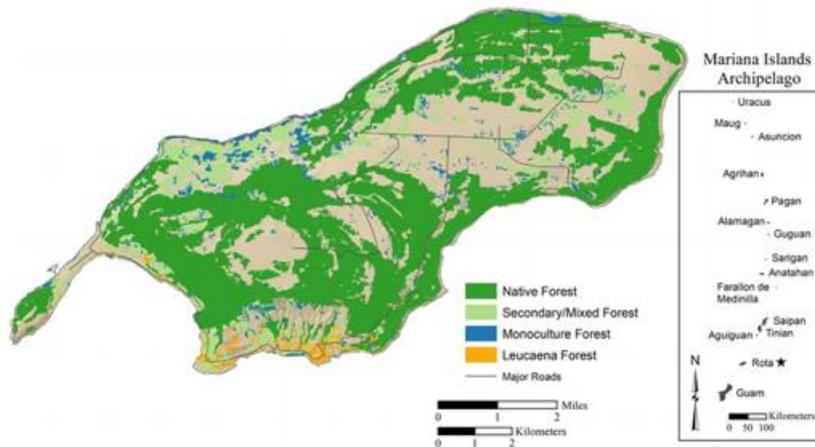
C-CAP Land Cover analysis of “developed” land uses on Saipan, Tinian, and Rota (Source: DFW, 2015 SWAP)

Updated 2019 forest cover maps are included here for reference:

Saipan and Tinian Forest Cover Types (USFWS) 2019



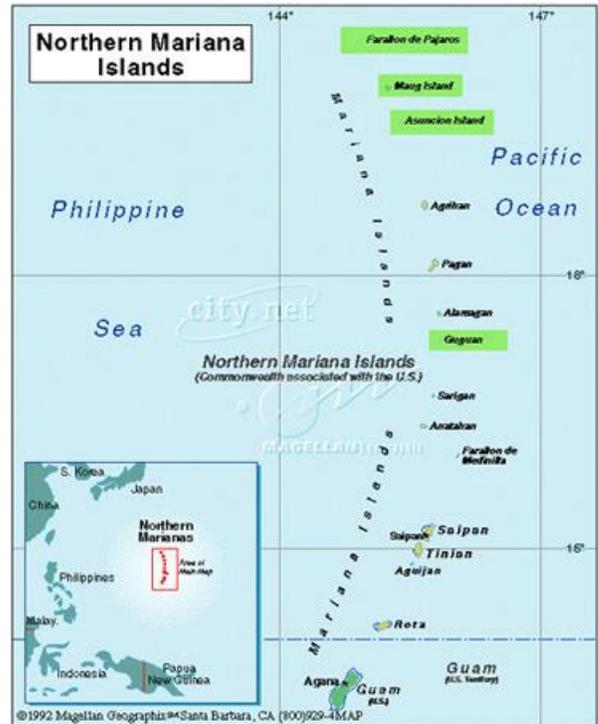
Rota Forest Cover Types (USFWS) 2019



(A-F) Current distribution of forests in the Mariana archipelago (Reeves and Amidon, 2018).

Protected Areas

The Division of Fish and Wildlife (DFW) manages conservation areas on land and in the water. On Saipan, DFW manages five protected areas; the Bird Island Wildlife Conservation Area and Kagman Wildlife Conservation Area, where the “take” of any plants or animal species is prohibited, as well as the Susupe Wetland, the Costco Park Wetland Mitigation Pond, and the Saipan Upland Mitigation Bank. On Rota there are three protected areas: Sabanna Heights, Wedding Cake, and I’Chenchon Park Bird Sanctuary, all of which are “no take” areas where collection of plants or animal species is prohibited. Additionally, DFW notes that the islands of Maug, Uracas, Asuncion, and Guguan are protected under the Constitution of the CNMI (see map at right). These islands are designated as wildlife conservation areas and maintained as uninhabited places. They are used solely for the preservation and protection of natural resources, including bird, wildlife, and plant species.



“Protected lands and waters” are those areas legally designated by the federal or CNMI government primarily for conservation of natural resources. Conservation Areas, Marine Protected Areas, and National Monuments are examples of protected lands or waters. Generally, protected lands and waters are secured from habitat conversion to development and have associated regulations regarding hunting, fishing, and other uses of the area. These regulations vary among protected areas, as each area has a distinct history and purpose for protection.

Protected Lands: Saipan

As DLNR-DFW reports, on Saipan there are five conservation areas with specific management goals outlined as follows:

Bird Island Wildlife Sanctuary

The Bird Island Wildlife Sanctuary extends from the Bird Island Marine Sanctuary landward. It consists of 220 acres of land, including the Grotto. It is designated to conserve and protect plant and wildlife resources. There is no taking of plants, animals, or wildlife in the conservation area.

Kagman Wildlife Conservation Area

The Kagman Wildlife Conservation area extends from the waters of protected Forbidden Island and includes 330 acres of land. It is designated to preserve and protect plant and wildlife resources. There is no taking of plant or animal species.

Susupe Wetland

The Susupe Wetland is one of the only large, freshwater wetlands in the CNMI. It is regulated to preserve, protect, and restore this unique ecosystem. Freshwater wetlands filter runoff from land to protect coral reefs from sedimentation. Additionally, these wetlands are important sources of freshwater, storm water catchment, and harbor many rare or unique species.

Costco Park Wetland Mitigation Pond

The Costco Park Wetland Mitigation Pond serves as an off-site mitigation for the loss of wetland habitat from the Costco Building. It is designated to protect, preserve, and restore freshwater wetlands habitat and species. Development that impacts wetlands may purchase an ecologically similar area for protection. Thus, we benefit from the economic development of land while simultaneously protecting valuable wetland habitat.

Saipan Upland Mitigation Bank

The Saipan Upland Mitigation Bank is designated as a species reserve for the Federally and locally listed endangered Nightingale Reed-Warblers. Development that impacts the habitat of this species can purchase credits to protect breeding pairs of birds.

Protected Lands: Rota

As DLNR-DFW reports, on Rota there are three conservation areas with specific management goals outlined as follows:

Sabanna Heights (Rota) is designated as a wildlife conservation area. To ensure the survival of endemic plant and animal species, there is no take of plants, animals, fish or wildlife.

Marine Monument

In 2009, U.S. President George W. Bush established the Marianas Trench Marine National Monument, which covers approximately 246,608 square kilometers of waters and submerged lands in the Mariana Islands. The Monument is comprised of the Islands Unit, which includes the submerged lands and waters surrounding the three northernmost Mariana Islands (Uracas, Maug, and Asuncion); the Volcanic Unit, which includes the submerged lands within one nautical mile of 21 designated volcanic sites; and the Trench Unit, which includes the submerged lands extending from the northern limit of the Exclusive Economic Zone of the United States in the CNMI to the southern limit of the Exclusive Economic Zone of the United States in the Territory of Guam; no waters are included in the Volcanic or Trench units. The Monument was placed within the National Wildlife Refuge System, with management falling under the jurisdiction of the U.S. Fish and Wildlife Service. The Secretary of Commerce, through the National Oceanic and Atmospheric Administration (NOAA), has management responsibility for fishery activities within the waters of the Islands Unit. The CNMI government maintains jurisdiction of the area landward of mean low tide on Uracas, Maug, and Asuncion. A management plan for the Monument is still in development. Upon agreement of the U.S. Department of Commerce (via NOAA), the Department of the Interior, and the Government of the CNMI to a coordinated management plan, it is anticipated that the U.S. Department of Interior will convey to the Government of the CNMI title to the submerged lands around Uracas, Maug, and Asuncion.

CNMI Protected Areas

Locally designated CNMI conservation lands total 55.6 km², representing 12% of the total land area of the CNMI. This includes conservation lands on Rota (22%) Tinian (4%), and Saipan (9%). The entire islands of Guguan, Asuncion, Maug, and Uracas are constitutionally protected. The entire island of Sarigan is owned by the Department of Public Lands but is regulated by the Division of Fish and Wildlife. These conservation areas have been established through the CNMI Constitution, CNMI public laws and local laws, as well as by agreement between government agencies and regulation. As discussed further in the Marine Resources section, the CNMI government has designated protected waters around Rota, Saipan, and Tinian. While the total area of these protected areas is small relative to the vast protected waters of the Marianas Trench Marine National Monument, these areas provide critical protection to ensure sustainable use of highly

visited areas and provide protected source populations for species that can be harvested outside of protected waters.

Forest Management

As the 2014-2024 Draft CNMI State Wildland Fire Plan details, on tropical islands, forests serve as critical cover for fragile soils, cultural and traditional resource corridors. Where healthy forests are present, island life is enhanced by clean, fresh water, productive soil that stays in place, abundant wildlife, and healthy reefs and lagoons that provide seafood and countless resources for native islander’s traditional needs. When island forests are destroyed, the soil is washed down slope by tropical rains. Fresh water becomes scarce, wildlife disappears, and corals sicken and die from sediment and chemical changes caused by runoff. Forests are thus of critical importance in maintaining all of the most necessary things that sustain human life: water; soil; food and many more. In addition, forests provide cool, beautiful places for people to enjoy nature. When carefully managed, forests also can provide a sustained yield of medicine, food, fuel, fiber, lumber, and poles to meet the needs of island people.

The history of the Commonwealth demonstrates that these resources have been subjected to fire damage, abuse, primarily due to intensive agriculture, and lack of comprehensive management. Today, the people of the Commonwealth are self-governing where developmental objectives are to achieve a level of income and quality of life that will meet minimum U.S. standards. This objective will be difficult to achieve without adequate planning to ensure that the remaining natural resources of these beautiful islands are conserved, protected and enhanced. The 2014-2024 Draft CNMI State Wildland Fire Plan further identifies soil erosion and fire as impacts of concern for forest management in CNMI.

As summarized in the 2014 Standard State Mitigation Plan (SSMP), the United States Department of Agriculture has divided the Northern Mariana Islands into four broad land classes: forest, secondary vegetation, agroforest, and non-forest. Forestlands include five primary types of areas that include native limestone forest, introduced trees, mangrove forest, casuarina forest, and atoll forest. Limestone forests grow on areas of uplifted or raised limestone and once dominated the islands of Rota, Aguijan, Tinian, and Saipan. Native forest lands are primarily found on Rota and in the southwest region of Tinian. Very few areas of native forest remain on Saipan, with a few scattered pockets on the Banadero cliffs and the Kagman Peninsula. Most altered native forests are impacted by such tree species as the Tangantangan (*Leucaena* sp.), Sosugi (*Acacia* spp.), and Kalaskas (*Albizia* sp). Comparing “forested” land cover change between 2014 and 2018 assessments suggests native limestone forest may continue to be declining on Saipan, with only 12% cover reported in the 2017 United States Fish and Wildlife Services’ (USFWS) Vegetative Mapping of the Marianas.

Percentage Distribution of Land Class Types within the CNMI Reported in 2014

Island	Forest	Secondary Forest	Agroforest	Non-forest
Saipan	35%	30%	11%	24%
Tinian	24%	54%	1%	21%
Rota	62%	13%	5%	20%

Percentage Distribution of Forest Lands within the CNMI

Island	Introduced	Native Limestone	Casuarina
Saipan	77%	12%	11%
Tinian	41%	28%	31%
Rota	2%	94%	4%

As the 2015-2025 State Wildlife Action Plan describes, native forest is characterized by a closed canopy of broadleaf trees and dark, humid conditions at the forest floor. It notes that the introduction of the scarlet gourd (*Corcinnia grandis*) an African vine of the melon family, Cucurbitaceae, is threatening the vegetation and ecology of Saipan and the CNMI is threatened to an extent that it may diminish the beauty of the islands which are heavily dependent on tourism. According to Dr. Aubrey Moore, a former researcher at Northern Marianas College's Agriculture and Life Sciences Department (ALS), now known as the Northern Marianas College CNMI Cooperative Research, Extension and Education Service (NMC CREES) the scarlet gourd is difficult to destroy with herbicides. The vine has an extensive tuberous root system that is difficult to dig out and may survive a first, or even a second, application of herbicide. The scarlet gourd is very aggressive and now much more widespread covering trees and other native vegetation so heavily that the sunlight cannot get to the leaves of the plants below it, eventually suffocating them. The scarlet gourd lacks the normal natural enemies that would have assured that the vine kept its place in the environment. Unfortunately, many of the natural enemies of this plant are also crop pests. Impacts of terrestrial invasive plant species have not been well established.

DLNR-DP&R – Strategic Plan for Parks and Recreation

The Department of Lands and Natural Resources (DLNR) Division of Parks and Recreation (DP&R)'s mission is to “enhance the quality of life in the CNMI by providing exceptional parks and recreation experiences while preserving significant natural and cultural resources and its economic stability.” DP&R published their first strategic plan for Saipan in 2019. The goals and objectives of this plan are driven by overarching community values that acknowledge the important role of enhancement of our natural resources and the improvement of the island’s quality of life. DP&R has 49 sites under its jurisdiction throughout the island of Saipan, including 13 tourist sites, 14 public beaches, 5 public parks, and 17 recreational facilities. These facilities are listed in Appendix E.

The vision of this plan is: “A parks and recreation system is the pride of the Commonwealth being that public be given full access to enjoy nature at its best, availing opportunity to visit historical sites, structures and beaches that are significant to the Commonwealth of the Northern Mariana Islands (Saipan).” Goals to support this vision include improving places where people live, work, and recreate, with consideration of health, diversity, environmental sustainability, and customer service needs. Goals and Objectives outlined in the plan include:

- Goal 1: Provide excellent programs, services, places and spaces
1. Plan, design, build and maintain a comprehensive system of sustainable facilities, trails and park spaces to high standards to provide attractive places people will use and enjoy;
 2. Plan, design, build and maintain programs and services to high standards to provide dynamic offerings that people will use and enjoy;
 3. Improve process for evaluating programs, facilities and services for operational efficiency and effectiveness; and
 4. Increase community awareness of parks and recreation resources.

Goal 2: Enhance and conserve natural and historical resources

1. Conserve, enhance and acquire natural areas and historical resources;
2. Preserve and improve tree canopy;
3. Advance historical and natural resources education and interpretation;
4. Develop and maintain internal and external partnerships to improve natural resource management; and
5. Integrate environmentally sound sustainability practices into park management practices.

Goal 3: Build community, promote wellness and ensure equal access for all

1. Improve civic engagement and provide opportunities for social connection;
2. Identify underrepresented groups and help them participate and feel connected;
3. Increase engagement in physically active recreation, and enjoyment of parks and trails to foster active healthy lifestyles; and
4. Further reduce barriers for accessing programs, services, places, spaces and information.

Goal 4: Manage assets efficiently and effectively

1. Work within annually adopted budget and comply with policies and procedures;
2. Maintain and communicate inventories of programs, services, places, and spaces;
3. Maintain and communicate financial and budgetary data;
4. Utilize budgeted resources in a deliberate and systematic manner throughout the entire year; and
5. Determine life cycles for equipment and schedule maintenance & replacement or renovation.

Goal 5: Cultivate an effective and dynamic workforce

1. Increase training through professional development opportunities;
2. Expand connections throughout the department and the division;
3. Recognize and celebrate staff excellence and innovation;
4. Implement approaches to improve accountability; and
5. Develop practices that encourage a safe and healthy work environment.

Several implementation challenges are highlighted in the 2019-2022 Strategic Parks and Recreation Plan. The plan notes that high recent development pressure despite the constitutional mandate and public laws aimed to ensure that open spaces under public land are maintained for community purposes and activities. There is a strong community support for completing projects in the CNMI is currently engaged in, particularly expansion of greenways and the joint facility with the tourism district. At the same time the recognition of limited operating resources challenges the division to find new partnerships and commit additional operating resources prior to initiating new projects. The plan also notes that the community has indicated strong interest in “increasing access” to and use of parks while maintaining safety and security.

It further notes that while state budget may appear as an obstacle to creating the community’s envisioned park system, the larger issue is ongoing operation and maintenance of the park system into the future. The most sustainable source of funding for both operations and maintenance is strong community support. This support will need to be reinforced and converted into the necessary political and financial support (including fees and taxes) to implement Future Park System Plan. The specifics of how these strategies will be applied and the value in the CNMI will depend greatly on the projects selected, as well as the strategies identified in the pending State Comprehensive Outdoor Recreation Plan (SCORP), which is in development as of December 2019.

DLNR-DFW State Wildlife Action Plan

The Division of Fish and Wildlife’s 2015 – 2025 State Wildlife Action Plan discusses management priorities for “species of greatest conservation need” (SGCN) which are animal species or groups of particular importance to the people of the CNMI for biological, cultural, or economic reasons. Marine species recommendations are discussed further in the Marine Resources section of this report. Using a quantitative ranking process, biologically important SGCN were selected based on vulnerability and threat ranking criteria, with 33 terrestrial species identified.

Chamorro	Carolinian	English (with subspecies identifier if applicable)	Type	BioScore ¹	Threat Ranking ²
<i>Species identified for biological reasons³:</i>					
Sasangat	Sasangal	Micronesian Megapode	Bird	27	H
Lifa'ru	Lifo'ro	Wedge-tailed Shearwater	Bird	18	M
Lu'ao (talasai)	Amwo	Masked Booby	Bird	18	M
Paya'ya	Asaf	Great Frigatebird	Bird	18	M
Pulattat	Gherel Bweel	Mariana Common Moorhen	Bird	36	H
Paluman kotbata	Apooka	White-throated Ground Dove	Bird	25	H
Paluman totut	Mwee'mwe	Mariana Fruit Dove	Bird	29	H
Chachaguak	Leghe'kiyank	Mariana Swiftlet	Bird	30	M
Sihek	Waaw	Mariana Kingfisher ssp. <i>albicilla</i>	Bird	23	H
Sihek	Waaw	Mariana Kingfisher ssp. <i>orii</i>	Bird	37	H
Sihek	Waaw	Mariana Kingfisher ssp. <i>owstoni</i>	Bird	19	M
Egigi	Tigh'par	Micronesian Honeyeater ssp. <i>saffordi</i>	Bird	27	H
Naabak	Leteghi par	Rufous Fantail ssp. <i>mariae</i>	Bird	25	H
Naabak	Leteghi par	Rufous Fantail ssp. <i>saipanensis</i>	Bird	27	VH
Chichurikan Tinian	Liteighi'par	Tinian Monarch	Bird	35	VH
Aga	Mwii'lup	Mariana Crow	Bird	46	VH
Ga'ga karisu	Litchoghoi bwel	Nightingale Reed-warbler	Bird	33	H
Nosa'/Chuchrika	Litchogh	Bridled White-eye	Bird	19	H

Chamorro	Carolinian	English (with subspecies identifier if applicable)	Type	BioScore ¹	Threat Ranking ²
Nosa' Luta	Litchogh	Rota White-eye	Bird	31	H
Canario	Khanooriyo	Golden White-eye	Bird	31	H
Fanihin Liyang	Payesyes/Pai'Scheei	Pacific Sheath-tailed Bat	Mammal	40	L
Fanihi	Pai'Scheei	Mariana Fruit Bat	Mammal	34	H
Achi'ak		Littoral Skink	Reptile	17	H
Achi'ak		Mariana Skink	Reptile	25	H
Guali'ek	Galuuf	Micronesian Gecko	Reptile	13	VH
Ayuyu	Lyaf	Coconut Crab	Crustacean	17	H
Akmangao		Mangrove Crab	Crustacean	23	H
		Mariana Wandering Butterfly	Insect	50	M
		Rota Damselfly	Insect	46	L
Dengdeng		Humped Tree Snail	Snail	34	H
Dengdeng		Langford's Tree Snail	Snail	46	M
Dengdeng		Rota Unidentified Partulid Snail	Snail	44	M
Dengdeng		Fragile Tree Snail	Snail	40	H

<i>Species identified for cultural or socioeconomic reasons³:</i>					
Fanihi	Pai'Scheei	Mariana Fruit Bat	Mammal	N/A	N/A
Ayuyu	Lyaf	Coconut Crab	Crustacean	N/A	N/A

¹ BioScore can range from 0 to 60 with higher scores indicating greater vulnerability.

² VH=Very High, H=High, M=Medium, L=Low; “Very High” signifies a species experiencing many and/or severe threats.

³ Many species have multiple values, i.e. biological, cultural, social, and/or economic. We identify here the value(s) for which this species was identified as SGCN. Many species have more values than what are listed here. Possible “biological reasons” are many, and does not necessarily mean that a species is in trouble.

Regulation of Land Uses in CNMI

In addition to natural resource conservation programs of DLNR, land management is addressed through laws, regulations, and policies of the Department of Public Lands (DPL), the Office of Zoning, and the Bureau of Environmental and Coastal Quality’s Division of Environmental Quality and Division of Coastal Resources Management. Formerly the Marianas Public Lands Authority, the Department of Public Lands is mandated to administer the Commonwealth’s public lands according to the provisions of Article XI of the Commonwealth Constitution (Public Laws 12-33, 12-71, 15-2, 2 CMC § 2800 et seq.). This including managing use, leasing, development, and disposition of public lands, which belong “collectively to the people of the Commonwealth who are of Northern Marianas descent” to support fundamental policies outlined in Section 5 of the Constitution such as proving a homestead program and adopting a comprehensive land use plan including establishment of priority uses.

Land management efforts are further supported by the Office of Zoning, which was established by the Saipan Zoning Law of 1993 and modified through numerous subsequent amendments to establish designated use districts to further guide development on Saipan (Saipan Local Law 8-7, §, modified; amended by SLL 15-22, §§ 4-10, amended 2013, 10 CMC § 3511). Additionally, the BECQ Division of Environmental Quality ensures compliance with environmental regulations to protect water and air quality as outlined in the “Commonwealth Environmental Protection Act of 1982” (PL 3-23, 2 CMC § 3101 et seq.). Established in 1983 as the Office of Coastal Resources Management and merged with BECQ in 2013, the Division of Coastal Resources Management administers the federal Coastal Zone Management Act to promote efficient resources management through coordination across CNMI departments to achieve twenty-three legislative policies, including to “plan for and manage any use or activity with the potential for causing a direct and significant impact on coastal resources” (Public Law 3-47, 2 CMC § 1500 et seq.). Current planning efforts underway to guide development within these agencies are outlined further below.

DPL Public Land Use Planning and Management

As highlighted by their 2019 Citizen Centric Report (CCR), “the mission of the Department of Public Lands, as trustees for public lands in the Commonwealth, is to provide for the efficient and effective services in the management, use, disposition and development of public lands for the economic and social betterment of individuals of Northern Marianas Descent and to implement the strategic Land Use Plan to promote cultural and economic growth for the benefit of our present and future generations.”

In 2006, Public Law (PL) 15-2 was signed into law which created the Department of Public Lands under the Executive Branch. The enactment of DPL transferred the obligations and responsibilities of the former Marianas Public Land Corporation which was established in 1979 under Article IX of the Northern Mariana Islands Constitution.

The Department of Public Lands Advisory Board is also a product of PL 15-2 as amended whose members meet with DPL every month to discuss important land matters and provide input on

behalf of the islands and the people of Northern Marianas Descent. Each member is of Northern Marianas Descent, and represents each island senatorial district that include the islands of Rota, Tinian, Saipan, and the Northern Islands and one member is appointed by the Governor.

DPL’s overall responsibilities include ongoing programs such as a homesteading, the commercial leasing and permitting of idle public lands, the settling of land claims and designating of public land parcels to other government agencies for the fulfillment of public purpose. Additional revenue is remitted to the Marianas Public Land Trust to continue to benefit the CNMI.

A portion of DPL's profits are contributed by Lease Agreements and Temporary Occupancy Agreements (TOAs) under the Real Estate Division. In FY 2019, there were 15 new TOAs, 28 TOA renewals, 2 new leases and 7 lease renewals. Financial reports show that since 2015 DPL’s total revenue has surpassed its annually budgeted expenses (see Figures 8, 9, and 10 below).

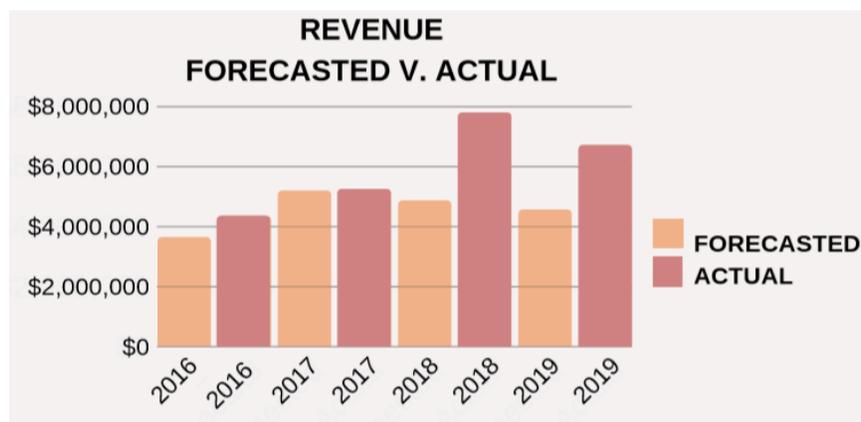


Figure 8 -Forecasted and Actual Revenue, DPL 2019 CCR.

Fiscal Year	2014	2015	2016	2017	2018	2019
Annual Budget	5,260,796.00	3,399,774.00	3,632,187.00	5,184,376.00	4,854,044.00	4,550,453.00
Revenue						
Total Revenue	4,027,168.00	5,485,204.00	7,170,984.00	8,007,437.00	7,787,100.00	6,702,776.96

Figure 9 – DPL Annual Budget and Total Revenue 2014 – 2019. DPL 2019 CCR.

Sources of revenue, listed in Figure 10 at right, supports DPL in fulfilling their constitutional obligation to remit money to the Marianas Public Land Trust. DPL remitted \$5,000,000 in 2014 as an advance payment to future net of operations covering 2015's remittance and requiring a reduced payment of \$800,334.16 in 2016. In 2018 \$2,367,513.00 was remitted. The Department collected \$4,550,453.00 for Fiscal Year 2019 and collected \$6,702,776.96 in revenue. This fiscal year, DPL remitted \$6,327,685.23 to MPLT which is the most the Department has ever remitted in one year and from 2016 to the present, DPL has remitted 58% of all money remitted to MPLT since its creation in 2006.

SOURCES OF REVENUE	
Long-term Leases	\$2,384,023.97
Estimated Revenue BGRTs	\$1,771,142.60
Royalties	\$211,039.33
Temporary Permits	\$405,755.70
Commercial Permits	\$7,323.43
AGPs	\$7,516.80
Submerged Land	\$15,000.00
Other Revenues	\$1,545,873.38
Total collections	\$6,347,675.21
Interest Income	\$355,101.75
Total Revenue	\$6,702,776.96

Figure 10 – FY19 Sources of Revenue. DPL 2019 CCR.

DPL – Regulation and Planning Updates

As reported in DPL’s 2019 Citizen Centric Report, recent accomplishments include regulatory and planning updates. Recently, DPL amended its regulation for lease projects that will need longer than

two years of construction time to now stipulate the condition that the project's capital investment must be no less than \$36 million, set a cap of \$4 million in base rent, \$5 million in additional rent and must have a Public Benefit for the CNMI. New lease agreements have infused thousands of dollars worth of public benefits including homestead infrastructure improvements, educational scholarships, job training and opportunities, discounts for hotel services and facilities, public park playground equipment, and discounts in stores and restaurants. This regulation ensures the financial buffer for the lessee and increases public welfare well before the completion of the project. Ongoing land use planning reflected in the 1989 and 2019 Public Land Use Plans further supports DPL in meeting its management objectives.

1989 Public Land Use Plan

The 1989 Public Land Use Plan provided a road map for long range development planning for the public lands of CNMI through 2015. It included goals, objectives, and policies for planning and management of public lands related to projected growth scenarios and socioeconomic analysis, as well as policy recommendations. Major recommendations of that plan included recommendations to:

- Align growth on Saipan with community development and homestead programs;
- Monitor growth on Rota to ensure public lands support development;
- Allow for public land leases to support hotel-style casino development on Tinian; and
- Land requirements for public services for visitors and non-residents should be met through application of impact fees and exactions so that demands placed on the system by these groups do not reduce existing public land resources.

Chapter II of the 1989 Public Land Use Plan outlined goals, objectives, and policies to support plan development and implementation as follows:

Goal: To assure that there are sufficient land resources to meet demands on public lands for services and the homesteads program through the year 2015 and, as a second priority, to support the economic development of the CNMI.

Objectives:

1. Utilize the public land resources of the CNMI in an equitable and efficient manner;
2. Manage public lands to direct overall physical growth in a socially responsible manner;
3. Provide land resources to supply the demand for housing for the residents of the CNMI as provided by law; and
4. Utilization of public lands to provide revenues for the management of public lands and for physical development that serves a public purpose.

Three categories of implementing policies addressing (i) overall policies that impact development of both private and public lands, (ii) public land-specific policies, and (iii) island-specific policies were detailed in Chapter II Part C and are listed for reference in Appendix F. Growth projections that were considered for the 1989 Plan are included in Appendix G. It is worth noting that plan assumed continued growth of "foreign workers" and continuing operations of the garment industry, and rapid expansion of the tourism industry.

Chapter VII of the 1989 Public Land Use Plan offered guidelines for how to manage the process of planning for public lands. These recommendations included:

- Public land use planning should be consolidated with similar master planning functions, especially economic planning, comprehensive land use, housing, and social services, and aligned with infrastructure planning, zoning, education planning, health and environmental

resource planning, park and recreation planning, and visitor industry development planning, in partnership with relevant CNMI agencies;

- Plan monitoring and updating must be an ongoing process because these steps are vital to maintaining a plan's relevance to changes occurring within the Commonwealth;
- Plan updating should generally advance the overall quality of data collection and analysis and should encompass new information that is valuable to improving the Plan's original data base, analysis, and recommendations.

2019 Public Land Use Plan

In March of 2019 the Public Land Use Board approved the Department of Public Lands' Public Land Use Plan – the prior plan was adopted in 1989. The document provides a comprehensive overview of public land use opportunities and growth trajectories over the next five years. Growth trajectories relied on for the 2019 update are discussed in detail in the socio-economics section of this report and included in Appendix H.

Growth Scenarios of the 2019 Update were detailed extensively in Appendix A of the PLUP, and the overview of the modeling approach as well as conclusions are included in Appendix I of this report. Key parameters of the Growth Scenarios of the 2019 Update included:

- Scenario A (“High Growth”)
 - Saipan: Visitor arrivals unconstrained by either labor or infrastructure capacity; based on averaged projections from Horwath report, they grow to 1.04 million by 2028; new casino opens in 2026-28 period.
 - Tinian: Two casino-hotels open or re-open, one by 2020 and other by 2028; all planned military activities (joint military training and divert airfield) constructed by 2028. (Implicit: Military and tourism can co-exist.)
 - Rota: Three small but very upscale 75-unit hotels are developed – one by 2020, another by 2025, third by 2028.
- Scenario B (“Medium Growth / Status Quo”)
 - Saipan: Infrastructure or other constraints result in visitor arrivals leveling off at Horwath's “sustainable” level of 750,000; no second casino.
 - Tinian: Just one casino-hotel, and not till 2028; all planned military activities proceed.
 - Rota: One small luxury hotel by 2025.
- Scenario C (“Poor / Negative Growth” with CW-1 Visa Phase-out by 2021)
 - Saipan: Decimation of visitor industry labor supply causes visitor arrivals to plummet by nearly 300,000 by 2020; then gradual partial recovery but no second casino.
 - Tinian: Military training developed but no divert airfield; no large casino-hotels but perhaps one small budget hotel by 2028 as part of “adaptive response” to new economic conditions.
 - Rota: Similarly, no luxury hotels but one small budget hotel by 2028.

In discussing total population projections in Chapter 4, the report explains that the total population levels for different islands show much greater variation according to the economic scenarios (see Appendix I of this report) show these estimates for Saipan, Tinian, and Rota by scenarios. Saipan estimates for 2028 vary from a low of 40,457 to a high of 67,414; Tinian, from 2,325 to 8,707; and Rota, from 2,284 to 3,577. On a CNMI-wide basis, the numbers add to represent a range from 45,066 to 79,698. These numbers are significantly different by scenario, and that is because of the wide range of economic futures that now appear possible for the Commonwealth. The most optimistic Scenario A – primarily driven by some of the visitor arrival assumptions in the Horwath Report commissioned by the Marianas Visitor Authority – assumes ongoing strong increases in

tourism (and, implicitly, some sort of solutions to potential infrastructure and labor constraints, as well as political support by residents). Planning for wide variations in population and economic growth presents land management challenges that may be most effectively addressed through flexible goal setting and iterative reassessment of development trends and trajectories in the CNMI.

Zoning – Office of Zoning Regulations and Updates

As of 2019, the Zoning Office continues to work on updates to zoning regulations. These updates include the text and map amendments to the Saipan Zoning Law of 2013, the Nuisance Abatement and Blighted Property Maintenance Act of 2018, and ATV/UTV/Motorcycle regulations. The proposed changes within the text amendments include increasing height restrictions and reducing landscaping and setback requirements across zoning districts.

Blighted Property & Nuisance Abatement Act of 2018

The proposed text and map amendments to the Saipan Zoning Law of 2013 were adopted by the Zoning Board during their meeting on August 23, 2019 and transmitted to the Saipan and Northern Islands Legislative Delegation (SNILD) for review and action. The Nuisance Abatement & Blighted Property Maintenance Act of 2018 was enacted into law on June 14, 2018. This law requires all property owners that hold blighted properties within the island of Saipan to be held accountable to secure and maintain abandoned, vacant, and blighted properties. The Zoning Office is currently finalizing proposed regulations to be adopted by the Board and published with the Commonwealth Register for public comments before its actual implementation.

All Terrain Vehicle, Utility Vehicle, and Motorcycle Rental Establishments

Zoning for these types of establishments are regulated as Amusement, Outdoor Intensive pursuant to the Saipan Zoning Law of 2013 (the “Zoning Law”) Uses that fit within the definition of Amusement, Outdoor Intensive as defined in Section 412 of the Zoning Law are permitted as conditional uses only in the Rural (excluding those areas north of Tanko Drive/Rakka Drive/Chalan Matuis Drive (Map Sheets 5-7), Beach Road, and Tourist Resort districts. These regulations in this part are additive and supplement the other regulations and provisions in this title and the Zoning Law. These regulations specify conditions to be imposed on all conditional use permits for all-terrain vehicle, utility vehicle, and motorcycle rental establishments to address community concerns including noise, emissions, erosion and other environmental concerns. These proposed regulations were published with the Commonwealth Register on April 28, 2019 for public comments and subsequently published for adoption on September 28, 2019.

Managing Development – Permitting Framework for Land Use Management

Development, which influences land availability, environmental quality, infrastructure needs, and socio-economic conditions, is addressed further in “Built Environment – Housing / Development” and “Growth Projections and Development” sections. “Land clearing and development” has been identified as an environmental driver that in some cases may lead to negative impacts to important resource categories such as native forest cover, water quality, and biodiversity. Numerous federal and state regulations are in place to support wise development that does not compromise the values of these precious natural resources. Land development in CNMI starts with obtaining land rights and permitting. On Saipan, a development permit from Zoning must be obtained before the environmental clearance application process begins.

The type of environmental clearance required depends on the type of development. All earthmoving activities that exceed six cubic yards of soil disturbance must apply for a “One-Start” permit with the Bureau of Environmental and Coastal Quality’s (BECQ) Division of Environmental Quality (DEQ). DEQ reviews the application to confirm that infrastructure is properly sized to

comply with wastewater and stormwater management standards and that the development is in compliance with related air, water, and land regulations. As established by a Memorandum of Understanding, DEQ also manages the “One-Start” process by routing the application to partner regulatory agencies – DLNR’s Division of Fish and Wildlife reviews the proposal to ensure no significant negative impacts to wildlife or important habitat; the Historic Preservation Office (HPO) reviews for compliance with cultural resource management standards; and the Division of Coastal Resources Management reviews to ensure no significant negative impacts to coastal resources. If a project is located in an “Area of Particular Concern” (APC), DCRM will issue an “APC” permit with additional conditions to protect important coastal resources such as corals and seagrass and wetlands, and to ensure early coordination with the Department of Public Works (DPW) Floodplain Administrator and Building Code Division (BCD) if a project is located in a high hazard flood zone. The BCD also issues final Certificates of Occupancy to completed developments to uphold Public Law No. 6-45 and ensure that all buildings are held to minimum safety standards of the International Building Code. Through enforcement and inspection, DPW-BCD works to promote the health, safety, and general welfare of the people of the Commonwealth of the Northern Mariana Islands in the built environment.

For projects that exceed certain size, utility demand, or operational thresholds, a “Major Siting” permit is required. This triggers a more extensive application and review process with the Coastal Resources Management Agency Board (CRM Board). The CRM Board is composed of appointed representatives from DCRM, DEQ, DPW, DLNR, HPO, and the Commonwealth Utilities Corporation (CUC). The Major Siting permit is issued to ensure the project avoids, minimizes, or mitigates all agency and public concerns regarding significant impacts (see Public Law 3-47, 2 CMC §§ 1500 et seq.).

Coastal Resources Management Policies, Regulations and Updates

The Division of Coastal Resources Management’s guiding policies include encouraging land use master planning, floodplain management, and the development of zoning and building code legislation with a focus on reducing risks of coastal hazards to people and the environment. The *2016-2020 Section 309 Assessment and Strategy Report* reviews trends and management stressors of nine coastal resource management categories outlined by the federal Coastal Zone Management Act of 1972: wetlands, coastal hazards, public access, marine debris, cumulative and secondary impacts, special area management planning, ocean and Great Lakes resources, energy and government facility siting, and aquaculture. Areas that were identified as management priorities included a “phase II assessment” providing more in-depth information and objectives for these categories. The 2016–2020 Section 309 Assessment showed a need to maintain a “high” priority focus on Coastal Hazards, Cumulative and Secondary Impacts, Ocean Resources, and Wetlands enhancement areas, and Special Area Management Planning as a medium priority area. Because the DCRM program supports “ridge to reef” management efforts, excerpts from relevant trends data for wetlands, coastal hazards, and cumulative and secondary impacts are included here and in the recommendations sub-section that follows as they relate to land and water management activities.

Wetlands

The goal of wetlands resource management is to protect, restore, or enhance coastal wetlands to support their ecosystem functions and values. Healthy wetlands can recharge aquifers, provide fish and wildlife habitat, and act as buffers to storm surge during high wind and flooding events. The Bureau of Environmental and Coastal Quality’s Department of Environmental Quality (BECQ-DEQ) conducts year-round watershed monitoring and provides quarterly water quality and nonpoint source program reports. The 2014 Integrated Report, discussed in more detail below, identifies watershed quality management challenges and impairment of Lake Susupe, the only freshwater lake in CNMI that has multi-year water quality data available. The most recent quarterly reports

confirm ongoing violations including unpermitted dredge and fill as well as water diversion and incompatible activities such as siting of pig farms and septic drain fields in local wetlands, highlighting use management challenges that continue to degrade the quality and extent of wetlands in the CNMI.

As reported in the 2011 - 2015 Assessment and Strategy Report, loss of open water due to exotic plant invasion and conversion of year-round wetlands to perennial wetlands due to sedimentation continue to be considered threats to wetland functions in the CNMI. Overgrowth by *Eichhornia crassipes* (water hyacinth) decreases open water habitat necessary for the Mariana Common Moorhen (*Gallinula chloropus guami*) and wetland vegetation overgrowth of scarlet gourd vine significantly degrades Nightingale Reed Warbler (*Acrocephalus luscini*) habitat; both of these bird species are listed as endangered. Constructed mitigation wetlands in the CNMI include those cared for by local government agencies, federal government agencies (USDA NRCS), and private businesses. The 1989 the National Wetlands Inventory indicated there were ~590 acres of palustrine wetlands, 40 acres of lacustrine wetland – an estimated total of 630 acres – and over 1000 linear feet of riverine habitat on Saipan. Based on 2005 C-CAP layers, wetlands cover less than 2% of the total land area on Saipan, Tinian, Rota, and Pagan.

While wetlands are limited in extent, they provide habitat for unique and endangered plants and animals as well as function to provide stormwater runoff storage and pollutant uptake. The 1991 CNMI Wetland Conservation Plan states that only 36% of the original wetland acreage still exists, and DCRM has adopted a policy of no-net-wetland loss which is implemented through permitting and enhancement projects. In the Phase II Assessment, development, pollution, and invasive species were identified as leading stressors on wetlands in CNMI, especially on Saipan and Tinian. To address these threats, DCRM has prioritized efforts to (1) adopt best management practices to protect and enhance wetlands, (2) establish conservation, protection, and restoration and enhancement tools, and (3) protect high-value wetlands through comprehensive watershed-based planning and management prioritization. Wetland loss and degradation remains a high-priority coastal resources management concern. For more detailed information on wetlands in terms of water quality, please refer to the water resources section that follows.

Coastal Hazards

The goal of the “coastal hazards” resource management area is to prevent or significantly reduce threats to life and property by eliminating development and redevelopment in high-hazard areas, managing development in other hazard areas, and anticipating and managing the effects of potential sea level rise. According to the 2010 Census and 1991 Federal Emergency

Type of Hazard	General Level of Risk ¹⁷ (H, M, L)
Flooding (riverine, stormwater)	M
Coastal storms (including storm surge)	H
Geological hazards (e.g., tsunamis, earthquakes)	H
Shoreline erosion	H
Sea level rise	H
Great Lake level change	N/A
Land subsidence	L
Saltwater intrusion	H
Other (please specify) Military activities and debris – unexploded munitions, ongoing training exercises and related activities resulting in coastal habitat degradation	H

Management Agency Flood Insurance Rate Maps, approximately 3.55% of CNMI’s population lives in a high hazard flood zone. General risks of coastal hazards are outlined in the chart below, which emphasizes “high risk” of impacts from coastal storms, geological hazards, shoreline erosion, sea level rise, saltwater intrusion to aquifers, as well as risks of significant impacts from military activities and debris.

These risks do not impact all people uniformly – as noted, approximately 3.55% of the 2010 population resides within mapped high hazard flood zones. Approximately 40% of the people living within these flood zones are at or below the national poverty level.

2010 Populations in Coastal Counties at Potentially Elevated Risk to Coastal Flooding*				
	Under 5 and Over 65 years old		In Poverty	
	# of people	% Under 5/Over 65	# of people	% in Poverty
Inside Floodplain	847	76% under 5 24% over 65	21,398	40%
Outside Floodplain	6,393	75% under 5 25% over 65	32,458	60%

* This CNMI-wide data is from the 2010 Census report. Numbers and percentages for population inside and outside the floodplain are based on the ratio of populated place area inside or outside the floodplain. This is a general estimate, and in some cases may differ from actual counts.

Additionally, numerous critical public facilities including schools, police stations, and medical facilities, are located within these flood prone areas.

Critical Facilities in the FEMA Floodplain¹						
	Schools	Police Stations	Fire Stations	Emergency Centers ²	Medical Facilities	Communications Towers ²
Inside Floodplain	6	1	1	0	1	0
Outside Floodplain	19	3	4	1	2	11

1. The critical facilities data used in these calculations reflect DCRM’s best available GIS layers for Saipan, Tinian, and Rota, but these layers lack metadata. It may be out of date or spatially incorrect. With the exception of the schools layer for Saipan, all of the critical facilities are represented as point locations. This can provide questionable results when determining flood risk. While certain points may not fall within the flood zone, the true areas of the facility may be partially impacted. For example, on Rota, none of the critical facilities are within the flood zone. However, the point locations for a school, hospital and fire station are all within 75 meters of the flood zone boundary. It is likely that at least some of the actual grounds for these facilities overlaps the flood zone, but it cannot be determined with the data that is currently available. Efforts are underway to update this information.

2. This report only classified Saipan’s Emergency Response Center on Capitol Hill. As detailed in the Saipan Climate Change Vulnerability Assessment, four of the nine shelter sites on island are also located in low-lying areas. Since these facilities are located at schools, and are not technically “emergency centers” this data was not reported in the “Emergency Centers” category. This data is not currently available for Rota and Tinian.

The 2016 – 2020 Assessment and Strategy Report highlights how the 2014 Standard State Mitigation Plan (SSMP) includes the addition of climate change as a new hazard profile, and includes threats identified in the 2014 Saipan Vulnerability Assessment findings as well as mitigation actions to address risk profiles that are exacerbated by climate change impacts. The 2014 SSMP highlights risks of coastal hazards including coastal and inland flooding and storm surge in low-lying coastal areas (below 10 feet in elevation), coastal erosion, and droughts. The plan notes that flash flooding is especially problematic in urban areas due to the removal of vegetation and the replacement of ground cover with impermeable surfaces. While the SSMP notes that additional data regarding tsunamis is needed, it indicates that risk of inundation is considered “high” in coastal areas below the 10-meter inundation line and along the shore.

As depicted by the images below, using a bathtub model of 50-years of sea level rise coupled with surge from a ten-year storm indicates approximately 13% of Saipan’s “developed / urban” area may be subject to extreme flooding. This number increases to 29% with surge from a fifty-year storm. The differences in the extent of these scenarios has prompted suggestions to consider “worst case” projections for future development and infrastructure investment to reduce risk in low-laying flood prone areas.

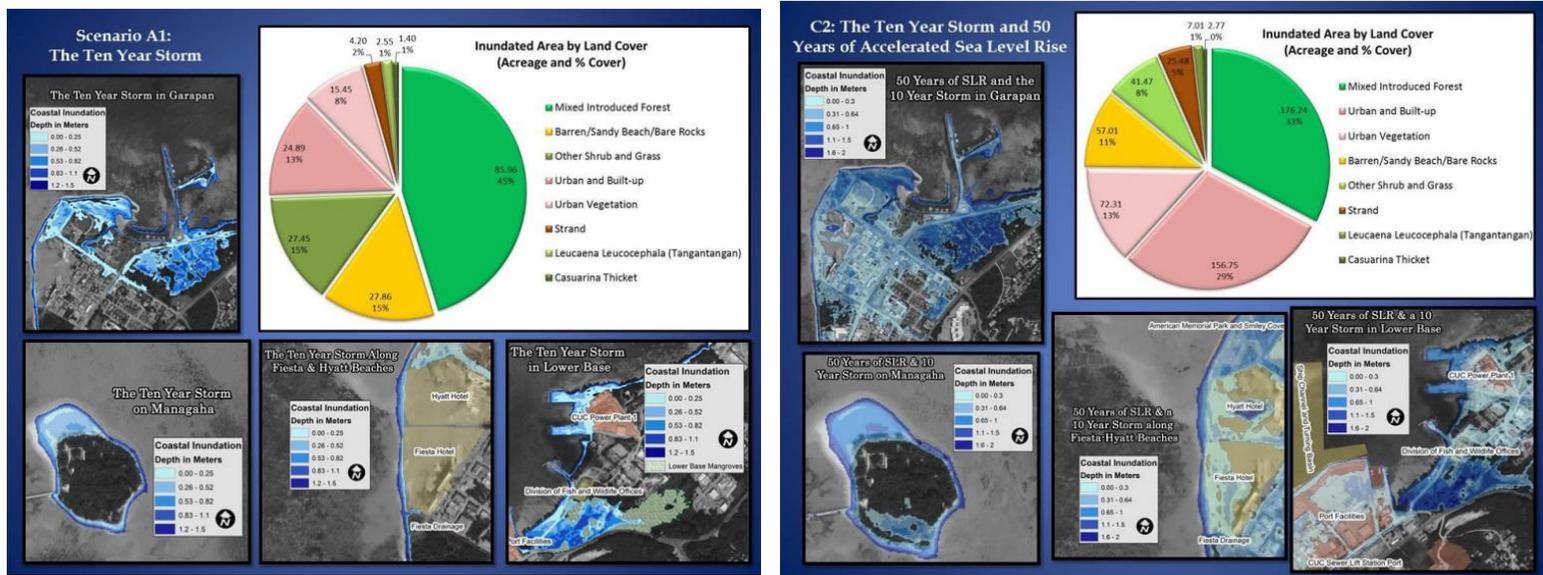


Figure 11 - Comparison of two sea level rise and storm surge scenarios. Source: 2014 Saipan Vulnerability Assessment Report, DCRM

To further reduce risk to people, property, and the environment, identified goals of the 2014 SSMP planning process for disaster mitigation in the CNMI include:

- Promoting sustainable development by reducing vulnerability to natural hazards in existing and planned development;
- To improve public awareness and decision making for land use planning by accurately mapping hazard-prone areas;
- To improve hazard risk management by the insurance industry and to help maintain adequate protection against any catastrophe for the region; and
- To promote community-based disaster preparedness and prevention activities with support from both the public and private sector.

The recently adopted 2018 SSMP similarly highlights these risks, as well as data collection and planning needs to reduce risks of impacts from coastal hazards to people, the environment, and overall community resiliency.

In assessing the state of coastal hazards, identified emerging issues and information gaps include:

Emerging Issue	Information Needed
Extent of infrastructure management / modifications needed to address risks associated with flooding and storm surge	Hydrological modeling to indicate the capacity of existing drainage facilities and the extent of rain / storm surge / sea level rise needed to cause overtopping and system failure.
Groundwater salinization due to future sea level change on Saipan	Updates to USGS Hydrological studies that focus on this specific issue.

Coastal hazards remain a high priority for the CNMI Coastal Management Program due to historic, current, and projected impacts on CNMI shorelines, coastal infrastructure, and freshwater resources. Studies conducted since the last 309 Assessment recommend the significant addition of resources to both mitigation and adaptation efforts. These recommendations are particularly important in light of recent proposals for large-scale tourism development and re-development in

the coastal zone. DCRM is working to make meaningful revisions and additions to its management policies and regulations with respect to coastal hazards. Identified management priorities include (1) adopt regulations and policies to reduce exposure to risk in coastal hazard areas, including shoreline setback requirements and buffer enhancement incentives in high-risk areas; (2) adopt policies and laws to incorporate coastal hazard considerations in the permitting process and enhance public support and awareness of these risks and potential solutions; and (3) develop policy support and incentives to facilitate protection of natural hazard mitigation features. These updates will be crucial in ensuring future coastal resiliency for the islands of the CNMI. Several risk responsive regulatory updates and policies were adopted in FY17, FY18, and FY19 funding cycles which will support updating this assessment for the 2021-2025 planning cycle.

Cumulative and Secondary Impacts

This resource management area aims to support development and adoption of procedures to assess, consider, and control cumulative and secondary impacts of coastal growth and development, including the collective effect on various individual uses or activities on coastal resources, such as coastal wetlands and fishery resources.

Due to the importance of managing coastal areas to reduce risk to people and the environment, the selected 2016-2020 “enhancement strategies” focused on (1) promoting better building and development practices through DCRM permit incentives, and (2) creating a DCRM-specific coastal hazards guidance plan that will help DCRM better address and mitigate coastal hazards. Implementation of these strategies is ongoing, therefore they are included in the recommendations subsection below. As discussed further in the “Built Environment” and “Socio-Economic Resources” sections of this report, between 2000 and 2010, CNMI’s population decreased by more than 15,000, or 22.2 percent. This trend contrasted with the one in the previous decade, when CNMI’s population increased by 59.7 percent, with a majority of the growth in Saipan Municipality. However, a population increase of 7 percent has been projected for CNMI for the 2010–2020 decade. Census data also reflects an increase in housing units despite a reduction in population, highlighting growing development pressures despite a significant decrease in population. Expansion of development poses particular concern for water quality on Saipan, and DCRM’s Marine Monitoring Team and Nonpoint Source Pollution Program continue to assess marine sites for potential impacts on Saipan, Tinian, and Rota. Additionally, BECQ-DEQ provides quarterly reports on water quality and nonpoint source pollution. As detailed further in the following section on Water Resources, these ongoing surveys indicate continued nutrient loading concerns and water quality degradation. Major drivers of these trends were identified as land-based impacts to water quality from stormwater and sediments as well as risks of increase sedimentation with potential for heavy metals and debris contamination due to proposed military build-up activities. These stressors are summarized in the chart below and detailed further in the 309 Assessment Strategy and Report.

	Stressor / Threat	Coastal Resource(s)/Use(s) Most Threatened	Geographic Scope - (throughout coastal zone or specific areas most threatened)
Stressor 1	Polluted runoff from insufficient wastewater and stormwater management as well as sedimentation and erosion due to land clearing, conversion activities, and natural processes such as wave action and storms that may be increased due to climate change (as well as potential impacts associated with live fire activities proposed on Tinian and Pagan)	Water quality (surface, ground, and coastal), habitat	Primarily more developed areas of Saipan, but development pressures also increasing on Tinian and Rota, and CJMT poses additional use concerns on Pagan.
Stressor 2	Modification of shoreline (tree removal) and marine vegetation (sea grass removal) for “beautification” for tourism purposes	Habitat	Primarily on beaches near hotels on Saipan, but an increasing concern on Rota, and may be a concern if development proposals on Tinian move forward.
Stressor 3	Increasing extent and intensity of marine use for recreation and commercial activities	Habitat, water quality	Primarily on the heavily populated and high-tourist use areas on the west side of Saipan.

To support land-based management of stormwater and sediments the report recommends ongoing watershed management planning that incorporates best management practices (BMPs), especially in the increasingly developed Garapan Watershed, and protection of groundwater resources through improved wastewater management in unsewered areas. Implementation of BMPs in livestock management and reducing use of fire in hunting practices will further reduce nutrient loading and water quality exceedances in rural areas. Key strategies to achieve these goals are outlined further in the recommendations section below.

Recommendations

Land management agencies are continuing to implement resource protection programs to achieve their mandates. Unifying standard operating procedures regarding maintenance and development priorities and additional planning coordination and goal alignment may be beneficial across these programs. Recommendations to achieve “sustainable land management” are outlined in this section. These recommendations have been extracted from existing management strategies with a focus on balancing use and conservation of natural resources from BECQ-DCRM, DLNR-DFW, and DLNR-Parks and Recreation, and focus on the cross-cutting goals of supporting sustainable natural resource use and land development in the CNMI. As such, the following recommendations highlight strategies and goals that have been organized as “protection and enhancing natural resources”, “sustainable management and improvement of open space”, “streamlining land management for sustainability objectives”, and “achieving community resilience and well-being”, as well as “continued data collection and assessment to support adaptive management planning”.

Protecting and Enhancing Natural Resources of CNMI

Working towards goals and strategies outlined in the State Wildlife Action Plan may help achieve multiple land management objectives. These include: compliance with conservation regulations, increased public engagement, and more sustainable management and improvement of open spaces

as detailed further from SWAP goals and strategies included here.

Compliance with Conservation Regulations

Goals: Increase resources for enforcement on all islands; increase public awareness of conservation regulations

Strategies:

- Install and maintain signage at all Conservation Areas and MPAs describing allowable uses
- Complete demarcation of all Conservation Area and MPA boundaries
- Continue and improve the delivery of information about conservation regulations through the DFW, BECQ, and other websites, and through social media networks Maintain existing funding for conservation enforcement, and seek new sources of funding

Public Engagement in Conservation

Goal: Increase public support for conservation of SGCN and habitats

Strategies:

- Continue and expand on environmental education and outreach efforts
- Create a community-based fish and wildlife advisory board, in particular to address issues related to harvested species
- Increase public support for conservation by providing trails, signage, and restoration demonstrations

Sustainable Management and Improvement of Open Space Resources

Saipan's 2019-2022 Strategic Parks and Recreation Plan notes maintenance challenges at parks and public areas are in part addressed by litter laws and sign prohibitions (2 CMC 85-50.2). Although enforcement of these provisions falls primarily upon the Department of Public Safety, updates to this law have allowed special enforcement personnel of the Department of Natural Resources, Bureau of Environmental and Coastal Quality, Office of Zoning, and other agencies to issue litter citations to help maintain beautiful open spaces and reduce risks to public health and safety. Use permits also help DLNR-DP&R monitor use and ensure cleanliness and safety of public recreation sites. Permit fees for established uses are collected to recover the cost of administering the permit system as well as managing, maintaining, landscaping, and beautifying facilities.

To achieve the vision, goals, and objectives outlined in the 2019-2022 Strategic Parks and Recreation Plan, the following long-term and short-term strategies outlined below and listed in full with next steps in Appendix J:

Strategy #1: Expand Recreational Programs (dependent on community needs and availability of funding)

Strategy #2: Improve Saipan Parks and Recreational Jurisdiction

Strategy #3: Increase funding for parks through Park fees, Federal Grants and Donations.

Consider funding for ongoing maintenance costs.

Strategy #4: Prioritize list of known projects.

Strategy #5: Create a unified approach –theme to beautify parks and recreational facilities

Strategy #6: Deter vandalism throughout Parks and Recreational facilities

Strategy #7: Continue updating Strategic Plan annually.

Strategy #8: Create a long-range capital plan.

Streamlining Land Management for Sustainability Objectives

In addition to supporting sustainable use of fish and wildlife and open space resources, numerous comments received by OPD through visioning surveys and as responses to this draft Resources Report highlighted the importance of streamlining development permits that support multiple

resource management objectives. These recommendations include:

- Combine permit review processes so that building code and fire compliance are conducted early in the Zoning application review process;
- Consider opportunities for pre-application project scoping to support developers in mainstreaming “smart, safe growth” principles and environmental requirements into project designs early in the process
- Include “smart, safe growth principles” project checklist as a review requirement for Zoning or “One-Start” application process

Achieving Community Resilience and Well-Being

In part to address land use pressures and achieve the vision “to protect and enhance the CNMI’s coastal resources for residents and visitors through effective and adaptive resource management, interagency collaboration, and stakeholder engagement, in a manner that builds and sustains community resilience and well-being” DCRM’s 2016-2020 priority strategies outlined in 309 Assessment and Strategy Report include (1) promoting better building and development practices through DCRM permit incentives, and (2) creating a DCRM-specific coastal hazards guidance plan that will help DCRM better address and mitigate coastal hazards.

Strategy 1: Promoting Better Building and Development Practices through DCRM Permit Incentives

The goal of this strategy is to incentivize the use of more environmentally friendly development and building practices in the CNMI. This strategy will prioritize building practices that will address two current issues facing the CNMI: (1) to reduce the impacts of stormwater runoff and non-point source pollution on the CNMI's shoreline and coastal waters, and (2) to build and enhance the resiliency of the CNMI's environment and communities in the face of a changing climate. The low-impact development (LID) building practices and enhancements identified through this strategy will be promoted as options to developers through an incentives program that will be built into DCRM's permitting system. This strategy will also include cooperative efforts with other regulatory and permitting agencies as well as the CNMI legislature with the goal of implementing similar incentives and practices outside of DCRM.

Strategy 2: Creating a DCRM-specific coastal hazards guidance plan that will help DCRM better address and mitigate coastal hazards

The goal of this strategy is to create a DCRM-specific coastal hazards guidance plan that will help better address and mitigate coastal hazards. A key component of this plan will be the development of an official agreement between DCRM and CNMI's Office of Homeland Security and Emergency Management (HSEM), such as a Memorandum of Understanding (MOU) or a Standard Operating Procedures (SOPs). This strategy will build and expand upon the sea level rise vulnerability work completed under the CNMI's 2011-2015 Section 309 Strategy. It will be informed by an enhanced social vulnerability assessment that will be completed to assess the way coastal hazards impact the different communities of the CNMI as well as a technical update and review that will use current sea level rise inundation models and be expanded to include other hazards.

Additional Coastal Hazards Risk Reduction Recommendations

- Promote sustainable development by reducing vulnerability to natural hazards in existing and planned development;
- Improve public awareness and decision making for land use planning by accurately mapping hazard-prone areas as well as designated recreation and conservation areas;
- Improve hazard risk management by the insurance industry and to help maintain adequate protection against any catastrophe for the region;
- Promote community-based disaster preparedness and prevention activities with support

- from both the public and private sector; and
- Consider “worst case” projections for future development and infrastructure investment to reduce risk in low-lying flood prone areas.

Continued Data Collection and Assessment to Support Adaptive Management Planning

Planning for wide variations in population and economic growth presents land management challenges. Given the range of uncertainty in growth scenarios and future climate conditions, efforts to continue to fill data gaps and “adaptively” manage resources to achieve use objectives will be critical. “Adaptive management” is a structured, iterative process of robust decision making in the face of uncertainty, with an aim to reducing uncertainty over time via system monitoring. In this way, decision making simultaneously meets one or more resource management objectives and, either passively or actively, accrues information needed to improve future management. Adaptive management is a tool which should be used not only to change a system, but also to learn about the system and support sustainability objectives. Because adaptive management is based on a learning process, it improves long-run management outcomes. The challenge in using the adaptive management approach lies in finding the correct balance between gaining knowledge to improve management in the future and achieving the best short-term outcome based on current knowledge. This process can help to support the accomplishment of management goals across sectors as well as periodic reassessment of key short- and long-range action items to ensure positive progress.

References

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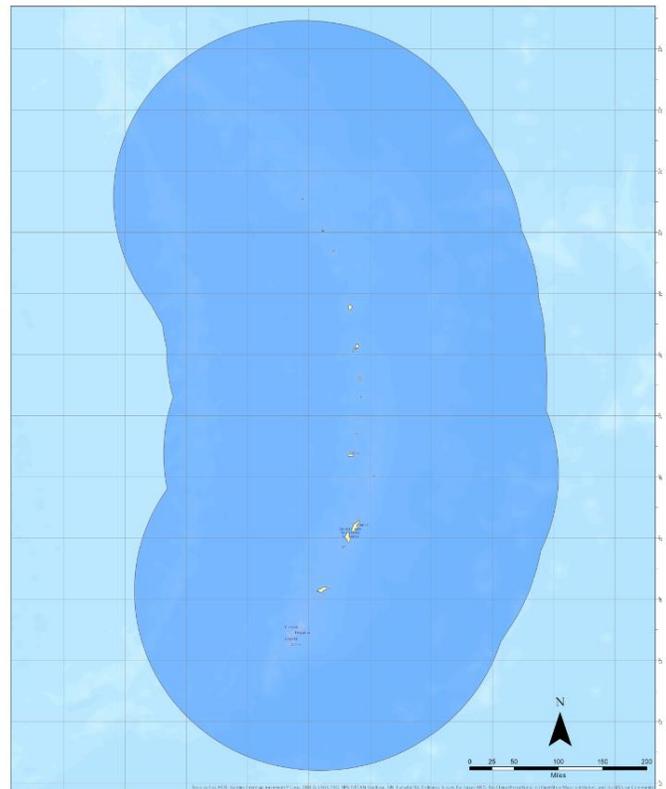
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Snapshot – Water Resources Management

This resource summary details the state of inland, coastal, and marine resources in the CNMI. The waters of the CNMI have a complicated legal status which is summarized but not fully detailed here.

The 1982 United Nations' Convention on the Law of the Sea has adopted the international definition of the "exclusive economic zone" to be from the seaward boundaries of the constituent states (3 to 12 nautical miles, in most cases) to 200 nautical miles (370 kilometers) off the coast. Within this area, nations claim and exercise sovereign rights and exclusive fishery management authority over all fish and all Continental Shelf fishery resources. In CNMI, the EEZ encompasses approximately 820,416 km² as depicted in the image at right. Increasingly, especially in the Pacific, "small" islands are self-identifying as "big ocean states", juxtaposing the size of their landmass and populations with the possession of sovereign authority over large swathes of the world's oceans. Such authority is increasingly being exercised in the context of biodiversity conservation through expanding marine protected areas (an element of both the Sustainable Development Goals and the Aichi Targets of the Convention on Biological Diversity) as an expression of "ecological responsibility." The CNMI has only recently been granted sovereignty over territorial waters and the management context of these areas remains an evolving state of law and policy.



Commonwealth of the Northern Marianas
Exclusive Economic Zone (EEZ)

In the United States, the Territorial Submerged Lands Act (Public Law 93-435), became law in 1974, two years before CNMI became a U.S. Commonwealth, and did not include CNMI. Until Congress amended that statute in September, 2013, CNMI was the only populated U.S. territory that did not have title to the submerged lands in that portion of the United States territorial sea. The law also provided the President of the United States the authority to withhold the transfer of some or all of these submerged lands for reasons of national interest, including defense preparedness and environmental protection.

In 2014 Presidential Proclamation 9077 granted title to submerged lands extending three geographical miles seaward from the islands' coasts, the transfer of submerged lands adjoining two islands where U.S. forces conduct military training – portions of Tinian and the entirety of Farallon de Medinilla which are "essential for ensuring that U. S. forces forward deployed to the Western Pacific are adequately trained and ready to respond immediately and effectively to orders from the National Command Authority, and for ensuring the safety of citizens of the Commonwealth of the Northern Mariana Islands" - and three islands in the Marianas Trench Marine National Monument - Farallon de Pajaros (Uracas), Maug, and Asuncion - until coordinated management plans can be developed to protect these resources.

As described by the 2014 Presidential Proclamation, the submerged lands of these islands are being withheld to allow time for the Department of Commerce (via the National Oceanic and Atmospheric Administration), the Department of the Interior, and the Government of CNMI to negotiate a coordinated management agreement for the national monument. The Department of the Interior could transfer these submerged lands to the Government of CNMI once a management agreement that is sufficiently protective is developed or when the Secretary of the Navy and the Government of CNMI have entered into an agreement that ensures protection of military training within the excepted area. As of December 2019, management plans have not been drafted or adopted.

Inland Waters: Wetlands and Streams

Inland water resources are primarily wetland areas which include ephemeral and perennial rivers and stream, also discussed in the “land management” section. As the Bureau of Environmental and Coastal Quality’s 2018 305b and 303d Water Quality Report (BECQ 2018) details, CNMI wetlands are not regularly monitored for water quality unless there are proposed developments within the buffer area established by the Division of Coastal Resources Management. As DLNR-DFW’s 2015 – 2025 State Wildlife Action Plan details, man-made water features, including golf course ponds, are an important wetland habitat for moorhens, as many of the moorhens on Saipan and all of the moorhens on Rota are found in man-made wetlands. DFW notes it is not known whether the productivity or survival of moorhens varies between natural and man-made wetlands. The Wildlife Action Plan also notes the importance of mangroves for coastal water quality. Additional information of coastal waters and water quality are included in the subsequent section discussing “coastal waters”.

Coastal Waters

Bureau of Environmental and Coastal Quality’s 2018 305b and 303d Water Quality Report (BECQ 2018) also monitors water quality of coastal waters, which includes shorelines and nearshore areas. Water quality is closely connected with overall ecosystem health and resiliency of aquatic systems. DLNR-DFW’s 2015 – 2025 State Wildlife Action Plan (SWAP) emphasizes the importance of coastal systems in supporting wildlife functions and human resource uses. Chapter 5 of the SWAP details habitat and wildlife in marine systems in the CNMI.

As the SWAP reports:

The CNMI archipelago also boasts relatively high coral reef species diversity, with a total of over 5,600 known reef-associated species (Paulay 2003a). More than 1000 species of reef-associated fish species, 280 species of hard coral (Randall 2003), 200 macroalgae species (Lobban and Tsuda 2003), 1,700 mollusks (Paulay 2003b; Smith 2003; Carlson and Hoff 2003; Ward 2003), 200 echinoderms (Paulay 2003c), and 800 crustaceans (Paulay et al. 2003) have been reported from the Mariana Islands. The actual number of reef-associated species that inhabit the archipelago’s varied marine habitats is likely considerably higher than what is currently known. Even at currently reported numbers the coral reef ecosystems of the Mariana Archipelago are among the most biologically diverse of all U.S. States and Territories.

The SWAP goes on to report coral cover, reef, lagoon, and reef slope areas, and major benthic types for the islands of the CNMI as detailed further in the tables that follow on the next page.

Island	Reef Flat Platform	Lagoon	Reef Slope
Uracas	0	0	0.52
Asuncion	0	0	2.07
Maug	0.01	0	3.46
Agrigan	0	0	6.47
Pagan	0	0	12.11
Alamagan	0.03	0	3.36
Guguan	0	0	2.07
Sarigan	0	0	2.56
Anatahan	0	0	6.53
Noos (FDM)	0	0	6.15
Saipan	7.94	25.08	65.62
Tinian	1.09	0.45	24.94
Aguigan	0.01	0	9.8
Rota	3.15	0	22.52

Table 2 – Area (km²) of primary reef zones for shallow (<30 m depth) coral reefs around the 14 islands of the CNMI, calculated using benthic habitat spatial data developed in 2005 by the NOAA Center for Coastal Monitoring and Assessment’s Biogeography Team. The Reef Flat Platform zone includes the “shoreline intertidal”, “reef flat”, “back reef”, and “reef margin” zones utilized for the NOAA Biogeography Team spatial data; the Lagoon zone includes the “Lagoon” and “Dredged” zones; and the Reef Slope zone includes the “Forereef” and “Bank/Shelf” zones.

Island	Coral	Coralline algae	Macroalgae	Turf algae	Seagrass	Uncolonized
Uracas	0.03	0	0	0.49	0	0
Asuncion	1.1	0.56	0	0.52	0	0.05
Maug	2.34	0.91	0.03	0.16	0	0.03
Agrigan	3.36	1.14	0.03	1.04	0	0.9
Pagan	7.64	2.56	0.1	0.93	0	0.88
Alamagan	2.08	0.68	0.03	0.13	0	0.47
Guguan	1.35	0.56	0.02	0.15	0	0
Sarigan	1.84	0.44	0.002	0.25	0	0.02
Anatahan	0.21	2.36	0.22	3.27	0	0.42
Noos (FDM)	4.36	0.02	0.64	0.27	0	0.71
Saipan	30.89	5.52	10.43	21.19	6.67	22.78
Tinian	9.42	7.47	2.02	1.85	0	5.46
Aguigan	0.87	4.0	2.53	0.14	0	2.25
Rota	6.51	5.21	3.66	1.19	0	8.71

Table 3 - Area (km²) of major benthic cover types for shallow (<30 m depth) coral reef habitat around the 14 islands of the CNMI, calculated using benthic habitat spatial data developed in 2005 by the NOAA Center for Coastal Monitoring and Assessment’s Biogeography Team.

Habitat complexity and relative condition of CNMI Marine Habitats is further assessed in SWAP Chapter 5.3.

As the SWAP details:

Comparisons of the relative condition of marine habitats across the CNMI must take into account differences in the degree of coral reef development and community composition drive by natural variation in geomorphology and wave exposure, as well as by acute natural disturbances such as typhoons and volcanic activity. The northern islands are active or dormant stratovolcanoes that have formed along the tectonically active portion of the Mariana Arc, with many of the islands having erupted multiple times in recent centuries. The northern islands are all small, with land areas ranging from 2-34 km², with the exception of Pagan (46 km²). These factors, accompanied by the strong influence of the northeast trade winds in the CNMI, together dictate that coral reefs in the northern islands are considerably less developed and host a lower number of species than those found in the older, larger, inactive southern islands. Despite less reef development and species richness, the marine communities are subjected to less human stress, notably fishing pressure and pollution. The southern islands and associated offshore banks lie atop much older, extinct volcanoes and are covered by carbonate formations. With the exception of the uninhabited island of Aguiguan, the southern islands are the largest in the CNMI, with land areas of 85-544 km². In addition, the seafloor around the southern islands is typically more gently sloping than the northern islands, and with step-like limestone topography. These conditions yield a larger range of habitat types and a greater diversity of marine species, but with greater exposure to human stressors.

Marine Waters, Coral Reefs, and Marine Species

Marine resources discussed in this section include habitat, species, and economic uses. A 2006 study qualities values of coral alone in CNMI to be \$61.7 million per year, considering benefits from tourism, habitat and fisheries, coastal protection, and other ecosystem benefits. The 2019 update of this study from BECQ-DCRM reports that together corals and seagrass provide an annual value of \$114.8 million.

As described in the chart at right, the majority of this value comes from foreign tourism, followed by coastal protection and recreation benefits, however, the ecosystem services that coral and seagrass provide that are detailed in this report include: commercial fishing, non-commercial fishing by residents, tourism and recreation, amenity/property value, research, biodiversity, and coastal protection. In an ongoing study by DCRM, 63 permitted Marine Sports Operators reported a Gross Revenue of \$3,822,019. Areas of highest economic importance include Managaha, Grotto, and Lao Lao.

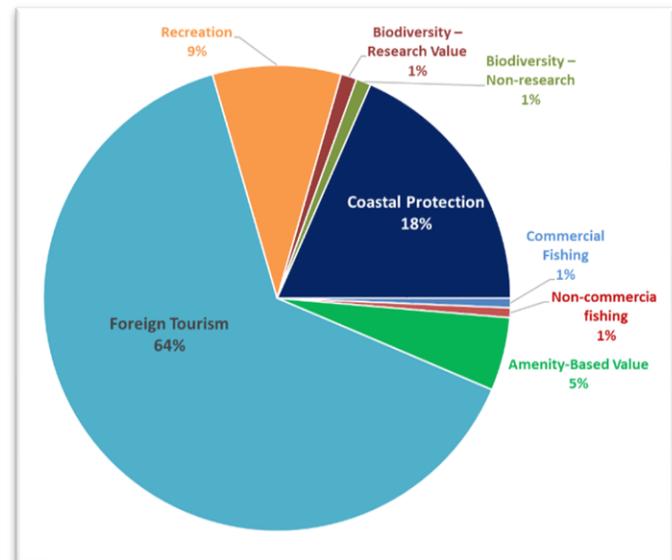


Figure 12 – Pie chart depicting source of value of corals and seagrass. Ecovaluation Update, BECQ-DCRM, 2019

Corals in CNMI have undergone serious bleaching events numerous times in the last decade; from 2013 to 2017 the CNMI had four major thermal stress and mass bleaching events, resulting in large-scale coral mortality and changes in community composition. Surveys in 2018 revealed a 66 percent reduction in overall coral cover since 2012, with over 90 percent staghorn *Acropora* spp. corals lost. Rising ocean temperatures and bleaching events combined with ocean acidification and

local stressors, have been impacting the resilience of these systems. Maynard et al. have studied resiliency of coral assemblages in Saipan, Tinian, and Rota, and have reported that some areas are more likely to “bounce back” from impacts and ongoing stressors than others. In 2018, a BECQ-DCRM supported corals analysis reported that coral reefs in CNMI are in “fair” condition, suffering from local and global environmental stressors including nonpoint source pollution and climate change. For this discussion on the health of coral reefs see Appendix K.

Healthy coral reef and seagrass systems also support resiliency of marine species. These species can be negatively impacted by numerous stressors that can result to negative socio-economic and environmental outcomes. DLNR-DFW’s 2015 – 2025 State Wildlife Action Plan (SWAP) assesses threats to marine species based on a “bioscore” that reflects resource vulnerability as well as social, economic, cultural, and/or biological values. Species with a “bioscore” of 18 or higher, with a threat ranking of “very high”, or with a bio-score of 13-17 and a threat ranking of “high” have been listed as “Species of Greatest Conservation Need” in the current SWAP. This includes 27 marine species that are listed in below in Table 4.

Table 4 – Marine Species of Greatest Conservation Need, 2015-2025 SWAP

Chamorro	Carolinian	English	Type	Bioscore ¹	Threat Ranking ²
<i>Species identified for biological reasons³:</i>					
Halu'u	Limwe	Grey Reef Shark	Shark	23	L
Tanguisson	Maam	Napoleon Wrasse	Fish	22	M
Laggua/Oscha	Igan-wosh	Steephead Parrotfish	Fish	18	M
Kabara		Seagrass Parrotfish	Fish	20	L
Toninos	Ghu	Spinner Dolphin	Mammal	18	L
Haggan karai	Wong maaw	Hawksbill Turtle	Reptile	38	L
Haggan	Wong mool	Green Sea Turtle	Reptile	46	M, H ⁴
Laun	Larr	Collector Urchin	Urchin	13	VH
Mahonggang	Yuurr	Longlegged Spiny Lobster	Crustacean	18	VH
Mahonggang	Yuurr	Pronghorn Spiny Lobster	Crustacean	16	VH
Mahonggang	Yuurr	Painted Spiny Lobster	Crustacean	12	VH
Hima	Tto	Small Giant Clam	Clam	27	VH
Hima	Shafeshaf	Fluted Giant Clam	Clam	25	VH
Tapon/Amsun	Ai'mett/Ghatil	Pectinate Venus	Clam	15	H
Gamson	Ghuus	Day Octopus	Octopus	15	H
Do'gas prensa	Mwe'ell	Horned Helmet	Snail	23	H
Kulu	Sa'wi	Triton's Trumpet	Snail	18	H
Toro	Li'yang	Common Spider Conch	Snail	20	VH
Aliling pulan	Lifott maram	Silver-mouthed Turban	Snail	18	VH
Aliling pulan	Lifott maram	Tapestry Turban ⁵	Snail	28	VH
Aliling pulan	Lifott maram	Rough Turban ⁵	Snail	28	VH
Do'gas	Abwel	Branched Murex	Snail	16	VH
Kuraling	Yeal	<i>Acropora globiceps</i> Coral	Coral	23	VH
Kuraling	Yeal	<i>Acropora retusa</i> Coral	Coral	23	VH
Kuraling	Yeal	<i>Seriatopora aculeata</i> Coral	Coral	15	VH
Kuraling	Yeal	All Staghorn Corals ⁶	Coral	23	VH

<i>Species identified for cultural or socioeconomic reasons³:</i>					
		"Food Fish"	Fish	N/A	N/A
Haggan	Wong mool	Green Sea Turtle	Reptile	N/A	N/A

¹ BioScore can range from 0 to 60 with higher scores indicating greater vulnerability.

² VH=Very High, H=High, M=Medium, L=Low; “Very High” signifies a species experiencing many and/or severe threats.

³ Many species have multiple values, i.e. biological, cultural, social, and/or economic. We identify here the value(s) for which this species was identified as SGCN. Many species have more values than what are listed here. Possible “biological reasons” are many, and does not necessarily mean that a species is in trouble.

⁴ Green Sea Turtle threats were separately assessed for terrestrial (nesting) and marine (foraging) threats. Terrestrial threat ranking is “High”, and the marine threat ranking is “Medium”.

⁵ The Marianas host endemic, undescribed subspecies of Tapestry Turban (*Turbo petholatus* ssp. undescribed) and Rough Turban (*T. setosus* ssp. undescribed) (G. Paulay, unpublished data).

⁶ “Staghorn corals” is a generic term for a group of corals, many of the genus *Acropora*, displaying an antler-like growth form and inhabiting nearshore shallow waters. Species in the CNMI include *Acropora aspera*, *A. austera*, *A. intermedia*, *A. muricata*, *A. pulchra*, and others.

This threat listing highlights the numerous challenges facing marine species and the ecosystems they depend on in the CNMI.

Status, Impacts, and Responses

Numerous factors influence the quality of inland, coastal, and marine water resources. Despite management challenges at local and global levels, there are also numerous management interventions that can help reduce vulnerabilities and build system resiliency. Implications of the status, observed impacts, and recommendations to help address these challenges are detailed further in here with focus on water quality of inland and coastal waters, and opportunities to enhance management outcomes for marine waters, seagrass, and coral reefs.

Inland and Coastal Waters and Water Quality

For the wetlands that have biological information available, an assessment of the Propagation of Aquatic Life Designated Use (DU) was made, the only DU assessed for CNMI wetlands, while lakes are designated to support propagation of shellfish and other aquatic life, fish/shellfish consumption, potable water supply, recreation, and aesthetic values. Of the total 717.8 acres of CNMI wetlands assessed, 85.6 acres are reported to be attaining the Aquatic Life DU, while 568.4 acres – approximately 79% - were found to be not supporting or attaining due to a “non-pollutant”. All 267.4 acres of assessed lakes were classified as meeting aesthetic enjoyment and potable water supply uses, however, the 57.4 acre Susupe Lake was found to not support recreational or propagation of aquatic life designated uses due to high pH (>8.5), diminished dissolved oxygen (<75%), and *E. coli* exceedances as well as invasive species. Impairment causes for wetlands and lakes are further detailed in the Tables 5, 6, and 7.

Table 5 - Size of CNMI Wetlands Impaired by Sources

Sources of Impairment	EPA Source ID	Size of Waters Impaired (Acres)	Comments
ALL WETLANDS (Class 1)			
Drainage/Filling/Loss of Wetlands	36	568.4	non-pollutant
Flow Alterations from Water Diversions	42	568.4	non-pollutant
Introduction of Non-native Organisms	180	568.4	non-pollutant

Table 6 - Designated Uses for CNMI Lakes

Designated Use	*Total in State (Acres)	Total Assessed (Acres)	Supporting /Attaining (Acres)	Not Supporting /Attaining due to non-pollutant	Insufficient Data / Does not exist (Acres)
ALL LAKES (Class 1)					
Propagation of shellfish and other aquatic life	267.4	267.4	210.0	57.4	0.0
Fish/shellfish consumption	267.4	267.4	210.0	0.0	57.4
Recreation with risk of waterborne illness	267.4	267.4	210.0	57.4	0.0
Potable Water Supply	267.4	267.4	267.4	0.0	0.0
Aesthetic enjoyment /other uses	267.4	267.4	267.4	0.0	0.0

Table 7 – Size of CNMI Lakes Impaired by Sources

Cause/Impairment Type	EPA Cause ID	Size of Waters Impaired (miles)	Comments
ALL LAKES (Class 1)			
Escherichia coli	217	57.4	
Oxygen, Dissolved	322	57.4	
pH, High	491	57.4	
Nonnative Fish, Shellfish, or Zooplankton	313	57.4	Non-Pollutant

There are 240.5 ocean shoreline miles in the CNMI. As the Bureau of Environmental and Coastal Quality’s 2018 305b and 303d Water Quality Report (BECQ 2018) reports, 140.4 ocean miles (58%) were found to be fully supporting all the designated uses set forth in the Clean Water Act (CWA), which make them “fishable and swimmable”. This includes the Support and Propagation of Aquatic Life, Fish and Shellfish Consumption, Recreational Use, and Aesthetic Enjoyment Designated Uses (DU). The remaining 100.1 coastal shoreline miles were unsupportive of at least one DU, or lacked sufficient information to assess their attainment. Coastal water impairments were either caused by pollutant concentrations exceeding the CNMI Water Quality Standards (WQS), and/or by a non-pollutant. Examples of non-pollutants include: diminished Aquatic Life Support Function (ALUS), alteration of hydrology, invasive species, etc. There were 30.1 ocean shoreline miles impaired due to a “Poor” ALUS ranking, this resulted in non-support of the Propagation of Aquatic Life DU, which included 6.7 coastal miles surrounding Saipan, 2.6 miles surrounding Rota, 20.8 miles surrounding Tinian.

Of the CNMI’s coastal shoreline miles that were impaired by a pollutant, exceedances of the WQS for dissolved oxygen, phosphate and Enterococci, were the most frequent causes for 303(d) listing a waterbody as impaired. Of the 50.5 coastal miles impaired due to Enterococci (21% of CNMI coastal miles), of these 17.8 miles surround Rota, and 32.7 miles surround Saipan. As in previous years the most common sources of Enterococci contamination are from point sources, such as failing sewer lines and other municipal wastewater collection, or individual on-site wastewater collection systems, and non-point sources (NPS).

NPSs include: (1) sediment-laden storm water runoff with naturally occurring Enterococci from urban runoff, secondary coral roads, erosion from construction sites and new developments, etc.; (2) Illicit wastewater discharges from animal pens and outhouses; (3) waste from free range feral and domestic livestock; and (4) in the case of remote tourist locations, an increase in visitor numbers in conjunction with a lack of available public restroom facilities at these sites. Notably, many of CNMI coastal waters showed a marked decrease in the percent of Enterococci violations since last reporting cycle. Saipan’s decrease is associated with upgrades to the municipal sewer system, completion of Phase I through III of the Cross-Island Road Reconstruction project, construction of roadway storm water Best Management Practices (BMPs), as well as a reduction in rainfall. Only “Aesthetic Enjoyment” is a fully supported “designated use” by all CNMI coastal waters. Maps on the following pages depict CALM Categories and causes of impairment for Saipan, Tinian, and Rota. In part to protect and enhance CNMI’s water quality, in 2018 the Division of Environmental Quality adopted “Total Maximum Daily Loads” (TMDLs) for waters impaired by bacteria on Saipan.

Saipan Coastal Waters CALM Categories and Causes of Impairment





Marine Waters and Coral Reefs

Based on an assessment of the available NOAA MARAMP survey results and other available literature, and in concordance with Starmer et al. (2008), the marine habitats of the CNMI exhibit a range of conditions as a result of various environmental and anthropogenic factors. The reefs of the southern populated islands have clearly been impacted by anthropogenic stressors, such as runoff and fishing pressure, in compliment to crown-of-thorns starfish in the mid-2000s. In contrast, the northern islands appear to have mainly been impacted by natural environmental regimes, including volcanic activity, periodic ashfall from adjacent watersheds, and naturally slow recovery rates. Both the northern and southern islands appear to have been significantly impacted by the recent back-to-back coral bleaching events. Coral reef areas impacted by chronic anthropogenic stressors are less resilient to acute disturbances, such as cyclones, COTS outbreaks, and temperature stress events, and can be expected to deteriorate further, potentially shifting from coral-dominated to less productive and less diverse fleshy algae- and cyanobacteria-dominated systems. The predicted increase in the frequency and severity of thermal stress events in the coming decades and the looming threat of ocean acidification will likely challenge even the healthiest of reef systems, but those systems with suitable water quality and robust reef fish communities will have the best chance at adapting to rapidly changing environmental conditions and continuing to provide essential goods and services to human populations. To address these multiple stressors, comprehensive planning and project development efforts are underway to try to reduce risk exposure and increase adaptive capacity at key “resilience hubs” through a pending resource mapping project. This product will support development of more robust plan and project development tasks that focus on building the resilience of inland, coastal, and marine systems to support the valuable ecosystem services they provide.

Some species and systems may be more likely to be resilient or “bounce back” from change than others. Maynard et al.’s coral resilience studies assess the relative vulnerability and ability of identified coral assemblages on Saipan, Tinian, and Rota to respond to and bounce back from disturbances (Maynard et al., 2015). As that paper describes, ecological resilience assessments are an important part of resilience-based management (RBM) and can help prioritize and target management actions. Use of such assessments has been limited due to a lack of clear guidance on the assessment process. The 2015 study builds on the latest scientific advances in RBM to provide that guidance from a resilience assessment undertaken in the Commonwealth of the Northern Mariana Islands (CNMI). Researchers assessed spatial variation in ecological resilience potential at 78 forereef sites near the populated islands of the CNMI: Saipan, Tinian/Aguijan, and Rota. The assessments are based on measuring indicators of resilience processes and are combined with information on anthropogenic stress and larval connectivity.

The analysis identified great spatial variation in relative resilience potential with many high resilience sites near Saipan (5 of 7) and low resilience sites near Rota (7 of 9). Criteria were developed to identify priority sites for six types of management actions (e.g., conservation, land-based sources of pollution reduction, and fishery management and enforcement) and 51 of the 78 sites met at least one of the sets of criteria. The connectivity simulations developed indicate that Tinian and Aguijan are each roughly 10. × the larvae source that Rota is and twice as frequent a destination. These results may explain the lower relative resilience potential of Rota reefs and indicates that actions in Saipan and Tinian/Aguijan will be important to maintaining supply of larvae. Maps of these sites are included in an excerpt from the report to support additional discussions of marine management priorities in these areas.

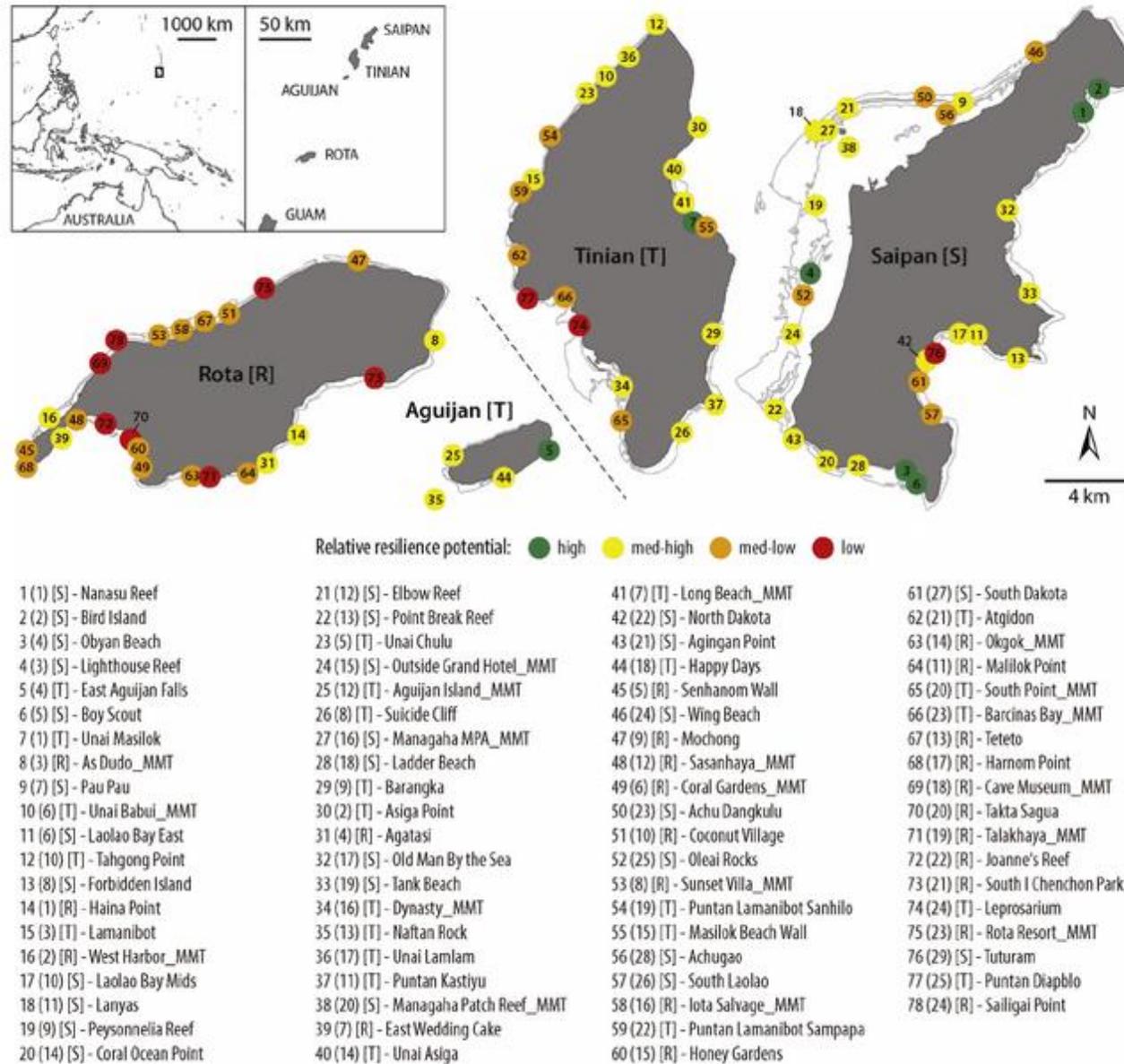


Figure 13 – Inter-island relative resilience potential of the 78 forereef survey sits in CNMI. Resilience rankings are from highest to lowest resilience score; the average score resilience indicators after normalizing and scaling scores among islands. Relative classifications for resilience scores are as follows: high ($> \text{avg.} + 1\text{sd}$), medium-high ($< \text{avg.} > \text{avg.}$), medium-low ($< \text{avg.}$ and $> \text{avg.} - 1\text{sd}$, see Fig. 3 in Mayard et al. report). Intra-island rankings are shown in square brackets “[]” to the right of the inter-island ranking, site numbers on the maps. Sites with “MMT” in the name refer to sites surveyed by the marine monitoring team of the Bureau of Environmental and Coastal Quality in the

Currently, CNMI has seven “Marine Protected Areas” (MPAs). MPAs are defined areas where natural and/or cultural resources are given greater protection than the surrounding waters. MPAs in CNMI span a range of habitats and vary in purpose, legal authority, management approaches, levels of protection, and restrictions on human uses. These “no take” and “limited take” areas as well as harvest restrictions were established by numerous laws and regulations, with management authority resting on the DLNR’s Division of Fish and Wildlife (Public Law 2-51, 18-42).

As reported by Starmer et al., of these, the Sasanhaya Bay Fish Reserve in Rota, the Mañagaha Marine Conservation Area, Forbidden Island Sanctuary, and Bird Island Sanctuary are established no-take zones for all marine resources by CNMI Public Law. In addition, permanent Topshell Gastropod Reserves exist on a mile-long stretch of the Saipan Lagoon barrier reef, the Lighthouse Reserve, and at Tank Beach. The Tank Beach Reserve overlaps with the Forbidden Island Sanctuary. Permanent Sea Cucumber Reserves have been established by DFW regulation at Lau Lau Bay and Bird Island, the latter of which overlaps with the Bird Island Sanctuary. The total area covered by no-take reserves is estimated at 9.63 km² while the total area of all MPAs is estimated at 12.32 km².

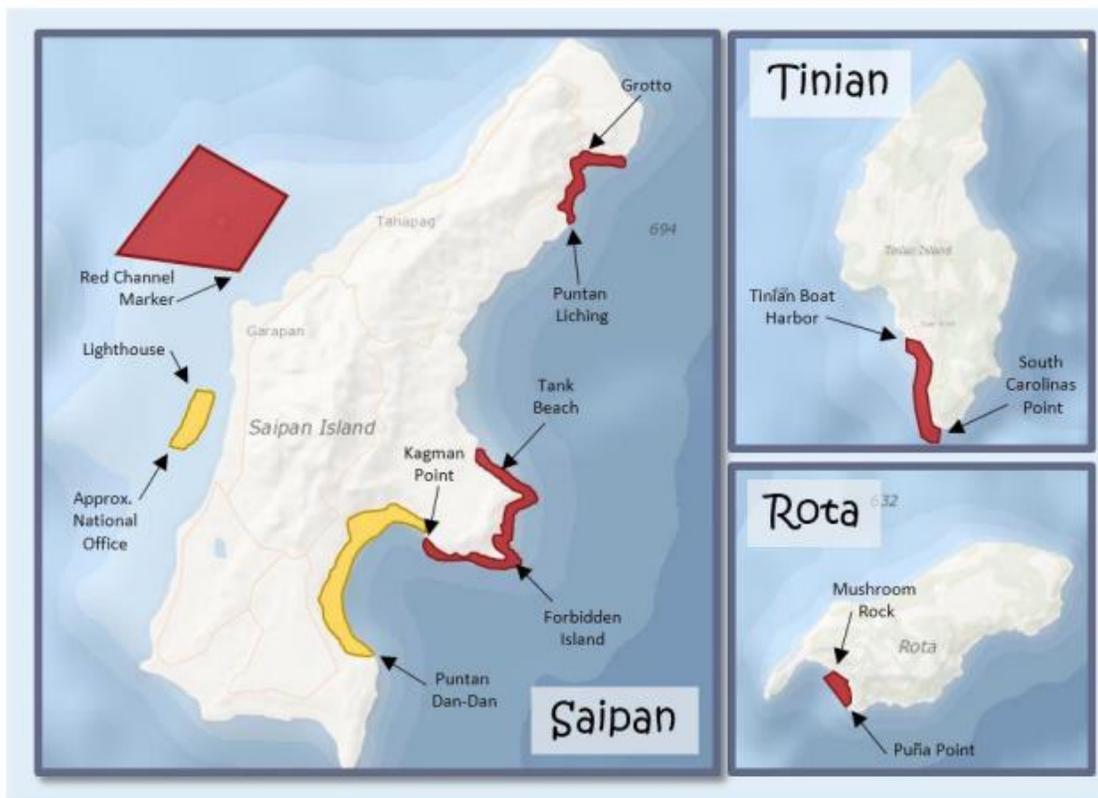


Figure 14 - Map of CNMI’s seven Marine Protected Areas (MPAs). Red areas are no-take MPAs, and yellow areas are limited take, or species-specific MPAs. Source: DNLN-DFW Marine Protected Areas (MPAs) of the CNMI Pertinent Laws and Regulations. July, 2015.

DLNR-DFW works closely with resource management partners to ensure these areas promote conservation of wildlife and marine life, protecting these areas in the public interest of CNMI.

Recommendations

Goals and strategies related to marine resources outlined in the State Wildlife Action Plan include:

Coral Reef Restoration and Management

Goal: Build capacity to restore and enhance coral reefs, especially in response to bleaching events

Strategies:

- Establish a coral nursery with the infrastructure and staffing expertise needed for propagation and seeding of corals, including ESA-listed corals
- Prioritize reefs for management, and implement appropriate actions to reduce the impacts of bleaching events

Marine Pollution Reduction

Goal: Reduce runoff from land-based sources of pollution

Strategies:

- Continue implementation of watershed plans such as the Garapan Conservation Action Plan (CAP), LauLau Bay CAP, and Talakhaya CAP
- Map the sources and distribution of pollutants in Saipan Lagoon in relation to pollution-sensitive marine SGCN; target actions in locations that can most benefit SGCN

To further improve marine resource monitoring and management outcomes that protect and enhance ecosystem services, the 2019 BECQ-DCRM Coral and Seagrass Ecoevaluation Study offers recommendations that include:

Ecosystem Service	Recommended Next Steps
Commercial Fishing	<ul style="list-style-type: none"> • Update data (landings, price per pound, etc.) annually. • Perform additional research using the “high catch rate” period to estimate value. • Perform research into the relative productivity of coral reefs and seagrass in terms of fisheries and adjust the distribution between the two habitats accordingly.
Non-commercial fishing	<ul style="list-style-type: none"> • Repeat the survey and associated analysis conducted for Guam for the 2006 report for CNMI to develop a more precise and more relevant estimate for this and other ecosystem services. • Perform research into the relative productivity of coral reefs and seagrass in terms of fisheries and adjust the geospatial distribution and associated values between the two habitats accordingly to provide geospatial explicit valuation data and management priorities.
Amenity-Based Value	<ul style="list-style-type: none"> • Perform a hedonic property valuation analysis to develop estimates of how property values vary with proximity to coral reefs and seagrass (or, alternatively, proximity to the shoreline). This would replace the study used as a basis for the estimate in the ecoevaluation report to support future updates.
Foreign Tourism	<ul style="list-style-type: none"> • In order to keep these estimates up to date, CNMI should continue to update the values for the dollars spent per person from different countries and the number of annual trips taken by visitors from those countries. • Identify the places that tourists visit that are related to coastal habitats. CNMI should determine which locations are most popular to allow for better spatial distribution of the estimates.
Recreation	<ul style="list-style-type: none"> • Update the costs per activity and the numbers of activities on a regular basis. • Map the locations where the activities occur based on input from businesses that perform these activities; this would allow for better spatial distribution of the estimates. • Perform a WTP study to estimate the value that people place on these specific activities
Biodiversity – Research & Biodiversity – Non-research	<ul style="list-style-type: none"> • Perform additional research on approaches to value research and non-research biodiversity values.

Additional recommendations from the Saipan Lagoon Use Management Plan including collection and analysis of system carrying capacities should be considered for implementation and water quality enhancement efforts should continue.

Pending USGS groundwater studies should be expanded to create updated “water budgets” for Saipan, Tinian, and Rota to support long-term water resource sustainability planning.

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- 2017 Saipan Lagoon Use Management Plan / DCRM User Capacity Updates (publication pending)
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Snapshot: Biodiversity – Invasive and Native Species

As described in the DLNR-DFW State Wildlife Action Plan, invasive species are species that are not native to the CNMI (i.e. were not here when Chamorros first arrived), and whose introduction here does or is likely to cause environmental or economic harm or harm to human health. Due to their evolutionary history and high levels of endemism, animals of the Marianas are particularly susceptible to the threats posed by the introduction and spread of invasive species. Invasive species (sometimes called “non-native,” “alien,” or “exotic”) may outcompete native species, or may directly harm native species through predation. Virtually no habitat important for Species of Greatest Conservation Need (SGCN) is free from the threat of invasive species, and most habitats important for SGCN experience some negative effects related to invasive species which can result in habitat loss or degradation for our SGCN.

In addition to invasive species already established in the CNMI, numerous species are positioned to invade. While a potentially invasive species can be introduced through air or ship travel from anywhere, with the high frequency of travel between Guam and the CNMI, and the similarity of climate, we are particularly at risk to receive new invasive species introductions from Guam. Guam has several invasive species that have yet to invade the CNMI, but pose a serious threat to our native wildlife, ecosystem, economy, and public health. Measures have been established in the CNMI to prevent introduction of brown tree snake (*Boiga irregularis*), which has extirpated nearly all of Guam’s native avifauna. However, Guam hosts other invasive species that could have devastating impacts if they became established in the CNMI, including the little fire ant (*Wasmannia auropunctata*) and coconut rhinoceros beetle (*Oryctes rhinoceros*). CNMI’s DLNR has been working diligently to monitor and control invasive species in order to protect the native and endemic species and habitats throughout the Marianas islands.

Many native species are protected by local and federal regulations.

The Division of Fish and Wildlife of the Department of Lands and Natural Resources, reorganized under E.O. 94-3, was created by Commonwealth Public Law (PL) No. 2-51 on October 1981, to provide for the conservation of fish, game, and endangered species. The Division of Fish and Wildlife (DFW) first promulgated permanent “Fish and Game Regulations” in 1983 under the authority of PL 1-8 and PL 2-51. The 1986 Fish and Game Regulations readopted and republished the previous regulations in their entirety with extensive changes. In 2000, the Division issued the “Non-commercial Fish and Wildlife Regulations” that are codified in Commonwealth Administrative Code Title 85, subchapter 30, as amended. These regulations establish species-specific protections and various hunting prohibitions to support conservation objectives. As the DLNR-Division of Fish and Wildlife reports, locally protected species include:

Protected Wildlife	Order, Family, Species	Common Names
Seabirds (including, but not exclusive to:)	Order Procellariiformes --Family Diomedidae- -- <i>Phaethon lepturus</i>	Albatrosses White-tailed Tropicbird Brown Booby

	-- <i>Sula leucogaster</i> -- <i>Sula sula</i> -- <i>Sula dactylatra</i> -- <i>Frigata minor</i>	Red-footed Booby Masked Booby Great Frigatebird
Long-legged, long-necked Waders	Order Ciconiiformes -- <i>Egretta sacra</i> -- <i>Bubulcus ibis</i> -- <i>Egretta intermedia</i>	Pacific Reef-Heron Cattle Egret Intermediate Egret
Waterbirds	Family Rallidae -- <i>Rallus owstoni</i> -- <i>Gallunula chloropus</i>	Guam rail Mariana Common Moorhen
Shorebirds	Order Charadriiformes -- <i>Anous minutus</i> -- <i>Anous stolidus</i>	Black Noddy Brown Noddy
Native Forest Birds	<i>Megapodius laperouse</i> <i>Gallicolumba xanthonura</i> <i>Ptilinopus roseicapilla</i> <i>Aerodramus vanikorensis</i> <i>Corvus kubaryi</i> <i>Monarcha takatsukasae</i> <i>Rhipidura rufifrons</i> <i>Acrocephalus luscini</i> <i>Aplonis opaca</i> <i>Zosterops conspicillatas</i> <i>rotensis</i> <i>Cleptornis marchei</i>	Micronesian Megapode White-throated Ground- Mariana Fruit Dove Island Swiftlet Mariana Crow Tinian Monarch Rufous Fantail Nightingale reed-warbler Micronesian Starling Rota Bridled White-eye Golden White-eye
Reptiles	<i>Chelonia mydas</i> <i>Eretmochelys imbricata</i> <i>Perochirus ateles</i>	Green Sea Turtle (Haggan) Hawksbill Turtle (Haggan Karai) Micronesian Gecko (uali'ek)
Marine Mammals	Cetaceans	Whales and Porpoises
Plants	<i>Serianthes nelsonii</i> <i>Lycopodium phlegmaria</i> <i>Osmoxylon mariannense</i> <i>Tabernaemontant rotensis</i>	Fire tree (Trongkon guafi, Hayun lago) cat's tail or discipina fern (no common name) (no common name)

As outlined by DFW's hunting regulations, hunting of any species on the above list is prohibited.

Games species, listed in the chart below, may be hunted with a permit in accordance with time and method restrictions (see 1 CAC §§ 85-30 et sec). In addition to timing and catch limit restrictions, size and gender limitations are established for some species, for example, no coconut crabs smaller than three inches wide across the back may be harvested, no female coconut crab, regardless of size, may not be taken when it is carrying eggs beneath the abdomen may be harvested, and the only legal means of taking coconut crabs is by hand

GAME ANIMALS	Bag Limit (Total/CNMI)	Season Limit (Total/CNMI)	SEASON
Sambar Deer (Rota only)	1	1	9/1 - 11/30
Wild Goat/Pig/Cow	No Limit	No Limit	Open all year
Philippine Turtle-Dove	5 10	20 20	4/15 - 5/31 10/1 - 11/30
Coconut Crab	5	10	9/15 - 11/15
Land Crab	No Limit	No Limit	4/1 - 6/30 and 10/1 - 12/3

To further support conservation objectives, DFW’s regulations also establish procedures and requirements for scientific research and export licenses.

Status, Impacts, and Responses

Most invasive species introductions are accidental from species “hitchhiking” on a plane or boat. However, introductions can and have occurred intentionally. The CNMI has strict laws regarding importation of live organisms into the Commonwealth, but residents may be unaware of the laws, or disregard them. For example, apple snail (*Pomacea* spp.) appears to have been intentionally introduced on Saipan by individuals presumably trying to create a readily available “wild” food source, without knowledge of the devastating impact this species can have on natural communities. Apple snails can compete with native species for limited resources, consuming all types of aquatic plants, potentially altering the natural balance of a wetland system.

Other introductions have occurred from legally or illegally imported pets that then escaped or were released and formed wild populations. Orange-cheeked waxbills are now ubiquitous on Saipan for this reason. The Division of Fish and Wildlife has recently taken measures on Saipan to control an incipient population of rose-ringed parakeets (De La Torre 2015). In addition to preventing new invasive species introductions to the CNMI, it is equally important to prevent the spread of invasive species among islands of the CNMI. Many of the invasive species that already occur in the CNMI may currently be restricted to just a few islands, often the southern inhabited islands (Table 8). Islands with few invasive species are refugia for many of our terrestrial SGCN.

The 2015-2025 SWAP goes on to detail current invasive species, which include habitat modifiers,

introduced ungulates, non-native predators, and invasive or nuisance marine species, as well as discusses threats of additional impacts due to development, climate change, military expansion, pollution, harvest, tourism and recreation, natural disasters, and sea transportation. These threats are detailed in the SWAP as follows:

Habitat Modifiers

One of the major threats to forest-dependent SGCN is the uncontrolled spread of many invasive plants. Because the seeds of many invasive plants persist for years, and many are bird-dispersed, eradication is exceedingly difficult after the plant is established. Invasive vines including scarlet gourd (*Coccinia grandis*), chain-of-love (*Antigonon leptopus*), alalag/paper rose (*Operculina ventricosa*), bitter vine (*Mikania micranthra*), bitter gourd (*Momordica charantia*) and wood rose (*Merremia tuberosa*) are of particular concern as they are visibly rapidly spreading across many islands. Invasive vines can potentially smother and kill host trees, bringing down the canopy so that forest is converted to scrub-shrub or grassland habitat. They also reduce light availability under the canopy, impacting plant species composition and the rate of forest regeneration.

Introduced Ungulates

Introduced ungulates (hooved animals) in the CNMI include goats (*Capra hircus*), deer (*Rusa marianna*), pigs, and cattle (*Bos taurus*). Ungulates directly and indirectly affect ecosystems through damaging vegetation by grazing and browsing, trampling seedlings, spreading non-native plant seeds, disturbing soil, and increasing erosion. These activities can affect the amount of light and moisture levels within forests, as well as nutrient cycling, and result in modified or destroyed plant and animal communities, decreased water retention of soils, increased erosion, and decreased water quality.

Because our native plants only recently have been exposed to the effects of grazing, they lack common defenses such as thorns or toxins. Thus, grazing and browsing animals often prefer native plants over non-native plants. Grazing and browsing can result in the extirpation of native plant populations, but even low intensity browsing can affect the species composition of habitats. Soil disturbance by rooting animals (i.e. pigs) favors the germination and establishment of alien plant species, many of which are adapted to such disturbances and may require disturbance to complete their life cycle. Conversely, native species are not adapted to such disturbances and tend to be negatively affected. This in turn affects the composition of plant communities, which indirectly affects the animals that depend on the community; effects on native invertebrates may be particularly acute.

DLNR-DFW has conducted eradications of feral ungulates on two islands to date, Anatahan and Sarigan. There has been a tremendous positive response of wildlife and vegetation on Sarigan following the successful eradication (Kessler 2011b.) Feral ungulate control or eradication is more controversial on the islands where they remain (Aguiguan, Alamagan, Pagan, and Agrigan). Many CNMI residents value these populations as a food source, or simply enjoy hunting for recreation, so support for eradication or control may be weak or lacking.

Table 8 – Presence across CNMI islands of select terrestrial invasive or feral animals of concern to wildlife*. Y=known or presumed present, N=known or presumed absent, blank indicates status unknown. Numbers in parentheses indicate the source reference, listed below. Source: DFW 2015-2025 SWAP.

	 Dog	 Cat	 Rat**	 Cow	 Goat	 Pig	 Deer <i>Rusa marianna</i>	 <i>Euglandina</i> snail	 <i>Platydemus</i> flatworm	 Curious Skink <i>Carlia ailianpalai</i>	 Oceanic Gecko <i>Gehyra oceanica</i>	 Musk Shrew <i>Suncus murinus</i>
Rota	Y	Y (1)	Y (2)	N	N	Y (24)	Y (24)	N (3)	Y (3)	Y (4)	Y (5)	N (2)
Aguiguan	N (6)	N (6)	Y (6)	N	Y (7)	N	N	N (8)	Y (8)	Y (4)	Y (4)	N (4)
Tinian	Y	Y	Y (2)	N	N	N	N	N (8)	Y (8)	Y (4)	Y (4)	Y (2)
Saipan	Y	Y	Y (2)	N	N	N	Y	Y (9)	Y	Y (10)	Y (10)	Y (2)
FDM	N	N	Y	N	N	N	N					
Anatahan	N	Y (7)	Y (11)	N	N	N (12)	N			N (13)	Y (14)	N (13)
Sarigan	N	Y (7)	Y (11)	N	N	N	N	N (15)	N (15)	N (15)	Y (14)	N (15)
Guguan	N	N	Y (11)	N	N	N	N			N (16)	Y (17)	N
Alamagan	Y (7)	Y (11)	Y (11)	Y (11)	Y (11)	Y (11)	N			N (18)	Y (17)	N (18)
Pagan	Y (19)	Y (11)	Y (11)	Y (11)	Y (11)	Y (11)	N	N (20)		N (21)	Y (21)	N (21)
Agrigan	Y (11)	Y (11)	Y (11)		Y (11)	Y (11)	N	Y (9)		N (22)	Y (22)	N (22)
Asuncion	N	N	Y (11)	N	N	N	N			N (23)	Y (17)	N (23)
Maug	N	N	Y (11)	N	N	N	N					
Uracas	N	N	Y (11)	N	N	N	N					

*This is not a comprehensive list. Cuban slug, black drongo and other invasive animals are present and negatively impacting native wildlife.

**Different rat species occur on different islands, but all prey upon native birds and snails and impact forest regeneration.

Sources (see References section for full citations):

- 1, Zarones et al. 2015; 2, Wiewel et al. 2009; 3, Bauman 1996; 4, USFWS 2009; 5, Wiles et al. 1990; 6, Amidon et al. 2014; 7, Amidon et al. 2010; 8, Smith 2013; 9, Bauman and Kerr 2013; 10, Wiles and Guerrero 1996; 11, Kessler 2011a; 12, DoN 2013; 13, Cruz et al. 2000c; 14, Vogt et al. 2001; 15, Martin et al. 2008; 16, Cruz et al. 2000d; 17, Rodda et al. 1991; 18, Cruz et al. 2000b; 19, Kessler 2011b; 20, Hadfield 2010; 21, Reed et al. 2011; 22, Cruz et al. 2000a; 23, Williams et al. 2009; 24, Gawel 2012

Non-native Predators

Our terrestrial animals evolved in the absence of mammalian predators and are extremely vulnerable to predation by these invasive species, especially rats (*Rattus* spp.) and feral cats (*Felis catus*). These species prey on eggs, nestlings, and adult birds, limiting populations. Rats are ubiquitous throughout our islands. Rats are commonly known to prey upon all of our bird species, even climbing into trees to prey upon canopy-nesting species. They are also known predators of our tree snails, and eat the seeds of a large number of native plant species, limiting their regeneration. Feral cats are extremely skilled predators and have been responsible for the extinction of birds on other islands. In the CNMI, cats are widely distributed (Table 20). Presently, high densities of feral cats are partially blamed for the continuing decline of Mariana crow on Rota.

Other predators that pose ongoing threats to native bird species include feral and unleashed dogs (*Canis familiaris*). Fortunately, snakes have yet to become established in the CNMI. Given that the brown tree snake (*Boiga irregularis*) effectively caused the extinction of most of Guam’s avifauna, it is expected that the successful establishment of predatory snakes in the CNMI would have equally devastating consequences.

Introductions of invertebrates, including ants, snails, and wasps, have been extensive throughout the CNMI. While we know much less about invasive invertebrates and how they affect our SGCN, we have examples that show that these can have devastating impacts on terrestrial invertebrate SGCN by preying on or parasitizing native invertebrates. For example, the SGCN tree snail *Partula langfordi*, known only from the island of Aguiguan, survived many threats on that island going back hundreds of years, including the introduction of rats, introduction of goats, large-scale conversion of forest habitat to agriculture, and intentional introduction of a non-native carnivorous snail (*Gonaxis kibweziensis*). Despite all of these threats, the species persisted into the 1990s, at which point the invasive flatworm *Platydemus manokwari* was accidentally introduced with plant materials taken to the island. The species has not been seen since, and may well be extinct (Smith 2008).

Invasive and Nuisance Marine Species

Non-native marine species have the potential to become invasive and cause significant impacts to marine habitats and species by out-competing and replacing native taxa and even altering the entire ecosystem. The introduction of non-native and potentially invasive coral reef species can be intentional, typically as a means to enhance fisheries, or accidental, primarily by transport on ship hulls and ballast water or by aquarists disposing of unwanted organisms. There are also concerns that red tilapia, *Oreochromis mossambica*, which was intentionally introduced in the 1950s, may enter the Saipan Lagoon from adjacent open-system pools (Starmer 2005).

Within the CNMI, non-native marine species that have been intentionally introduced include the topshell, *Tectus niloticus*, which was introduced by the Japanese in 1938. Topshell populations have been established in the CNMI and have become an important fishery requiring regulation, including a moratorium and the establishment of two no-take reserves. The effects of the introduced topshell on native taxa and coral reef ecosystems is unknown (Starmer 2005), but its abundance in unfished areas suggests that it may out-compete native topshell species and perhaps other organisms that share food sources and refugia. The potential for additional (and likely unplanned) introductions currently exist and will likely increase with an increase in ship activity directly or indirectly related to U.S. military activities in the CNMI and throughout the region. Unintentional introductions of non-native and potentially invasive marine species would mostly likely occur via transport on ship hulls or ballast water, although the risk associated with ballast water is at least somewhat mitigated by a prohibition on the discharge of ballast water in commercial port areas, and because vessels are more likely to take in rather than discharge ballast water in the CNMI (Starmer 2005).

A small number of coral reef species native to the CNMI, most notably the corallivorous crown of thorns seastar (*Acanthaster planci*), may be considered nuisance species in certain circumstances. Crown of thorns seastars can appear in great numbers, sometimes resulting in severe and potentially widespread coral mortality. The causes of periodic outbreaks are not well-understood, and while there may be a natural component to their occurrence, it is possible that increased levels of nutrients and organic matter in nearshore waters, as well as fisheries-associated cascade effects, may influence the frequency and severity of the outbreaks.

Development

Between the closure of the garment factory industry and the reduction in tourism with the global economic recession, we saw widespread abandonment of properties on Saipan, Tinian, and Rota over the last 10+ years, not development. The tourism market is beginning to rebound now, so we anticipate development to begin again, at least on Saipan, although at a modest pace (U.S. Census Bureau 2015). Large development projects (i.e. casino and resorts) are in the planning process for both Saipan and Tinian. Tinian development may hinge upon the outcome of the military's proposals there (see Military Expansion section). We are not aware of any major development projects planned for Rota, but certainly Rota residents would welcome economic investments. "Development" encompasses the conversion of natural habitats for commercial, residential, or agricultural uses. Development impacts terrestrial SGCN through direct conversion from natural habitats. Developed areas typically support few terrestrial SGCN, and usually at reduced densities. Development can also result in fragmentation or degradation of adjacent natural habitats, further reducing terrestrial SGCN populations.

Commercial development is the development type considered the primary threat to terrestrial SGCN and their habitats, as it will likely result in conversion of the most habitat acres. It is also considered the primary type of development threatening marine SGCN, as commercial development encompasses resorts and other tourism infrastructure that are typically concentrated in coastal

areas. Removal of natural vegetation nearer to the shoreline results in increased pollutant runoff, which impacts most of our marine SGCN (see Pollution section of SWAP).

Climate Change Impacts

The concentration of carbon dioxide and other greenhouse gases have increased in the Earth's atmosphere primarily as a result of excessive anthropogenic greenhouse gas emissions since the advent of the industrial revolution in the late eighteenth century (IPCC 2014). These increased atmospheric greenhouse gas concentrations have, in turn, led to an unusually rapid increase in the average global temperature, a phenomenon known as global warming. While the average global temperature has increased, other effects on climate are more variable, and thus the phenomenon is also referred to as global climate change. The threats associated with excessive greenhouse gas emissions are wide ranging and potentially catastrophic, and, in addition to an increase in the average temperature of the Earth's atmosphere, also include an increase in ocean temperatures, a decrease in ocean pH, and a rise in sea levels.

Many impacts of global climate change are known or currently anticipated. Additional impacts that are not currently anticipated or understood may also occur. We refrained from identifying as threats those climate change effects that we are currently unable to predict, or for which we were unable to articulate the specific mechanism by which it would act on a SGCN.

For example, we anticipate that marine and terrestrial food webs will be altered in coming decades, and the threat of “altered prey or forage availability” will be an effect of climate change. However, the cascading effects through an ecosystem are very difficult to predict. Future changes are likely to benefit some species and harm others, but we do not know and cannot predict the outcome at this point, so we did not include this climate change effect as a threat for any SGCN. Similarly, we expect that climate change effects will ultimately result in changes in the structure and composition of our forests upon which many terrestrial SGCN depend, but at this time we cannot predict how the forest will change, and which SGCN may benefit or be harmed.

The effects listed below, therefore, are not a comprehensive list of all effects of climate change, or even all effects expected to impact our SGCN. Rather, these represent the most important climate change effects that will impact our SGCN that we can fairly reliably predict will occur or intensify in the coming decades (Leong et al. 2014) (Table 24). For each SGCN, we can articulate a reasonable mechanism of how a particular climate change effect would threaten that SGCN. Generally, we find that our marine SGCN are at greater risk from the effects of climate change relative to terrestrial SGCN. Most of the effects of climate change on marine SGCN will be constant and inescapable (e.g. ocean acidification); climate change effects on terrestrial SGCN are more episodic (e.g. increased typhoon activity). The SWAP goes on to assess specific climate impacts in Chapter 6.3.

Table 9 – Climate change projects for the CNMI. Source: DFW 2015-2025 SWAP.

Climate Change Variable	Projection
Air temperature	Steady increase, with seasonal extreme highs
Precipitation	Small increase in average rainfall. Increase in extreme rainfall events. Wet season gets wetter; dry season gets drier.
Sea level	Gradual increase, with interannual and decadal fluctuations.
Sea surface temperature	Steady increase, with interannual variations depending on El Nino-Southern Oscillation. Increase in degree heating weeks to induce coral bleaching on an annual basis before 2050.
Ocean acidity	Steady increase, with declining pH of up to 0.3 by the end of the century.
Storms	Intensification in extreme wave action, and potential increase in severity of typhoons.

Military Expansion

The U.S. military has proposed to expand the scope of their training activities in the CNMI (U.S. Navy 2015a). While the ultimate outcome of their proposal is unknown at this time, for our purposes we took a conservative approach with our threat assessment and assumed the highest proposed impacts to SGCN and their habitats. We assumed that the military's preferred alternative to install live-fire and bombing ranges on Pagan and Tinian would occur in the next ten years, and accordingly assessed the predicted impact on SGCN populations.

The military's preferred alternative would have devastating impacts on a variety of SGCN, both terrestrial and marine. For example, on land, the military proposes to eliminate nearly 10% of the habitat of the Tinian monarch, which occurs nowhere else in the world. In the water, the military proposes to eliminate 10 acres of coral reef at Unai Chulu on Tinian, which would severely impact the SGCN staghorn corals, the ESA-listed *Acropora globiceps*, and reef-dependent SGCN. DLNR-DFW produced written comments which describe in detail the anticipated impacts of the military's proposal on fish and wildlife populations (DLNR 2015).

Pollution

Land-based sources of pollution

Land-based sources of pollution, such as bacteria from human and animal waste, nutrients from agricultural land use, nutrients and chemicals from urban land use, and sediments from unpaved roads or improper land clearing are carried by rainfall into our waters, which can reduce survival and reproduction of marine SGCN, especially those nearer to shore and source points.

Land-based sources of pollution are among the primary causes of coral reef degradation around the world. A variety of pollutants, including sediment, organic matter, nutrients, sewage, herbicides, pesticides, petroleum products, and other substances detrimental to the health of marine organisms can enter coastal waters through riverine discharge, stormwater runoff, sewage outfalls, and submarine discharge of aquifer waters. The presence of these pollutants in nearshore waters is generally a result of coastal development, land clearing, burning, and other activities that alter the landscape, increasing the amount of runoff and introducing pollutants or elevating levels of substances (e.g., sediment) than may occur naturally at lower levels. The discharge of sediment at levels greater than the level to which coral reef communities in the receiving waters are adapted can result in mortality of corals and other benthic organisms through burial in extreme instances of sedimentation, but more often results in sublethal impacts that may eventually lead to whole colony mortality and to a shift in community structure and condition. Excess nutrients can fuel algal growth, allowing fleshy macrophytes and cyanobacteria to out-compete corals through direct interaction and by making substrate conditions unsuitable for the recruitment of many coral species. Pesticides, herbicides, petroleum products, and other chemicals can interfere with important physiological processes, such as reproduction and growth, of corals and other marine organisms. In addition to supplying an excess of nutrients and other chemicals to coastal waters, sewage discharge and runoff may also introduce pathogens that directly cause diseases of marine organisms.

Coastal development and associated runoff

Overall, the marine impacts of coastal development and associated runoff are relatively low across the CNMI, and limited primarily to nearshore areas adjacent to high density development and agricultural activities in Saipan, and to a lesser extent on Tinian and Rota. Most of the marine waters of the CNMI meet the high water quality standards designated by the CNMI Bureau of Environmental and Coastal Quality (BECQ), but where high density development does occur, impacts to nearshore water quality and marine ecosystems can be pronounced.

According to Starmer et al. (2008), impaired coastal waters in the southern islands are primarily a result of failing sewer collection systems, urban runoff, discharge from reverse osmosis water purification systems (addressed in more detail below), sedimentation from unpaved roads and improperly managed construction activities. In contrast to the populated southern islands, the very sparsely populated northern islands are largely removed from these development issues. Of the 83 locations monitored for water quality by BECQ, a high number of microbiological violations occur in the highly developed Garapan district adjacent to the Saipan Lagoon, as well as at sites near Saipan's marinas and boat docks (Starmer 2005). Waters impaired by excessive nutrient or bacteria levels can be found across the southern islands, with 42%, 28% and 9% of the beach shorelines in Saipan, Tinian, and Rota, respectively, classified as impaired (Starmer et al. 2008). Data collected by the CNMI Marine Monitoring Team (MMT) suggests a continued decline in reef condition at sites with impaired water quality, indicated by decreased coral species richness and recruit abundance (Starmer et al. 2008).

Wastewater discharge

As with other kinds of pollutants, wastewater can enter coastal waters at discrete locations, such as sewage outfalls (i.e., point source pollution), or diffusely across a relatively large area (i.e., non-point source pollution). Two sewage outfalls exist in the CNMI, including one at Agingan Point and one at Sadog Tasi, Saipan. The Agingan Point outfall currently discharges treated effluent at the surf line into Class A receiving waters of the Tinian Channel, while the Sadog Tasi outfall discharges treated effluent approximately 365 m offshore into the Class A receiving waters in Tanapag Harbor, Saipan Lagoon, at a depth of 15 m. Both outfalls are in violation of local water quality standards, and although the U.S. Environmental Protection Agency has been working with the Commonwealth Utilities Commission (CUC) to bring the outfalls into compliance, it is not clear when this will happen. The relocation of the Agingan Point outfall to discharge approximately 244 m from shore at a depth of 30 m is planned (Starmer et al. 2008). While the Agingan Sewage Treatment Plant will not be upgraded from secondary to tertiary treatment, the discharge of effluent into offshore ocean currents may assist in diffusing the effluent and moving it away from shore (Starmer et al. 2008). In 2006, the CUC replaced a sewer line that had been chronically overflowing into the lagoon at San Antonio, Saipan (Starmer et al. 2008).

The discharge of hypersaline, nitrate- and phosphate-rich waters from reverse osmosis water purification systems also has the potential to impact nearshore marine habitats. Starmer et al. (2008) reported that in 2005 all major hotels were illegally releasing wastewater from reverse osmosis systems. After action by the U.S. Environmental Protection Agency, the majority of these systems now discharge into deep injection wells. This mitigation action appears to have resulted in a short-term improvement in nearshore water quality, but it is still not known how the injection wells may impact water quality (Starmer et al. 2008).

Marine debris

Marine debris, including derelict fishing nets, fishing line, plastics, glass, metal, rubber and other types of discarded or abandoned human-made objects, can enter the marine environment directly from ships or indirectly when washed or blown from land or waterways into nearshore marine waters. Marine debris arriving to the shorelines of the CNMI from offshore can be found along the beaches in the southern islands, but the predominately rocky, sea cliff-dominated shorelines and limited reef development on the windward exposures results in limited accumulation of marine debris in coral reef habitats. Debris generated by local, land-based activities are of greater concern (Starmer et al. 2008). This debris can impact marine habitats and species including sea turtle and seabird SGCN through breakage, entanglement, abrasion, and ingestion. Still, regular clean ups and outreach campaigns have limited the accumulation of these debris in shoreline and marine habitats

and thus is considered only a minor concern in the CNMI.

Artificial light

Light pollution, i.e. artificial lighting, can impact use and habitat quality of beaches for sea turtle nesting. The presence of lights on or adjacent to nesting beaches alters the behavior of nesting adults (Witherington 1992) and is often fatal to emerging hatchlings as they are attracted to light sources and drawn away from the water (Witherington and Bjorndal, 1991; Nelson Sella et al. 2006). Sea turtle nesting in the CNMI is already restricted to a handful of beaches and associated strand that are currently little-influenced by artificial lighting. Additional coastal development could result in increased artificial lighting and therefore degradation of these areas for sea turtle nesting, in addition to other development impacts.

Harvest

The people of the CNMI are entitled to legally harvest and enjoy their fish and game resources. We have regulations in place for some species to ensure that these resources will be sustainable, so our children and grandchildren can continue to enjoy these resources. Most harvest is legal, welcome, and not problematic, but there are a few cases where harvest can negatively impact fish and game SGCN.

Poaching/Human persecution

Illegal fishing and hunting are on-going threats to SGCN. Illegal fishing and hunting can involve poaching from a no-take area such as a Marine Protected Area, or taking fish, lobster, or ayuyu smaller than the legal size limit. Out-of-season poaching of ayuyu is anecdotally reported as common. Poaching of haggan and fanihi continues to hinder recovery of these two federally threatened species which cannot be legally harvested. Illegal hunting generally targets game for consumption, but the Mariana crow is a unique case. In the past Mariana crows were reportedly shot by Rota residents disgruntled with their status as federally endangered species or concerned that crows on their private property might affect their property rights, but this threat appears to have declined. Although this type of targeted persecution has not been reported for nightingale reed-warbler on Saipan, it is possible that this could become a threat over the next ten years as wildlife-development conflicts may escalate.

Potentially unsustainable harvest

Some invertebrate SGCN, including mangrove crab and day octopus, are legally harvested, but with no catch limits or reporting requirements. We are lacking basic biological information on many of these consumed invertebrates, i.e. we know little of their life history, abundance, distribution, habitat requirements, movements or behavior. We know that CNMI residents are securing permits for harvest, but we do not know the extent of legal harvest. Given these unknowns, harvest could potentially be occurring at an unsustainable level. In this case, the “threat” is a lack of information; we do not know if harvest represents a “real” threat. Invertebrate SGCN groups for which this threat applies include mangrove crabs, octopus, and clams.

Tourism and Recreation

Tourism is the backbone of the CNMI economy. Most visitors to the CNMI come from Korea, China, and Japan, typically from large urban centers where they may have less opportunity to interact with nature and wildlife at home. Indeed, this is a primary reason why they visit our islands, to enjoy the natural beauty and wildlife, on land and in the water. However, they are often unaware of the impacts of their activities, in particular in the marine environment. CNMI residents participate in many of the same activities that foreign tourists do, but typically have a higher degree of awareness of how their actions can impact resources, at least in the marine environment.

Potential marine impacts

Reef sites visited on a regular basis by tourists and other recreational users may be impacted as a result of intentional and accidental physical contact with corals and other benthic organisms, which may result in breakage, tissue damage, and potentially secondary infection of those organisms directly impacted. Over time, these impacts may lead to coral mortality and may reduce the structural complexity and diversity of habitat available for reef fishes and other reef-dependent species. Physical contact with corals and other organisms can occur by individuals engaged in wading, swimming, snorkeling, scuba diving, kayaking, paddle boarding, and other recreational activities, or by anchors or vessels used in recreational activities. Physical impacts may result in long-term changes to the benthic community structure and composition, and ultimately to changes in reef fish communities and other reef-dependent species.

In some locations recreational overuse, which can occur even with informed and conscientious users, can be exacerbated by poor reef etiquette. The most severe instances of recreational overuse and misuse are usually restricted to high-traffic reef sites that are generally somewhat limited in size, although even areas that receive less traffic may still be impacted. While recreational impacts are generally limited in scale when compared to the total reef area of the CNMI, they also are often focused on more accessible, high value areas such as Mañagaha Island, and thus jeopardize the long-term viability of reef-centered tourism, and may also affect fishing and other uses of the area. The problem can be partially addressed through better education of visitors. Most tourists are accompanied by tour guides, who are at the front lines of mitigating the recreation impacts on our resources. However, we also regularly see occurrences of tour guides misusing the resources, i.e. by feeding reef fish to bring them closer for tourists to view. The use of certain foods, such as those high in animal fats, may be directly harmful to fishes by negatively altering their diet. Fish feeding also appears to alter the behavior of fish species, causing some species to become more aggressive, even biting recreational users at sites where fish feeding is commonly practiced.

Another potential concern is the request by hotel operators to remove seagrass beds from designated swim zones (Starmer 2005). Although no action has been taken by the operators to obtain the proper permissions to remove the seagrass or move the swim zones, the requests indicate a need to educate the public about the importance of seagrass beds.

Cave Disturbance

Although unquantified, we expect that cave visitation poses the most potential problem on Saipan, with the highest human population and one of only two CNMI islands that hosts the cave-nesting SGCN Mariana swiftlet, a federal and local endangered species. Human disturbance caused by entering swiftlet caves can alter the behavior of nesting swiftlets, and can even result in nest abandonment.

Driving on beaches

Vehicle driving on beaches is restricted and relatively uncommon now, but still occasionally occurs, potentially causing compaction of sand and other sediments, direct injury or mortality of wildlife, and reduction in habitat quality. This is of particular concern for those beaches utilized by sea turtles for nesting. Vehicle use in beach strand habitat may result in further habitat degradation by damaging strand vegetation, resulting in increased erosion.

Natural Disasters

Typhoons

The CNMI lies within a region of high typhoon activity, with an average of three typhoons passing

within 300 nm of Saipan annually since 1970 (Lander 2004). Strong typhoons that down many mature trees have short- and long-term impacts on SGCN. SGCN dependent on forest for food and shelter may find short-term survival challenging. For example, fruit-eating SGCN such as fanihi and totot can starve as most fruits are stripped from trees. Over the long-term, forest habitat can take years to re-grow, which has long-term population level impacts on forest SGCN.

In addition, typhoons create widespread disturbance across forests, which frequently benefits invaders. Following Typhoon Soudelor on Saipan in August 2015, invasive vines grew and spread rapidly. We do not yet know if Saipan's forests have been permanently altered, or whether trees will recover quickly enough to compete with the rapidly growing vines. Severe typhoons are also accompanied by wave action that causes physical damage to coral SGCN, which can take years to be replaced and will have cascading, indirect effects on reef-dependent SGCN. Storm wind-driven waves can cause significant physical damage to shallow coral reef areas, and storm surge and setup can cause coastal erosion and associated reductions in nearshore water quality. The impacts of storm surge on nearshore habitats may be exacerbated where artificial shoreline structures, such as wharves, groins, and jetties occur; these structures reflect rather than attenuate wave energy, resulting in additional movement of sediments. Storm surge can also move loose objects, such as corals, sunken vessels, and other debris, causing additional physical damage to nearby marine habitats (Starmer 2005). Heavy rainfall and runoff associated with storms can result in large influxes of freshwater into the nearshore marine environment. The freshwater runoff can significantly alter the salinity and temperature of nearshore receiving waters, and can contain sediments, nutrients, and other pollutants that with prolonged exposure can stress or even cause mortality in corals and other marine organisms (Jokiel et al. 1993). Heavy rainfall can also cause upland erosion, adding to the load of sediments and organic matter in runoff. Heavy winds and rain can also deposit trash and debris into nearshore waters. The impacts of storm-associated runoff on nearshore marine habitats can be exacerbated by coastal development, poor land use practices, and inadequate stormwater drainage infrastructure.

Large volumes of stormwater runoff may also overwhelm wastewater treatment facilities, resulting in the release of untreated or under-treated sewage into nearshore waters. In addition, coral reef ecosystems chronically affected by degraded water quality and with reduced herbivorous fish populations may not be able to recover from storm-associated damage, potentially shifting from a coral-dominated to algae-dominated state. Although typhoons can be destructive to terrestrial and marine habitats, they are a natural occurrence in the CNMI, and SGCN and their habitats typically recover readily from temporary post-typhoon declines. Based on the historical frequency and severity of typhoons, we only consider typhoons a potential threat to very small SGCN populations, where any disaster could tip the scales toward extirpation. For example, the Pacific sheath-tailed bat lives only on Aguiguan, with fewer than 500 individuals in a single population. The effects of a severe typhoon hitting Aguiguan could be disastrous for a population in an already precarious position such as this. However, we cannot assume that the frequency and severity of typhoons will continue according to the historical pattern, so the potential threat of typhoons may change.

Volcanic activity

While all of the Mariana Islands are volcanic in origin, the northern islands are geologically younger and experience more volcanic activity. Volcanoes on Anatahan, Pagan, and Sarigan are particularly active and could experience an unpredictable eruption at any time. A devastating eruption could extirpate most terrestrial wildlife and vegetation on an island, and ash runoff can have nearly as devastating an effect on nearshore marine habitats, as happened on Anatahan in 2003. The 2003 eruption of Anatahan is believed to have resulted in the extirpation of all land birds on the island. The coral reefs around Anatahan have not yet recovered. Again, extirpations from volcanic

eruptions are a natural, unavoidable process. On long timescales, these islands would recover and eventually be re-populated, at least by mobile species such as birds. However, many of our endemic SGCN have been greatly reduced from their historical abundance or distribution due to other human-related causes. Potential source populations for re-population are smaller and fewer, so the process will take much longer, and greatly increases the risk of extinction of narrow-range endemic SGCN. Mariana skink, for example, formerly occurred across the southern islands, but is now known to occur on only 5 northern islands, including Pagan and Sarigan. The loss of any of its island populations would significantly increase the overall risk of extinction.

Wildfire

Wildfire is very rarely a natural occurrence in the CNMI, but rather is typically human-caused, both intentionally and unintentionally. Some hunters on Saipan and Rota intentionally start fires in grassland areas to attract deer. Wildfires prevent these areas from succeeding to forest. Grassland does not prevent runoff as well as forest, so heavy rainfall results in increased erosion, with sediments carried into the marine environment and degrading habitats for marine SGCN. Wildfires can convert our forests, which are not fire-adapted, into grassland, or even to bare land with repeated fires. While wildfires are not necessarily common or widespread, they do affect a wide range of terrestrial and marine SGCN.

Sea Transportation

Various aspects of sea transport have the potential to negatively impact marine SGCN and their habitats. Commercial shipping activities, due to the larger size of the ships, have greater potential for negative impacts in the form of groundings. For example, the 2014 grounding of the M/V Paul Russ near the channel leading into the Port of Saipan impacted more than 3100m² of benthic habitat, including an estimated loss of more than 16,000 coral colonies, as well as a significant reduction in reef complexity at the impact site (Johnston et al., in prep). In some instances, in addition to the physical damage to reef habitat and species, vessel grounding can also result in the release of fuel, oil, and other chemicals that may impact marine habitats, including far from the grounding site.

Although very infrequent, dredging is required to maintain commercial shipping lanes. Dredging raises sediment that can smother and kill nearby corals and other organisms. When the Saipan shipping channel was last dredged in the mid-1990's, spinner dolphins became stranded in the Saipan Lagoon, presumably after becoming disoriented by the dredging activities (Trianni and Kessler 2002). Not restricted to commercial ships, boats of any size can strike and potentially kill or injure large marine animals. Little information is available on vessel strikes in the CNMI, but SGCN spinner dolphin and grey reef shark are seen with what appear to be scars or injuries from strikes (Trianni and Kessler 2002). The DLNR-DFW SWAP includes ecosystem-based goals and strategies to address the threats and challenges detailed in their risk assessment in Chapter 7.

Recommendations

The following goals and strategies are reproduced directly from the 2015-2025 SWAP to support ongoing biodiversity preservation and invasive species prevention:

Invasive Species Prevention

Goals: Prevent introduction of new invasive species to the CNMI, including but not limited to brown tree snake; prevent the spread of invasive species among CNMI islands; manage invasive species as needed to protect key areas for SGCN

Strategies:

- Continue and improve upon existing brown tree snake prevention efforts
- Develop and implement a comprehensive biosecurity program that includes but goes beyond brown tree snake interdiction, focusing on other invasive species present on Guam but not yet in the CNMI, such as little fire ant and coconut rhinoceros beetle
- Develop new regulations and enforce biosecurity measures for all expeditions to the northern islands
- Educate boat owners about specific invasive species that could be spread among islands, and measures to take to prevent spread
- Establish an invasive vine management program on Saipan to conserve ecological structure and function of important forest areas for SGCN
- Develop protocols and capacity for early detection/rapid response to new invasive species arrivals

Compliance with Conservation Regulations

Goals: Increase resources for enforcement on all islands; increase public awareness of conservation regulations

Strategies:

- Install and maintain signage at all Conservation Areas and MPAs describing allowable uses
- Complete demarcation of all Conservation Area and MPA boundaries
- Continue and improve the delivery of information about conservation regulations through the DFW, BECQ, and other websites, and through social media networks
- Maintain existing funding for conservation enforcement, and seek new sources of funding

Public Engagement in Conservation

Goal: Increase public support for conservation of SGCN and habitats

Strategies:

- Continue and expand on environmental education and outreach efforts
- Create a community-based fish and wildlife advisory board, in particular to address issues related to harvested species
- Increase public support for conservation by providing trails, signage, and restoration demonstrations

Marine Protected Area Management

Goal: Increase the effectiveness of existing Marine Protected Areas

Strategies:

- Develop and maintain a long-term sustainable funding stream to support MPA management,

conservation, and enforcement

- Demarcate all MPA boundaries with in-water buoys (where feasible) or land markers
- Develop and implement management plans for all seven MPAs, i.e. gather public and local resource management agency input, update, and implement three existing MPA management plans, and develop new plans for the remaining 4 MPAs
- Develop regulations to further MPA objectives, as outlined in Public Laws and CNMI Administrative Code
- Increase resources for enforcement of existing MPA regulations
- Conduct a comprehensive assessment of biological data collected in MPAs since inception; use the assessment results to refine the monitoring program and establish overall measures of effectiveness
- Institute a tour guide certification program for companies operating within MPA boundaries
- Install and maintain signage at all MPAs communicating responsible and allowable uses
- Maintain a current list of all fish, invertebrate, and coral species present in each MPA; develop a data management system to track annual presence/absence information and streamline updates to the checklist

Educated, Experienced Workforce in Conservation Agencies

Goals: Increase the educational level of professional and administrative staff working in conservation agencies; reduce turnover of professional staff

Strategies:

- Introduce financial incentives such as tuition reimbursement for existing employees to pursue degrees or certifications related to their position
- Develop an apprenticeship or other program for conservation agencies to hire and train recent college graduates with ties to the Mariana Islands
- Continue to provide opportunities for local high school and college students to intern with conservation agencies
- Ensure that salaries for conservation agency positions remain competitive compared to other U.S. states and territories

Coral Reef Restoration and Management

Goal: Build capacity to restore and enhance coral reefs, especially in response to bleaching events

Strategies:

- Establish a coral nursery with the infrastructure and staffing expertise needed for propagation and seeding of corals, including ESA-listed corals
- Prioritize reefs for management, and implement appropriate actions to reduce the impacts of bleaching events

Marine Pollution Reduction

Goal: Reduce runoff from land-based sources of pollution

Strategies:

- Continue implementation of watershed plans such as the Garapan Conservation Action Plan (CAP), LauLau Bay CAP, and Talakhaya CAP
- Map the sources and distribution of pollutants in Saipan Lagoon in relation to pollution-sensitive marine SGCN; target actions in locations that can most benefit SGCN

Strategic Use of Resources

Goal: Enhance the capability of CNMI conservation agencies and organizations to coordinate on proactive conservation efforts

Strategies:

- Improve communication and cooperation among state and local agencies and organizations to avoid redundant efforts and to partner when interests are shared
- Develop island-wide conservation and management plans for all 14 islands in a process that includes stakeholder involvement; include an evaluation of restoration and reintroduction opportunities
- Conduct bioinventories to gather basic information about the abundance, distribution, and habitats of both rare and common native species on all islands; develop a data management system to track information as part of a proactive approach to avoid the need for ESA listings

References

1 CMC §§ 2651-2691, 2 CMC §§ 5101 - 5109, 5235, & 5324

DNLR-DFW 2015-2025 State Wildlife Action Plan

Public Law 1-8, *“Establishing the Organization of the Executive Branch of the CNMI...”*

Public Law 2-51, *“To Establish a Fish and Wildlife Division in the Department of Natural Resources...”*

and PL 2-51. The 1986 Fish and Game Regulations readopted and republished the previous regulations in their entirety with extensive changes. In 2000, the Division issued the “Non-commercial Fish and Wildlife Regulations” that are codified in Commonwealth Administrative Code Title 85, subchapter 30, as amended

Built Environment – Overview

CNMI in Context – Administration of Public Infrastructure

Contributions for the following sections were provided by state and local level agencies who manage elements of public infrastructure development and administration. For roads, these include the Department of Public Works (DPW) Highways Division and the Offices of the Mayors of Saipan, Tinian, and Rota, which respectively manage primary and secondary road networks and associated drainage. The Commonwealth Utilities Corporation (CUC) manages power, water, and wastewater infrastructure. The Department of Public Works Solid Waste Division manages municipal landfills, transfer stations, and convenience centers with project implementation support from the OPD-Capital Improvement Program (CIP). Housing statistics have been provided by the Department of Commerce Central Statistics Division and the Northern Marianas Housing Corporation, which promotes affordable and safe housing through the administration of U.S. Housing and Urban Development programs as detailed further in that section. Together these programs support safe and sustainable development and growth in the CNMI.

Primary and Secondary Roads

The Department of Public Works (DPW) Roads and Grounds Division manages development and maintenance of primary roads and highways while respective Mayors' offices and at time private land owners maintain secondary unpaved roads. It is the mission of the Roads and Grounds Division to provide quality service to the general public in maintaining primary roads, road shoulder beautification, swale and drainage systems (island wide), traffic light intersection and the opening of right-of way access roads to ensure the public safe driving conditions. According to DPW as of January 2019 there are 82.54 miles of primary road on Saipan, 39.30 miles of primary road on Rota, and 60.66 miles of primary road on Tinian. Stormwater management and flood risk reduction planning efforts are ongoing and will require coordination across jurisdictions and sectors to support road development and maintenance objectives.

Public Transportation

Public transportation is recognized as an important socio-economic service which typically operates at a deficit, however, it is included in this section because of the built infrastructure development and planning coordination requirements. Nearly one in four household (23%) do not have a private vehicle, highlighting a "latent demand" for a public transportation system that is comprehensive and reaches the most underserved and vulnerable areas in our community. The Commonwealth Office of Transit Authority (COTA) was established by CNMI Public Law 17-43 on May 27, 2011 and charged with the development and establishment of a public transportation system in the Commonwealth. COTA's mission is to "provide the citizens of our communities with a dependable, reliable, safe and cost-effective public transit system in order to reduce energy consumption, strengthen cultural values, and contribute economic development for the residents of the Commonwealth." Currently core route operations are being developed on Saipan with the goal to establish efficient and effective core service.

Ports / Airports

The Commonwealth Ports Authority (CPA) manages operations and maintenance of airports and harbors throughout the CNMI. Although Saipan, Tinian, and Rota are designated as international airports, size and operational challenges have limited 24/7 operations, especially on Tinian and Rota. Numerous major updates are underway at Saipan, Tinian, and Rota ports and airports. On Tinian in particular, airport and fuel storage expansion is being supported by the Department of Defense's Divert proposal; in May, 2019, CNMI signed a 40-year lease agreement worth \$21.9

million to allow for airport expansion and allow for military training and operations while supporting economic development of the island.

The Commonwealth Ports Authority is an autonomous agency and recent and pending updates have been executed by contractors with limited engagement with relevant CNMI infrastructure and resources management agencies. As such, there remain opportunities for further coordination and alignment between port and airport improvement plans and surrounding growth districts which could be developed further through more inclusive comprehensive planning efforts.

Power

As reported in the 2019 Citizen Centric Report, the Commonwealth Utilities Corporation (CUC) is the only publicly owned utility providing power, water, and wastewater services in the islands of Saipan, Tinian and Rota, Commonwealth of the Northern Mariana Islands (CNMI). CUC was created in 1986 as an autonomous agency of the CNMI government which is governed by an independent Board of Directors. Daily operations are managed by an Executive Director with a staff of approximately 400. CUC's rates, fees, charges, services, rules, and conditions of service are regulated by the Commonwealth Public Utilities Commission (CPUC).

There are three power plants under CUC control. Plant #4 is the oldest with five engines that have more than 45 years of service. Plants #1 & #2 are similar in age with six in the former and four in the latter with more than 40 years of service. Together they could generate 68 MW of power and are averaging 40 MW per day. The carcass of the existing Power Plant #1 building is structurally deficient and a decision to replace that structure and the primary generating engines is needed. The downturn in the economy has slowed the rapid increase in power demands coming back after Typhoon Yutu which is providing time to reset and build some baseline resiliency in anticipation of the next storm. On Rota, power generation averages 1.2 MW per day at peak load, whereas Tinian averages 1.9 MW per day

As the U.S. Energy Information Administration reports, despite renewable energy goals established by Public Law 15-23, the CNMI meets nearly all of its energy demand through importing petroleum products, including 22 million to 24 million gallons of diesel fuel annually to run the islands' power plants. The CNMI has no known reserves of conventional fossil fuels, and currently, 100% of power generated by CUC is imported. CUC supports alternative energy systems, PV and waste-to-energy and is looking into these alternatives as they continue to develop and implement their strategic plan.

Water and Wastewater

As outlined by CUC's 2019 Citizen Centric Report, CUC achieved, for the first time, 24-hour water island wide in July of 2018 providing water to 60,000 residents in 14 Tank Service Areas (TSA's) using 131 wells to meet demand. Despite Typhoon Yutu, CUC only lost 24-hour water for less than two months which was a significant improvement over the five-month delay in providing scheduled water following Typhoon Soudelor. There are fourteen TSA's on Saipan with only one each on both Tinian and Rota. Water production reaches 265 mg/month with 119 mg/month of billings which represents 55.9% non-revenue water loss efficiency on Saipan. CUC is diligently working to reduce that loss due to leaks and to improve system pressures in support of new development opportunities as CUC and EPA invest in rehabilitating the water system each year. Typhoon Soudelor identified a gap in CUC's critical systems of backup generating units to supply temporary power pending reinstallation of the overhead power system to wells and booster stations. FEMA is funding the installation of backup generating units and containment facilities to assure power will

be available for a minimum of 70% of the island. Tinian received a new power backup unit for its primary well head and Rota has two new generating units purchased by CUC.

Water is life and the Commonwealth Utilities Corporation is working diligently to ensure continuous high-quality service at affordable costs. At the 2019 Climate Adaptation Planning training facilitated by BECQ-DCRM, CUC staff identified water wells as an essential resource that is vulnerable to sea level rise and climatic disruptions in addition to water loss and management and maintenance challenges due to aged infrastructure. This asset is vulnerable due to lack of power redundancy for pumps, physical vulnerability of the networked infrastructure, and information challenges due to lack of data availability regarding groundwater tables and freshwater inputs. Consequences of impacts to this resource would be severe and could include major economic disruptions, declining water quality, and impacts to daily life and potentially to public health. Therefore, it is recommended that strategies and actions aggressively consider climate scenarios for data collection, during infrastructure design, and in mitigation planning.

The water we use ultimately must be disposed of, however, Saipan is the only island with sewage treatment. Tinian and Rota rely exclusively on septic systems. As CUC's 2019 Citizen Centric Report highlights, the age and condition of Saipan's two treatment plants and its collection system is fair to poor due to age, soil condition, harshness of the influent wastewater, and under investment in its rehabilitation and maintenance. CUC has plans to correct this condition and put both the wastewater plants back into their original design condition over the next year. Collections is spending extra time identifying the highest priority sewer main repairs and are going back to identify new and existing sewer accounts CUC had missed. For Rota and Tinian, CUC does not provide wastewater treatment services at this time but there is interest developing to introduce a small modular system for each homestead. To further address these challenges CUC is supporting in-house and inter-governmental planning dialogs to identify wastewater management options for Saipan, Tinian, and Rota.

Solid Waste

The Department of Public Work's Solid Waste Management Division is responsible for the proper operation and management of all municipal solid waste disposal in the Commonwealth, ensuring the protection of health, safety and welfare of the general public as well as the preservation of the environment. Currently, DPW operates solid waste facilities on Saipan, Tinian, and Rota, however, only Saipan's Marpi Landfill is lined and operated in compliance with the federal Resources Conservation and Recovery Act. Recent reports indicate that the rate of use of the Saipan landfill is outpacing its expansion, with "Cell 1" reaching capacity, prompting the need to close that portion of the landfill, expand "Cell 2" and line "Cell 3" to comply with the federal Resource Conservation and Recovery Act (RCRA) Subtitle D landfill requirements. Feasibility studies are currently underway at DPW to assess the capacity at the Lower Base transfer station and the Marpi Landfill to evaluate economic, market, technical, financial, and management options for solid waste management for the CNMI. Based on preliminary findings, recycling and overall annual disposal rates have been rising, but have not consistently been meeting projected disposal projections from when the Landfill was designed.

Housing

The Northern Marianas Housing Corporation (NMHC) oversees project planning for the U.S. Department of Housing and Urban Development's (HUD) Community Planning and Development grant funds for the islands of Saipan, Tinian, and Rota. Trends and gaps discussed in the NMHC Needs Assessment for the 2015-2019 include decreasing median incomes, decreasing affordable

housing stock availability, and increasing in housing demand for elderly populations. Specifically, based on the 2010 Census, the population in the CNMI decreased by 22% from the last decennial Census in 2000 bringing the population total to 53,883. As reflected in the charts included below, according to the 2010 Census, the median income in the CNMI is \$19,958 which decreased by 13% from the 2000 Census. The total number of households increased by 12% from the 2000 Census, with 71% reporting as “renter householders” and 12% reporting as “owner households”.

Housing trends for the CNMI show improvements in housing stock and sanitation with an increase in connections to public wastewater treatment, installation of concrete roofs, and in-home connections to internet between 2005 and 2016. The percentage of units with an inside flush toilet increased from 90 to 94 percent. About half the roofs in 2005 were made of poured concrete, but that percent increased to 57 percent in 2016. The percentage of units connected to the internet by broadband increased significantly during the 11 years. In fact, in 2005 almost no units were connected via broadband. By 2016, about 1 in every 5 units was connected.

According to assessment of the Housing Urban Development Area Median Family Income, based on HUD FY 2015 Income Limits, 3,990 households – or 21% of the 2010 total – qualified as “extremely low income” with 30% or less Area Median Income, and 85% of the population qualified as “extremely low to middle income” households. Housing challenges were assessed in terms of substandard housing which lacked plumbing or kitchen facilities, overcrowding with greater than 1.51 people per room, and housing cost burden greater in terms of percentage of income. Statistical analysis identified housing problems of substandard housing, overcrowding, and housing cost burden, leading NMHC to conclude that extremely low income to middle income households are more exposed to increases in housing costs and associated challenges.

To address these challenges, the CNMI identified goals and objectives based on the needs assessment of the community, prior year performance, housing market analysis, and various agency State plans. The 2015-2019 goals are:

- Special needs and low-to moderate-income housing
- Increase homeowner education and counselling
- Promote Fair Housing
- Sustain Affordable Housing Stock
- Economic Development
- Public facilities and Improvements
- Public Services
- Neighborhood Revitalization
- Energy Efficiency/Renewable Energy

As of 2019, NMHC has initiated planning efforts to support the plan update slated for completion by August, 2020. These planning dialogs should continue to gather community feedback regarding priorities and updated objectives to achieve NMHC’s mission to:

- provide efficient and responsive delivery of housing, mortgage and community development programs to the people of the Commonwealth;
- afford fair and equal opportunity to housing programs and services for all, with special emphasis to very-low, low- and moderate-income individuals, elderly and persons with disabilities;
- increase and implementing home ownership programs with houses that is safe, decent, sanitary and affordable;
- encourage and promote economic independence, self-sufficiency and upward mobility for families; and

- implement programs to address the growing and future needs and economic viability of the communities in the Commonwealth.

Given the pending 2020 Census, it may be prudent to update 2020 trends analysis when updated demographics data becomes available.

SDG Alignment and Relevant Indicators

Adoption and application of sustainable development goals is an aspirational and adaptive process. The goals listed below reflect preliminary areas of data alignment. The colors in the “indicator status” column identify whether data is sufficient and CNMI is currently making progress towards a stated objective (green), if data or the objective itself are present but unclear or not adopted (yellow), or if data requests or objective setting remains pending at this time (red). These data points will regularly be updated and reassessed as comprehensive planning efforts continue.

Resource Category	SDG Target	Indicator / Status
Roads / Transportation / Ports & Airports / Infrastructure	9.1: Develop sustainable, resilient and inclusive infrastructures Goal: "Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, with a focus on affordable and equitable access for all by 2030."	9.1.1 – Proportion of the rural population who live within 2 km of an all-season road. 100% access within 2 km reported within Saipan (COTA Feasibility Study, 2013)
Roads / Transportation / Ports & Airports / Infrastructure	11.2: Affordable and sustainable transport systems Goal: "Provide access to safe, affordable, accessible and sustainable transport systems for all" by 2030.	11.2.1 – Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities.
Power	7.2: Increase global percentage of renewable energy Goal: By 2030 "improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning".	7.2.1 –Renewable energy share in the total final energy consumption Currently < 1% CUC renewable energy share; <i>Listed as pending as CNMI target not yet established</i>
Water / Wastewater	6.3: Improve water quality, wastewater treatment and safe reuse Goal: "By 2030, increase substantially the share of renewable energy in the global energy mix".	6.3.1 – Proportion of wastewater safely treated 94.3% inside flush toilet, 75% connection to public wastewater treatment (HIES, 2016) <i>Listed as pending as CNMI target not yet established</i>
Solid Waste	11.6: Reduce the environmental impacts of cities Goal: "By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to municipal and other waste management".	11.6.1 – Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated, by cities <i>Listed as pending as CNMI target not yet established</i>

Resource Category	SDG Target	Indicator / Status
Solid Waste / Recycling	12.5: Substantially reduce waste generation Goal: "By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse".	12.5.1 – Recycling rate, tons of material recycled <i>Listed as pending as CNMI target not yet established</i>
Housing	1.4: Equal rights to ownership, basic services, technology and economic resources	1.4.1 – Proportion of population living in households with access to basic services (including access to improved sanitation and drinking water) 94.3% inside flush toilet; 81.6% 24-hr water service; 80% concrete outside walls (HIES, 2016) <i>Listed as pending as CNMI definition(s) and target(s) not yet established</i>
Housing / Communications Trends	9.C: Universal access to information and communications technology	9.C.1 is the "proportion of population covered by a mobile network, by technology". 2016 HIES reports 1 in every 5 units was connected by in-home broadband; phone line data provided for land lines <i>Listed as outstanding as CNMI target and improved data source for "mobile network, by technology" not yet established</i>

Key Built Environment Planning Recommendations

Increasing interagency and inter-sectoral coordination and support for maintenance and operations are recurrent themes of this resource assessment section. Key recommendations include:

- Comprehensively manage existing and new road development to include considerations of stormwater management and flood risk reduction;
- Support maintenance and upgrade planning in coordination with DPW and CUC to increase efficiency of complementary actions
- Area development plans (such as CPA airport or harbor updates) should be coordinated with public and private land owners and relevant agencies to maximize alignment of improvement efforts with complementary development proposals within and adjacent to CPA property.
- Inclusion of CPA, COTA, and NMHC on the PDAC Built Environment Taskforce at minimum, or on the PDAC itself, to support greater alignment of transportation, connectivity and low-income services programs, and socio-economic development goals in the comprehensive sustainable development planning processes
- Support assessment of energy and water system management alternatives that can reduce operations and management costs and diversify sources to build resilience to future disturbance events be they storms or spikes in diesel prices, including prioritizing public facilities for renewable energy siting to support progress towards CNMI’s Renewable Energy Standard goals
- Incorporate stormwater management and flood risk reduction planning into infrastructure

- (road, utility, ports, etc.) development and management planning
- Infrastructure and utility system maintenance and upgrade plans should be coordinated across road types and between DPW and CUC to increase efficiency of complementary actions
 - Since typhoon storm surge can periodically inundate port areas, public improvements and commercial recreational developments should be designed to withstand flooding events
 - Investment in master plan implementation of ports should be supported and aligned with complementary capital improvement projects that include development and improvement of roads, stormwater infrastructure, utility lines, and supporting structures and include cross-cutting hazard mitigation planning to further build resiliency of built infrastructure resources; overall disaster risk reduction considerations should be incorporated into plans and project implementation of built infrastructure to extend project lifespans and reduce risks to people and the environment.

Cross-cutting themes of agency missions and mandates supporting management of the built environment emphasize the importance of wise, efficient, economical planning and project implementation to improve public health, safety, and well-being through development. Further coordinating planning efforts is recommended to achieve complementary management objectives.

Snapshot – Primary and Secondary Roads

The Department of Public Works (DPW) manages development and maintenance of primary roads and highways while respective Mayors' offices and at time private land owners maintain secondary unpaved roads. Route maps maintained by DPW are included in Appendix L.

Many of the drainage systems on Saipan and Tinian, and to some extent also Rota, were built during the Japanese period. Historically, many of these concrete culvert systems were used to drain wetlands and reroute water to support agricultural activities. This, along with steep erosive slopes and periodic monsoon-level rain events has set the stage for challenging stormwater management. DPW primarily aims to ensure water that flows down streets in storm events doesn't cause flooding that can be dangerous to people. However, these rain events can also cause environmental impacts. As Governor Ralph Torres noted in a 2017 Press Release:

Addressing non-point source pollution is a very important step in safeguarding our coastal resources. We know that runoff has a direct impact on the health of our beaches and marine life. Our water quality monitoring has improved but low-volume roads have been an ongoing concern. Through this collaboration, we hope to improve road construction and engineering especially in terms of erosion control which has been overlooked in secondary road construction. Project proposals to identify flood hazards and stormwater management opportunities for primary and secondary roads are currently being discussed with OPD, DPW, and the Mayors of Saipan, Tinian, and Rota to support confirmation of road miles, mapping, and hazard mitigation planning.

Status, Impacts, and Responses

DPW works to ensure all roads are designed and constructed to support safe transportation in the CNMI. Stormwater management continues to be a priority of the Bureau of Environmental and Coastal Quality's Earth Moving and Erosion Control and Water Quality branches. An updated Highways Management Plan was approved by the Department of Transportation in 2018, which details \$2,994,476 in projected funding expenditures for the 2017 to 2020 funding cycle. According to DPW as of January 2019 there are 82.54 miles of primary road on Saipan, 39.30 miles of primary road on Rota, and 60.66 miles of primary road on Tinian. Efforts are underway to map all secondary roads for Saipan, Tinian, and Rota with the respective Mayors' offices in order to identify and prioritize maintenance needs as well as standardize operating procedures.

Recommendations

Due to the interjurisdictional and interdisciplinary nature of road development and maintenance, it is encouraged that DPW and the Mayors' Offices continue to work with the Bureau of Environmental and Coastal Quality as well as other partners to address current and future needs including stormwater management and flood risk reduction. System maintenance and upgrade plans should be coordinated across road types and with the Commonwealth Utilities Corporation to increase efficiency of complementary actions.

References

Saipan Tribune, Sept. 15, 2017. *BECQ hones in on non-point source pollution.*
<https://www.saipantribune.com/index.php/becq-hones-non-point-source-pollution/>
DPW Saipan, Tinian, and Rota Route Length Maps, 2019

Snapshot – Public Transportation

Public transportation is recognized as an important socio-economic service, however, it is included in this section because of the built infrastructure development and planning coordination requirements. The Commonwealth Office of Transit Authority (COTA) was established by CNMI Public Law 17-43 on May 27, 2011. COTA is responsible for the development and establishment of a public transportation system in the Commonwealth. COTA is administered by a Special Assistant for Public Transportation who is appointed by the Governor and serve at the pleasure of the Governor. COTA has a six-member Commonwealth Public Transportation Advisory Board established by Public Law 18-51. COTA's mission is to "provide the citizens of our communities with a dependable, reliable, safe and cost-effective public transit system in order to reduce energy consumption, strengthen cultural values, and contribute economic development for the residents of the Commonwealth."

To support achievement of its mission and mandates, the COTA Fixed Flex-Route Paratransit System Feasibility Report was conducted and completed in 2013. The goal of this study was to provide a framework for a feasible public transportation service that meets community needs, operates effectively within available resources, does not over-commit the CNMI government financially, and provides a blueprint for orderly development. Key data points and conclusions highlighted in this study include:

- According to the 2010 US Census, almost one in four homes (23%) do not have a private automobile and 29.6% of households and 52% of the population are below the US poverty line, highlight a "latent demand for public transportation";
- Residents, whether they would use transit or not, see a critical need for affordable public transportation;
- Past attempts to operate transit in Saipan have been frustrated by the fact that urban and rural transit is not self-supporting, instead requiring financial support of government at all levels;
- The illegal taxi industry plays a significant role and will continue so long as it remains cost competitive and addresses gaps in service; and
- Due to high ridership densities of approximately 1,600 residents for every one mile of bus route, Saipan's dense mixed-use development would allow COTA to operate an efficient and effective core service with low-cost feeder services introduced to bring residents to transfer points over time as demand increases.

Based on these observations, the study team proposed a route network concept, illustrated in Figure 15a on the following page, that would establish five routes with core service between Garapan and communities along the south and west coast of Saipan. A five-year transit service and financial plan was developed to begin by providing minimal service and then support flexible expansion as warranted by demand. Noting that public transit does not support itself through ridership revenues, and that CNMI has legislative authority to appropriate funds to address this gap, this plan included assumptions that the Federal Transit Administration would provide 50% funding of the operating deficit, with the CNMI responsible for the balance. The feasibility

assessment suggested use of licensing fee surcharges and collection of parking meter revenues as well as potentially dedicated shared of sales tax or gas taxes to further reduce CNMI’s fiscal commitments to annual operating and maintenance costs of this important public service. To further address funding challenges, the report recommended that the CNMI support the public sector ownership and private sector management of the transit system in the long-term to ensure high value service delivery, but also suggested an interim business model to enable COTA management and staff to build their own experience before contracting out operational services.

COTA has assessed this report further and determined that “Fixed Flex” concepts would not work for many roads because current road widths, especially in older villages such as Chalan Kanoa and Susupe, are too narrow for bus access, which is necessary to meet Federal Transit Authority American with Disability Act (ADA) requirements. As such, 8-passenger “paratransit” or “Call-A-Ride” vans are more appropriate to provide access to these areas. Based on this information, COTA updated route plans to establish “Fixed Route” systems with paratransit to be deployed separately in the future once the “Fixed Route” system is fully operational (see Figure 15b); for now, “Call-A-Ride Saipan” vans are being used to support accessibility requirements as well as for the general public. As shown in Figure 13b below, COTA has maintained all of routes 1, 2, 3, 4, 5 as shown on the COTA Fixed Flex-Route Paratransit System Feasibility Report of 2013 with some minor updates. Current costs for general riders is \$5 one-way and is \$3 for the elderly, veterans, students, and people with disabilities.

The revisions made are as follows:

1. Route 5 is made part of the new Route 3;
2. Route 1 (core route) is revised to include part of Beach Road from AK Toyota to Garapan Tourists District and part of Chalan Pale Arnold in Garapan and a section of Micro Beach Road to be able to serve the CHC other medical clinics along the route. Route 1 is broken down into two sections, Flame Tree Line 1A and 1B. Flame Tree Line 1A has been implemented in April 2018.
3. Transfer Station planned at the Joeten Superstore is taken out due to land ownership issues. The planned transfer station at the Joeten Superstore can be revisited at a later date.

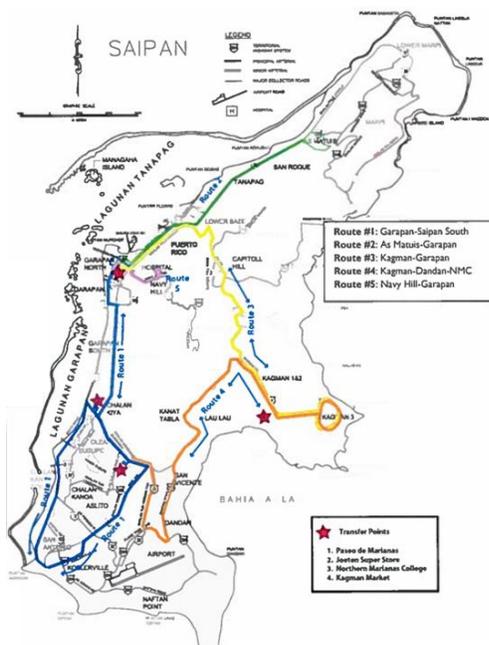


Figure 16a – Conceptual routes identified in Saipan Fixed Flex Route Pa Systems Feasibility Study, 2013.

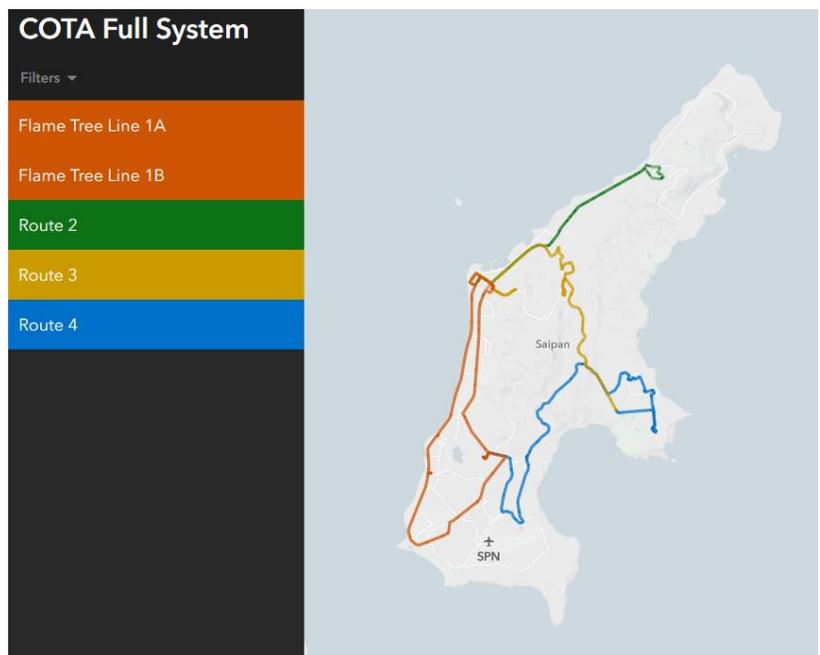


Figure 15b – Updated conceptual “Fixed Route”, Dec. 2018

COTA launched its first service in April and expanded its Fixed-Route feeder service for route coverage in the Kagman area toward the Northern Mariana College (NMC), the southern villages of San Antonio and Koblerville to NMC, and northern areas of As Matuis, San Roque, Tanapag to the Paseo de Marianas in Garapan, in October 22, 2018. In September, 2019, the U.S. Department of Transportation's Federal Transit Administration awarded COTA \$1.33 million for fiscal year 2020 to continue the development of the fixed-route system and demand response shared ride service. In a September 2019 press release Gov. Ralph DLG Torres said the grant award reflects the administration's commitment to progress for public transportation, explaining that "[b]y truly creating a public transportation system that is comprehensive and reaches the most underserved and vulnerable areas in our community, we are doing our part to provide services for our people while also freeing up funds in our local budget for other key priorities like education and healthcare". To further support comprehensive transportation planning and project implementation, in July, 2018 COTA and the Department of Public Works adopted the amended CNMI Territorial Highway Implementation Plan & Commonwealth Office of Transportation Authority Transportation Improvement Plan, which prioritizes planning, design, and construction of highway and public transportation projects.

Status, Impacts, and Responses

As reported in COTA's 2019 Citizen Centric Report, major accomplishments and ongoing projects include expansion of the fixed route system, ongoing staff training and facilities maintenance, and efforts to develop a Sustainable Comprehensive Transportation Master Plan through submission of a competitive grant application. COTA's revenue includes the fare collection received from the community utilizing the public transportation services, however, the majority of COTA's funding since FY13 has been grant supported. Acquiring off-island resources such as custom-made buses is timely and costly, as is the process of siting and building bus turn-outs. However, allocating funding to ensure accessible transportation with sufficient rights-of-way are important next steps to ensure the transit system is attractive to residents and visitors alike.

In 2019 COTA was awarded a total of \$6,387,346.00 United States Department of Transportation: Federal Transit Administration 5339 Bus and Bus Facilities Infrastructure Investment program 5339 (b) competitive grant application to fund the following:

- Construction of COTA Administrative Building and Maintenance Facility;
- Construction/Installation of thirty-seven (37) prefabricated solar bus shelters along the COTA's Fixed Route System;
- Procurement of twelve ADA Compliant transit buses for the COTA's fixed route system for the island of Saipan;
- Procurement of one (1) ADA accessible van each for the islands of Rota and Tinian.

COTA also supported Super Typhoon Yutu mass evacuation and recovery support efforts for a total of 679 individuals. During the recovery, COTA transported individuals to the FEMA Disaster Relief Center, American Red Cross, medical facilities, and back to their residences, providing vital health and social services to community members in need of transportation.

In 2020, COTA anticipates the construction of their Administrative Building and Maintenance Facility, installation of bus shelters along the Flame Tree Line 1A and 1B Fixed Route System (core route), and is projecting an increase in use of the Saipan Demand Response Service ridership to over 9,000 trips from FY 2019's 5,744 ridership numbers.

COTA continues to seek ways to:

- Increase ridership on Flame Tree Line 1A Fixed Route while awaiting the full implementation of its fixed route system;
- Ensure sufficient revenue, maintenance practices, and data collection and analysis to keep vehicles in a state of good repair;
- Apply for federal grant opportunities to fund its operations and capital projects; and
- Expand and successfully implement a full-fledged public transportation system for the CNMI with ongoing planning, staffing, and acquisition practices.

Recommendations

Although public transportation systems are not profitable, they provide important services that have the ability to reach and support socio-economic needs of the most underserved and vulnerable areas in our community. Continuing to avail of formula and competitive grants will help to reduce economic burdens of this service upon CNMI, however, public-private partnerships should also be considered to offset operations and maintenance costs. Development and implementation of a Sustainable Comprehensive Transportation Master Plan and addressing next steps flagged in the Fixed Flex-Route Paratransit System Feasibility Report and subsequent COTA plans and policies will help to further guide investment in and expansion of the public transit system.

Comprehensive master planning of the entire transit network – including ports, roads, sidewalks, and rights-of-ways – will be costly, but is essential to ensure well-planned and executed transportation systems that support COTA’s mission. COTA has submitted a federal grant application for the United States Department of Transportation Federal Transit Administration’s Pilot Program for Transit Oriented Development (TOD) Planning for the opportunity to fund the development of the CNMI Sustainable Comprehensive Transportation Master Plan. If successful, this grant will enable COTA to work closely with other transportation and service delivery partners as well as the private sector to outline necessary next steps and long-term objectives. This document should include discussion of right-of-way issues and how to resolve these for public utilities and services in CNMI. To further support these efforts, enhanced geospatial information on road locations, road conditions, and population distribution including demographics such as income, access to vehicle, and needs of persons with disabilities and clinic locations should be mapped and shared to inform service delivery and planning priorities. Moving forward, transit hubs should be built out using this resolution of supporting data.

References

Commonwealth Office Transit Authority Website: <http://cota.gov.mp/>

COTA Fixed Flex-Route Paratransit System Feasibility Report, 2013

COTA Citizen Centric Report, 2019

CNMI Territorial Highway Implementation Plan & Commonwealth Office of Transportation Authority Transportation Improvement Plan, July 2018 Amendment

Press Release: COTA awarded \$1.3M to expand Saipan bus system, Sept. 10, 2019

Snapshot – Ports and Airports

The Commonwealth Ports Authority (CPA) oversees the management and operations of ports and airports in CNMI (Public Law 2-48). The mission of CPA is “to develop air and sea navigation to and from the CNMI to its fullest potential.” CPA is responsible for three airports and three seaports on the islands of Saipan, Tinian and Rota. The Island of Pagan also has an airstrip but it is currently unavailable for air travel. CPA has shared Master Plans for the Rota and Tinian Harbors (2018) as well as a Master Plan for the Pagan Airstrip (2008), as well as annual reports to support this summary. Relevant data and excerpts of these plans are included to support discussion of the state of the port and airport resources in this section. Additional information regarding the ports and airports was sourced from the CPA website (www.cpa.gov.mp). Details of these facilities, operations, and future planning are included in the subparts below.

Status, Impacts, and Responses

The Commonwealth Ports Authority is an autonomous agency that generates revenues from port users to fund operating expenses, capital projects, and debt service requirements. The CPA also receives federal grants from the Federal Aviation Administration (FAA), Department of Homeland Security (DHS), and the Department of Interior (DOI) to fund improvements throughout the ports. According to the Financial Outlook of the FY19 Citizen Centric Report, airport revenues and expenses are closely balanced while seaport operations are resulting in an annual surplus.

Airport Revenues	FY 2018
Aviation Fees	\$ 9,283,223
Concession & Lease Income	\$ 6,257,277
Other	\$ 1,709,499
TOTAL	\$ 17,249,999

Airport Expenses	FY 2018
Salaries & Wages	\$ 5,533,286
Utilities	\$ 5,907,737
Insurance	\$ 528,835
Contractual Services	\$ 1,354,875
Employee Benefits	\$ 987,808
Supplies	\$ 695,046
Repairs & Maintenance	\$ 924,601
Professional Fees	\$ 251,071
Travel	\$ 218,642
Fuel	\$ 275,455
Other	\$ 530,114
TOTAL	\$ 17,207,470

Seaport Expenses	FY 2018
Salaries & Wages	\$ 990,207
Utilities	\$ 164,000
Insurance	\$ 403,371
Contractual Services	\$ 77,519
Employee Benefits	\$ 220,500
Supplies	\$ 54,195
Repairs & Maintenance	\$ 85,406
Travel	\$ 49,700
Fuel	\$ 30,114
Other	\$ 47,749
TOTAL	\$ 2,122,761

Seaport Revenues	FY 2018
Seaport Fees	\$ 6,362,170
Concession & Lease Income	\$ 1,479,941
Other	\$ 911,289
TOTAL	\$ 8,753,400

Figure 17 – FY18 Revenues and Expenses for CPA’s Airport and Seaport operations. 2019 CPA Citizen Centric Report.

As discussed in the Rota Harbor Master Plan, however, a significant portion of this surplus is earmarked to satisfy debt obligations for two outstanding bonds – the 1998 Seaport Revenue issue and the 2005 Seaport Revenue issue. Combined, these debt requirements total \$3.1 million per annum between 2017 and 2025, at which point the 1998 seaport issue is retired in 2028 followed by the 2005 issue in 2031. Recent revenues and expenses generated by CPA seaport operations appear to be supportive of the existing debt service coverage ratio (DSCR). The debt covenant states that monies available to cover debt payments must be 1.25 times the level of the payment in a given year. Revenues generated from seaport operations in 2012, 2013, 2014, and 2015 achieved DSCR of 1.25 or greater. In 2015, operations produced an estimated 1.9 times DSCR, well above the required 1.25 times. However, these revenues are contingent on ongoing economic growth.

Additionally, the CPA issued airport revenue bonds in 1998 in the amount of \$20,050,000. Average annual debt service for these bonds is \$1.3 million. CPA uses surplus revenues from operations and its debt reserves to satisfy the debt service requirements. CPA remains in compliance with its debt covenant for the airport and seaport bonds.

The following subparts detail the current condition and identified needs at the ports and airports of Saipan, Tinian, Rota, and Pagan.

Saipan Port

As CPA summarizes, the Port of Saipan includes 2,600 linear feet of berthing space, 22-acre container yard, and is serviced by three freight forwarding companies and three shipping agents. The channel, turning basin, and berthing areas have been widened and deepened to a uniform -40 feet in order to comfortably welcome medium to deep draft vessels into port. Other features include:

- Water line and an underground fuel line protected by a concrete vault
- An underground sewage removal system
- Backup generator for port operations area
- Dockside lights for night time operation
- Refrigerated containers outlets with backup power source
- Seawater Fire Fighting System
- Two fuel storage facilities at the Saipan seaport
- Bulk cement company
- Two car rental companies available at the seaport for our inter-island travelers
- Sunset cruises

The Port of Saipan offers 24-hour power with the recently installed 500 KVA backup generator. This backup power source also provided uninterrupted power to seven refrigerated container outlets. Improved navigational aids and repositioned harbor buoys to mark the safest route into port with the assistance from the U.S. Coast Guard. Future projects being considered are paving of the access road leading to the main port, upgrading of the security communication system and water rescue equipment and updating of the harbor master plan (publication pending).

Saipan International Airport

As CPA reports, the Francisco C. Ada/Saipan International Airport is the gateway to the CNMI, serving Saipan, Rota, and Tinian. With a runway that is 8,700 feet long and 200 feet wide with a parallel taxiway and connecting taxiways, and can accommodate wide-bodied aircraft (i.e. DC 10s and 747s). The main terminal accommodates international passengers with six jetways, which were damaged by Typhoon Yutu, and provides immigration and customs processing. Primary flights are

direct from cities in Japan, Korea, Hong Kong, China and Guam with major operating airlines including Skymark Airlines, Asiana Airlines, United Airlines, China Eastern, Jeju Air, T'way Airlines, Hong Kong Express, Beijing Capital, and Sichuan Airlines. The international terminal also features:

- Major duty-free concessionaire (Duty Free Shoppers) offers high-quality products.
- Experienced caterer (LSG Lufthansa) provides food and beverage service for flight kitchen and restaurants.
- Six car rental companies available.
- Automated teller machine, tourist information booths, cargo handling services, snack shop, free wireless internet service, and overnight parking facilities.
- Airport is open 24 hours, seven days a week.
- 24-Hours Operating Air Traffic Control Tower
- 24-Hours Operating Aircraft Rescue Firefighting (ARFF) personnel/equipment
- FAA certified facility

The Commuter terminal serves as feeder for Tinian and Rota using single engines Cherokees, and a twin-engine Navajo aircraft (inter-island travel). Airlines operating from the commuter terminal are Star Marianas Air and Arctic Circle.

CPA has completed many improvements to the airport including newly renovated restrooms, resurfaced taxiways, and new air-conditioning systems. The international terminal has received a new facelift and the parking lot will soon be expanded. CPA has also procured three additional 1,500-gallon ARFF vehicles and a runway sweeper for the airport and is working on replacing all six passenger loading bridges that were damaged by Typhoon Yutu. The majority of CPA's projects are funded through grants from the Federal Aviation Administration's Airport Improvement Program.

Tinian International Airport

As CPA reports, the Tinian International Airport operations and conditions include:

- FAA certified facility
- Passenger traffic is from inter-island travels from Saipan, Rota and Guam.
- It currently accommodates single engine aircraft with capacity of up to 9 passengers.
- Runway is 8,600 feet in length and 150' wide with a parallel taxiway and two connecting taxiways at each runway end.
- Airport is equipped for night operation. Night Flights between Saipan and Tinian is serviced by Star Marianas Air by reservation.
- Two car rental concessionaires, Avis and Island Rent A Car, are available.
- Mini snack bar concession available in the terminal.
- Weather advisory services and aircraft rescue personnel provided.

CPA recently completed improvements to the Departure Terminal and Arrival terminal. The improvements included doors, windows, painting, roof repairs, structural retrofitting work, installation of a baggage handling system, and other associated work. CPA also completed an update to its airport master plan, constructed a new 200,00-gallon water tank, and repainted all airfield markings. CPA has also procured a new ARFF vehicle and runway sweeper.

The 2018 Tinian International Airport Master Plan notes the following conditions of the Tinian Airport:

With an 8,600-foot runway, the airport is large enough to accommodate international flights. Passenger facilities include about 50,000 square feet of arrival, departure, and administration spaces, in addition to parking and passenger vehicle lanes. However, cars are available for rent at the airport.

The air terminal is attended from 6:00 a.m. to 7:00 p.m., with other hours available by arrangement with the Airport Manager. However, there is no air traffic control at the airport, and arriving aircrafts must follow Visual Flight Regulations. Immigration and Customs agents are available during scheduled operations. At other times, prior arrangements must be made with the Chief of Immigration on Saipan. Aircraft arrivals having more than 10 passenger seats per plane require written authorization obtained 24 hours in advance.

Tinian Port

As CPA reports, at the Tinian Harbor there is:

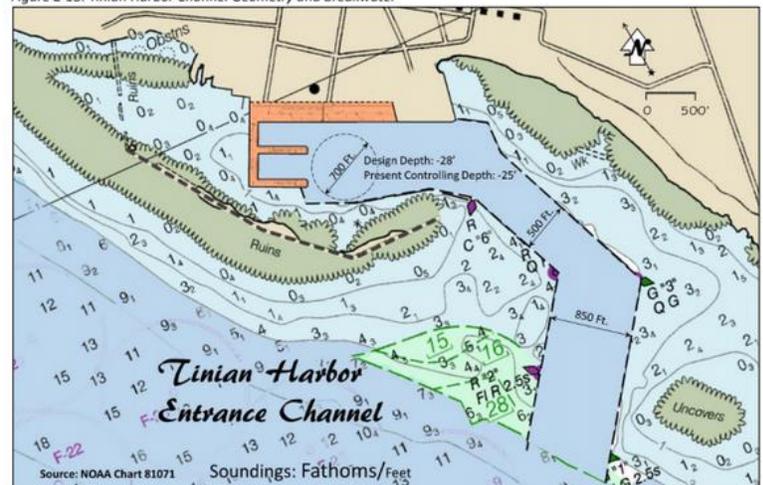
- One stevedoring company available
- A fuel bulk plant operated by Mobil Oil
- Three finger piers available for berthing
- Small boat ramp

CPA is working on the installation of a firefighting system, replacement of their perimeter fencing, new lighting, and has completed the harbor master plan. In addition, CPA has leased a portion of its harbor to Bridge Investment Group for commercial development. The April 2018 Tinian Harbor Master Plan further details the current state of the Tinian Port, which includes a needs assessment, an outlined financial feasibility, an economic outline, and permitting requirements for proposed port expansion. The Executive Summary and excerpts of this plan relevant to current conditions and identified needs are included here.

2018 Tinian Harbor Master Plan

The Commonwealth Ports Authority engaged Moffatt & Nichol (M&N) to develop a master plan for Tinian Harbor that would accommodate reasonable demand-driven growth and improve the island economy. The master plan includes provisions for commercial harbor operations, recreational boating and upland commercial development. The study includes short, medium, and long-term plans for repair, maintenance and development of the port and associated upland areas. It provides a framework to guide future port development that forms a cost-effective program to satisfy projected future demand, while considering potential environmental and socioeconomic impacts. Short term recommendations include improvements that are needed now and should be planned and initiated this year. Medium term improvements should be planned and funded now and constructed over the next five years to meet the needs of the island. The plan notes that given the population and economic projections for Tinian, long term improvements will only be needed if a permanent U.S. Military presence on Tinian requires a dedicated berthing and operating area. Additional excerpts of the Tinian Harbor Master Plan, included in Appendix M represent needs and next steps to achieve a cost-effective and needs-driven program for port enhancement at the CPA facilities on Tinian.

Figure 2-18: Tinian Harbor Channel Geometry and Breakwater



Rota International Airport

As CPA reports, at the Benjamin Taisacan Manglona International Airport (BTMIA) provides:

- FAA certified facility.
- Passenger traffic is from inter-island travels from Saipan and Guam using eight passenger Navajo aircraft.
- Airlines operating include Star Marianas Air and Micronesia Air Cargo
- Runway is 7,000 feet long, 150' feet wide - capable of handling 757's or 727's with restricted landing and takeoff load.
- Terminal can accommodate 100 passengers at any given time.
- Two car rental concessionaires – Budget Rent A Car and Islander Rent A Car – are available.
- Airport is equipped for nighttime operations (but it is currently open 6am – 8pm).
- Weather advisory services and aircraft rescue personnel provided.

CPA has procured a new 1,500-gallon ARFF vehicle and runway sweeper for the airport with FAA funding. CPA is also working on extending the ticket counter area, upgrading the airfield markings and signage (in process) and replacing the perimeter security fencing (bid award pending). An update to the Rota Airport master plan is also underway.

The 2018 Rota West Harbor Master Plan notes the following conditions regarding the Rota International Airport:

With a 7,000-foot runway, Rota Airport is large enough for Boeing 737 class aircraft as well as Airbus 320 and smaller 330 class planes. These aircraft are commonly used for local domestic and international flights. However, the airport is normally open only to shuttle flights from Guam and Saipan. Passenger facilities include roughly 42,000 square feet of arrival, departure, and administration spaces; in addition to parking and passenger vehicle lanes. There is no airport taxi service or other public transportation on the island, but cars are available for rent at the airport.

The air terminal is attended from 6:00 a.m. to 8:00 p.m., with other hours available by arrangement with the Airport Manager. However, there is no air traffic control at the airport, and aircraft control is conducted from Guam. Flights arriving at Rota must go on to Guam or Saipan to refuel. Prior arrangements must be made with the Chief of Immigration on Saipan prior to arrival.

Rota – West Harbor

As CPA reports, at the Rota West Harbor provides:

- Two berths
- One stevedoring company available
- Two storage companies
- Quarantine, Customs, and Immigration services
- Eight boat slips
- Secured Port Area

CPA is seeking funding sources to perform maintenance dredging of the west harbor as well as improvements to the dockside and revetment repairs. CPA is also conducting an assessment through the US Army Corps of Engineers on the harbor and is working on planning updates.

The April 2018 Rota West Harbor Master Plan further details the current state of the Rota Port, including a needs assessment, and outlines financial feasibility, economic outline, and permitting requirements for proposed port expansion. The Executive Summary and excerpts of this plan relevant to current conditions and identified needs are included in Appendix N. Rota East Harbor is included in the 2018 report, however, it is not approved as a port of entry or managed by CPA at the

time of this drafting of this resources report. Nevertheless, according to the 2007 Attorney General’s opinion “In Re: The CNMI’s Rights Over its Submerged Lands,” CNMI’s internal waters include Rota’s East and West Harbors, depicted for reference below.

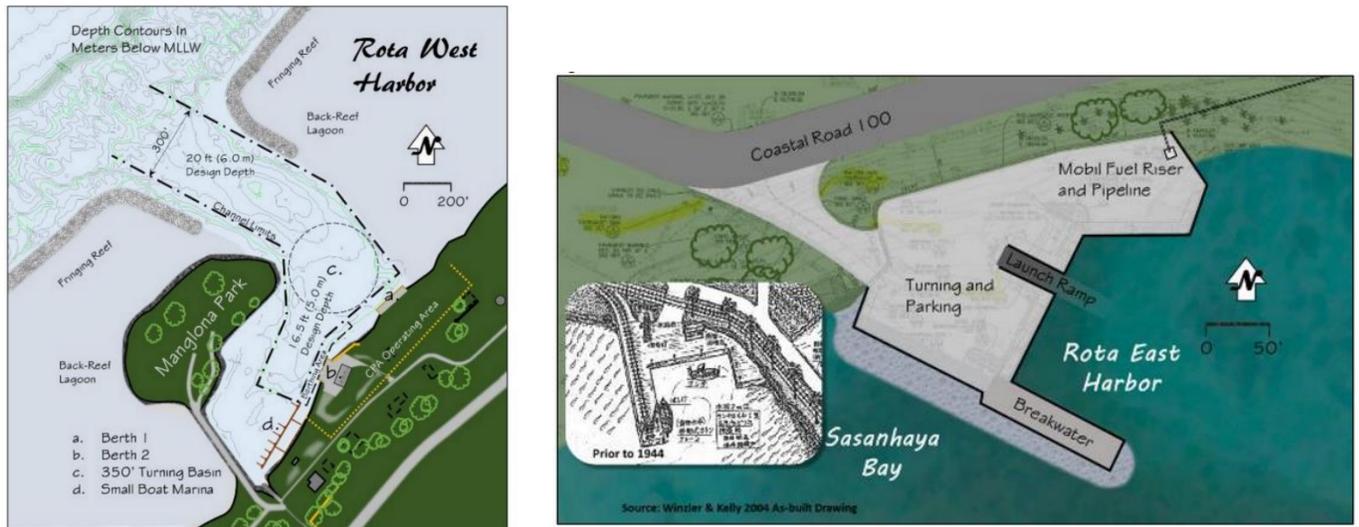


Figure 18 – Rota West and East Harbor As-Built Drawings, 2018 Rota Harbor Master Plan

Northern Islands – Pagan Airstrip

A Master Plan for the Pagan Airstrip was prepared by EFC Engineers & Architects Corp. for the Civil Military Innovative Readiness Training and submitted to the Commonwealth Ports Authority and the Office of the Governor in 2008. Adoption status of this plan is unclear; however, relevant information and excerpts are summarized here.

Pagan Island is the middle and largest island of the Northern Island chain. It is located 320 miles north of Saipan at latitude 18°10’ N and longitude 145°46’ E. Approximately ten miles long and ranging in width from one-half to four miles, the island of Pagan covers an area of approximately 18.5 square miles.

The construction of the Pagan Airstrip and its supporting installations began during the Japanese era, around 1935, as Japan was preparing for war. The Japanese military built a military base and a complex airfield with rainwater drainage ditches, water storage cisterns, bunkers, pillboxes, and defense guns. During World War II, U.S. fighter planes bombed Pagan, severely destroying the airstrip and Japanese fortifications, as well as the Shomushon village and harbor. The bombings started in June 1944, and succeeded in completely destroying most facilities of the Japanese military base within 48 hours. The U.S. Navy continued frequent aerial bombings for 14 months until the surrender by the Japanese Empire in August 1945. The massive bombing raids by formations of about 15 to 30 fighter planes dropped an estimated 400 tons of bombs and many incendiary bombs. This scarred the airstrip making it almost unusable, and many bomb craters still mark the existing runway. In the 1960s, Pagan residents and American Peace Corps volunteers took on the task of repairing the airstrip. In 1970, US Air Force Civic Action Team, “Prime Beef” (Prime Base Engineer Emergency Force) rebuilt the runway. The bomb craters were repaired and the runway was given a smooth surface of crushed volcanic rock. During the reconstruction, which lasted almost a year, the team built a headquarters building, latrine buildings, a generator station,

and a plumbing system. None of these temporary structures exist today.

Today the Pagan Airstrip is a grassy strip extending approximately 1,900 feet long and 120 feet wide, bearing South 69°49'15" East. The entire island of Pagan is publicly owned, including the runway, and administered by the Department of Public Lands (DPL). The 1981 eruption of Mt. Pagan covered nearly half of the airstrip with lava. The existing runway measures approximately 1,900 feet in length. The width of the existing clearance is approximately 250 feet. The main strip measures at a width of approximately 56 feet, and at a length of approximately 1,900 feet. The runway slopes up significantly from west to the east. At the west end of the runway is an abrupt drop off to the beach, approximately 20 feet deep.

In June 2007, the Commonwealth Ports Authority (CPA) awarded a contract to EFC Engineers and Architects Corporation to prepare a Master Plan for the development of the Pagan Airstrip. Requests from the former residents of Pagan to return to the island and re-establish permanent settlements, combined with growing interest in developing the economic potential of Pagan and the other islands north of Saipan, have prompted the CNMI government, and particularly the Northern Islands Mayor's Office (NIMO) to prepare plans for infrastructure development on Pagan. The NIMO considers the development of the Pagan Airstrip and the provision of reliable air transportation services as critical infrastructure improvements required to facilitate the resettlement process and to stimulate economic activity in the Northern Islands.

Recommendations

Numerous master planning efforts are currently underway within CPA. The Commonwealth Ports Authority is an autonomous agency and recent and pending updates have been executed by contractors with limited engagement with relevant CNMI infrastructure and resources management agencies. As such, there remain opportunities for further coordination and alignment between port and airport improvement plans and surrounding growth districts which could be developed further through more inclusive comprehensive planning efforts. Area development plans should be coordinated with public and private land owners and relevant agencies to maximize alignment of improvement efforts with complementary development proposals within and adjacent to CPA property. Additional coordination across agencies and sectors would support plan updates that may more effectively align CPA needs with comprehensive management objectives of the public and private sectors of CNMI. Inclusion of CPA on the PDAC Built Environment Taskforce at minimum, or on the PDAC itself, would support greater alignment of transportation and socio-economic development goals in the comprehensive sustainable development planning processes.

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Commonwealth Ports Authority Website: www.cpa.gov.mp

CPA FY19 Citizen Centric Report

Tinian Harbor Master Plan, 2018

Rota West Harbor Master Plan, 2018

Pagan Airstrip Master Plan, 2008

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Snapshot - Energy

The Commonwealth Utilities Corporation (CUC) is the only publicly owned utility providing power, water, and wastewater services in the islands of Saipan, Tinian and Rota, Commonwealth of the Northern Mariana Islands (CNMI). CUC was created in 1986 as an autonomous agency of the CNMI government which is governed by an independent Board of Directors. Daily operations are managed by an Executive Director with a staff of approximately 400. CUC's rates, fees, charges, services, rules, and conditions of service are regulated by the Commonwealth Public Utilities Commission (CPUC).

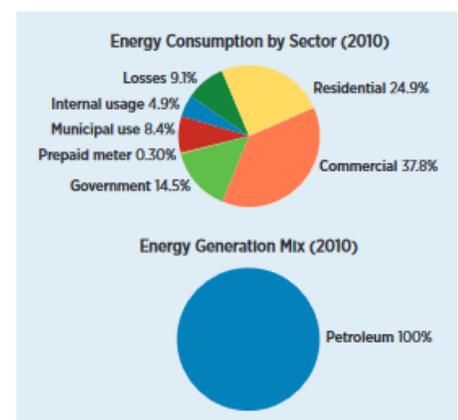
The CNMI has no known reserves of conventional fossil fuels. Alternative energy opportunities were assessed for the CNMI in a 2011 report from the National Energy Research Laboratory (NERL). As USEIA summarizes, wind and solar energy are believed to be viable, although deployment has been slow. Specifically, the NERL assessment notes that Saipan, Tinian, and Rota are believed to have wind resources suitable for commercial turbines, but potential sites are limited because the islands are mountainous, land is scarce, and turbines may interfere with airstrip and military facilities. Additionally, turbines must be designed to withstand typhoons, and there are concerns about turbine impacts on several threatened bird species. The U.S. Congress has considered amending federal law to authorize offshore wind development in all five U.S. territories, although no amendments have been made as of June, 2019.

CUC's renewable energy goal is facilitated by the CNMI's Renewable Portfolio Standard, established by Public Law 15-23 (4 CMC § 8112). Amendments to the law provide for the goal of 20% renewable power by 2016 provided these standards can be achieved in a "cost effective manner" (Public Law 15-23 as amended by P.L. 18-62, authorizing net metering and extending renewable standards to 20% by 2016). Notably, Public Law 18-75 amended P.L. 16-62, placing emphasis on prioritizing net metering to build renewable energy capacity for health and education facilities.

The goal is to balance power purchase affordability and operational cost coverage through the integration of residential and utility scale renewable energy systems into CUC's electric power grid without compromising power system reliability. The CNMI's renewable energy program is governed by CUC's Net Metering System. Currently, the CNMI's renewable energy portfolio amounts to 379 grid connected renewable systems that comprise a majority of solar producing energy systems. The total grid connected renewable energy systems in the CNMI is 4 MW.

The technical requirements guiding the CUC's regulation of renewable energy systems in the CNMI is guided by the 2013 Renewable Energy Integration Study Report. As of 2010 there were 74.5-kilowatt (kW) capacity small solar projects and small wind turbines with 144-kW capacity, however, overall the energy mix remains 100% petroleum. The Energy Information Administration reports that CNMI imports 22 million to 24 million gallons of diesel fuel annually for both electricity generation and transportation (EIA, 2018).

CUC's rates for renewable energy are applied only to net metering systems that endure past one year of grid connectivity while exporting renewable energy into the CUC power grid. These rates are applied as



compensation to the system host at a rate not to exceed 50% of the CUC standard rate for a certain KWH category level required to produce the same power. CUC’s renewable energy rates are enforced by Part C of Section 2 for Payment for Net Energy under CUC’s 2014 Net Metering Interconnection Agreement.

Solar energy resources in the Northern Marianas are suitable for both solar hot water heating and for electricity generation by photovoltaic (PV) panels. CNMI law allows for net metering of up to 30% of the CUC system's peak demand, and some rooftop solar PV projects are connected to the grid. Projects with combinations of solar panels and small wind turbines have been installed at schools and government buildings across Saipan, Tinian, and Rota islands. Due to the small size of the three islands' transmission systems, the impact of intermittent and variable power from larger wind and solar projects requires careful integration into the islands' transmission systems, possibly by combining advanced energy storage with renewable facilities.

Other potential renewable energy sources available in the CNMI include geothermal energy, tidal wave energy and biodegradable energy sources. The CNMI’s active volcanic islands contain an undetermined geothermal energy supply however the utilization of the energy resource yields a negative return in capital due to high capital cost and relatively low energy demand. Similarly, an undetermined amount of tidal wave energy exists but will most like be nonapplicable to the CNMI energy portfolio due to a low return in capital. In 2017, the U.S. Department of the Interior funded a feasibility assessment on extracting methane gas from landfills. Diversifying energy sources would help reduce reliance on fuel imports and could reduce consumer energy rates, which are high due to the variable price of diesel fuel compounded by additional charges for long-distance fuel deliveries.

As of June, 2019, CUC reports the following island-specific power generation and capacity information for the islands of Saipan, Tinian, and Rota. Power distribution maps are included in Appendix O. Utility rates as of July 2019 are included in Appendix P. As noted in the July 2019 electricity rate schedule, due to a decrease in the average fuel prices, CUC adjusted the “fuel and lube oil” element by 6.39% in the most recent rate update, reducing the Fuel Adjustment Charge from \$0.20087 to \$0.18803 per kilowatt hour (kWh). According to the U.S. Energy Information Agency, the average U.S. retail price was \$0.1048 per kWh in 2017.

Saipan

The electric power grid in Saipan, is CUC’s largest power system in the CNMI. The island’s power system is responsible for providing electric power services to 14,446 customers. The island has an average peak demand of 43 MW that consists of residential, governmental and commercial customers. The island’s largest load demand for commercial development exists along the CNMI’s

Existing Policy and Regulatory Framework

Renewable Energy	
Feed-In Tariff	
Net Metering/Billing ⁹	●
Interconnection Standards ⁹	●
Renewables Portfolio Standard/Quota ⁷	●
Tax Credits	
Tax Reduction/Exemption	
Public Loans/Grants	
Green Public Procurement	
Energy Efficiency	
Energy Efficiency Standards	
Tax Credits	
Tax Reduction/Exemption	
Public Demonstration ⁶	●
Restrictions on Incandescent Bulbs	
Appliance Labeling Standards	
Targets	
Renewable Energy ⁷	●
Energy Efficiency	

● In Place ■ In Development

coastal land areas. For Saipan, these commercial development zones exist along the island's western coast. In reference to CUC's power line diagram, current and future commercial developments are occurring along CUC's Feeder 1, Feeder 2, Feeder 7, Kiya 3 and Kiya 4 distribution circuits due to the close proximity and view of Saipan's western lagoon. As part of their daily job, CUC engineers monitor the load performance of these circuits and perform the necessary engineering analysis and designs to ensure that the delivery of electric power in these areas are safe, reliable and efficient. CUC expects for future commercial development to occur along these feeders.

CUC owns and operates three (3) power generation facilities with a total installed capacity of 85.49 megawatts (MW) and an available capacity of 68 MW as of September 18, 2019. CUC's power generating fuel source is exclusively Ultra Low Sulphur Diesel.

- **Power Plant I**

Located in Lower Base village, Power Plant 1 is Saipan's largest power generation facility. The plant has an installed capacity of 60.93 MW and an available capacity of 33.5 MW. The plant accounts for 71% of Saipan's installed power generation capacity and supplies 69% of Saipan's available power. The plant has a total of eight (8) generator units that consist of low, medium and high-speed types.

- **Power Plant II**

Located adjacent to Power Plant 1, Power Plant 2 is Saipan third largest power generation facility. The plant serves as a subsidiary power generation facility to Power Plant 1. Power Plant 2 contains an installed capacity of 10 MW and an available capacity of 6 MW. The plant is used mainly as a stand-by and back-up plant during overhauls and maintenance of generator sets at Power Plant I. Additionally, the plant serves as supplementary power generation source to Power Plant 1 during peak load demands. Overall, the power generation facility accounts for 12% of the Saipan's installed capacity and available capacity. The plant has a total of four (4) generator units.

- **Power Plant IV**

Located in Puerto Rico village, Power Plant IV Saipan's second largest power generation facility. The plant also serves as a subsidiary power generation facility to Power Plant 1. Power Plant 2 contains an installed capacity of 14.56 MW and an available capacity of 9 MW. As with Power Plant 2, Power Plant IV is used mainly as a stand-by and back-up plant during overhauls and maintenance of generator sets at Power Plant I. The plant also serves as a supplementary power generation source to Power Plant 1 during peak load demands. Overall, Power Plant IV accounts for 17% of Saipan's installed capacity and 19% of the island's available capacity. The plant has a total of six (6) units.

Power Transmission and Distribution System

Saipan's electric power grid contains both a power sub-transmission and distribution system responsible for the transmission and delivery of electric power across the island's electric power grid. The power sub-transmission system is an underground power system that operates at a nominal voltage of 34.5 kV. The sub-transmission line originates from a step-up power substation facility in Lower Base village and extends 5.6 miles up to a step-down power substation station facility called the Water Loo Substation. The power distribution system is made up of overhead power distribution lines that operate at a nominal voltage of 13.8 kV and runs approximately 191 miles across nine distribution circuits. Five (5) of the nine distribution circuits emanate from

Power Plant 1 and the other four (4) emanate from the Water Loo Substation.

Tinian

The electric power grid in Tinian is CUC's second largest power system in the CNMI. The island's power system is responsible for providing electric power services to 867 customers. The island has an average peak demand of 2.5 MW that is comprised mostly of residential and government customers.

The power generation system on Tinian is operated by an Independent Power Producer (IPP) called Telesource, CNMI Inc. CUC and the IPP have a contract for the design, supply of power generation equipment, and private construction, maintenance and operation, and transfer of ownership of the facility to CUC. A total of six (6) generators are used to produce a total generation capacity of 20 MW.

The contract between CUC and the IPP also covers the construction, maintenance and operation of Tinian's power distribution system. The power distribution system is built as an overhead system that operates at a nominal voltage of 13.8 KV and 4.16 kV. The power distribution system contains three distribution circuits that emanate at approximately 41.4 miles across the island's electric power grid.

Rota

The electric power grid in Rota is CUC's third largest power system in the CNMI. The island's power system is responsible for providing electric power services to 857 customers. The island has an average peak demand of 1.65 MW and consists of residential, government and commercial customers.

The power system in Rota is owned and operated by CUC. The island contains only one power generation facility that produces 7.4 MW. Rota's power distribution system is built as an overhead system that operates at 13.8 kV and 4.160 kV. The power distribution system consists of three distribution circuits that run approximately 20 miles across the Rota's electric power grid.

Status, Impacts, and Responses

Power Restoration Efforts

As U.S. Energy Information Administration (USEIA) reports, CNMI's power systems are vulnerable to typhoon events. The CNMI's Saipan's power generation and distribution system were badly damaged by Typhoon Soudelor in 2015, which led to several months of power outages and disruptions of the public water supply and wastewater treatment systems. More recently, Typhoon Mangkhut devastated Rota in September 2018, and destroyed much of that island's energy infrastructure. In the same year of October, Super Typhoon Yutu decimated the electric power grid on Saipan and Tinian, disrupting power service again for several months. In response to the damage sustain on the all three islands' energy infrastructure, CUC and mutual aid partners have executed power restoration efforts to disaster damages areas within each island's electric power grid. Currently, CUC is developing hazard mitigation planning strategies to integrate hardening and resiliency measures into all three islands' energy infrastructure. CUC has solicited assistance from the U.S. Department of Energy in the creation of an energy resiliency plan to cover hazard mitigation planning strategies that focus on distribution automation, undergrounding system and distributed energy resources as part of the resiliency response to natural disasters such as typhoons.

Distribution Automation

The integration of distributive automation devices, an energy resiliency plan that integrates the use of power system technologies and devices shall simply power restoration and isolation work and allows for power restoration efforts to operate more efficiently. The CUC power system currently employs technologies and protective devices necessary to operate and management power system reliability performance at an elementary level. The absence of more sophisticated technologies in the power system, limit CUC's resiliency capabilities in response to natural disasters or existential threats. The modernization of CUC's power distribution system to allow for distribution automation, CUC proposes seven objectives that ensure an effective implementation of distribution automation.

The seven objectives for distribution automation include the following:

1. Fuse Coordination Study
2. Recloser Integration
3. Switch Fault Interrupters Integration
4. Segmentation of Distribution Circuits through Switching Installations
5. Power Flow Flexibility (Circuit Looping)
6. Power Restoration Scheme
7. Implementation of supervisory control and data acquisition (SCADA) for real-time data collection and analysis

Undergrounding

Since the resolution of resiliency initiatives in 2015 as a result of Typhoon Soudelor, CUC had prioritized the hardening and strengthening of overhead electrical assets through replacement of wooden poles with concrete poles and the replacement of wooden crossarms with fiberglass crossarms as a cost effective and short-term solution to mitigating the power distribution system from future typhoon events. A resolution to convert the existing overhead power distribution system to an underground infrastructure has been absent from CUC's long-term resiliency plan leaving much of the power system critical areas susceptible to damages caused by a future typhoon. Consequently, CUC proposes for the consideration for its energy resiliency plan to include the undergrounding of critical areas of the power distribution systems that are built to distribute power to CUC's financial sector and critical facilities that contribute to the local facility.

Distributed Energy Sources

CUC's limited power generation resource portfolio forces a constraint on CUC's ability to generate power from a secondary power generation resources during or following natural disaster or existential threats. In addition to the implementing a large-scale power generation asset, CUC would like to consider for the integration of distribution energy sources to supplement CUC's existing power generation resource during or following natural disasters or existential threats. CUC thoughts on distributed on distributed energy source shall materialize in the form of commercial scaled solar microgrids built on each of distribution circuits.

Strategic Plan

CUC's long-term strategic plan for electric power services is based on the enhancement of the CNMI's overall energy infrastructure and the standardization of its internal programs. CUC's long-term strategic plan is projected over a five-year period between 2020 and 2025. The plan consists of priority projects that are deemed achievable in the aforementioned timeframe and have been assigned plausible funding sources.

The call for an improvement to the CNMI’s energy infrastructure serves to achieve long-term resiliency of the overall energy infrastructure through the implementation of resiliency measures for CUC’s overhead and underground power distribution systems. Specifically, this improvement entails the integration of resilient deemed materials that are exude high ratings for resiliency capable of withstanding category 5 typhoon events. Some of the major projects to be performed include the replacement of wooden poles with concrete poles and the replacement of wooden crossarms with fiberglass crossarms. Other resiliency measures include the conversion of overhead distribution circuits designed to deliver electric power to critical customer bases and facilities such as the Commonwealth Healthcare Facility and the Saipan International Airport to an equivalent underground power distribution system. The overhead to underground conversion will also cover Saipan’s tourist district to an underground power distribution system.

CUC’s goal to improve the CNMI’s overall energy infrastructure includes the integration of smart grid systems. CUC utilization of smart grid system are made to improve the energy demand side management experience of CUC’s electric customers. The integration of smart grid systems serves to create a two-way dialogue on energy demand side management between CUC and its electric customers. This two-way dialogue will allow CUC’s electric customers the ability to monitor their electric consumption pattern in real time and if necessary, respond with energy conservation measures accordingly. The benefit of utilizing these smart grid systems for CUC is to mitigate accounted non-revenue losses through the minimization of human error attributed from meter reading and translation.

Other projects encompassed under CUC’s enhancement of the CNMI’s energy infrastructure include the integration of a utility scale solar energy system. The project is an extension to Public Law 15-62 which requires the CNMI’s overall renewable energy portfolio to match 30% of the CNMI’s peak demand. The goal behind the project will be to create an additional power generation resource facility that may result in an overall reduction in utility rates due to reduce cost in fuel importation needed to operate CUC’s diesel fuel generator sets. In accordance to the technical requirements for power system reliability and intermittence control, the integration of an additional power generation resource facility that operates on renewable energy may result up to 12 MW of additional installed capacity and available capacity in the island of Saipan, 750 kW of additional installed capacity and available capacity in Tinian and 450 kW of additional installed capacity and available capacity in Rota.

Renewable Energy Status and Potential^a



The standardization of CUC’s internal programs represents the investment of utility resources that promote employment training and development in accordance to utility practices and standards prevalent in the United States. This objective constitutes as a priority item in CUC’s strategic plan as the corporation’s embarks on the execution of projects which require technical aptitude on the part of CUC’s technical personnel for quality control. One of the major groups focused under this objective are CUC’s electrical engineers. Currently, CUC’s electrical engineers exercise trivial engineering assignments sufficient to meeting the minimal demands of CUC’s electric customers.

Further improvement to CUC’s electrical engineering aptitude is necessary in order for CUC’s electrical engineers to engage in the in-depth analysis of its power transmission and distribution systems. An engineering analysis includes a review and study of its customer load demands. The study evaluates the performance in which electric power is being delivered to its load customers.

As noted in CUC’s 2019 Citizen Centric Report, CUC was challenged to cope with “explosive growth” from 2016 thru October of 2018. With Typhoon Yutu dramatically slowing growth, CUC has been given some breathing room to reset, look at new opportunities for grants, push for resiliency opportunities in all areas, and finally, build some durability into CUC’s more vulnerable infrastructure. There are many far reaching decisions and new investments that must be put in motion if CUC hopes to stay ahead of the next growth curve that is gradually returning over the next five years. Key priorities and objectives of this planning horizon are outlined as follows:

Priority	Objectives
Consistent Leadership Strategy	<ul style="list-style-type: none"> Mentor senior leaders to be accountable for their divisions/sections Emphasize efficiency, new treatment technology (modular waste treatment) Participate in interagency leadership initiatives Establish CUC as financially viable to banking institutions
Pre-Disaster Planning	<ul style="list-style-type: none"> Remind, lead, and push divisions to always prepare for a disaster Annually review gaps that need disaster assistance Identify smart investments for hardening
Asset Preservation	<ul style="list-style-type: none"> Push to establish criticality and condition of all primary assets Emphasize maintenance planning based on risk Argue for creation of maintenance reserves
Communicate, Coordinate, Delegate	<ul style="list-style-type: none"> Improve transparency of purpose, mission, goals, objectives Work with outside agencies as partners to a sustainable future Build a team spirit that shares, talks about, and understands CUC’s mission and leaders are held accountable
Develop Core Leadership Team	<ul style="list-style-type: none"> Attract and develop desired leadership capability through hiring process Develop, train and certify high quality workforce Work with local universities/high schools to build career alternatives
Financial Stability and Rate Setting	<ul style="list-style-type: none"> Support solar and green waste energy supply sources Establish a reputation for solid financial management and control Create financial rate base to justify issuance of long-term debt to build and maintain expensive long-lived capital infrastructure
Promote Technology	<ul style="list-style-type: none"> Support Waste to Energy and other alternative energy systems (renewables) Support New Efficiency systems (AMR, AMI, SCADA, Desalination)

Recommendations

The information provided in the energy report is cultivated from CUC’s records on the CNMI’s power system profile. Information presented in the report may be subject to change overtime due to the occurrence of new developments during the CNMI’s active recovery period and integration of projects managed by CUC, the CNMI Public Assistance Office and the Capitol Improvement Project Office. The data points shared in the report are cultivated from metric systems that capture real time data, historical data and future data projections. CUC shall update the contents of the report further in coordination with OPD and the PDAC.

Based on challenges and trends outlined in CUC’s 2019 Citizen Centric Report, additional summarized themes of high priority objectives for CUC’s Energy Division include:

- Increasing fiscal responsibility and transparency;
- Emphasizing energy efficiency and renewable siting at public facilities;
- Assessing viability of alternative energy supplies and promoting technology and capacity to identify and implement smart investments that can reduce operations and management costs and diversify sources to build resilience to future disturbance events be they storms or spikes in diesel prices; and
- Incorporating disaster risk reduction into plans and project implementation.

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Snapshot – Water/Wastewater

This subsection introduces the state of water management in terms of water supply and wastewater management on Saipan, Tinian, and Rota. Beyond the currently non-operational treatment system at the Tinian Dynasty and the functioning “other waste treatment system” at Rota resort, Saipan is the only island with centralized wastewater treatment. No improved water or wastewater infrastructure is currently available for the Northern Islands, where rain catchment and, in the case of Pagan, shallow wells, provide minimal fresh water supplies.

Because it is so critical to life and well-being, access to clean, healthy, affordable water is considered by some to be a human right. So is access to “improved sanitation” which allows for safe treatment of wastewater that all people produce. When assessing new projects and planning for future growth the Commonwealth Utilities Corporation (CUC) and Division of Environmental Quality (DEQ) estimates wastewater management projections based on eighty-percent 80% of total water demand. CUC reports the daily water demand as reported by billing accounts on Saipan, Tinian, and Rota is 4.8M gpd, 400,000 gpd, and 380,000 gpd respectively.

In the CNMI, freshwater availability is dependent on rainfall. Rain either enters streams and wetlands as surface water or it infiltrates the earth as groundwater and recharges “aquifers” that hold this precious resource. For this reason, rain gauges are used to collect water data and chloride concentrations can be used to measure salinity. Where chloride levels are available, they are included here because they can indicate the level of salt water intrusion and therefore the “sustainability” of the use of a groundwater well. To be sustainable, water resource management in part means ensuring an aquifer can be used for many years to come without reducing quantity or quality of the water.

Water Supply, Production, Transmission, and Distribution Systems

The Commonwealth Utilities Corporation (CUC) is the only publicly owned utility, providing power, water, and wastewater services in the Commonwealth of the Northern Mariana Islands (CNMI), although several private water companies operate, selling bottled water and ice. BECQ reports that there are 550 public and private permitted wells for drinking water, irrigation, monitoring, and exploration on Saipan, Tinian, and Rota. Of these, 342 groundwater well sources are used for drinking water with a permitted total of 16,587 gallons per minute or 995,220 gallons per hour production. Production well locations which indicate use are included in Appendix Q.

As of June 2019, CUC has provided the water production and transmission data for Saipan, Tinian, and Rota, included in this report. As CUC detailed in their Profile Report, the CUC Water Division is responsible for all aspects of the engineering, operation, and maintenance of the public water system (PWS) including the sources, treatment, storage, testing, and distribution of potable drinking water for the islands of Saipan, Tinian, and Rota. CUC is regulated by the U.S. Environmental Protection Agency (EPA) and the local counterpart, the CNMI Bureau of Environmental and Coastal Quality (BECQ).

CUC provides water service to the community which conforms to the U.S. Safe Drinking Water Act (SDWA). CUC has improved its water transmission and distribution systems throughout the recent

years (i.e. new water mains, water tanks, booster stations, etc.). These improvements were made possible through local and federal funds from multiple U.S. Federal partners (OIA, EPA, EDA). CUC continues to work with BECQ to improve its standards of operations and the quality of water supplied to the community.

Saipan

The CUC Saipan Water Division operates 140 groundwater wells; one (1) spring, one (1) rainwater catchment basin and slow sand filter (not currently in use due to turbidity), 19 chlorination stations, 14 finished water storage tanks including concrete tanks (above ground and buried), welded and bolted steel tanks, four (4) sump tanks associated with booster pump stations, and nine (9) additional in-line booster pumps, and approximately 286 miles of transmission and distribution water mains. Total water production averages 9.5 - 10 million gallons per day according to daily well production reports.

Tinian

CUC operates one (1) shaft well (Maui 2); one (1) chlorination station, three (3) finished storage tanks (bolted and welded); one (1) booster station and approximately 58 miles of transmission and distribution water mains. Tinian is served by a series of wells relying on a connected or “sole source aquifer”.

USGS reported in 2000 that:

Tinian receives about 79 in. of rainfall annual and has distinct wet and dry seasons. Six wells produce water. Most production comes from the Municipal well which pumps about 1 Mgal/d and was the sole source of potable water on Tinian for more than 50 years. The chloride concentrations of pumped water from the Municipal well was about 180 mg/L during 1992-97, which was about 100 mg/L higher than initially measured after construction in 1945.

The USGS includes detailed information regarding well drilling, rehabilitation, and monitoring on Tinian over various periods: USGS-drilled 1993-97, U.S. military drilled 1944-45, and dug wells from the 1930's. In that report, USGS concluded that the “current water supply system is expected to be insufficient for future population growth and development.”

Rota

The island of Rota has one main surface water source (the “Main Cave”), one (1) chlorination station, two (2) finished storage tanks (bolted and welded), one (1) booster station, and approximately 61 miles of transmission and distribution water mains. Total water production averages 900,000 gal/day.

Wastewater Management

The Commonwealth Utilities Corporation operates two waste water treatment plants (WWTP) on Saipan, the Agingan and the Sadog Tasi systems, for the southern and northern collection systems respectively.

The southern wastewater collections system comprises of 22 sewer pump/lift stations with submersible pumps, precast manholes, intertwined into a force main, gravity transmission lines. The waste is transmitted into a cascading flow that terminates to the Agingan Wastewater Treatment Plant, a three (3) million gallon per day secondary treatment plant with peak daily flows of approximately one (1) million gallons of wastewater treated per day.

The northern wastewater system comprises of 15 sewer pump/lift stations terminating at the Sadog Tasi Wastewater Treatment Plant, converted in 2005 from a World War II oil tanker, it is a 5.2 million gallon per day secondary wastewater treatment plant. Based on data recorded, influent flows of approximately

two (2) million gallons of wastewater treated per day.

The CUC Water Quality Laboratory has the function of collecting the test samples for the plants three times a week as mandated on the EPA permit. Reports are compiled and submitted to BECQ and EPA for discharge monitoring reports and quarterly review. EPA and BECQ have regular plant inspections twice yearly.

Similar to the water system, CUC has received local and federal funds from the CNMI and U.S. government to rehabilitate and repair existing wastewater infrastructure to include wastewater lift station and treatment plant rehabilitations. These improvements will assist CUC to comply fully with the National Pollutant Discharge Elimination System (NPDES) requirements. There are no CUC operated wastewater treatment systems on Tinian or Rota. CUC cannot promote or advocate for a specific treatment process, but has encouraged the respective legislative representatives to support additional research into current needs and build-out options for wastewater management systems on these islands.

Status, Impacts, and Responses

The status, impacts, and responses section discussed below are excerpts from draft 2015 planning guidance focused on achieving regulatory compliance across CUC water and wastewater management programs. CUC has identified the need for updated studies and surveys to optimize systems operations and growth planning.

Saipan

In 2003, *Ground-water resources of Saipan*, prepared by the United States Geologic Survey (USGS) with support from the Commonwealth Utilities Corporation (CUC) reported the following:

Freshwater resources on Saipan are not readily observable because, aside from the abundant rainfall, most freshwater occurs as ground water. Fresh ground water is found in aquifers composed mainly of fragmental limestones. About 90 percent of the municipal water supply comes from 140 shallow wells that withdraw about 11 Mgal/d. The chloride concentration of water withdrawn from production wells ranges from less than 100 mg/L for wells in the Akgak and Capitol Hill well fields, to over 2,000 mg/L from wells in the Puerto Rico, Maui IV, and Marpi Quarry well fields.

The chloride concentrations and rates of ground-water production are not currently adequate for providing island residents with a potable 24-hour water supply and future demands are expected to be higher. To better understand the ground-water resources of the island, and water resources on tropical islands in general, the U.S. Geological Survey (USGS) entered into a cooperative program with the Commonwealth Utilities Corporation (CUC). The objective of the program, initiated in 1989, is to assess the ground-water resources of Saipan and to make hydrologic information available to the CUC in support of their ongoing efforts to improve the quality and quantity of the municipal water supply.

Noting that “estimates of ground-water recharge from previous studies range from about one quarter to one third of the annual rainfall (Mink, 1987)”, the study reported that “using a water-budget accounting procedure on daily rainfall data at the Saipan airport from 1987 to 1997, about 30 percent (23 in.) of rainfall is estimated to recharge ground water on Saipan (S.B. Gingerich, USGS, written commun., 2000)”. The report highlights a decade of trends for rainfall and groundwater withdrawal on Saipan.

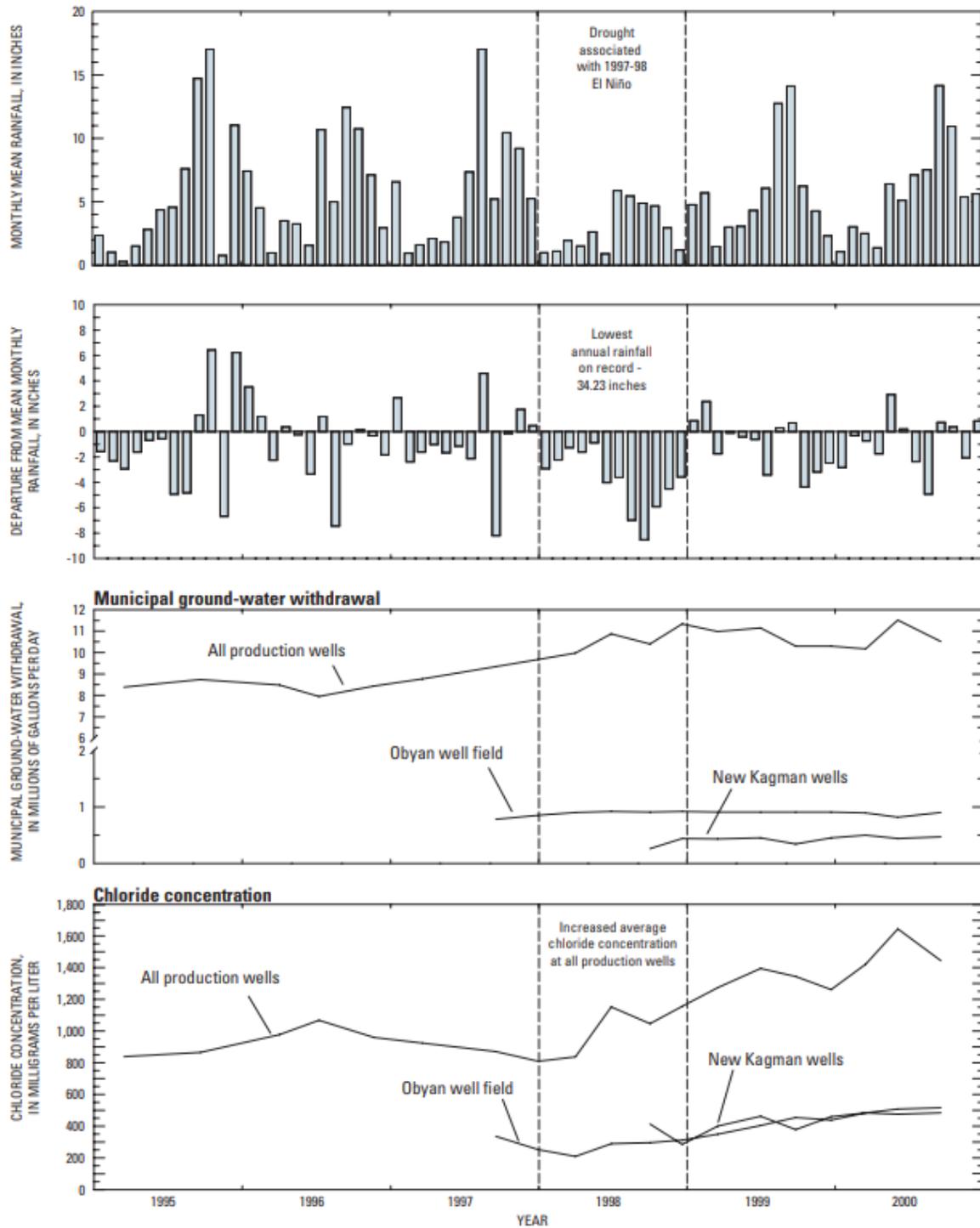
Rainfall. Seasonal differences in rainfall define distinct wet and dry seasons on Saipan. The

months of July through November (the wet season) receive about 67 percent (53 in.) of the annual rainfall; January through May (the dry season) receive 21 percent (17 in.) of the rainfall; and December and June (transitional months) receive 12 percent (10 in.) of the rainfall. Rainfall records for Saipan are available for most years since 1901 from German, Japanese, and U.S. sources; however, there is confusion about the location of some rain gages and no long-term records are available for any one location (unpublished rainfall data on file at the USGS Saipan Field Office). From 1901 to 2000, the annual totals of rainfall ranged from a low of 34.23 in. in 1998 at the Commonwealth Ports Authority (CPA) Tower rain gage at Isley Field, to a high of 145.07 in. in 1978 at the former Hakmang Communication Center on the Kagman Peninsula. The lowest monthly rainfall recorded from 1901 to 2000 was 0.1 in. in the dry season month of January 1998 at the Isley Reservoir rain gage at Isley Field (unpublished rainfall data on file at the USGS Saipan Field Office). In 1998, rainfall at some Saipan stations was less than half of normal, the lowest 12-month rainfall recorded since data collection began in 1901. The highest amount of monthly rainfall recorded for the period of record was 73.25 inches in August, 1978, when tropical storms Carmen, Winnie, and Tess passed over the island. The record high monthly rainfall was recorded at the Hakmang Communication Center on the Kagman Peninsula. Rainfall from tropical storms makes up a significant percentage of the total annual rainfall and a lack of storms may significantly contribute to drought conditions.

Ground-water withdrawal. Ground water is pumped and distributed by the CUC, the municipal water purveyor for the CNMI. On Saipan, about 140 municipal production wells are active continuously. Pumps typically are operated at maximum capacity 24 hours per day, except when one or more pumps are turned off for maintenance or replacement. The production wells are unequally divided into 15 well fields. Accurate records of groundwater production rates are sparse. In October 1998, a synoptic survey was done to meter and record production rates at all municipal wells and developed springs. A summary of the results of the survey to determine municipal groundwater withdrawal are shown in table 1. Complete results of the synoptic survey are given in Carruth (2000). Daily production at each well was determined by multiplying the instantaneous meter reading in gallons per minute by 1,440 minutes per day; this method of estimating daily withdrawal is considered reasonable over short periods of time because all production wells are operated continuously. Municipal ground-water withdrawal in October 1998 for the entire island was about 11.15 Mgal/d, and withdrawal from southern Saipan well fields accounted for about 57 percent of the total. From a review of available records at the CUC, estimated withdrawal and chloride concentration data for 1995-2000 are shown in the chart series below (next page). Increases in withdrawal correlate to the activation of new wells or well fields. Groundwater protection areas are established by BECQ-DEQ to protect water quality. These regulations limit land uses that may negatively affect groundwater in recharge areas, and establish well injection requirements for facilities – the majority of which are hotels on Saipan – that are currently using reverse osmosis to provide drinking water needs to ensure brine disposal does not negatively impact the groundwater lens.

USEPA recommends a secondary standard of 250 ppm (parts per million). Saipan varies per well field on the current chloride concentration but as figure 7 from the report, included on the next page here, indicates, many already were over the secondary standard of 250 ppm in the year 2000.

Chart Series 1 – Rainfall at CPA Tower rain gage, departure from mean monthly rainfall in inches (van der Brug, 1985), municipal ground-water withdrawal, and chloride concentration at municipal wells, Saipan. Chloride and pumpage data from Commonwealth Utilities Corporation. Rainfall data from Commonwealth Ports Authority (CPA), 1995-2000.



Tinian

CUC's 2015 Draft Final Drinking Water and Wastewater Management Plan for Tinian reports the most significant problems for the Tinian water system were:

- Large water losses associated with failing infrastructure, theft, and poor meter reading
- Failure to comply with State Drinking Water Act water quality requirements

The most significant problems with the Tinian wastewater system were:

- Lack of central sewer systems in major homestead areas

The plan goes on to outline goals, objectives, and actions to address these challenges.

Rota

As CUC reported in the 2015 Draft Final Drinking Water and Wastewater Master Plan for Rota, the most significant challenges for the Rota water system were potential health concerns associated with:

- Lack of flexibility in moving treated water to all parts of the island and difficulty in accessing and maintaining facilities
- Failure to comply with Safe Drinking Water Act water quality requirements

The most significant problems with the Rota wastewater system were potential public health concerns associated with:

- Lack of central sewer systems in Song Song and Sinapalo

The plan goes on to outline goals, objectives, and actions to address these challenges.

Recommendations

Water connects public health, food security, environmental wellbeing, and climate action. Water and sanitation are necessary for human dignity and economic growth. This section outlines current CUC responses and recommendations for necessary next steps to support the goals of the water and wastewater management sections.

CUC Water Division

Water is life and the Commonwealth Utilities Corporation is working diligently to ensure continuous high-quality service at affordable costs. At the 2019 Climate Adaptation Planning training facilitated by BECQ-DCRM, CUC staff identified water wells as an essential resource that is vulnerable to sea level rise and climatic disruptions in addition to water loss and management and maintenance challenges due to aged infrastructure. This asset is vulnerable due to lack of power redundancy for pumps, physical vulnerability of the networked infrastructure, and information challenges due to lack of data availability regarding groundwater tables and freshwater inputs. Consequences of impacts to this resource would be severe and could include major economic disruptions, declining water quality, and impacts to daily life and potentially to public health. Therefore, it is recommended that strategies and actions aggressively consider climate scenarios for data collection, during infrastructure design, and in mitigation planning.

Challenges to meeting these goals include:

- Growing water demand and potential water scarcity during the dry season
- Water pollution from controllable causes
- Impacts of climate change on water and system infrastructure
- Setting the right price for water and wastewater services

To reduce impacts of climate change including catastrophic storms and drought CUC has actively been

working to build water system resilience through the installation of back-up generators and improved system redundancy. This includes the pending procurement of granular activated carbon filters to ensure high quality water sources are available from the well fields at Isley airport area. CUC is currently working to upgrade systems, install back-up generators, and harden critical infrastructure to proactively address threats of impacts, however, additional groundwater data and scenario modelling would be helpful for long-term planning. Evaluating vulnerabilities, planning for long-term asset management and project implementation, as well as outreach and communications to raise public awareness and political support for management needs were identified as priorities for next steps to support sustainable water system management.

To support operational needs and growth of the water section, recommendations include:

- Establish Standard Operational Procedures (SOP) for each of the Tank Service Areas (TSAs) to help operators carry out complex routine operations. SOPs aim to achieve efficiency, quality output and uniformity of performance, while reducing miscommunication and failure to comply with utility regulations.
- Establish Preventive Maintenance Program. Having work that is performed regularly (on a scheduled basis) will minimize the chance that a critical piece of equipment will fail and cause costly unscheduled downtime.
- Continue with the replacement of old, undersized pipes under Capital Improvement Projects that frequently break and contribute to a huge source of water loss.
- Expand efforts and promote water auditing, leak detection, and leak repair as a means to reduce NRW, operating costs and to conserve water.
- Create an asset management system and work culture.
- Create policies and measures to promote sustainable water use.
- Continue long-term research program with USGS for determining the hydrologic, physical, chemical, and biological characteristics of the aquifers in the CNMI. Proper development and management of well fields are critical to the sustainable production of good quality water.
- A reliable and efficient method of meter reading and bill collection, and water tariffs should be set at a level that allows CUC to develop a self-sustaining program that could include AMR (automated meter reading).
- Installation of back-up power system. CUC and CIP office are working on a \$7.3M project (funded by FEMA) that will provide back-up power source to 70% of CUC wells. The intent is to allow CUC to provide continuous water source to all TSAs immediately following an environmental event.
- Policy decisions and regulatory actions that will protect the Commonwealth's water resources to ensure that it is optimally managed and utilized in the best interest of the people.
- Public education is encouraged to compel the public to engage in water conservation measures that will eliminate wasting of water and maximize utilization of all water resources.
- Implement an action plan that promotes a comprehensive and integrated approach to the sustainable management of water and sanitation for the CNMI.

CUC Wastewater Division

CUC aims to provide affordable wastewater management systems to communities throughout CNMI in order to protect water quality as well as public health and welfare. To address wastewater management system needs, CUC has been working closely within the major siting development permitting process to ensure that new developments provide for essential upgrades in order to avoid significant impacts to existing services.

Challenges of wastewater management include:

- Maintaining and updating existing treatment plants on Saipan, and potentially installing new

wastewater treatment alternatives (i.e., modular systems) on the islands of Saipan, Rota and Tinian.

- Ensuring existing wastewater stream is free of inappropriate materials such fibrous rags and fats, oils and grease which can cause clogs in the collection systems, lift stations and treatment plant facilities.
- Infiltration / inflow (I&I) allows for essentially clean water to enter the collection system which can dilute the wastewater stream. Dilution reduces the strength of the food supply to the biological organisms at the plant which decreases efficiency of treatment and may cause sewage volumes to exceed treatment system design capabilities.
- Unsewered neighborhoods can be difficult and expensive to access for installing new sewer collection mains and due to the cost of connection fees for sanitary treatment services.
- Getting existing water customers to connect to the sanitary system and terminating their septic systems when collection mains are installed within 200 feet of their property.
- Introducing alternative treatment systems to take advantage of developing science on the value and opportunity of reuse water treatment alternatives.
- Understanding the true pace of development based on the current workforce challenge and slow pace of development gaining ground on a reinvigorated tourist trade.

CUC responses to these challenges include:

- Installing a level of protection at our lift stations (i.e., variable frequency drives) using VFDs to control the flow of wastewater through pumps to reduce pressure on system pump startups using soft start controls and ensure plants achieve required flow rates that automatically adjust based on system pressures for assuring a greater chance for consistent operations;
- Working with resort hotels, apartment and condominium complexes, and laundries to install screening in manholes on their properties downstream from their effluent discharge locations to capture rags, and other debris that can get into the waste stream;
- Installing new trash and grit removal systems at each wastewater plants headworks sites in order to capture approximately 6 cubic feet of material before it enters the plants treatment process.
- Procuring equipment to perform pipeline flushing as well as televised inspection and grouting wastewater lines to reduce I&I in the collection system;
- Expanding collection systems on Saipan to existing unsewered neighborhoods; and
- Requesting a portion of development fee payments by developers to support infrastructure investment to handle effects of growth.

To further address these challenges CUC is supporting in-house and inter-governmental planning dialogs to identify wastewater management options for Saipan, Tinian, and Rota.

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Snapshot – Solid Waste

The solid waste stream is composed of sources from individuals, known as “general” solid waste, commercial, institutional and municipal solid waste. The U.S. EPA estimates that the average American generates approximately 4.4 pounds of garbage per day. Solid waste from residential and commercial sources makes up the majority of the Municipal solid waste (MSW). Although assessment studies are currently underway, generation rates are not available at a local level for CNMI; however, news coverage has highlighted numerous challenges with waste management in recent years. Saipan is the only island in CNMI that has a RCRA Subtitle D compliant “Municipal Solid Waste Landfill”, however, space in the existing developed landfill cells is limited. Additionally, as BECQ-DEQ reports, illegal dumping is an environmental concern island-wide.

Illegal dumping can disrupt natural processes on land and in the water. Dumping can interfere with proper drainage of runoff, and is therefore regulated to protect public health and safety. Illegal dumping is disposal of large amounts of waste in an unpermitted area. Pursuant to the Litter Control Act, BECQ is one of the government agencies mandated to enforce the Litter Control Law. The other agencies included by the law are: Department of Land and Natural Resources (DLNR), Department of Public Health (BEH), Department of Public Works (DPW), Commonwealth Zoning Office, the Department of Public Lands (DPL) and the Department of Public Safety (DPS). DEQ enforcement officers frequently encounter open dumps in the CNMI. Open dumps are areas in which a collection of garbage is “dumped.” Open dumps are illegal and are susceptible to burning when exposed to elements, vectors, or scavengers. Open dumps on private or public lands may result in the issuance of an Administrative Order and may be assessed a civil penalty of a maximum of \$25,000 per violation.

As BECQ-DEQ describes, options for solid waste management include recycling, reuse or landfills.

LANDFILL – A landfill is a permanent disposal facility. Modern sanitary landfills are designed and operated following a strict set of regulations. They are engineered to be protective of the environment and minimize the risk of contamination to the soil, water and air. Landfills are operated by trained personnel. Landfills are engineered areas where waste is placed into the land. Landfills usually have liner and cover systems, leachate management and landfill gas management and other safeguards to prevent groundwater contamination. There is one landfill on the island of Saipan, located in Marpi.

TRANSFER STATION-A facility that consolidates the loads of several waste collection deliveries into a single, larger vehicle or container for shipment to a landfill. A transfer station is not a final disposal facility. Rather, it is an intermediate facility that provides convenience and efficiency to the solid waste system.

RECYCLE – Recycling is the system of collecting, sorting, and reprocessing old material into usable raw materials. Currently items such as paper, glass, plastic, and metals are currently recycled at 2 centers on the island of Saipan and none on the island of Tinian. There are currently no recycling facilities on the island of Rota that is permitted under DEQ at this point in time. Source reduction and reuse are the most preferred waste management methods in the waste management hierarchy. Recycling reduces the use of landfills and extends the useful life of existing landfill.

COMPOSTING-Composting is the controlled biological decomposition and stabilization of organic materials. Currently, DPW-Solid Waste Division has no composting program in place.

Status, Impacts, and Responses

Saipan

Saipan’s municipal solid waste landfill was built in 2003. The prior waste disposal site, the Puerto Rico “dump” was originally a dock facility used by the U.S. military during World War II. As early as 1945, the military began dumping scrap metal into an unlined back water area. From 1953, the area was used as a municipal waste disposal site. Waste consisting of household and commercial refuse, construction debris, and garment factory waste was deposited in the dump. The CNMI government was issued an “Administrative Order” due to discharge of pollutants from the Puerto Rico dump site in 1993. In 2003 the Puerto Ricco site was closed and Brownfield remediation site began. This CIP-funded remediation and restoration project, which converted the area into a community peace park, was completed in 2015.

Recent reports indicate that the rate of use of the Saipan landfill is outpacing its expansion, with “Cell 1” reaching capacity, prompting the need to close that portion of the landfill, expand “Cell 2” and line “Cell 3” to comply with the federal Resource Conservation and Recovery Act (RCRA) Subtitle D landfill requirements. In September 2017, the Saipan and Northern Islands Legislative Delegation appropriated over \$2.3 million from the Developers Infrastructure Tax for solid waste management improvements on Saipan, with \$2 million being allocated to the Marpi Landfill and an additional \$380,840 for the construction of solid waste convenience centers in Kagman and As Gonno, Saipan. On Saipan, residents and industries may utilize the services of private waste collectors for a nominal fee or may deposit their waste at the landfill or the transfer station. Items are then deposited to the landfill or are recycled.

Feasibility studies are currently underway at DPW to assess the capacity at the Lower Base transfer station and the Marpi Landfill to evaluate economic, market, technical, financial, and management options for solid waste management for the CNMI. Based on preliminary findings, recycling and overall annual disposal rates have been rising, but have not consistently been meeting projected disposal projections from when the Landfill was designed.

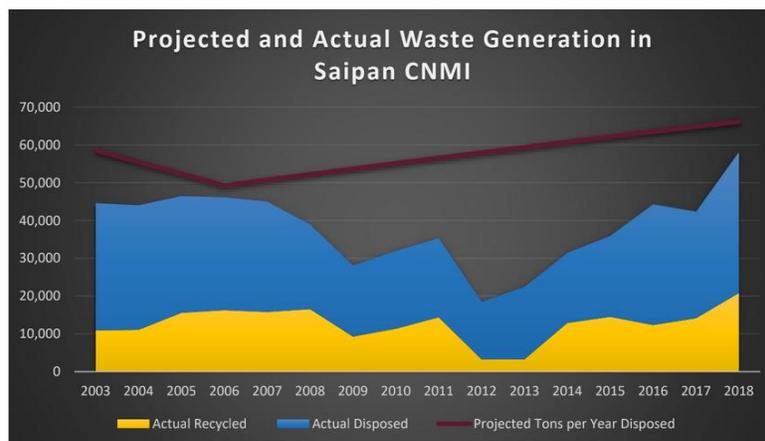


Figure 19 – Actual Tons per year recycled and disposed in Saipan compared to 20 year old tons projection (GHD Publication Pending)

The original plan provided for six (6) cells and approximately 2.58M cubic yards of airspace. In the Government estimates of generation by Harding Environmental Science and Engineering from the 2002 Closure Plan (Harding ESE 2002, or “Harding02”), it was indicated that the 2.58M cubic yards would provide disposal capacity for sixteen (16) years. As of February 2019, approximately 718,549 cubic yards of the approximately 2.58M cubic yards have been exhausted or approximately 27.8%. Additionally, there is approximately 422,403 cubic yards of existing capacity remaining in

Cell #1 and Cell #2 given the current configuration of the lined area. The final DPW feasibility report results will estimate lifespan and discuss recommended management approaches (publication pending).

Tinian

On Tinian, residents and businesses transport solid waste to an open dump site near San Jose and the southwest coast known as the Tinian Municipal Dump (TMD). Historically, solid waste was placed on an unpermitted dump site within the 10,000-foot restriction of the West Tinian Airport. The old disposal site operated as an open burn dump. Then and today, the TMD site does not comply with RCRA Subtitle D regulations, and the CNMI DPW is required to maintain the TMD in accordance with an Administrative Order (AO) issued in 2010 by BECQ-DEQ. The AO requires the application of daily cover materials and prohibits burning wastes. At the time of the writing of this report, CIP is completing a transfer station in San Jose on Tinian. In 2010 TetraTech reported that the Island of Tinian has 3,500 residents and generates approximately 2,623 tons per year of mixed refuse from residential, commercial, institutional, and industrial establishments. As noted in the August 2014 CJMT Solid Waste Study, U.S. military units conducting exercises on Tinian collect their solid waste in waterproof containers and transport the waste to a permitted disposal facility in accordance with Appendix C of the *Marianas Training Manual, Joint Region Marianas Instruction 3500.4A (DoN, 2010)*.

In 2016 the Department of the Interior approved \$1 million to support the CIP-led construction of a new sanitary and environmentally compliant solid waste transfer station facility which would also include ancillary services, such as separation of recyclables. As of the writing of this report the solid waste transfer facility is nearly complete after some delays due to the active 2018 typhoon season. According to the 2014 major siting permit, the facility, which as an expected 50 year or more lifespan on the 32 acre site adjacent to the CUC powerplant in San Jose, will receive and transfer waste to a designated disposal facility within 48 hours of receipt. The facility overview accompanying the major siting application indicates that the facility will receive no more than 20 tons of waste materials daily.

Rota

The open dump on Rota has been under an Administrative Order with BECQ-DEQ since 2010. In 2016 the Department of the Interior approved \$1 million to support the modification of the existing dumpsite on Rota to comply with standing Administrative Order requirements aimed to eliminate health hazards associated with pollution and waste disposal.

Northern Islands

There are no designated solid waste management facilities established in the Northern Islands. Vessels that travel to these islands are encouraged to carry back their trash to an approved disposal facility, however, residents and visitors have reported challenges in implementing this policy.

Recommendations

- Expand Marpi Landfill / Saipan Transfer Station study to encompass waste stream throughout CNMI and include additional management recommendations;
- Invest in recycling, diversion, and other “zero-waste” programs to reduce costs of solid waste disposal and facility maintenance while maximizing life of existing facilities; and

- Support development of environmentally compliant solid waste management facilities or transfer facilities on all inhabited islands.

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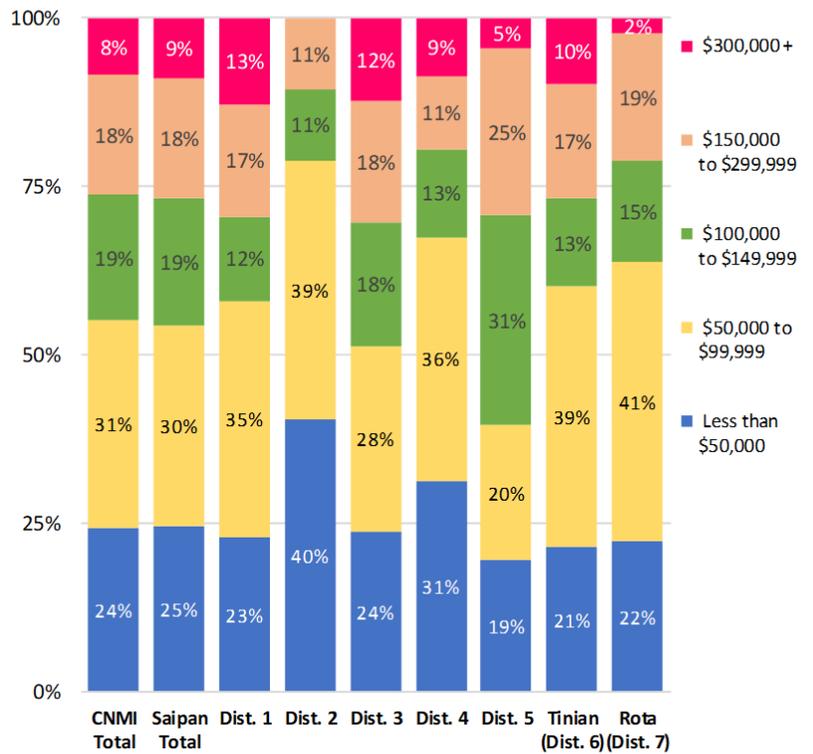
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Snapshot: Housing

CNMI’s 2017 Labor Force Participation Survey found that the home value median amount was highest in Tinian (\$85,000), followed by Saipan (\$80,000), then Tinian (\$75,00). The mean amount was highest in Saipan (\$167,276), followed by Tinian (\$127,350), then Rota (\$92,957).

As shown, in the table at right, percentage of units valued between \$50,000 and \$99,999 was 41.4% in Rota, 38.6% in Tinian and 29.7% in Saipan. Within Saipan, home value median was highest in District 5 (\$100,00) and lowest in District 2 (\$50,000) while the mean amount was highest in District 4 (\$323,914) and lowest in District 2 (\$61,500). The percentage of all units with home value less than \$50,000 was highest District 2 (40.3%) and lowest in District 5 (19.5%). The percentage of all units with home values between \$50,000 and \$99,999 was highest District 2 (38.6%) and lowest in District 5 (20.0%). The percentage of all units with values between \$100,000 and \$149,999 was highest District 5 (31.4%) and lowest in District 2 (10.5%). The percentage of all units with values between \$150,000 and \$299,999 was highest in District 5 (24.5%) and lowest in District 2 (10.5%). The percentage of all units with values \$300,000 or more was highest District 1 (12.8%) and lowest in District 2.

Figure 20 – Median Home Value Percent Distribution, CNMI Commerce CSD, 2017



The Northern Marianas Housing Corporation (NMHC) oversees project planning for the U.S. Department of Housing and Urban Development’s (HUD) Community Planning and Development grant funds for the islands of Saipan, Tinian, and Rota. HUD requires submission and approval of a consolidated plan every five years, with additional annual reporting requirements to ensure progress towards plan objectives. The most recent Five-Year Consolidated Plan covers Program Years 2015-2019 (2015-2019 Plan). Trends, challenges, and program goals of that plan, including next steps and current updates underway are outlined here.

Status, Impacts, and Responses

Trends and gaps discussed in the NMHC Needs Assessment for the 2015-2019 include decreasing median incomes, decreasing affordable housing stock availability, and increasing in housing demand for elderly populations. Specifically, based on the 2010 Census, the population in the CNMI decreased by 22% from the last decennial Census in 2000 bringing the population total to 53,883. As reflected in the charts included below, according to the 2010 Census, the median income in the CNMI is \$19,958 which decreased by 13% from the 2000 Census. The total number of households increased by 12% from the 2000 Census, with 71% reporting as “renter households” and 12% reporting as “owner households”. The number of owner-occupied households remained constant from 2000 to 2010, while renter-occupied households increased by 17% from 2000 to 2010.

Demographics	Base Year: 2010	Most Recent Year: 2000	% Change
Population	53,883	69,221	28%
Households	16,035	14,055	-12%
Median Income	\$19,958.00	\$22,898.00	15%

Significant changes were observed regarding householder’s age. The CNMI saw a 53% decrease in householders in owner- occupied units between the ages of 25-34 and a 39% decrease in householders in renter-occupied units with the same age range. Householders within the 45-54 age range increased by 52% in renter-occupied units, while householders in owner-occupied units within the same age range remained steady since 2000 to 2010. There was also a 59% increase in householders whose age ranged from 65-74 years old in renter-occupied units, while there was a 29% increase in householders within the same range in owner-occupied units. As with the elderly population, for those ages 75-84, there was a 50% increase in householders since 2000 and a 31% increase for those 85 and over in owner-occupied units. For the renter-occupied units, there was an increase 36% increase in householders’ ages 75-84, and a 50% increase in householders ages 84 and over.

According to assessment of the Housing Urban Development Area Median Family Income, based on HUD FY 2015 Income Limits, 3,990 households – or 21% of the 2010 total – qualified as “extremely low income” with 30% or less Area Median Income, and 85% of the population qualified as “extremely low to middle income” households. Housing challenges were assessed in terms of substandard housing which lacked plumbing or kitchen facilities, overcrowding with greater than 1.51 people per room, and housing cost burden greater in terms of percentage of income. Statistical analysis identified housing problems of substandard housing, overcrowding, and housing cost burden, leading NMHC to conclude that extremely low income to middle income households are more exposed to increases in housing costs and associated challenges.

To address these challenges, the CNMI identified goals and objectives based on the needs assessment of the community, prior year performance, housing market analysis, and various agency State plans. The 2015-2019 goals are:

- Special needs and low-to moderate-income housing
- Increase homeowner education and counselling
- Promote Fair Housing
- Sustain Affordable Housing Stock
- Economic Development
- Public facilities and Improvements
- Public Services

- Neighborhood Revitalization
- Energy Efficiency/Renewable Energy

As of 2019, NMHC has initiated planning efforts to support the plan update slated for completion by August, 2020.

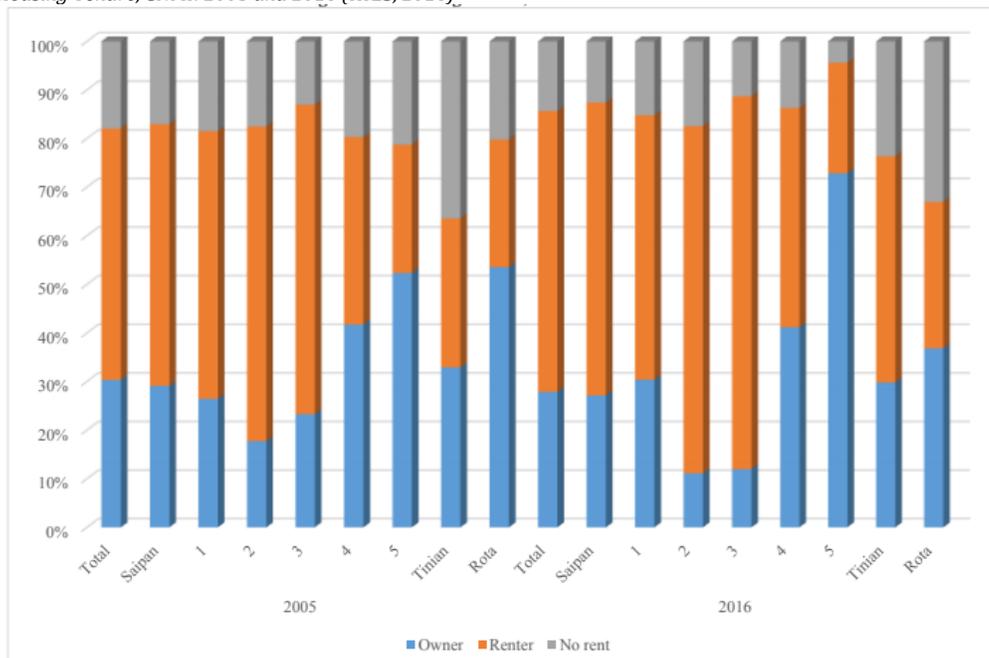
Housing Trends

The Department of Commerce’s Central Statistics Division’s 2017 Household Income and Expenditures Survey (HIES) report provides some demographic trend analysis on selected key data points on the CNMI population characteristics between the 2016 and the 2005 (HIES). Their analysis includes housing information, which is incorporated for additional reference here.

Housing Tenure

The 2005 and 2016 HIES both asked a series of housing questions, with most of the items being the same in the two enumerations. The type of housing often shows wealth, and in many countries, zoning requires different types of housing, and housing separate from commercial endeavors. The CNMI, however, does not have Western-style zoning, so housing is not consistent within a small area. Traditionally, housing was only “owned”, not rented, but with foreigners in the Commonwealth, and some natives also not having access to their own housing, renting has been very frequent in recent years. About half of all units in the CNMI were rented in 2005 and a larger percentage were rented in 2016, particularly in Districts 2 and 3. Rota had the smallest percentage of rented; District 5 had the highest percentage of owner-occupied units (Figure 21).

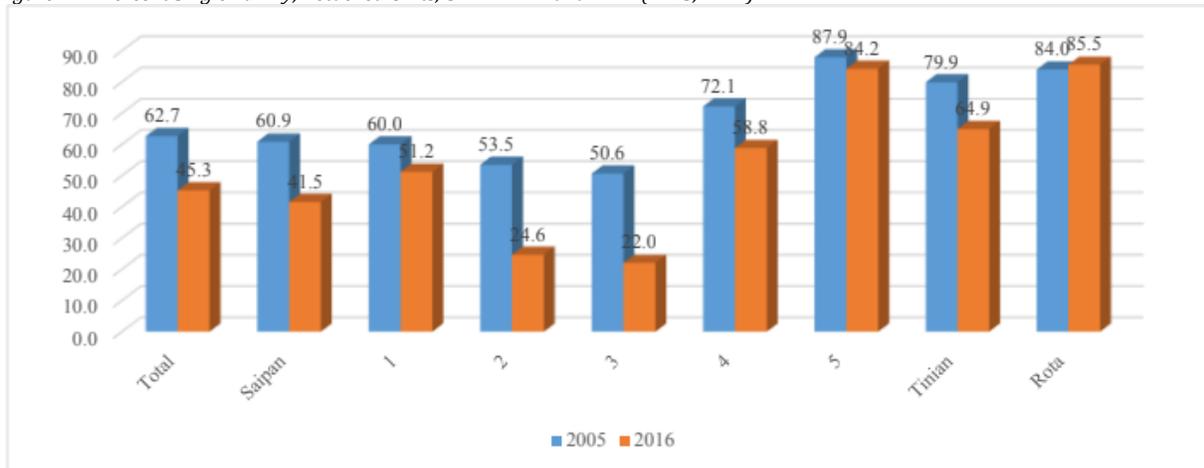
Figure 21 – Housing Tenure, CNMI: 2005 and 2016 (HIES, 2016)



Between 2005 and 2016 more families moved into apartment and other multiple family dwellings. While 63 percent of the housing units were single-family detached units in 2005, but that decreased to just 45 percent in 2016. A detached unit is not attached to any other housing unit or business; so, if a mom and pop store is at the front of the housing unit, that unit is not considered detached. The percentage living in single-family detached housing units in Rota increased slightly to about 86 percent, but all other districts and Tinian decreased during the period. In District 3, for example, the

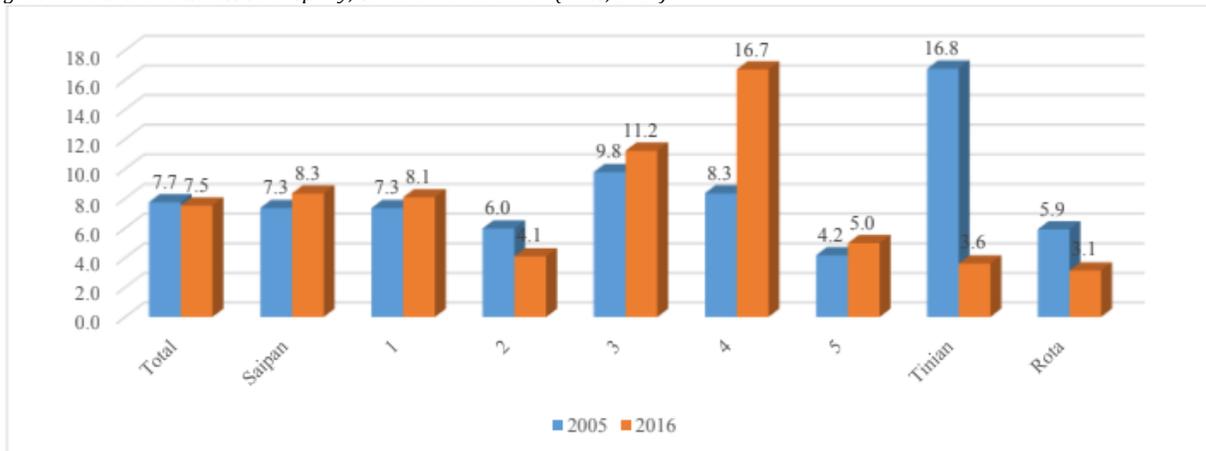
percentage living in single family detached units decreased from about half in 2005 to less than 1 in 4 in 2016. The largest percentage living in single-family units was District 5, with 88 percent in 2005 decreasing only slightly to 84 percent in 2016 (Figure 22).

Figure 22 – Percent Single Family, Detached Units, CNMI: 2005 and 2016 (HIES, 2016)



The percent of units with businesses attached stayed about the same in 2016 as in 2005, at about 8 percent of the units. A business could be a mom and pop store or a doctor’s office or poker place or some other commercial enterprise. Some of the numbers seem somewhat suspect. According to the surveys, about 17 percent of the Tinian units in 2005 had a business decreasing to about 4 percent in 2016; and about 8 percent of the District 4 units had a business in 2005 but that increased to 17 percent in 2016. About 8 percent of the Saipan units in 2016 were attached to a business compared to 4 percent for Tinian and about 2 percent for Rota (Figure 23).

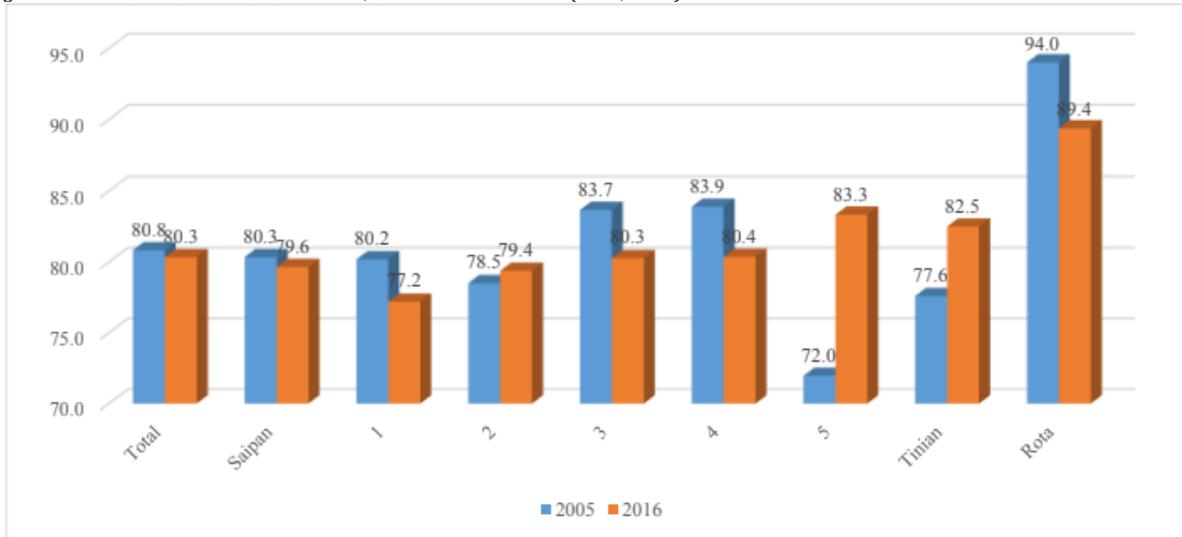
Figure 23 – Percent Business on Property, CNMI: 2005 and 2016 (HIES, 2016)



Housing Types

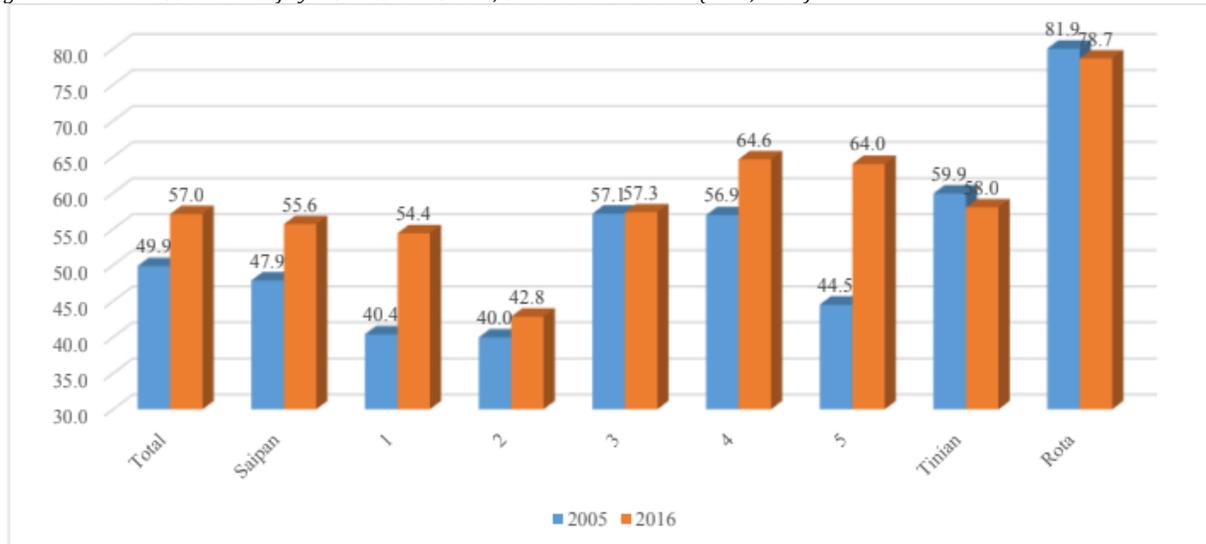
About 4 in every 5 units had poured concrete or concrete block walls in both 2005 and 2016. About 9 in 10 of Rota’s units were concrete walled but this value had decreased from 2005. The percentage of units with concrete walls increased from 72 to 83 percent in District 5 and from 78 to 82 percent on Tinian. Most of the others saw small increase or decreases over time (Figure 24).

Figure 24 - Percent Concrete Outside Walls, CNMI: 2005 and 2016 (HIES, 2016)



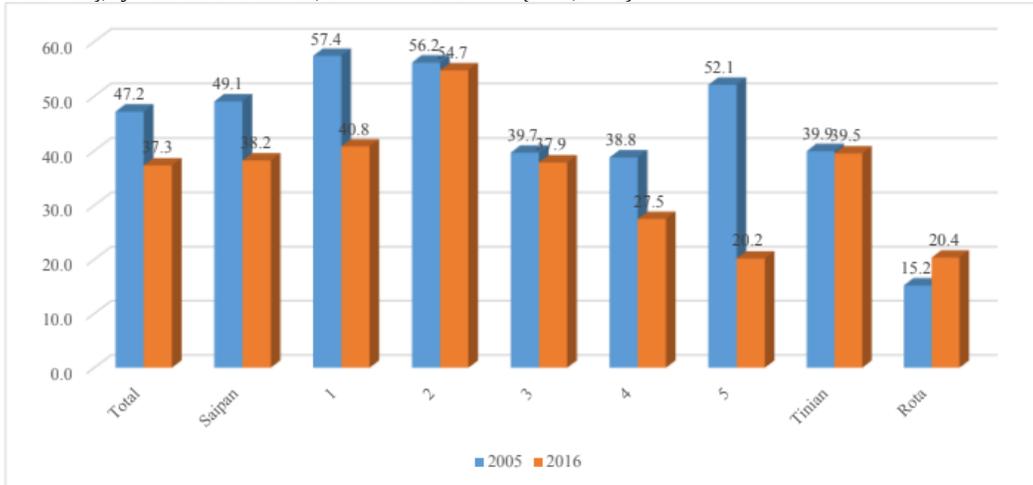
About half the roofs in 2005 were made of poured concrete, but that percent increased to 57 percent in 2016. About 4 in every 5 of Rota’s units in both surveys had concrete roofs, and about 3 of 5 for Tinian. About 2 in 3 of the units in Districts 4 and 5 had concrete roofs compared to only 2 in 5 for District 2 and about half of those in Districts 1 and 3 (Figure 25).

Figure 25 - Percent Concrete Roof by Districts and Islands, CNMI: 2005 and 2016 (HIES, 2016)



Most of the rest of the roofs were made of metal. The percent of units having metal roofs decreased from 47 to 37 percent during the 11 years. About 2 in 5 of Tinian’s roofs were metal in 2016 compared to about 1 in 5 for Rota. More than half the units in Districts 1,2, and 5 had metal roofs in 2005, but by 2016 all except District 2 saw large decreases. In 2016, only 1 in 5 of the District 5 units had metal roofs (Figure 26).

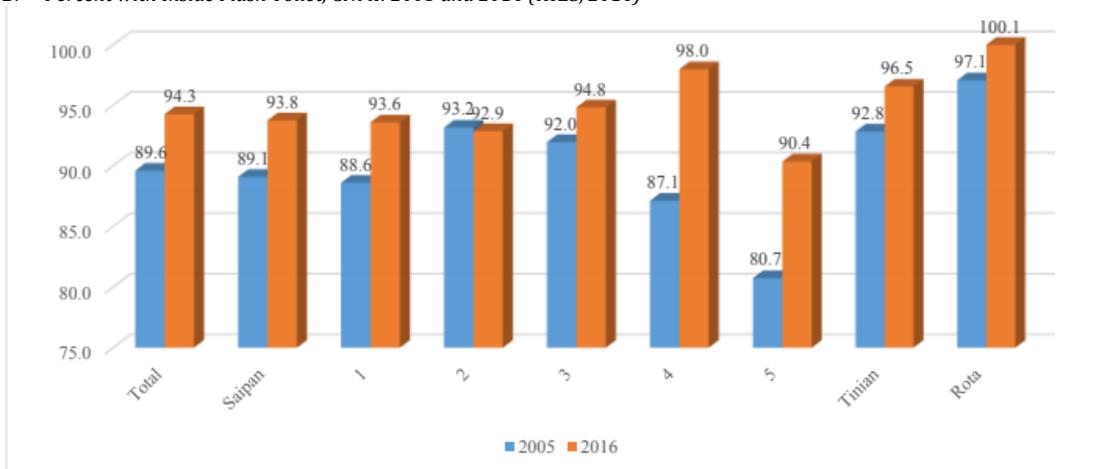
Figure 26 - Metal Roof, by Districts and Islands, CNMI: 2005 and 2016 (HIES, 2016)



The median number of rooms did not change very much between 2005 and 2016, increasing from about 3.7 to 3.9 during the period, around 4 rooms per unit. The size of housing units increased by about 1 room during the period in District 5, but otherwise the changes were small, with Tinian and Rota decreasing a little.

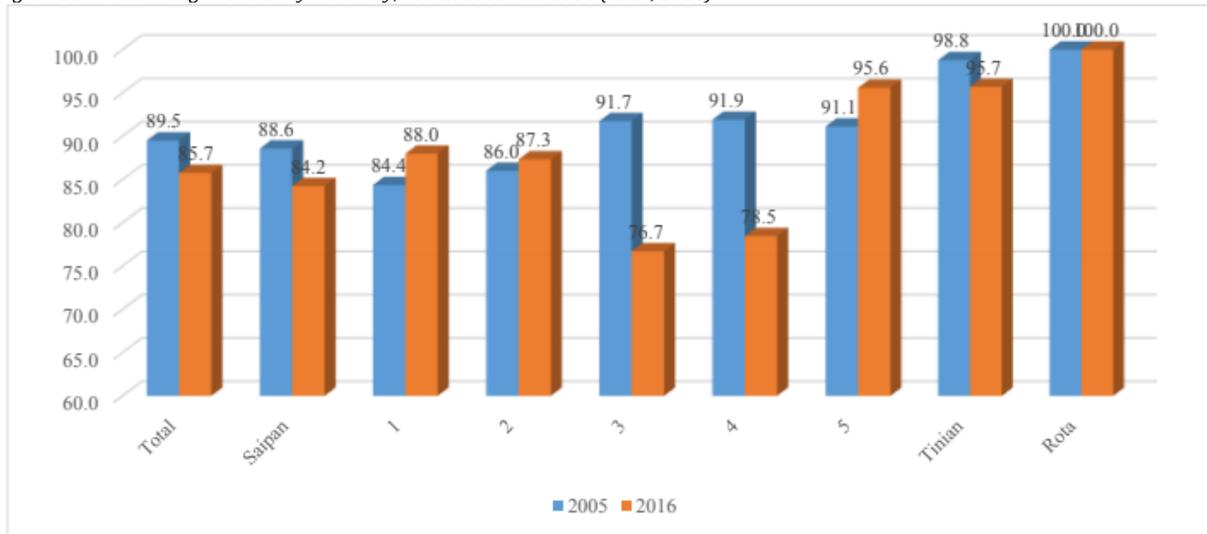
As CNMI has come into the 21st century, almost all units now have flush toilets. When the huge influx of foreign workers came in during the 1990s and early 2000s, some sub-standard housing was built and occupied, but now many units are vacant. Most of the remaining units have toilets. The percentage of units with an inside flush toilet increased from 90 to 94 percent between 2005 and 2016. All of Rota’s selected units in the survey had at least one flush toilet as did 97 percent of those on Tinian. District 4 was the most likely to have a flush toilet, at 98 percent, up from 87 percent 11 years before. All Districts saw more than 90 percent of the units with a flush toilet (Figure 27).

Figure 27 – Percent with Inside Flush Toilet, CNMI: 2005 and 2016 (HIES, 2016)



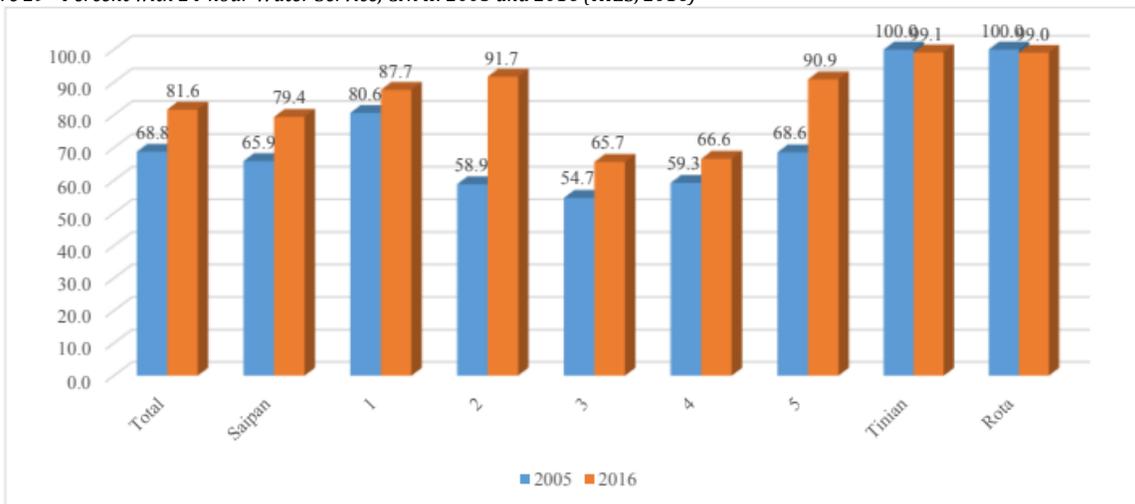
The questionnaire asked whether the unit was connected to a public system to get water, or whether it was connected to a public system but also had some auxiliary method of obtaining water. Most of the units were connected to the public system only. All the units on Rota were connected and about 96 percent of those on Tinian. But, only about 3 in 4 units in districts 4 and 5 were connected to the public system (Figure 28).

Figure 28 – Connecting to Public System Only, CNMI: 2005 and 2016 (HIES, 2016)



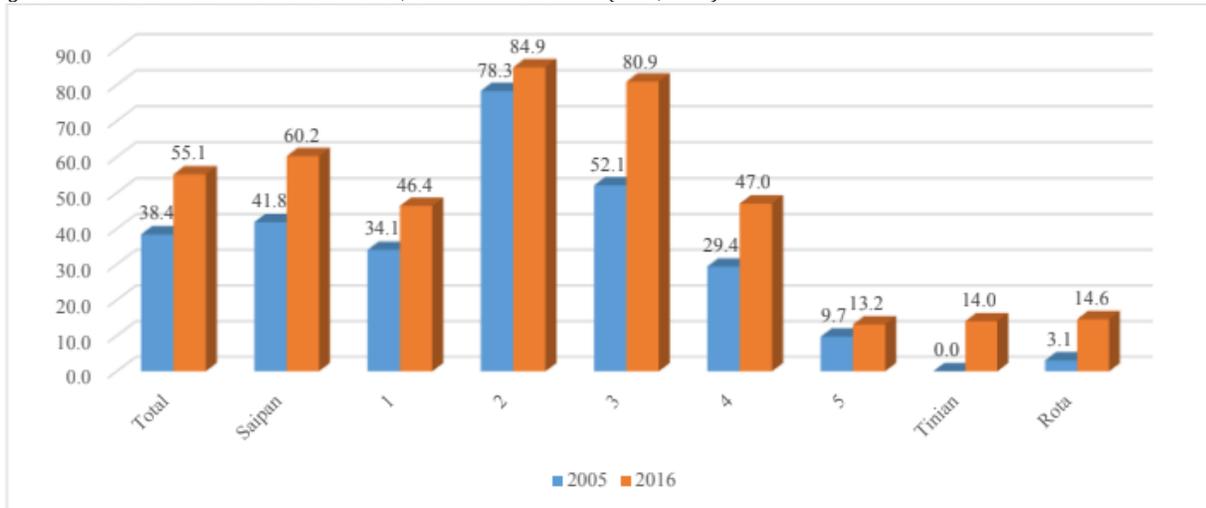
The percentage of units getting 24-hour water service increased from 69 to 82 percent during the 11 years between surveys. Almost all the units on Tinian and Rota had 24-hour service, and about 4 in every 5 of Saipan’s unit had complete daily service. However, only about 2 in every 3 of the units in Districts 3 and 4 had 24-hour service, pulling down the Saipan average (Figure 29).

Figure 29 - Percent with 24-hour Water Service, CNMI: 2005 and 2016 (HIES, 2016)



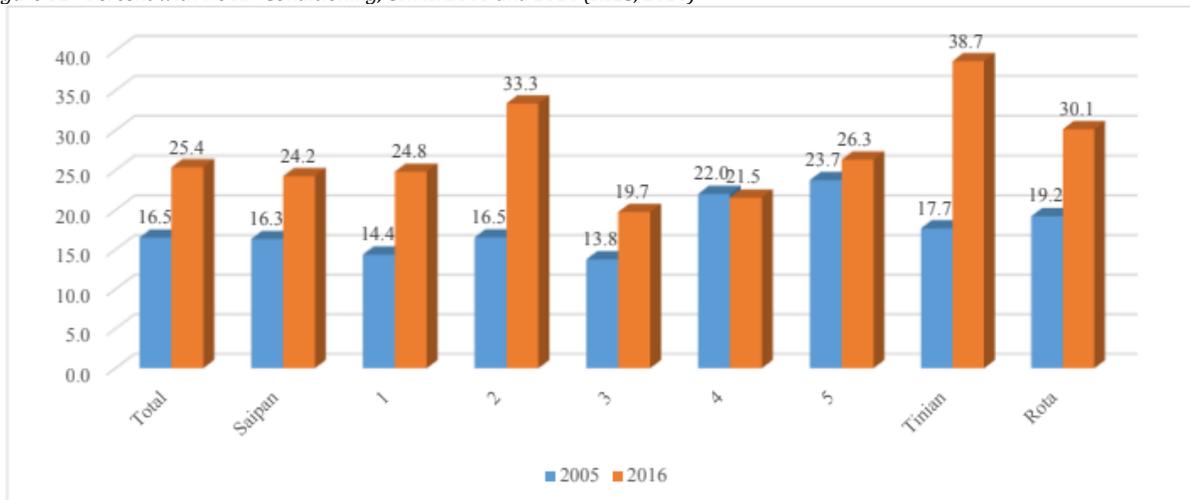
About 1 in every 4 housing units in the 2005 household survey were connected to a public sewer, but by 2016, more than 55 percent were connected. As would be expected, connections for Rota and Tinian were much lower, at 14 percent for Tinian and 15 percent for Rota in 2016. Almost 85 percent of the units in District 2 were connected to the public sewer, as were 81 percent of those in District 3. However, only 13 percent of the units in District 5 had that connection. Those units not connected to the sewer system had to continue to use cesspools or septic tanks (Figure 30).

Figure 30 – Percent Connected to Public Sewer, CNMI: 2005 and 2016 (HIES, 2016)



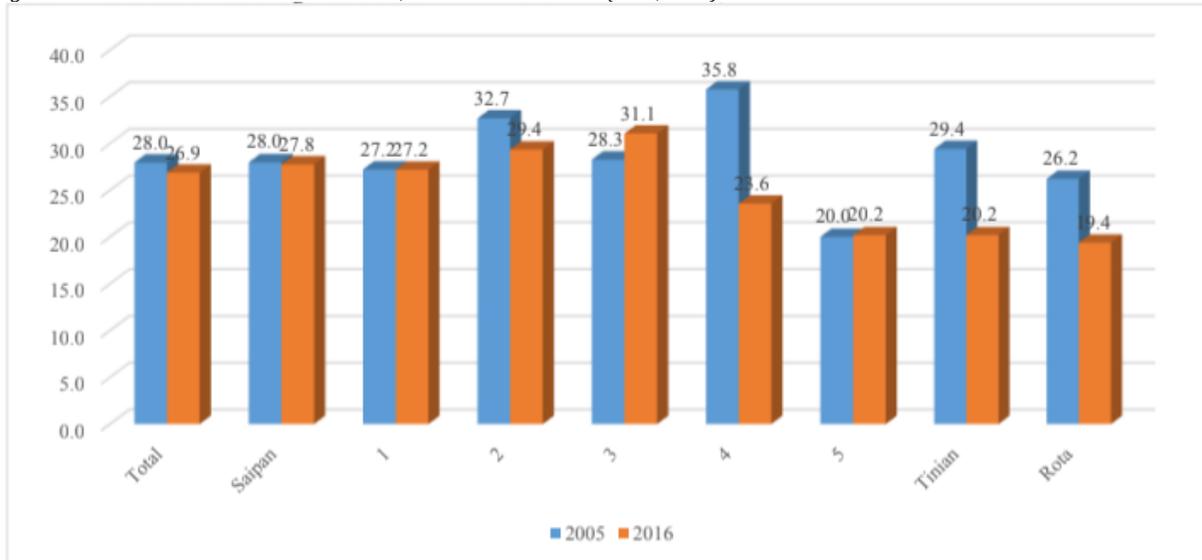
Air conditioning has only come to CNMI in more usage recently. In 2005, only 1 in 6 units had air conditioning, but by 2016, 1 in 4 units had either room air conditioners or central air conditioning. The amount of air conditioning has an impact on the public utilities, so this may be considered for government planning. While about 30 percent of Rota’s units in 2016 had air conditioning, as much as 39 percent of Tinian’s unit did, as did 24 percent of Saipan’s units. About 1 in every 3 of the units in District 2 had air conditioning, compared to 1 in 7 for District 1 and 20 percent for District 3 (Figure 31).

Figure 31 - Percent with No Air Conditioning, CNMI: 2005 and 2016 (HIES, 2016)



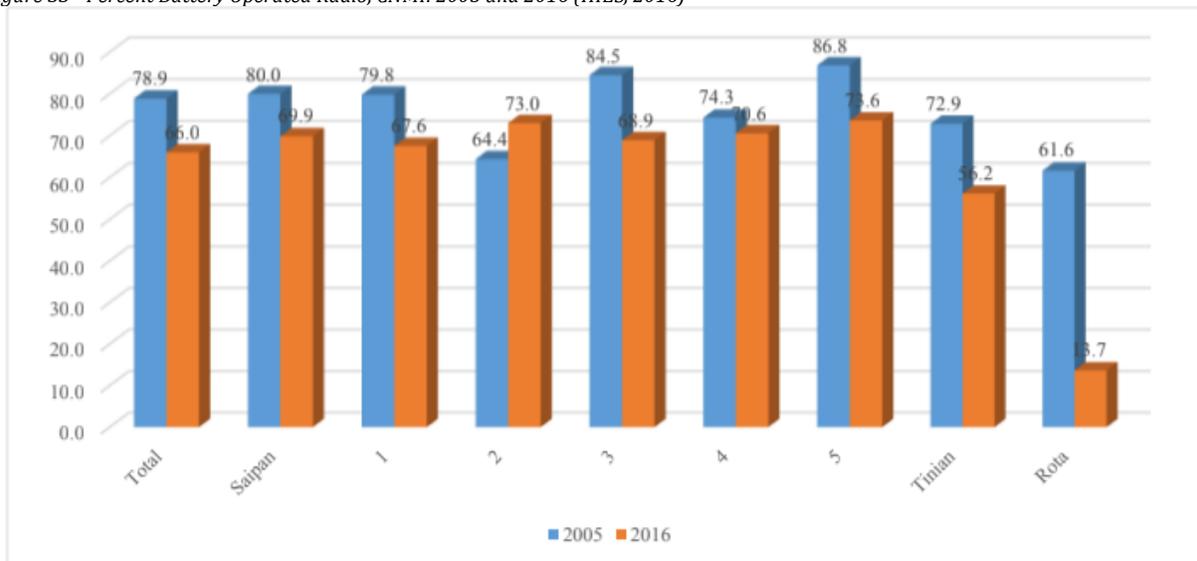
The percentage of units with no vehicle available stayed about the same over the 11 years, at about 27 percent in 2016 on Saipan. The percentages of units in Tinian and Rota, however, decreased – from 29 to 20 percent for Tinian and 26 to 19 percent for Rota, meaning more units had cars. While Districts 2 and 4 saw an increase in percentage in the percent with cars, District 3 saw an increase in units without a vehicle (Figure 32).

Figure 32 - Percent with No Vehicles Available, CNMI: 2005 and 2016 (HIES, 2016)



The percent with a battery-operated radio decreased during the period, probably because of the increased use of smart phones. Traditionally, battery operated radios were needed in times of disasters, but cell phones now serve that purpose. Most of the units, except on Rota in 2016, continued to have radios (Figure 33).

Figure 33 - Percent Battery Operated Radio, CNMI: 2005 and 2016 (HIES, 2016)



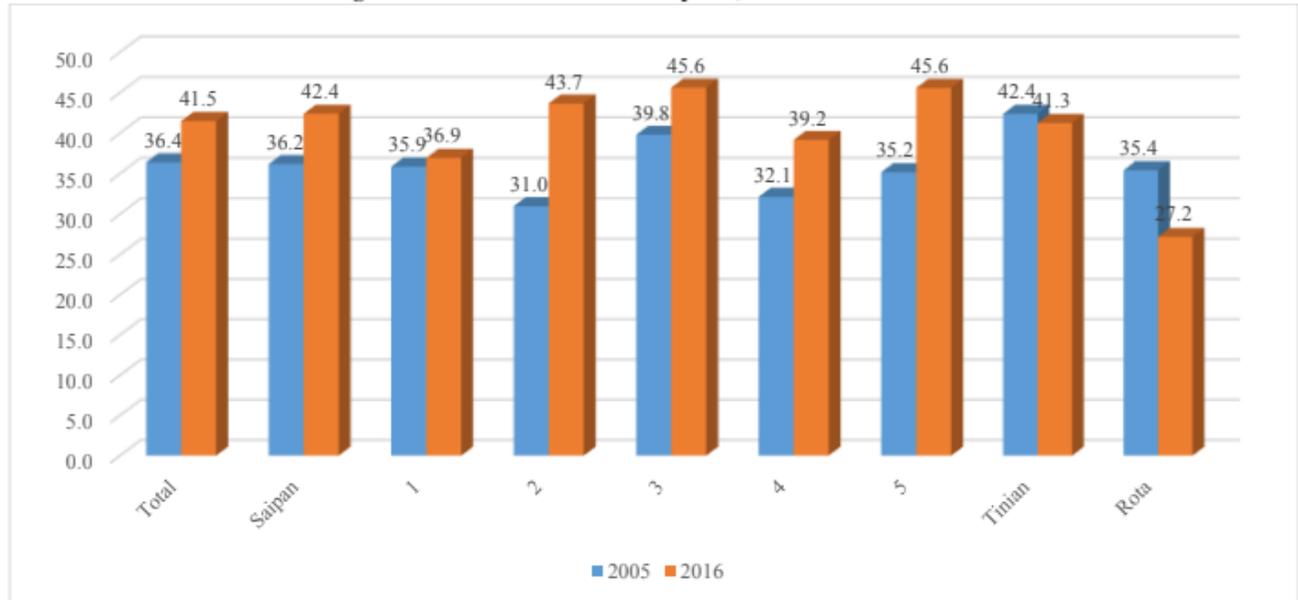
For some households, a boat is a necessity as they use it for fishing for subsistence. However, most units did not have a boat, either in 2005 or 2016. The percentage with a boat increased only from 3 to 4 percent. About 1 in every 5 units on Rota had a boat in 2005 but that decreased to less than half in 2016. All the others had only small percentages with boats (Figure 34).

Figure 34 - Percent With At Least One Boat, CNMI: 2005 and 2016 (HIES, 2016)



The percentage of units with a personal computer (including laptops and notebooks) increased from 36 percent in 2005 to 42 percent in 2016. While all the Districts on Saipan saw increases in personal computers, Tinian had a small decrease and Rota had a more substantial decrease, since that only 27 percent, slightly more than 1 in 4 units, had a personal computer (Figure 35).

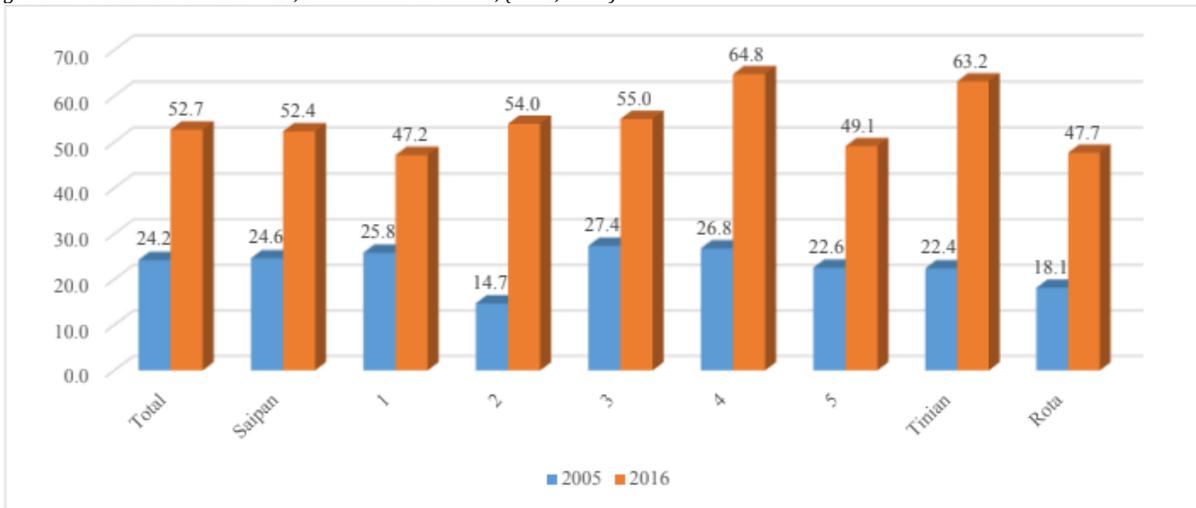
Figure 35 - Percent With Personal Computer, CNMI: 2005 and 2016 (HIES, 2016)



The internet was still relatively young in 2005 during the first of these two surveys. So, only about 1 in 4 of the households had internet access. The distribution was even across the districts and islands. District 2 had the lowest attachment, at 15 percent, followed by Rota at 18 percent. But by 2016, about half the housing units had internet access. Almost 2 out of every 3 housing units in District 4 had internet access, followed by Tinian, at 63 percent. While Districts 1 and 5 and Rota

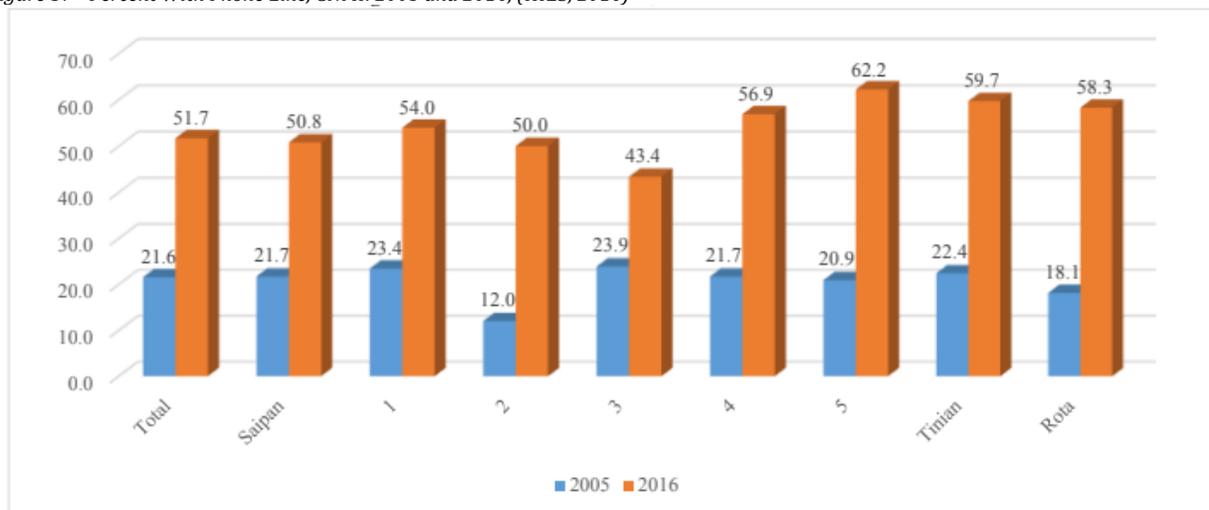
had the lowest internet access, even for them, about half the units had internet access in 2016 (Figure 36).

Figure 36 - Percent Internet Access, CNMI: 2005 and 2016, (HIES, 2016)



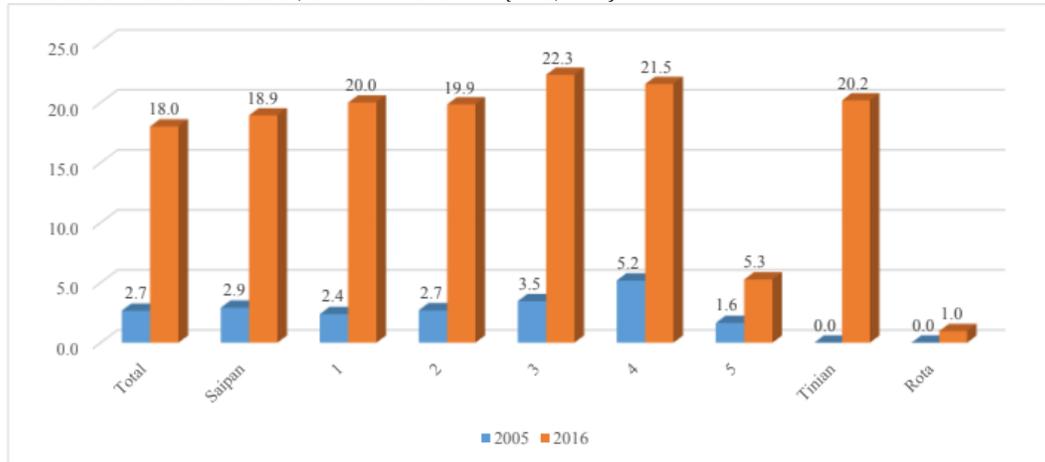
In 2005, cell phone use was not as common as it is now, particularly smart phones, so households had landlines if they could get them. With increasing cell phone use, some units are moving away from landlines. Nonetheless, in CNMI landline use increased over the period. While about 1 in 5 units had a landline in 2005, about half of the units had a phone in 2016. Only in District 3 did fewer than half of the units have a landline. District 5 saw about 62 percent with a landline (Figure 37).

Figure 37 - Percent With Phone Line, CNMI: 2005 and 2016, (HIES, 2016)



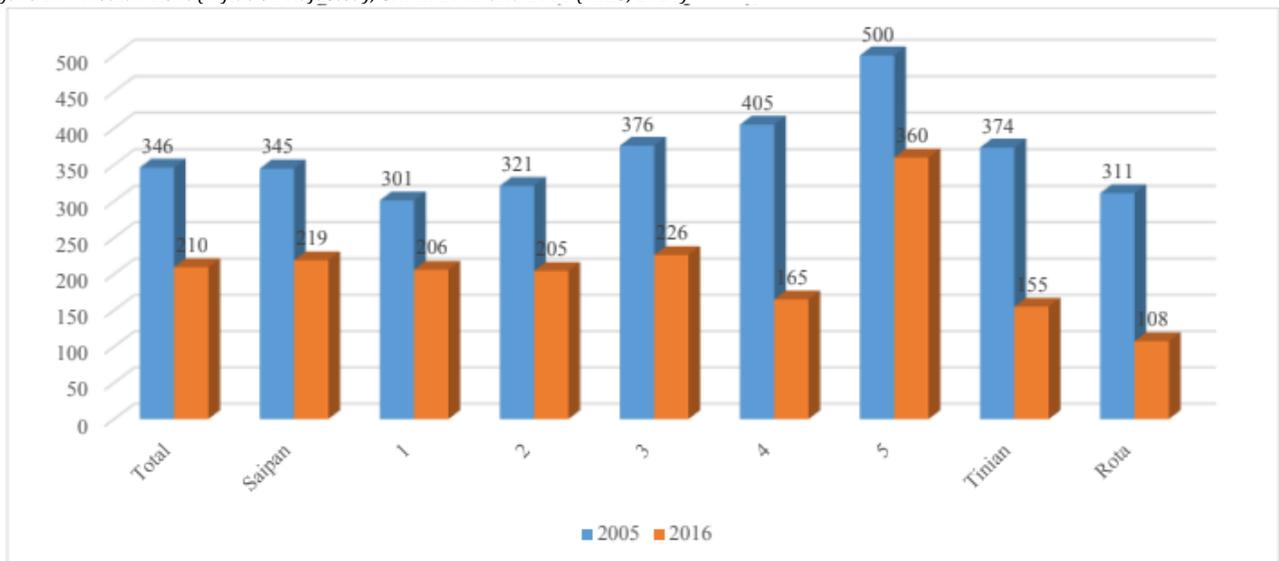
The percentage of units connected to the internet by broadband increased significantly during the 11 years. In fact, in 2005 almost no units were connected via broadband. By 2016, about 1 in every 5 units was connected. Rota continued to have almost no broadband connection, but Tinian's was among highest use percentage-wise. Less than 5 percent of the District 5 units were connected to the internet, but the other districts had used about the same as for Saipan (Figure 38).

Figure 38 - Broadband Internet Connection, CNMI: 2005 and 2016 (HIES, 2016)



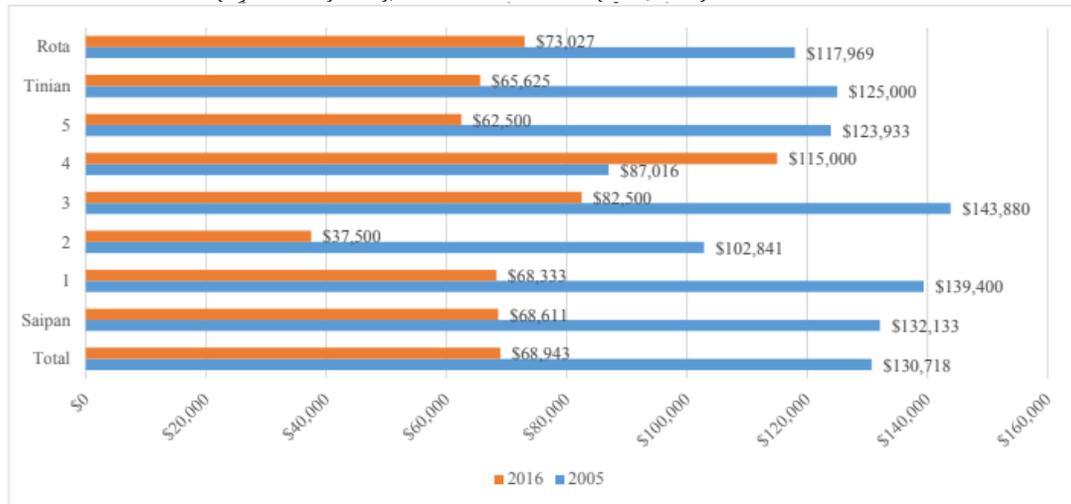
For median rent paid, the U.S. standard for inflation is used between the two survey years. Hence, while it looks like all Districts and Tinian and Rota seem to have decreases in rent – and this makes sense since there was less pressure on rental resources with so many people leaving the Commonwealth – the trends may be obscured by lack of knowledge of the true inflation rate for the CNMI between the enumerations (Figure 39).

Figure 39 - Median Rent (Inflation Adjusted), CNMI: 2005 and 2016 (HIES, 2016)



Similarly, for value of unit. While the chart shows a significant decline in the value of units, from about \$120,000 in 2005 to about \$60,000 in 2016, adjusted for inflation, it is not clear whether we have the correct inflation factor. Nonetheless, it is very likely that the value of housing did decline in the period because of the out-migration. All Districts and Tinian and Rota saw decreases in the median value of housing (Figure 40).

Figure 40 - Median House Value (Inflation Adjusted), CNMI: 2005 and 2016 (HIES, 2016)



After the landfall of Typhoons Yutu and Manghkut in 2018, CNMI became available for HUD Community Development Block Grant Disaster Response funding. This funding stream requires a disaster recovery plan, which is currently being developed to support multiple resiliency objectives. The release of that plan will warrant further updates to this section.

During Super Typhoon Yutu, CNMI’s Homeland Security and Emergency Management reported that 8 shelters with the capacity for 326 people were opened on Saipan, two shelters with the capacity for 90 people were opened on Tinian, and two shelters with the capacity for 160 people were opened on Rota. Shelters on Saipan exceeded capacity, renewing interest in shelter expansion and emphasizing the importance of hardening critical government facilities.

Recommendations

NMHC has initiated planning efforts to support the plan update slated for completion by August, 2020. These planning dialogs should continue to gather community feedback regarding priorities and updated objectives to achieve NMHC’s mission to:

- provide efficient and responsive delivery of housing, mortgage and community development programs to the people of the Commonwealth;
- afford fair and equal opportunity to housing programs and services for all, with special emphasis to very-low, low- and moderate-income individuals, elderly and persons with disabilities;
- increase and implementing home ownership programs with houses that is safe, decent, sanitary and affordable;
- encourage and promote economic independence, self-sufficiency and upward mobility for families; and
- implement programs to address the growing and future needs and economic viability of the communities in the Commonwealth.

Given the pending 2020 Census, it may be prudent to update 2020 trends analysis when updated demographics data becomes available.

References

2015-2019 Five-Year Consolidated Plan, Northern Marianas Housing Corporation.
 Department of Commerce Central Statistics Division, Household Income and Expenditures Survey (HIES) report (HIES, 2016)

Socio-Economic / DRR – Overview

Socio-economic resources reflect the human component of sustainable development. Disaster risk reduction was incorporated into this planning taskforce to help build resiliency across planning elements. This section provides details about population, economic statistics, and public health and social services that support community health, wellbeing, and positive developmental growth.

CNMI in Context – Socio-Economic / DRR Planning

Positive growth trends have been reported in CNMI between 2012 and 2017; the U.S. Department of Commerce’s Bureau of Economic Analysis (BEA) report said the CNMI economy grew by 25.1 percent in 2017 based on the gross domestic product (GDP) estimates. GDP is the measurement of the overall economic activity that includes private and public consumption, government outlays, investments, and construction costs while adding exports and subtracting the imports. Much of the growth over the last five years has been attributed to the development of a new casino on Saipan as well as expansion in real estate investments and the construction sector. As noted in the 2019 Comprehensive Economic Development Strategy update, which outlines CNMI’s “strengths, opportunities, threats, and weaknesses” detailed in Section 2 of this report, as well as goals for sustainable economic growth, continued uncertainty regarding labor dynamics remains a significant socio-economic challenge.

On July 24, 2018, President Trump signed the Northern Mariana Islands U.S. Workforce Act of 2018 (Workforce Act, H.R. 5956), extending the CW-1 program through Dec. 31, 2029, and increasing the CW-1 cap for fiscal year (FY) 2019 from 4,999 to 13,000. This cap decreases by 500 annually from 2019-2023, by 1,000 from 2023-2029, and then to 1,000 permits for the first quarter of fiscal year 2030. Although the United States Citizenship and Immigration services reports that CW-1 visas will generally no longer be available to workers who would be performing jobs classified as “construction and extraction occupation”, the Workforce Act exempted H-1B and H-2B workers from national caps until December 31, 2029, making these visa programs more widely available to support importation of skilled labor to fill these positions. Worker availability is an ongoing development concern. Despite the 2029 extension provided by Congress and authorized by President Trump in 2018, absent any congressional amendments to expand the CNMI’s CW transition period, the CNMI’s labor crisis is anticipated to continue to serve as a critical challenge in its continued economic development efforts.

Growth Projections and Development

The most recent growth projection study for the CNMI was conducted by John M. Knox and Associates in 2018 to support the 2019 Department of Public Lands Public Land Use Plan update. The Knox model, which was completed before the Northern Mariana Islands U.S. Workforce Act of 2018, assessed three growth scenarios:

1. Scenario A is a High-Growth scenario. For Saipan, it flows from optimistic visitor arrival scenarios developed for the Marianas Visitors Authority (MVA) in a January 2017 report by consultants Horwath HTL. For Tinian, it assumes two casino hotels and construction of both military training facilities and a divert airfield. For Rota, it assumes three small upscale hotels.
2. Scenario B is a Medium-Growth scenario, with limited change. For Saipan, it assumes visitor arrivals plateau at the level considered “sustainable” (in terms of infrastructure capacity) in the Horwath report. For Tinian, it assumes just one casino hotel plus military activities. For Rota, it assumes one upscale hotel.
3. Scenario C is the only one assuming phase-out of CW-1 visa workers and probable attendant economic devastation – a Poor/Negative scenario. Saipan visitor arrivals would plunge, and

then slightly recover. Rota and Tinian would have minimal budget-hotel development, and Tinian would be assumed to have the military training but not the divert airfield.

Using the three growth scenarios described above, the Knox report provided 2028 estimates by island and CNMI-wide for population associated with change in labor demand for permanent residents ranging from 45,066 in Scenario C – less than the 2010 Census report of 53,883 – to 79,698 in Scenario A, with the majority of residents located on Saipan. However, because the CW-1 program has been extended through 2029 and as concrete development plans for military build-up such as the Tinian Divert project, along with several major siting development projects permitted by the Division of Coastal Resources Management are moving forward, updated projections would be helpful to frame a discussion of carrying capacities of the built and natural environments in the context of actual anticipated growth.

Socio-Economic Trends and Projections

As the Bureau of Economic Analysis (BEA) reports, the CNMI GDP increased incrementally between 2016 and 2017 and substantially in 2018 with growth led by tourism and gaming industry revenues. Estimated real GDP—GDP adjusted to remove price changes—decreased 19.6 percent in 2018 after increasing 25.5 percent in 2017. Between 2015 and 2019, change in GDP in the CNMI averaged 2.8 percent. For comparison, real GDP for the United States (excluding the territories) increased 2.9 percent in 2018. BEA data shows that approximately 72 percent of CNMI’s 2016 GDP was from travel and services associated with the tourism industry. Agriculture, which includes small cattle ranches and farms producing coconuts, breadfruit, tomatoes, and other local produce contributed 1.7 percent of CNMI’s GDP in 2016. Federal grants have also contributed to economic growth and stability. In 2016, federal support amounted to \$101.4 billion which made up approximately 26 percent of the CNMI government’s total revenues.

As noted in the 2019 Comprehensive Economic Development Strategy (CEDS) update, Super Typhoon Yutu demonstrated, preparedness for catastrophic disturbances is an integral part of risk reduction that enhances overall community resilience and wellbeing. Impacts from Super Typhoon Yutu following only three years after Super Typhoon Soudelor have created socio-economic burdens on many households and businesses as well as on our infrastructure and finances. “Yutu is a harsh reminder of the importance of planning and constructing for resiliency and recovery among the small islands and small economies of the tropical Pacific.” Despite challenges, including several weeks with “zero tourists” MVA board chair Marian Aldan-Pierce announced that the CNMI’s tourism industry has quickly bounced back after Super Typhoon Yutu’s devastation. The Saipan Tribune reported that Aldan-Pierce noted visitor arrivals in fiscal year 2018 were 7 percent lower than the year before, at just under 608,000 total visitors, after several years of steady growth. Due to Yutu, the MVA reported an expected 16 percent reduction in its budget for fiscal year 2019, with similar constraints expected across CNMI agencies due primarily to fourth quarter losses from the near complete disruption of tourism activities following the storm. It is within this context that the 2019 CEDS update has made strides to update CNMI needs assessments and project listings in order to support sustained positive economic growth and long-lasting recovery. Key updates in the 2019 CEDS included the incorporation of principles of “Smart, Safe Growth” into planning and project prioritization to support sustainable development which encompasses the built, natural, and socio-economic environments.

Health Systems

Health is not a silo – it starts and is maintained outside of the health care system. Therefore health considerations should be integrated into every aspect of planning from the sidewalks and roads

people use, the air they breathe and the water they drink, the food they consume, the violence and trauma they experience – all of these things are interconnected and must be addressed together to work towards the goal of healthy people and a healthy community in the CNMI.

The Commonwealth Healthcare Corporation's (CHCC) 2015-2020 Strategic Plan aims to improve the standard of services to the people of the CNMI as well as overall health and wellbeing of its populace. To achieve this goal, CHCC has been working to implement eight (8) operating strategies which include organizational and facilities objectives. Outcomes include obtaining full accreditation from the Centers for Medicare and Medicaid (CMS) for the hospital (recently surveyed in May 2019), public health, behavioral health, as well as decrease the incidence of the top six (6) major causes of death and debilitation in the CNMI: cancer, diabetes, hypertension/heart disease, teen pregnancy, HIV/STI, and substance abuse. These goals are aimed to address community health system needs and support achievement and maintenance of numerous targets of Sustainable Development Goal 3 – Good Health and Well Being.

CHCC tracks data and is meeting these standards for numerous SDG indicators, including maternal mortality ratio (3.1.1), under-five mortality rate (3.2.1), and neonatal mortality rate (3.2.2). Despite continued improvement in services and efforts to extend service areas, health system challenges remain, especially regarding management of noncommunicable diseases (NCDs), which the leading causes of deaths and of premature deaths in CNMI. CHCC's 2016 NCDs Household Survey reported that over half (56%) of CNMI adults are estimated to have hypertension, one out of five (17.3%) CNMI adults are estimated to have high cholesterol, and estimated that 12.5-18.7% of adults in the CNMI have diabetes. Additionally, almost half of CNMI adults (46.1%) do not have health care insurance, and only one-third (35.7%) of adults reported having an annual medical checkup in the past year. The Institute for Health Metrics and Evaluation (IHME) reports an average 2017 life expectancy of 76.45, over two years less on average than the total U.S. population average of 78.6 years. Asthma prevalence is 11.1% in CNMI, more than double the U.S. average of 5.45% (IHME, 2017). Lifestyle diseases such as diabetes, obesity, and hypertension are challenges that are being prioritized through comprehensive planning dialogs that further support redevelopment dialogs. For example, in addition to expanding the local hospital, located adjacent to Garapan, revitalization planning conversations are including prioritization of walkable communities to address health and socio-economic development objectives.

Employment and Social Services

Employment and demand for subsidized social services are correlated and therefore are addressed together in this section. Analysis of population and income characteristics between 2005 and 2016 show volatility in part due to the loss of the garment industry and global economic recession. During this assessment period CNMI saw an overall decline in percent of adults in the workforce from 79.2% in 2005 to 70% in 2016, a corresponding increase in unemployment rates from 8.2% in 2005 to 12.8% in 2016, and decreases in median and mean household incomes - about 56% of CNMI's population was living in poverty in 2015 by the U.S. Census Bureau's definition (HIES 2016). Although the HIES report notes that rate is higher than it would be if access to traditional lands and housing were monetized, it remains substantial and requires various Federal Programs like State Nutritional Assistance Programs (NAP) and WIC to offset the low wages and other incomes in the Commonwealth. Social services are supported at federal and state levels to reduce effects of income disparities including supporting nutritional, housing, and medical needs of qualifying individuals and families, which are detailed further in this section.

The CNMI Supplemental Nutrition Program for Women, Infants, and Children (WIC Program) is a short-term intervention program for a lifetime of nutrition and breastfeeding health benefits, while

the Nutrition Assistance Program (NAP) was established to promote the general welfare and to safeguard the health and well-being of Commonwealth residents by raising the levels of nutrition among low income, zero-income, and needy families and individuals. For both programs eligibility is determined by family size and income. In FY18 DCCA reported 8,210 qualifying NAP participants in CNMI.

The Northern Marianas Housing Corporation (NMHC) manages the Section 8 Housing Choice Voucher Program. This temporary housing assistance program has experienced ongoing administrative and technical challenges – Section 8 is only able to accommodate 500 applicants for housing assistance for Saipan, Tinian, and Rota combined, and it can be challenging for families to find suitable and qualifying housing, especially after the reduction of housing stock after Super Typhoons Soudelor and Yutu. NMHC is addressing this housing shortage through the Low-Income Tax Credit Program, which supports the development of qualifying low-income rental facilities. Tasi Homes, a 49-unit single building apartment complex opened in 2016 and Saipan Comfort Home opened 40 two-bedroom residential units across from the Northern Marianas College in 2017. The Division of Coastal Resources Management reports two additional low-income housing development project proposals are under review at the time of the writing of this report.

Support for medical services is provided through federal Medicaid and Children’s Health Insurance Program (CHIP). CNMI began participating in Medicaid in 1979, and eligibility is tied to income and resource requirements for Supplemental Security Income (SSI). Individuals receiving SSI cash benefits are automatically eligible for Medicaid. Medicaid additionally covers individuals who meet up to 150 percent of the income and resource requirements for SSI but who are not necessarily disabled. After exemptions and deductions are applied, this translates to a monthly income of \$1,735.5 and assets of \$4,500 for a couple. The Northern Mariana Islands use CHIP funds as an additional source of funding for children in Medicaid, but do not offer coverage to children whose incomes are above the threshold for Medicaid eligibility. As of September 2017, 15,472 people were enrolled in Medicaid, or approximately one-third of the Northern Mariana Islands population. The Commonwealth Healthcare Corporation’s 2019 Citizen Centric Report (CCR) noted that 44% of FY19 revenue was paid by Medicaid. It further details that the operation of the CHCC is highly dependent on the CNMI Medicaid Agency’s ability to pay for services. If cuts are made, the CHCC would likely see an increase in charity and uncompensated care.

Law Enforcement

While there are numerous agencies with regulatory enforcement authorities, the Department of Public Safety is tasked broadly with maintaining peace and order in CNMI. Across the islands, DPS has been working to address a methamphetamine epidemic while increasing staff capacity through participation in training and educational programs relating to criminal justice and crime prevention. In 2018, the Department of Public Safety reported that crime plummeted as a result of its war on drugs, with the crime rate is down 63 percent since 2013. Crime statistics for the past five years show reported domestic violence offences have fallen by over 78 percent and property crimes are down by 58 percent, leading to an overall decline in criminal offenses of more than 60 percent. CNMI police also said their awareness campaign on the dangers of drunk driving has reduced the rate of driving under the influence offences by nearly 80 percent. As outlined in the 2019 DPS Citizen Centric Report (CCR), the average population in custody has gone down since 2015 while the number of officers and civilian personnel has increased.

Cultural Resources

As described in the 2011-2015 Historic Preservation Plan, “although the CNMI is tiny in terms of

population and land area when compared to U.S. mainland jurisdictions, it is both culturally diverse and physically spread out over thousands of square kilometers of ocean.” The Historic Preservation Act of 1982 (Public Law 3-39) created the Historic Preservation Office (HPO) and protects important historic, archaeological, architectural and cultural resources on public and private lands throughout the Commonwealth. To achieve this mission, HPO conducts survey, registration, project review, public education, and cultural preservation activities. Currently, 35 sites in the CNMI are listed on the National Register. Of these, twelve are ancient Chamorro sites, two are traditional Carolinian sites, twelve date to the Japanese period, and nine are associated with World War II. Two National Historic Landmarks have been designated in the CNMI, both following the theme of the War in the Pacific. A plan update is currently under way and the Historic Preservation Office intends to complete the 2015-2020 revision in tandem with the Office of Planning and Development’s comprehensive sustainable development planning process.

Education

Sustainable Development Goal (SDG) 4 aims “ensure inclusive and quality education for all and promote lifelong learning” because “obtaining a quality education underpins a range of fundamental development drivers.”

Public education in the CNMI has expanded significantly in the past ten years. Issues surrounding the need to train the local workforce to take on jobs currently held by non-immigrant contract workers have also placed the impetus on public education entities to respond accordingly and immediately, thus resulting in an urgent compulsory rate of growth and development for all. Currently, four educational institutions are awarded funding from “CW visa” applications to support workforce training needs: the Northern Marianas College (NMC), the Northern Marianas Technical Institute, the Public School System (PSS), and the Latte Training Academy.

The SDGs place emphasis on gender achievement categories to promote equal access to education; because this data is not currently available, non-gendered achievement statistics for CNMI’s PSS are included in this section as a proxy indicator for SDG targets. CNMI has not yet established its own “proficiency standards” for SDG progress tracking purposes, however, based on national standardized testing, many of CNMI’s students are in need of support, particularly for math, reading, and science.

	PSS 2017 Exceeding	PSS 2017 Ready	PSS 2017 Close	PSS 2017 Need Support	National 2017 Exceeding	National 2017 Ready	National 2017 Close	2017 National Need Support
English	42%	29%	36%	6%	42%	30%	22%	5%
Math	1%	6%	13%	80%	4%	6%	36%	41%
Reading	2%	10%	18%	70%	6%	15%	24%	55%
Science	2%	7%	13%	79%	6%	12%	19%	62%
Writing	2%	26%	27%	26%	3%	25%	37%	35%

Based on the 2017 the National Center for Education Evaluation and Regional Assistance (NCEERA) report, entitled “*Comparing enrollment, characteristics, and academic outcomes of students in developmental courses and those in credit-bearing courses at Northern Marianas College*” most students entering Northern Marianas College in 2008–10 were initially placed in non-credit-bearing developmental courses. In English, 80 percent of full-time first-time freshmen students seeking associate degrees were placed in developmental courses. In math, 91 percent were placed in developmental courses. A total of 769 students, 90.4% male and 93.6% female students needed

additional developmental support. Implications of this study highlighted that “very high percentages of high school graduates are unprepared for college coursework”. As outlined in the *Northern Marianas College Five Year Strategic Plan 2015-2020—Full Speed Ahead*, NMC is working with PSS and partners at NMTI and the Latte Training Academy to improve student preparedness and success while increasing relevance to CNMI workforce and community needs.

Disaster Risk Reduction (DRR)

Homeland Security and Emergency Management (HSEM) is supported by numerous agency and nongovernmental planning partners in leading CNMI’s Disaster Mitigation Planning Process. HSEM’s mission is to “protect lives and property by effectively preparing for, preventing, responding to and recovering from all threats, crimes, hazards and emergencies by coordinating the efforts of the first response community to effectively manage incidents, and to collaborate with public, private, and community partnerships.” HSEM receives “preparedness funding” to support disaster risk reduction planning through regular updates of the Standard State Mitigation Plan. The CNMI adopted the first Standard State Mitigation Plan (SSMP) in 2004 with the aim to develop effective strategies that will promote hazard mitigation, reduce vulnerabilities, and ensure the CNMI can respond to the many hazards and threats that affect socio-economic, environmental, cultural, and historical resources. The approved plan allows the CNMI to remain eligible for funding assistance under Categories C through G (Permanent Restoration Work) under the FEMA Public Assistance Program following a major disaster.

The CNMI is currently using the October 2018 SSMP, which was adopted in 2019. Both the 2014 and 2018-2019 updates were narrow in scope, resulting in minimal collection of new data which pertained primarily to updates to the Inventory of Assets, as well as incorporation of climate change as a new hazard under Hazards Profile & Analysis. For the 2014 update, review of the Facilities Assessment Matrix was focused only on facilities that required updated information for a number of reasons, including relocation, or closure. Minor updates were also made to loss estimation for various hazards like typhoon, flooding, earthquakes, tsunamis, and wildfire. As detailed in the subsections that follow, the SSMP describes additional hazard specific risk summaries and reported potential losses and assessment values, as well as numbers of vulnerable people based on data from the 2010 Census. Updates based on the 2020 Census and updated risk map layers is anticipated in the next update. The SSMP is updated in compliance with the 5-year planning cycle, with the next update due by 2024.

The CNMI’s Disaster Mitigation Planning Process (DMPP) provides an organized and coordinated consistent set of goals for reducing or minimizing the loss of human life and property, major economic disruption, degradation of ecosystems and critical habitats, and the destruction of cultural and historical resources from natural disasters. The DMPP process is the basis for intergovernmental coordination related to natural hazard mitigation at the state and local municipal levels. Each municipal does not have its own local mitigation plan. The CNMI SSMP planning process and the mitigation strategy identifies activities/actions for each of the three major islands. The identified goals of the planning process for disaster mitigation in the CNMI include the following:

- To promote sustainable development by reducing the vulnerability to natural hazards in existing and planned development;
- To improve public awareness and decision making for land use planning by accurately mapping hazard-prone areas;
- To improve hazard risk management by the insurance industry and to help maintain
- Adequate protection against any catastrophe for the region; and

- To promote community-based disaster preparedness and prevention activities with support from both the public and private sector.

By incorporating these considerations across planning areas, we can comprehensively plan for a more resilient future.

SDG Alignment and Relevant Indicators

Adoption and application of sustainable development goals is an aspirational and adaptive process. The goals listed below reflect preliminary areas of data alignment. The colors in the “indicator status” column identify whether data is sufficient and CNMI is currently making progress towards a stated objective (green), if data or the objective itself are present but unclear or not adopted (yellow), or if data requests or objective setting remains pending at this time (red). These data points will regularly be updated and reassessed as comprehensive planning efforts continue.

Resource Category	SDG Indicator Target	CNMI Indicator Status
<p>Socio-Economic</p> <p>Goal 1.2: By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions</p>	<p>1.2: Reduce poverty by at least 50%</p> <p>1.2.1 Proportion of population living below the national poverty line, by sex and age</p> <p>1.2.2 Proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions</p>	<p>1.2.1 Proportion of population living below the national poverty line, by sex and age</p> <p>Census poverty status data available based on age (<18, >65 – gender details pending)</p> <p>1.2.2 Proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions</p> <p><i>Listed as pending as CNMI target for reduction and age / gender data not yet established</i></p> <p>About 56 percent of CNMI’s population was living in poverty in 2015 by the U.S. Census Bureau’s definition HIES 2016</p>
<p>Public Health / Social Services</p> <p>Goal 3. Ensure healthy lives and promote well-being for all at all ages. See full list of reported SDG indicators in “Health Systems” Section of Report.</p> <p>3.1 By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births</p>	<p>3.1 By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births.</p> <p>3.1.1: Reduce maternal mortality</p> <p>3.1.2 Proportion of births attended by skilled health personnel</p>	<p>3.1.1 - Maternal mortality ratio (MMR)</p> <p>CHCC reports 2015-2018 MMR = 62.6; meeting goal</p> <p>3.1.2 - Proportion of births attended by skilled health professional</p> <p>CHCC reports 99.7%; meeting goal</p>

Resource Category	SDG Indicator Target	CNMI Indicator Status
<p>Public Health / Social Services</p> <p>Goal 3.2. Ensure healthy lives and promote well-being for all at all ages – By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births</p>	<p>3.2: By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births</p> <p>3.2.1 Under-five mortality rate</p> <p>3.2.2 Neonatal mortality rate</p>	<p>3.2.1 – Under-five mortality rate (probability of dying during the first 28 days of life per 1,000 live births) = 2; meeting goal</p> <p>3.2.2 – Neonatal mortality rate = 4.2, meeting goal</p>
<p>Public Health / Social Services</p> <p>Goal 3.3: By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases</p>	<p>3.3: By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases</p>	<p>3.3.1 Number of new HIV infections per 1,000 uninfected population, by sex, age and key populations</p> <p>CHCC reports 0.33 in 2018, up from 0.25 in 2017</p> <p>3.3.2 Tuberculosis incidence per 1,000 population</p> <p>CHCC reports 90.38 in 2018, up from 78.84 in 2017, 57.5 in 2016, 54.5 in 2015</p> <p>3.3.3 Malaria incidence per 1,000 population</p> <p>0 reported in 2018 – meeting goal</p> <p>3.3.4 Hepatitis B incidence per 100,000 population</p> <p>0.005% 2013-2018 – meeting goal</p> <p>3.3.5 Number of people requiring interventions against neglected tropical diseases</p> <p>0 reported 2018 – meeting goal</p>
<p>Public Health / Social Services</p> <p>Goal 3. By 2020, halve the number of global deaths and injuries from road traffic accidents</p> <p><i>For additional discussion on Goal 3 see “Health Systems” section of this report.</i></p>	<p>3.6.1 Death rate due to road traffic injuries</p>	<p>3.6.1 Death rate due to road traffic injuries</p> <p>CHCC reports rate for 2015-2018 – 5.7</p>

Resource Category	SDG Indicator Target	CNMI Indicator Status
Public Safety	<p>16.1: Reduce violence everywhere</p> <p>Goal: “Significantly reduce all forms of violence and related death rates by 2030”.</p>	<p>16.1.1 – Number of victims of deaths under DPS investigation in the previous 12 months – 55 in 2018</p> <p>16.1.3 - Proportion of population reporting physical, psychological, or sexual violence in the previous 12 months – 260 in 2018</p> <p><i>Listed as outstanding as CNMI target (modified definitions) not yet established and confirmation of data (Saipan vs CNMI-wide) pending</i></p>
<p>Education</p> <p>Goal 4. Quality Education – Outlined here in general. See full list of reported SDG indicators in “Education” Section of Report.</p>	<p>4.1 Free, quality primary and secondary education</p> <p>Goal: By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes.</p>	<p>4.1.1 - Proportion of children and young people (a) in grades 2/3; (b) at the end of primary; and (c) at the end of lower secondary achieving at least a minimum proficiency level in (i) reading and (ii) mathematics, by sex</p> <p>CNMI data for “college ready” in reading and math by sex:</p> <p>In English, 80 percent of full-time first-time freshmen students seeking associate degrees were placed in developmental courses. In math, 91 percent were placed in developmental courses. A total of 769 students, 90.4% male and 93.6% female students needed additional developmental support.</p> <p><i>Listed as pending as CNMI target not yet established</i></p>
Housing and Development	<p>1.4: Equal rights to ownership, basic services, technology and economic resources</p>	<p>1.4.1 – Proportion of population living in households with access to basic services (including access to improved sanitation and drinking water) 94.3% inside flush toilet; 81.6% 24-hr water service; 80% concrete outside walls (HIES, 2016)</p> <p><i>Listed as pending as CNMI definition(s) and target(s) not yet established</i></p>
Housing and Development / Communications	<p>9.C: Universal access to information and communications technology</p>	<p>9.C.1 – Proportion of population covered by a mobile network, by technology</p> <p>2016 HIES reports 1 in every 5 units was connected by in-home broadband; phone line data provided for land lines</p> <p><i>Listed as outstanding as CNMI target and improved data source for “mobile network, by technology” not yet established</i></p>

Resource Category	SDG Indicator Target	CNMI Indicator Status
Housing / Safety	<p>11.1: Safe and affordable housing</p> <p>Goal: By 2030, ensure access for all to adequate, safe and affordable housing and basic services</p>	<p>11.1.1 – Proportion of urban population living in slums, informal settlements or inadequate housing where “slum household” is defined as household is defined as a group of individuals living under the same roof lacking one or more of the following conditions: access to improved water, access to improved sanitation, sufficient living area, and durability of housing.</p> <p><i>Listed as outstanding as CNMI definition(s) and target(s) not yet established</i></p>
Disaster Risk Reduction (DRR) Strategies	<p>1.5: Build resilience to environmental, economic and social disasters</p> <p>Goal: “By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other environmental disasters”.</p>	<p>1.5.3 – Adoption and implementation of national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015–2030</p> <p>State Standard Mitigation Plan (2018) adopted and updated at least every five years, but does not clearly address the seven targets and four priorities for action outlined by the Sendai Framework.</p> <p><i>Listed as outstanding as CNMI target (modified definitions) not yet established</i></p>

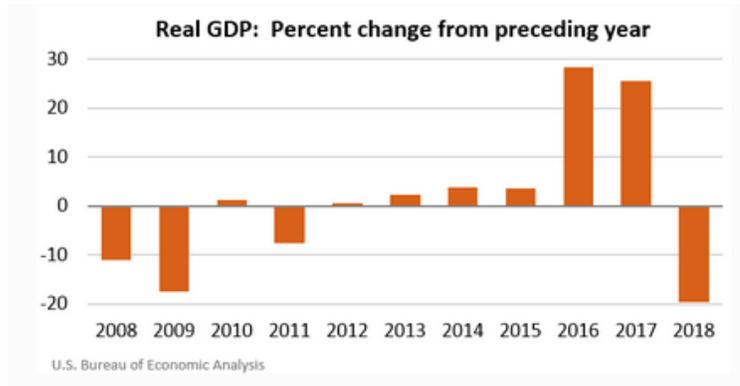
Key Socio-Economic Resiliency Planning Recommendations

Cross-cutting recommendations and themes from this section to support sustainable development objectives for people, the economy, and social service systems include:

- Coordinate plan updates with comprehensive planning visioning that includes “Smart, Safe Growth” considerations;
- Update planning objectives to include “SMART” descriptions of “specific, measurable, attainable, relevant, and time-bound” tasks with supporting action plans;
- Update population growth projections for 10-year and 20-year planning horizons to include current permitted development projects and Department of Defense build-up scenarios including the Divert - Modified Tinian Alternative – North Option, and use these projection ranges to inform long-term planning and budgeting for social services and socio-economic support mechanisms;
- Detailed quarterly reports on the status of permitted projects and projects in the permitting pipeline would help support ongoing assessment of infrastructure build-out needs to further support planning and project development efforts;
- Support streamlined and sustainable development permitting. Development guidance should be provided that details federal and local requirements for construction projects and enables early project planning coordination; and
- Add Finance, CHCC, DPS, and HPO to relevant task forces and/or to PDAC as members to further align planning across relevant planning elements and management sectors.

Snapshot: Growth Projections and Development

Positive growth trends have been reported in CNMI between 2012 and 2017; the U.S. Department of Commerce’s BEA report said the CNMI economy grew by 25.1 percent in 2017 based on the gross domestic product (GDP) estimates. GDP is the measurement of the overall economic activity that includes private and public consumption, government outlays, investments, and construction costs while adding exports and subtracting the imports.



The estimates of GDP for the CNMI show that real GDP—GDP adjusted to remove price changes—decreased 19.6 percent in 2018 after increasing 25.5 percent in 2017 (see U.S. B.E.A, above). For comparison, real GDP for the United States (excluding the territories) increased 2.9 percent in 2018 after increasing 2.4 percent in 2017. The five-year GDP average between 2014 and 2018 was 2.8 percent for CNMI. As detailed further in BEA’s GDP breakdown at the end of this subsection, much of the growth over the last five years has been attributed to the development of a new casino on Saipan as well as expansion in real estate investments and the construction sector. The 2019 BEA report highlighted the following trends in 2018 GDP in CNMI:

	Total in Millions	% CNMI GDP
PCE ¹	616	46.56%
PFI ²	245	18.52%
Net Exports ³	-14	-2.27%
Government Spending ⁴ (Fed)	57	4.31%
Government Spending (CNMI)	419	31.67%
<i>Total 2018 GDP</i>	1323	—

¹ Personal consumption expenditures (PCE), also referred to as “consumer spending,” measures the goods and services purchased by “persons”—that is, by households and by nonprofit institutions serving households (NPISHs)—who are resident in the CNMI.

² Private fixed investment (PFI) measures spending by private businesses, nonprofit institutions, and households on fixed assets in the CNMI economy. Fixed assets consist of structures, equipment, and software that are used in the production of goods and services.

³ Net exports of goods and services is the difference between exports of goods and services and imports of goods and services. Exports measures the portion of total CNMI production of goods and services that is provided to the rest of the world. Imports measures the portion of total CNMI expenditures that is accounted for by goods and services provided by the rest of the world. In 2018 51.85% of CNMI’s GDP was expended on imported goods.

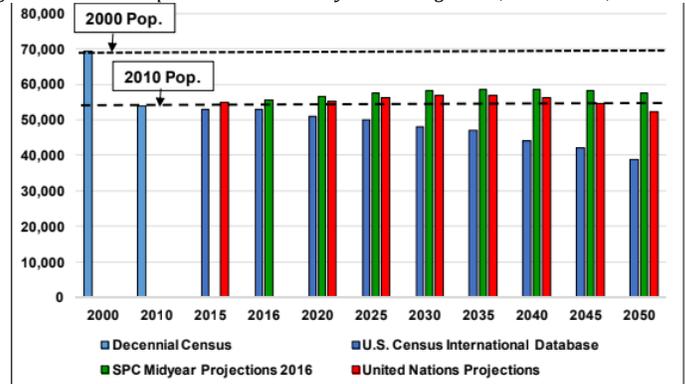
⁴ Government consumption expenditures and gross investment, or “government spending,” measures the portion of GDP that is accounted for by the government sector. Government consumption expenditures consists of spending by government to produce and provide services to the public. Gross investment consists of spending by government for fixed assets that directly benefit the public or that assist government agencies in their production activities.

This annual data reflects ongoing economic trends observed in other regional reports. For example, the 2016 CNMI Economic Report from the University of Guam’s Regional Center for Public Policy reports that key economic developments that have been driving growth in the CNMI include:

- Continuous growth in tourism
- Minimum wage increase on September 30, 2016
- The transition period to phase out the CW-1 visa category continues until December 31, 2019
- Job growth from the casino industry
- Signing of the Record of Decision on U.S. military plans for Tinian as a divert airfield and exercises
- Indications of no or low inflation threat (despite lack of data later than 1st Qtr. 2015)

In general, economic growth and trend projects are tied closely to population dynamics, however, a 2018 population forecast report from John M. Knox and Associates notes that this is not necessarily the case for those of Northern Marianas Decent (NMD) in the CNMI. Specifically, that report notes that “NMD numbers vary little over [growth] scenarios ... primarily because of the finding from the initial historical research phase that NMD population is, on a net basis, not very responsive to economic conditions. Change in historical NMD figures appears to come largely from natural increase, and the NMD population has shrunk over time.” Conversely, the report notes, the “non-NMD Resident population of the CNMI (citizens or green card holders from the Philippines, Freely Associated States, U.S., etc.) in contrast to the NMD population has historically responded to economic change with in- or out-migration.” Therefore, population estimates of this study show wider variation between “High-Growth” and “CW-1 termination and no build-up” scenarios. These studies and growth implications are also discussed in the “Land Management” section of this report.

Figure 41 - CNMI Population Forecasts by Various Agencies, 2019 PLUP, DPL.



Sources: (a) U.S. Census Bureau Decennial Census 2000, 2010; (b) Pacific Community (SPC). Population Projections. Retrieved at <https://prism.spc.int/> November 2017; (c) U.S. Census International Database. International Programs. <https://www.census.gov/population/international/data/idb/region.php?N=%20Results%20&T=13&A=separate&RT=0&Y=2017&R=-1&C=CQ> Retrieved in November 2017; and (d) United Nations, Department of Economic and Social Affairs, Population Division (2017). Probabilistic Population Projections based on the World Population Prospects: The 2017 Revision. Population Division, DESA. <http://esa.un.org/unpd/wpp/> Retrieved November 2017.

As reported in the 2019 Public Land Use Plan, the population of the CNMI has experienced growth over the last few decades including a peak population in 2000 for the main islands of Saipan, Tinian and Rota. After the garment industry left the CNMI the Commonwealth population decreased on all islands by 2010. From 2010 to 2016 the population of the CNMI has experienced minor population growth, and overall population has declined from 2000 census reported levels. Despite this, small gains in population growth are reported between the 2010 U.S. Census Bureau’s Decennial Census and the Secretariat of the Pacific Community’s population projections for 2016, retrieved in 2017.

	2000	2010	2016
Saipan	62,392	48,220	49,820
Tinian	3,540	3,136	3,160
Rota	3,283	2,527	2,720

As part of the Public Land Use Plan development, in January 2018 John M. Knox & Associates, Inc. prepared a report titled Population Forecasts for Master Planning for the Department of Public Lands (DPL). The Knox forecast model focused specifically on providing (i) estimates of “NMD” (Northern Marianas Decent – Chamorro and/or Carolinian) population and Homestead Award

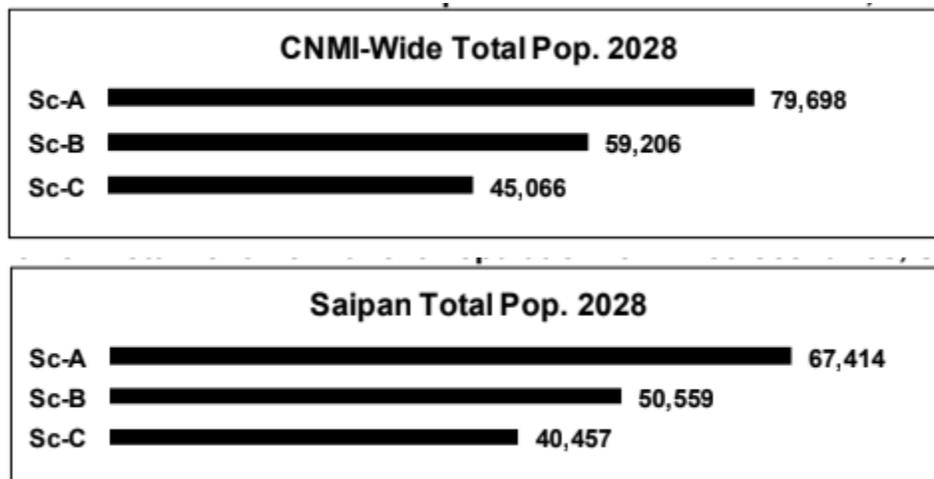
Eligibility for 2028, by island, and (ii) total population estimates for 2028, by island, to guide other plan development, although authors note that a potential secondary model purpose also involves job estimation.

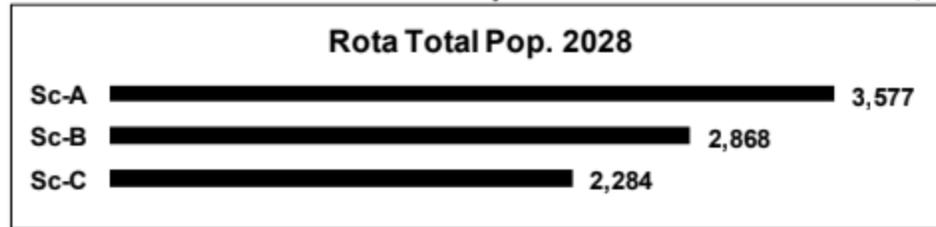
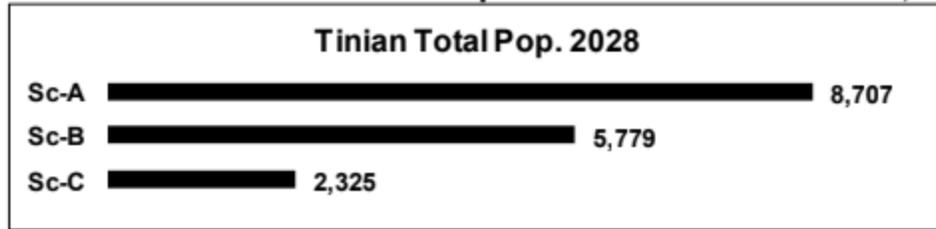
The Knox model assessed three growth scenarios:

1. Scenario A is a High-Growth scenario. For Saipan, it flows from optimistic visitor arrival scenarios developed for the Marianas Visitors Authority (MVA) in a January 2017 report by consultants Horwath HTL. For Tinian, it assumes two casino hotels and construction of both military training facilities and a divert airfield. For Rota, it assumes three small upscale hotels.
2. Scenario B is a Medium-Growth scenario, with limited change. For Saipan, it assumes visitor arrivals plateau at the level considered “sustainable” (in terms of infrastructure capacity) in the Horwath report. For Tinian, it assumes just one casino hotel plus military activities. For Rota, it assumes one upscale hotel.
3. Scenario C is the only one assuming phase-out of CW-1 visa workers and probable attendant economic devastation – a Poor/Negative scenario. Saipan visitor arrivals would plunge, and then slightly recover. Rota and Tinian would have minimal budget-hotel development, and Tinian would be assumed to have the military training but not the divert airfield.

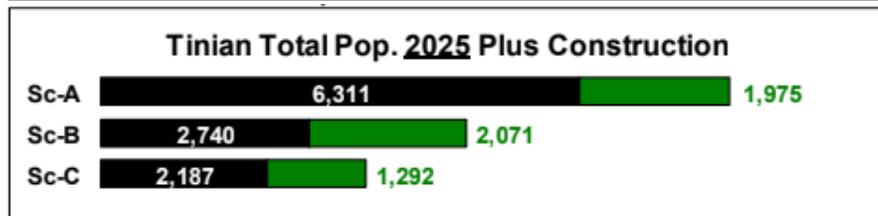
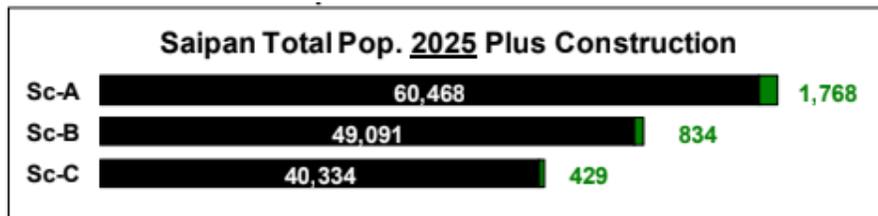
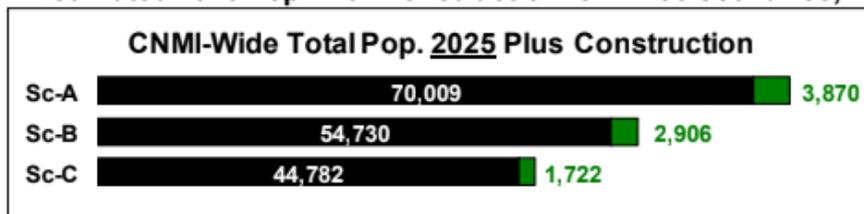
Since the completion of this model, new information regarding the CW-1 visa program as well as military build-out including approval of the Divert airfield has been resolved, emphasizing the need to regularly assess and update economic growth projection data. What follows is a summary of the growth projections provided by the January 2018 Knox forecast model and report used in the 2019 Public Land Use Plan.

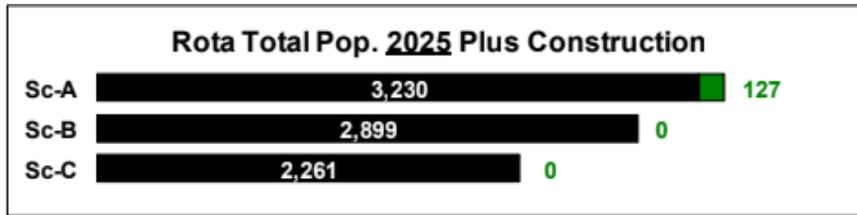
Using the three growth scenarios described above, the Knox report provided 2028 estimates by island and CNMI-wide for population associated with change in labor demand for permanent residents ranging from 45,066 in Scenario C – less than the 2010 Census report of 53,883 – to 79,698 in Scenario A, with the majority of residents located on Saipan. Additional excerpts are included in Appendix I.





In addition to assessing growth of resident populations, the 2018 Knox study also provides estimated change in the construction-related population. As they describe: it is particularly hard to predict exactly when construction “spikes” on large projects will occur, and the somewhat arbitrary nature of our assumptions about this in scenario specifications. That is why the principal focus of the analysis has been on population linked to relatively “permanent” operational jobs. But to give some sense of how construction booms can swell population, the following charts show “permanent” population plus additional construction-related population. We do this for the year 2025 instead of 2028, because overall our scenarios hypothesize relatively little construction activity in 2028 and much more in 2025 – thus, 2025 for most islands is not typical of normal conditions but may typify a construction “boom.” Given our scenarios, Rota shows this least and Tinian (with both casino-hotel and military projects in the first two scenarios) shows the greatest proportionate impact.





As indicated in preceding tables, construction-related population by 2025 is estimated in the Model to consist overwhelmingly of Non-Resident (Foreign) workers and a limited number of dependents for Scenarios A and B, predominantly Non-NMD people for Scenario C.

Status, Impacts, and Responses

Although the 2018 Knox analysis provides helpful growth analysis information, it is worth noting that only “Scenario C” assesses phase-out of the CW-1 program, which appears at the time of this report likely to remain a reality. However, “Scenario C” also assumes no build-up activities, which is not realistic given the 2010 “Pacific Pivot” agreement, which relocates approximately 8,600 Marines and their 9,000 dependents to Guam and envisions construction of facilities and infrastructure to support training and operations of Guam and Tinian as well as the 2016 Record of Decision for the Divert Activities and Exercises which announced the U.S. Air Force’s selection of the “Modified Tinian Alternative – North Option” as a future Divert location. A Supplemental Environmental Impact Statement (SEIS) is currently under development to address potential impacts of additional infrastructure construction for Divert-related projects.

Regarding expected construction growth, the Division of Coastal Resources Management (DCRM) reports that 8,147 additional hotel rooms have been permitted through the “major siting” permitting process, with 5,329 proposed or being constructed on Saipan and 2,818 proposed or being constructed on Tinian. As highlighted in the chart below, when constructed, monthly infrastructure demands of these projects will be approximately 121,309,109 gallons of water, 75,810,652 gallons of wastewater management, 95 megawatts of power, and 340,929 cubic yards of solid waste management. DCRM reports they have added questions regarding the number of workers needed to construct and operate these projects to further support development planning dialogs with the CRM Agency Board and major siting permit applicants.

Table 10 – Current permitting major siting projects in development; July 2019, CRM Major Siting Report

	Proposed Infrastructure Demands/Generation							Completion Date/Status	Rooms
	Per Month	Water (Gallons)	Power (MW)	Sewer (Gallons)	Solid Waste (cy)	Parkng Stalls	Traffic Volume		
Total Monthly Infrastructure Demands/Generation Per Utility:		121,309,109	95	75,810,652	340,929	6,251		TOTAL:	8,147
Total Annual Infrastructure Demands/Generation Per Utility:		1,455,709,308	95	909,727,819	4,091,142				
SAIPAN		56,534,249	57	47,297,530	169,116	4,114		# of Rooms/Employees for Saipan:	5,329
TINIAN		64,774,860	38	28,513,122	171,813	2,137		# of Rooms/Employees for Tinian:	2,818
								TOTAL ROOMS:	8,147

Given expected military build-out and anticipated continued implementation of pending development projects, positive population growth estimated under Scenarios A and B appear to be more likely than the population decline assessed in Scenario C, however, updated analysis in this regard may be prudent.

As noted in public feedback provided on the draft resources report, permitting and enforcement trends are linked to development trajectories. Although numerous projects have been permitted for

development through local and federal permitting processes, at times lack of available infrastructure or shortage of workers or supplies can delay projects or stop them all together. This results in economic losses for investors as well as for the CNMI when investments are made to prepare sites with improved roads and utility infrastructure to meet demand.

Recommendations

Since the 2017 Tourism Development Feasibility Study and 2018 Knox Projections, CNMI has experienced several factors that are likely to influence population trends. These include the 2018 extension of the “Commonwealth Worker” or “CW” program under US Public Law 110-229, restriction of certain worker types. Updating socio-economic growth projections with refined estimates for military build-up and “CW” phase-out data would provide for a more robust long-term outlook to inform continuing planning discussions for multiple resource areas.

Development guidance should be provided that details federal and local requirements for construction projects in CNMI. This guidance should include contact information of regulatory agencies and recommendations for early coordination to avoid project permitting and implementation challenges.

Detailed quarterly reports on the status of permitted projects and projects in the permitting pipeline would help support ongoing assessment of infrastructure build-out needs. Enforcement reports should also be shared between regulatory agencies to help ensure efficiency of interagency actions and monitor compliance with permit conditions, especially as they relate to protecting public health and safety and supporting compliance with development plans.

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BEA GDP Breakdown, Nov. 6, 2019 (contents enclosed below)

List of News Release Tables

Table 1.1.	Gross Domestic Product
Table 1.2.	Real Gross Domestic Product, Chained Dollars
Table 1.3.	Percent Change From Preceding Year in Real Gross Domestic Product
Table 1.4.	Contributions to Percent Change in Real Gross Domestic Product
Table 1.5.	Percent Change From Preceding Year in Prices for Gross Domestic Product and Price Indexes for Gross Domestic Product
Table 1.6.	Gross Domestic Income
Table 1.7.	Revisions to Percent Change in Real Gross Domestic Product
Table 2.1.	Value Added by Industry
Table 2.2.	Value Added by Industry as a Percentage of GDP
Table 2.3.	Real Value Added by Industry
Table 2.4.	Percent Changes in Real Value Added by Industry
Table 2.5.	Contributions to Percent Change in Real Gross Domestic Product by Industry
Table 2.6.	Compensation of Employees by Industry

Commonwealth of the Northern Mariana Islands

1. Domestic Product and Income

Table 1.1. Gross Domestic Product

	Line	[Millions of dollars]											
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Gross domestic product	1	938	939	795	799	733	751	782	845	931	1,250	1,601	1,323
Personal consumption expenditures	2	480	504	431	442	451	469	494	520	526	551	607	616
Goods	3	358	387	332	354	366	399	424	451	453	462	522	522
Durable goods	4	137	142	119	130	132	143	166	186	194	202	227	225
Nondurable goods	5	222	245	213	224	234	256	257	265	258	259	295	298
Services	6	409	427	381	398	378	427	460	498	556	965	1,168	772
Net foreign travel	7	-287	-310	-283	-309	-293	-357	-390	-429	-483	-876	-1,083	-678
Private fixed investment	8	79	83	85	77	74	79	87	123	198	327	301	245
Net exports of goods and services	9	47	29	-47	-70	-132	-98	-111	-110	-130	0	282	-14
Exports	10	627	488	312	335	317	380	414	451	504	903	1,113	712
Goods	11	333	172	23	19	17	16	17	15	13	19	23	26
Services	12	293	316	289	316	300	364	397	436	491	883	1,091	686
Imports	13	579	459	360	405	449	478	525	561	633	902	831	726
Goods	14	498	394	307	346	384	409	449	477	488	636	632	608
Services	15	81	66	53	59	65	69	76	84	145	267	199	119
Government consumption expenditures and gross investment	16	332	324	327	349	340	301	312	312	336	372	411	476
Federal	17	13	15	20	22	22	21	20	22	29	26	26	57
Territorial	18	319	308	306	327	318	279	292	290	308	346	386	419

NOTE. Detail may not add to total because of rounding.

Table 1.2. Real Gross Domestic Product, Chained Dollars

	Line	[Millions of chained (2009) dollars]											
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Gross domestic product	1	1,084	964	795	806	744	748	766	795	823	1,056	1,326	1,066
Personal consumption expenditures	2	516	509	431	444	430	440	463	483	499	518	554	548
Goods	3	395	400	332	349	338	363	388	403	414	422	462	450
Durable goods	4	149	149	119	127	121	131	153	169	185	190	203	196
Nondurable goods	5	246	251	213	222	217	232	234	235	230	233	260	254
Services	6	434	433	381	389	354	390	413	435	485	812	966	622
Net foreign travel	7	-313	-324	-283	-294	-263	-313	-336	-353	-400	-732	-894	-528
Private fixed investment	8	80	82	85	78	72	76	84	119	193	320	292	234
Net exports of goods and services	9	147	48	-47	-56	-82	-52	-64	-76	-148	-105	133	-78
Exports	10	747	476	312	320	284	333	357	373	415	721	874	544
Goods	11	396	138	23	19	15	14	15	13	12	18	20	23
Services	12	320	331	289	300	269	319	342	359	402	702	852	522
Imports	13	600	428	360	376	367	384	421	449	563	825	741	622
Goods	14	511	361	307	320	308	323	354	378	440	594	573	527
Services	15	88	67	53	56	59	61	67	71	124	229	169	98
Government consumption expenditures and gross investment	16	348	326	327	341	327	286	289	279	297	326	349	381
Federal	17	13	16	20	21	21	20	19	20	25	23	22	47
Territorial	18	335	310	306	320	307	265	270	259	272	304	327	334
Addenda:													
Population (thousands) ¹	19	59.3	57.6	55.5	53.5	52.2	51.4	51.2	51.0	50.8	50.6	50.3	50.0
Per capita real GDP (chained dollars)	20	18,280	16,736	14,324	15,065	14,253	14,553	14,961	15,588	16,201	20,870	26,362	21,320

(1) Source: U.S. Census Bureau

NOTE. Estimates of population for 2013–2018 reflect the incorporation of updated information from the U.S. Census Bureau's International Data Base.

Table 1.3. Percent Change From Preceding Year in Real Gross Domestic Product

	Line	[Percent]										
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Gross domestic product	1	-11.1	-17.5	1.3	-7.7	0.6	2.4	3.9	3.5	28.4	25.5	-19.6
Personal consumption expenditures	2	-1.4	-15.4	3.0	-3.2	2.4	5.3	4.2	3.4	3.7	7.1	-1.1
Goods	3	1.3	-17.1	5.1	-3.0	7.4	6.7	4.0	2.7	2.0	9.5	-2.7
Durable goods	4	0.2	-20.2	6.7	-5.0	8.5	17.0	10.0	9.5	3.1	6.7	-3.4
Nondurable goods	5	2.0	-15.3	4.1	-1.9	6.8	1.0	0.1	-2.1	1.2	11.7	-2.2
Services	6	-0.3	-11.9	2.0	-9.1	10.4	5.7	5.3	11.6	67.4	19.0	-35.6
Net foreign travel	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Private fixed investment	8	2.1	4.4	-8.9	-6.9	5.6	9.4	42.2	62.6	65.7	-8.9	-19.8
Net exports of goods and services	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Exports	10	-36.3	-34.4	2.4	-11.1	17.1	7.2	4.5	11.3	73.8	21.2	-37.7
Goods	11	-65.2	-83.4	-16.7	-20.8	-8.6	6.9	-11.7	-9.0	48.2	16.5	11.8
Services	12	3.4	-12.5	3.8	-10.5	18.5	7.3	5.2	11.9	74.5	21.3	-38.8
Imports	13	-28.6	-16.0	4.5	-2.5	4.8	9.5	6.7	25.4	46.6	-10.3	-16.1
Goods	14	-29.3	-15.0	4.3	-3.8	5.0	9.6	6.6	16.4	35.0	-3.6	-7.9
Services	15	-24.3	-21.2	6.0	5.7	3.8	8.8	7.3	73.4	85.3	-26.3	-42.0
Government consumption expenditures and gross investment	16	-6.4	0.2	4.4	-4.0	-12.8	1.1	-3.2	6.5	9.7	6.8	9.2
Federal	17	19.2	30.7	4.4	-3.6	-2.5	-6.4	7.4	26.1	-9.7	-4.4	113.8
Territorial	18	-7.4	-1.3	4.4	-4.0	-13.5	1.7	-4.0	4.9	11.5	7.6	2.3

Table 1.4. Contributions to Percent Change in Real Gross Domestic Product

	Line	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
		Percent change:										
Gross domestic product	1	-11.1	-17.5	1.3	-7.7	0.6	2.4	3.9	3.5	28.4	25.5	-19.6
Percentage points:												
Personal consumption expenditures	2	-0.68	-8.36	1.65	-1.80	1.47	3.27	2.63	2.00	2.07	3.12	-0.43
Goods	3	0.48	-7.20	2.14	-1.39	3.69	3.55	2.13	1.37	0.95	3.54	-0.87
Durable goods	4	0.03	-3.14	1.02	-0.84	1.52	3.22	2.09	1.99	0.63	1.10	-0.48
Nondurable goods	5	0.45	-4.06	1.12	-0.55	2.17	0.33	0.04	-0.63	0.32	2.43	-0.40
Services	6	-0.13	-5.45	0.99	-4.67	5.37	3.25	3.13	6.64	40.11	14.61	-25.97
Net foreign travel	7	-1.02	4.28	-1.47	4.25	-7.60	-3.52	-2.64	-6.01	-38.99	-15.03	26.41
Private fixed investment	8	0.17	0.38	-0.96	-0.67	0.56	0.98	4.59	8.83	13.65	-2.32	-3.69
Net exports of goods and services	9	-8.43	-9.64	-1.19	-3.46	4.44	-2.35	-2.05	-9.70	9.19	22.68	-17.87
Exports	10	-25.55	-17.22	0.95	-4.80	7.39	3.66	2.38	5.85	39.66	15.27	-26.24
Goods	11	-26.56	-12.91	-0.49	-0.53	-0.20	0.14	-0.25	-0.15	0.66	0.25	0.17
Services	12	1.01	-4.31	1.44	-4.27	7.58	3.52	2.63	6.00	39.00	15.02	-26.41
Imports	13	17.13	7.58	-2.14	1.35	-2.95	-6.01	-4.43	-15.55	-30.47	7.40	8.38
Goods	14	15.13	6.08	-1.74	1.78	-2.62	-5.21	-3.73	-8.49	-17.57	1.82	3.15
Services	15	2.00	1.50	-0.41	-0.43	-0.33	-0.80	-0.70	-7.06	-12.90	5.59	5.22
Government consumption expenditures and gross investment	16	-2.12	0.08	1.82	-1.75	-5.92	0.45	-1.28	2.33	3.45	2.04	2.40
Federal	17	0.24	0.51	0.11	-0.10	-0.07	-0.18	0.19	0.67	-0.29	-0.09	1.84
Territorial	18	-2.36	-0.43	1.71	-1.65	-5.84	0.63	-1.47	1.66	3.74	2.13	0.56

Table 1.5. Percent Change From Preceding Year in Prices for Gross Domestic Product and Price Indexes for Gross Domestic Product

	Line	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
		[Percent]											
Gross domestic product	1	1.6	12.5	2.7	-0.8	-0.7	1.9	1.7	4.1	6.4	4.7	2.0	2.8
Personal consumption expenditures	2	3.2	6.3	1.1	-0.4	5.3	1.6	-0.1	1.1	-2.2	1.0	3.0	2.6
		[Index numbers, 2009=100]											
Gross domestic product	3	86.5	97.4	100.0	99.2	98.5	100.4	102.1	106.3	113.1	118.4	120.8	124.2
Personal consumption expenditures	4	93.0	98.9	100.0	99.6	104.9	106.6	106.6	107.7	105.4	106.4	109.6	112.5

Table 1.6. Gross Domestic Income

	Line	[Millions of dollars]											
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Gross domestic income	1	938	939	795	799	733	751	782	845	931	1,250	1,601	1,323
Compensation of employees	2	533	501	455	456	431	415	433	469	497	581	656	715
Taxes on production and imports less subsidies	3	119	109	99	94	95	102	121	153	165	229	244	213
Gross operating surplus	4	286	329	241	249	207	234	228	223	269	440	701	395

NOTE. Detail may not add to total because of rounding.

Table 1.7. Revisions to Percent Change in Real Gross Domestic Product

	Line	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
		Percent change:									
Revised	1	-11.1	-17.5	1.3	-7.7	0.6	2.4	3.9	3.5	28.4	25.5
Previously published	2	-11.1	-17.5	1.3	-7.7	0.6	2.4	3.9	3.4	28.2	25.1
Percentage points:											
Revision	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.4

2. GDP by Industry

Table 2.1. Value Added by Industry

	Line	[Millions of dollars]										
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Gross domestic product	1	938	939	795	799	733	751	782	845	931	1,250	1,601
Private industries	2	717	727	586	589	540	563	583	642	716	1,024	1,340
Manufacturing	3	174	50	18	16	15	12	11	15	18	22	18
Distributive Services	4	140	165	135	149	153	157	170	178	187	196	207
Accommodations and Amusement	5	111	122	105	110	97	114	134	149	188	450	721
All Other	6	291	390	328	314	274	280	269	301	323	355	394
Government	7	222	212	209	210	193	188	198	203	215	226	261
Federal	8	13	14	16	14	15	15	15	14	16	16	17
Territorial	9	209	197	193	196	178	173	184	189	199	210	244

NOTE. Detail may not add to total because of rounding.

Table 2.2. Value Added by Industry as a Percentage of GDP

	Line	[Percent]										
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Gross domestic product	1	100	100	100	100	100	100	100	100	100	100	100
Private industries	2	76	77	74	74	74	75	75	76	77	82	84
Manufacturing	3	19	5	2	2	2	2	1	2	2	2	1
Distributive Services	4	15	18	17	19	21	21	22	21	20	16	13
Accommodations and Amusement	5	12	13	13	14	13	15	17	18	20	36	45
All Other	6	31	42	41	39	37	37	34	36	35	28	25
Government	7	24	23	26	26	26	25	25	24	23	18	16
Federal	8	1	1	2	2	2	2	2	2	2	1	1
Territorial	9	22	21	24	25	24	23	24	22	21	17	15

Table 2.3. Real Value Added by Industry

	Line	[Millions of chained (2009) dollars]										
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Gross domestic product	1	1,084	964	795	806	744	748	766	795	823	1,056	1,326
Private industries	2	846	745	586	601	560	573	585	616	641	868	1,115
Manufacturing	3	181	52	18	16	15	11	10	13	16	20	15
Distributive Services	4	147	169	135	147	148	148	158	164	170	179	189
Accommodations and Amusement	5	120	128	105	110	98	110	126	136	165	364	574
All Other	6	391	396	328	328	298	303	288	298	285	291	313
Government	7	237	219	209	204	184	176	182	182	184	191	215
Federal	8	13	15	16	14	14	14	13	13	13	14	14
Territorial	9	224	205	193	191	170	163	168	169	170	177	200

Table 2.4. Percent Changes in Real Value Added by Industry

	Line	[Percent]									
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Gross domestic product	1	-11.1	-17.5	1.3	-7.7	0.6	2.4	3.9	3.5	28.4	25.5
Private industries	2	-12.0	-21.3	2.6	-6.9	2.3	2.1	5.2	4.1	35.4	28.5
Manufacturing	3	-71.4	-65.4	-10.5	-7.8	-27.3	-6.5	32.3	21.1	23.1	-21.7
Distributive Services	4	15.1	-20.4	9.3	0.8	-0.3	7.1	3.8	3.4	5.4	5.8
Accommodations and Amusement	5	6.9	-17.8	4.2	-11.0	13.0	13.8	8.4	20.8	121.2	57.8
All Other	6	1.2	-17.1	0.1	-9.1	1.6	-5.2	3.5	-4.3	2.3	7.2
Government	7	-7.5	-4.6	-2.3	-9.9	-4.3	3.1	-0.1	1.2	4.1	12.2
Federal	8	10.0	9.9	-15.1	1.5	-2.4	-2.1	-3.8	4.5	3.6	1.3
Territorial	9	-8.6	-5.6	-1.2	-10.8	-4.5	3.6	0.2	0.9	4.2	13.0

Table 2.5. Contributions to Percent Change in Real Gross Domestic Product by Industry

	Line										
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Percent change:											
Gross domestic product	1	-11.1	-17.5	1.3	-7.7	0.6	2.4	3.9	3.5	28.4	25.5
Percentage points:											
Private industries	2	-9.27	-16.49	1.94	-5.05	1.68	1.57	3.91	3.14	27.40	23.32
Manufacturing	3	-12.60	-3.50	-0.24	-0.16	-0.58	-0.10	0.45	0.36	0.44	-0.39
Distributive Services	4	2.16	-3.58	1.58	0.16	-0.06	1.48	0.82	0.70	1.06	0.89
Accommodations and Amusement	5	0.78	-2.34	0.55	-1.52	1.74	2.12	1.42	3.63	25.09	20.74
All Other	6	0.39	-7.07	0.04	-3.53	0.58	-1.92	1.22	-1.55	0.81	2.07
Government	7	-1.71	-1.04	-0.61	-2.65	-1.13	0.79	-0.03	0.28	0.94	2.22
Federal	8	0.13	0.15	-0.32	0.03	-0.05	-0.04	-0.07	0.08	0.06	0.02
Territorial	9	-1.84	-1.19	-0.30	-2.68	-1.08	0.83	0.04	0.21	0.88	2.20

NOTE. Percentage-point contributions do not sum to the percent change in real gross domestic product because of rounding and differences in source data used to estimate GDP by industry and the expenditures measure of real GDP.

Table 2.6. Compensation of Employees by Industry

	Line	[Millions of dollars]										
		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total compensation	1	533	501	455	456	431	415	433	469	497	581	656
Private industries	2	336	307	263	264	259	252	267	298	311	383	436
Manufacturing	3	74	26	9	8	8	8	7	10	12	15	12
Distributive Services	4	62	72	58	62	62	63	67	71	74	78	82
Accommodations and Amusement	5	61	67	58	60	54	64	74	83	104	150	184
All Other	6	140	142	137	134	135	119	118	135	121	141	159
Government	7	197	194	192	191	172	163	166	171	186	198	220
Federal	8	13	14	16	14	14	14	14	14	15	16	16
Territorial	9	184	180	176	177	158	149	152	158	171	182	204

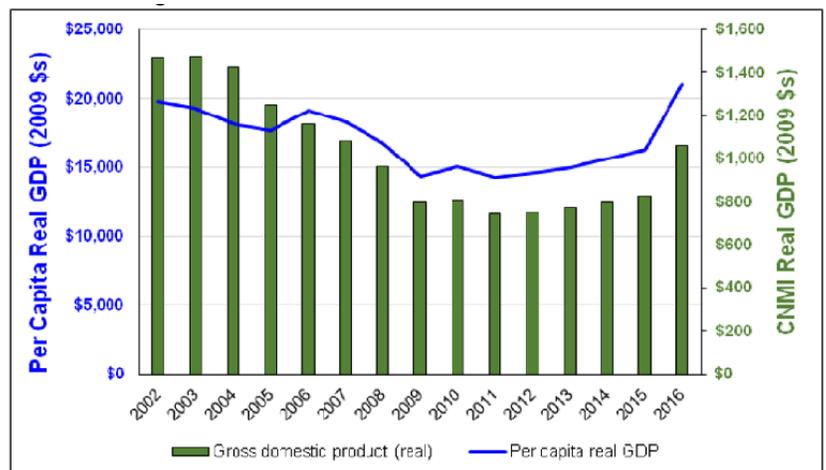
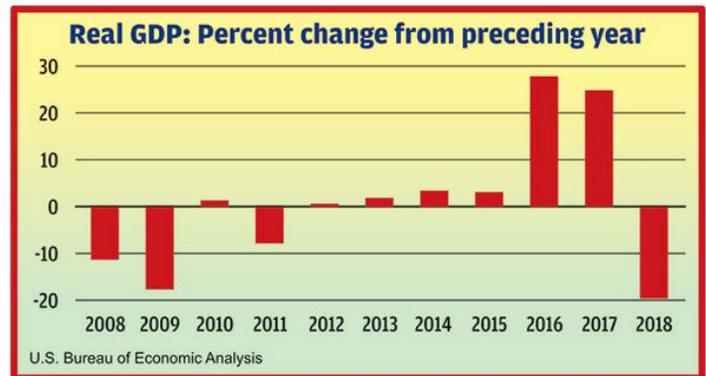
NOTE. Detail may not add to total because of rounding.

Snapshot – Economic Trends

As the Bureau of Economic Analysis (BEA) reports, in 2016 and 2017, the CNMI GDP increased with growth led by tourism and gaming industry revenues. Estimates developed under the Statistical Improvement Program funded by the Office of Insular Affairs (OIA) of the U.S. Department of the Interior assessed Gross Domestic Product by industry and compensation by industry, assess economic trends quarterly. As of November

30, 2019, the BEA reported that the CNMI GDP fell to \$1.323 billion in 2018, a 19.6% decrease from fiscal year 2017, which had a GDP of \$1.6 billion, which was 25.1% higher over that of fiscal year 2016. The BEA report noted that exports of services decreased 38.8% last fiscal year due to a decrease in visitor spending, including on casino gambling. “Revenues from casino gambling dropped over 50%. The number of visitors to the CNMI decreased 21.5%, reflecting the effects of Super Typhoon Yutu, which made landfall on Saipan and Tinian on October 2018,” the report noted. While private fixed investment decreased by 19.8% in the CNMI, reflecting a decline in business spending on construction and equipment, the report noted that business spending on construction and equipment remained at “historically high levels,” supported by continued development of the casino on Saipan, as well as post-Yutu repairs.

Services and tourism are CNMI’s primary economic drivers. As reported in the Pacific Daily News, exports of services was the largest contributor to economic growth in CNMI in 2016, reflecting significant growth in visitor spending, particularly on casino gambling. Despite gains in GDP over the past two years, as demonstrated by the chart at right, GDP in 2016 was still lower than 2006, and much uncertainty regarding economic growth projections remains. A comprehensive study of economic growth projections, opportunities, and challenges has not been commissioned for the CNMI, however, resource- and sector-specific studies have been conducted for the Department of Public Lands (Knox, 2018) and the Marianas Visitors Authority (Horwath, 2017). The Knox study notes that uncertainties regarding the labor pool, infrastructure limitations,



Source: U.S. Department of Commerce. Bureau of Economic Analysis. Release Date: October 15, 2017. Retrieved November 2017. https://www.bea.gov/national/gdp_territory.htm
 Note: Estimates of population for 2013-2016 reflect the incorporation of updated information from the U.S. Census Bureau's International Data Base.

and reliance on a sustained tourism market are major drivers that may sway development in CNMI.

As detailed further in the “housing” section, the Northern Marianas Housing Corporation’s Five-Year Consolidated Plan covers Program Years 2015-2019 notes, 85% of the households identified in the 2010 Census qualified as “extremely low to middle income” households, with 3,990 households – or 21% of the 2010 total – qualified as “extremely low income” with 30% or less Area Median Income. The 2010 Census further demonstrated that CNMI’s total housing units equal 20,850. Out of the total, there were 16,035---or 77 percent---that were considered “occupied housing units”. The data further indicated that the CNMI’s population in occupied housing units total to 52,312 of which, 18,844 are living in owner-occupied units and a majority, or 33,468 are living in renter-occupied housing units. Analysis of the household totals and sizes relative to the CNMI’s Area Median Family Income (AMFI), estimated at \$39,000.00 according to the 2010 U.S. Census data for owner-occupied households, show that the majority of the households are within 0-30% and 30-50% range. An estimated 52% of small family households (7,000 total); and 55% of large family households (1,200 total) are living within 50% of the AMFI. Based on the analysis of the number of households data, NMHC has concluded that a majority of CNMI households in need of housing assistance are the extremely low-income (0-30% AMFI) to moderate income families (>30-50% AMFI), both small and large household sizes. Planning objectives reflected in the Five-Year Consolidated Plan covers Program Years 2015-2019 aim to address these gaps.

Additionally, the 2015 CNMI Statistical Yearbook reports that the CNMI’s Central Statistics Division has collected random samples of broadband internet use in recent years. In the 2014 Broadband survey, when the sample was weighted to the 2010 census count, about 88 percent of CNMI population had access to the internet. The percentages were similar for the islands – 88 percent on Saipan and Rota and 85 percent on Tinian. This data point relates to SDG 17.8 to fully operationalize the technology bank and science and innovative capacity building mechanism by enabling the use of information and communications technology, a key driver of socioeconomic development and sustainable development.

Status, Impacts, and Responses

As reported in the 2014-2019 Comprehensive Economic Development Strategy (CEDS), the CNMI’s economy has historically and remains rooted in its tourism industry. With the recent introduction of the gaming industry on the capital island of Saipan, the jurisdiction’s tourism industry has become more robust. In addition to natural synergies between the industries, the emergence of the gaming industry has spawned employment and business opportunities. Due to the CNMI’s geographical setting, air service is a center piece of its economic health. Much of the recent economic uptick has been premised on the accessibility to low-cost carriers and charter flights from various source countries. According to the Marianas Visitor Authority’s feasibility and sustainability study, more than half of current air service is derived from low cost carriers and regular charter flights, however, loss of major airlines and direct flights has created some challenges to further growth. Additionally, as detailed at length in the CEDS report, labor dynamics related to the “phase out” of non-resident workers also presents regional workforce deficiencies.

The 2014-2019 Comprehensive Economic Development Strategy (CEDS) aimed to establish planning priorities for human, physical, and natural assets to support positive growth. Projects are prioritized based on evaluation criteria that includes public benefit, industry growth, and impacts to employment, infrastructure, and the environment. The CEDS planning and implementation process is supported by the U.S. Economic Development Administration (EDA). Although typically a five-year planning document, EDA reached out to CNMI to encourage a 2019 CEDS update to address recovery needs as they relate to economic re-development in the wake of Super Typhoon Yutu. Agencies and partners were asked to revisit prior submissions and remove projects that had

been implemented and add newly identified needs. The Office of Planning and Development was tasked with coordinating this effort with the Planning and Development Advisory Council (PDAC) and partners, a conversation which complemented ongoing dialogs focused on supporting comprehensive sustainable development planning in CNMI.

2019 CEDS Update – CNMI’s Economic Growth Today

As reported in the 2019 CEDS Update, tourism remains the primary economic driver of the CNMI’s economy today. As the Mariana Visitor’s Authority’s 2017 Tourism Development Sustainability and Feasibility Study notes, sector recovery began in 2014, with strong surges in demand from the Chinese and Korean markets in particular. Regular chartered flights brought in the Chinese tourists; the previously small market grew to over 200,000 arrivals in essentially less than five years, accounting for 40 percent of the CNMI’s overall arrivals by year end 2016. Accompanying the boom in demand, hotel performances as well as general tourism spending improved significantly, translating to more a prosperous economic environment. At the same time, the CNMI welcomed a large number of Chinese investors, particularly after the issuance of the casino license to Imperial Pacific International Holdings Limited from China. By December 2016, the number of scheduled flights at the Saipan International Airport increased to around 85 per week; a completely different scene than just two years prior.

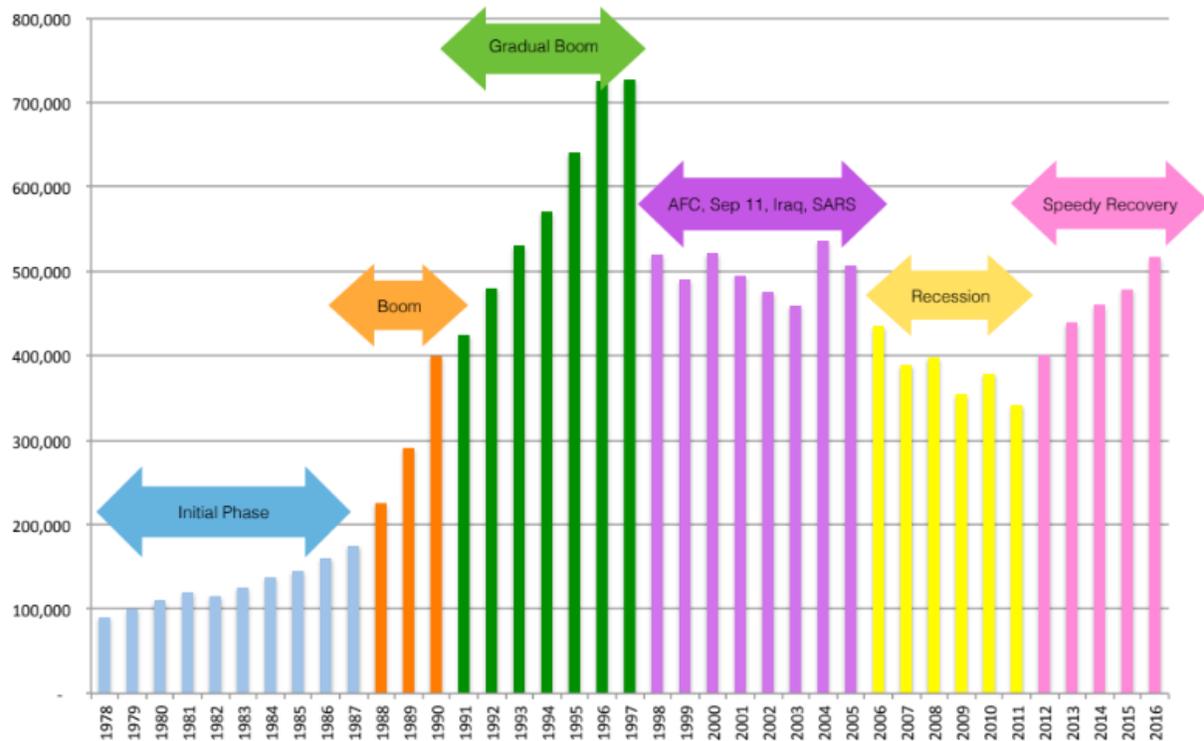
Despite this growth, the 2017 Sustainability and Feasibility Study also identified challenges which include:

- Negative impacts on some aspects of the overall experience for visitors as a result of infrastructure not catching up with visitor arrival growth;
- Hotel products operating at close to or over capacity, leading to considerably deteriorated products that are in much need of refurbishment;
- An increase in organized crime and drugs;
- Inflated employment terms which may or may not be an accurate representation of the likely long-term outlook;
- Unrealistic pipeline of new hotel rooms given the CNMI’s resource constraints;
- Infrastructural issues including strains on public utilities; and
- Insufficient work force; for the first time, the CW visa quota for the CNMI was reached at the beginning of a fiscal year in 2017.

That study noted that “although the market is booming, the current situation where relatively quick returns are generated without considerations to longer term impacts is not sustainable” (MVA, 2017). A visualization of CNMI’s arrival trends and corresponding events from that report is included on the next page for additional context.

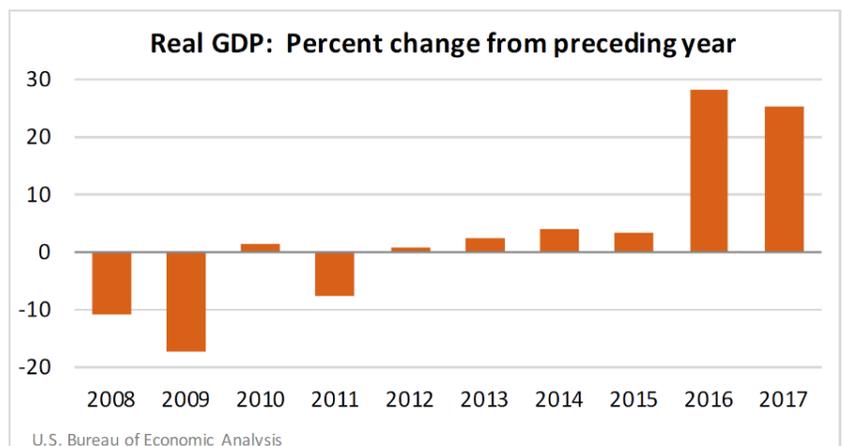
In the Northern Mariana Islands Tourism Master Plan for 2012-2016 it was acknowledged that “in order to revitalize tourism to an adequate level of economic sustainability, stable international and inter-island transportation, more marketing, new foreign investment and new management approaches from within the islands are needed.” That plan assessed 14 key factors developed by the World Economic Forum to support growth, and identified the “need for greater community involvement and employment of citizens to make the Northern Marianas’ tourism industry more culturally authentic, more resilient and sustainable for the future. The Marianas Visitors Authority as well as partners throughout the CNMI government and the Governor’s Strategic Economic Development Committee, a group of private sector industry leaders and top government officials, are working together to improve and create economic related initiatives that will help sustain the CNMI’s overall economy and have continued to support key action items to support economic sustainability and revitalization in the CNMI. Despite challenges, positive indicators have been observed since the 2015 publication of this initial CEDS report.

Table 11 - Tourist arrival trends, MVA Tourism Development in the CNMI: A Feasibility & Sustainability Study, January 2017.



As the Bureau of Economic Analysis reports, in 2016 and 2017, the CNMI GDP increased with growth led by tourism and gaming industry revenues. Estimates developed under the Statistical Improvement Program funded by the Office of Insular Affairs (OIA) of the U.S. Department of the Interior assessed estimates of Gross Domestic Product by industry and compensation by industry, assess economic trends quarterly. As of October 18, 2018, BEA reported that estimates of GDP for the CNMI show that real GDP—GDP adjusted to remove price changes—increased 25.1 percent in 2017 after increasing 28.2 percent in 2016. For comparison, real GDP for the United States (excluding the territories) increased 2.2 percent in 2017 after increasing 1.6 percent in 2016.

Although these gains are positive, disturbances to this sector such as the landfall of Super Typhoon Yutu demonstrate risks of overreliance on one external sector and highlight the importance of diversification and redundancy in the growth of a local, sustainable economy. As reported in 2018, the superstorm resulted in the closure of four hotels on Saipan and the cancelation of international airline flights through mid-November.



Despite challenges, including several weeks with “zero tourists” MVA board chair Marian Aldan-Pierce announced that the CNMI’s tourism industry has quickly bounced back after Super Typhoon Yutu’s devastation. The Saipan Tribune reported that Aldan-Pierce noted visitor arrivals in fiscal year 2018 were 7 percent lower than the year before, at just under 608,000 total visitors, after

several years of steady growth. Due to Yutu, the MVA reported an expected 16 percent reduction in its budget for fiscal year 2019, with similar constraints expected across CNMI agencies due primarily to fourth quarter losses from the near complete disruption of tourism activities following the storm. It is within this context that the 2019 CEDS update has made strides to update CNMI needs assessments and project listings in order to support sustained positive economic growth and long-lasting recovery. Key updates in the 2019 CEDS included the incorporation of principles of “Smart, Safe Growth” into planning and project prioritization to support sustainable development which encompasses the built, natural, and socio-economic environments.

Recommendations

As Super Typhoon Yutu demonstrated, preparedness for catastrophic disturbances is an integral part of risk reduction that enhances overall community resilience and wellbeing. These principles are being incorporated into discussions of comprehensive sustainable development and recovery planning being coordinated by the Office of Planning and Development with support of the Planning and Development Advisory Council (PDAC) and planning partners. The 2019 and future CEDS updates will provide an essential component of the Comprehensive Sustainable Development Plan that is being developed for CNMI and slated for initial release in 2020. The Strengths, Weaknesses, Opportunities, and Threats analysis framework will be updated and applied to support identification of a shared vision of an economically resilient CNMI and the development of goals as well as implementation and monitoring measures with the CEDS Commission, the PDAC, and community partners in upcoming island-wide planning meetings. CEDS project prioritization and implementation continues with the support of the Office of the Governor’s Department of Commerce, Office of Grants Management, and the Office of Planning and Development. Resiliency priorities should be identified and incorporated across all planning efforts as much as possible to support increased coordination and more efficient project prioritization and implementation.

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Snapshot – Health Systems in CNMI

The Commonwealth Healthcare Corporation’s (CHCC) 2015-2020 Strategic Plan articulates a commitment to improving the standard of services to the people of the CNMI as well as overall health and wellbeing of its populace. Goals and objectives outlined in the CHCC Strategic Plan outline desired outcomes that CHCC perceives as being critical to address the current state of health in the CNMI with the goal to achieve affordable and accessible care.

VISION
STATEMENT

Commonwealth Healthcare Corporation strives to improve the quality of life for the CNMI community through its innovative preventive/urgent care services to foster responsible lifestyles.

VALUES
STATEMENT

CHCC is committed to exceed standards by providing a culture of quality care, honoring the dignity of its stakeholders and community, and promoting equality and accountability throughout the corporation.

MISSION
STATEMENT

Improving CNMI health and well-being through excellence and innovation in service.

To achieve this goal, CHCC has been working to implement eight (8) operating strategies which include organizational and facilities objectives. Outcomes include obtaining full accreditation from the Centers for Medicare and Medicaid (CMS) for the hospital (recently surveyed in May 2019), public health, behavioral health, as well as decrease the incidence of the top six (6) major causes of death and debilitation in the CNMI: cancer, diabetes, hypertension/heart disease, teen pregnancy, HIV/STI, and substance abuse. This objective aligns closely with the United Nations Agenda 2030 Goal 3: “Ensure health lives and promote well-being for all at all ages, and associated targets.” Despite only one Sustainable Development Goal (SDG) specifically dedicated to health (SDG 3) the remaining goals are social and environmental determinants of health, therefore, health, by proxy, is part of all SDGs for the CNMI.

The SDG 3 targets and relevant correlating CNMI health data are as follows:

SDG Target	SDG Indicator	CNMI Data	Data Trend
3.1 – By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births	3.1.1 – Maternal mortality ratio	3.1.1 - 62.6	3,1.1 Maternal mortality ratio (2015-2018)
	3.1.2 – Proportion of births attended by skilled health professional	3.1.3 - 99.7%	3.1.2 Meeting goal
3.2 – By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births	3.2.1 – Under-five mortality rate	3.2.1 - 2	3.2.1 - Meeting goal
	3.2.2 – Neonatal mortality rate	3.2.2 - 4.2	3.2.2 - Meeting goal
3.3 – By 2030, end the epidemics of AIDS, tuberculosis, malaria, and neglected tropical diseases and hepatitis, water-borne disease, and other communicable diseases	3.3.1 – Number of HIV infections per 1,000 uninfected population, by sex, age, and key populations	3.3.1 - 0.33	3.3.1 - Rate for 2017 (0.25)
	3.3.2 – Tuberculosis incidence per 1,000 population	3.3.2 - 90.38	3.3.2 - Rate for past 3 years: (54.5); 2016 (57.5); 2017 (78.84)
	3.3.3 – Malaria incidence per 1,000 population	3.3.3 - 0	3.3.3 - Meeting goal
	3.3.4 – Hepatitis B incidence per 1,000 population	3.3.4 - 0.005%	3.3.4 - Rates for years 2013-2018

3.6 By 2020, halve the number of global deaths and injuries from road traffic accidents	3.6.1 – Death rate due to road traffic injuries	3.6.1 - 5.7	3.6.1 - Rate for years 2015
3.7 By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programs	3.7.1 – Proportion of women of reproductive age (aged 15-49 years) who have their need for family planning satisfied with modern methods 3.7.2 – Adolescent birth rate (aged 10-14 years; aged 15-19 years) per 1,000 women in that age group	3.7.1 - 9.8% 3.7.2 - 26.1	1 - Meeting goal 2 - Rate for the past 3 years: 2016 (15); 2017 (8.5); 2018 (11.6)
3.D – Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of and global health risks	3.d.1 – International Health Regulation 2005 (IHR) capacity and health emergency preparedness Country capacity strengthening: Surveillance a. IHR Core Competencies Goal 3 -- Surveillance, Goal 4 -- Response Goal 5 -- Preparedness. 3.3 Annual reporting of age specific morbidity rates of AIDs, TB, and Hepatitis.	3.d.1 - IHR-2005 76.9 <u>3.d.1 Surveillance</u> a. Proportion of sentinel sites that report on time each week. b. Proportion of weekly surveillance report that are distributed on time each week <u>Response</u> a. National clinical guidelines for case management of common infections and outbreak prone diseases. b. Guidelines for Chemical, Biological, Radiological, and Nuclear Events. (CBRNE). <u>Preparedness</u> a. SOP All Hazard	3.d.1 <u>Surveillance</u> a. 90% b. 90% <u>Response</u> Guidelines completed and Guidelines include current disease threats. <u>Preparedness</u> a. SOPs current

As the chart highlights, although indicators are being tracked and many targets are being met or exceeded, some opportunities for improvement in regard to mortality rate monitoring and reduction remain. As the University of Washington’s Institute for Health Metrics and Evaluation (IHME) reports, based on tracked data, CNMI is currently ranked 65 out of index of 100 for health-related SDGs in 2017, however, some indicators are not tracked or reported and are estimated in that assessment. Despite that, the IHME data shows positive gains across Goal 3 indicators in CNMI since the 1990s and projects continued improvements. Recently, part of CHCC efforts to reduce maternal mortality included the institution of policies and operating procedures to address maternal hemorrhage at the L&D and OB units. This was a system wide effort that included a workgroup from Departments such as L&D/OB, Women’s Clinic, Pharmacy, CHCC Quality Office, CHCC Lab, Public Health, and Nursing. Metadata for metric tracking is included. Health trends are also tracked using “Healthy Island Initiative” indicators.

Status, Impacts, and Responses

CHCC is working hard to achieve their mission to improve the health of the people of the Commonwealth of the Northern Mariana Islands by providing quality health care and preventing disease and promoting health through public health efforts. As the 2018 CHCC Annual Report highlights, numerous programs have been expanded to support achievement of healthcare outcomes. These include:

Hospital Improvements

The CHCC hospital focused on improving patient care outcomes and reduced the hospital readmission rate to 8.3% – which is below the national average. There were significant upgrades to hospital equipment in the NICU and L&D units, including new maternal and fetal monitors, infant respirators, and giraffe warmers. The CHCC also hired two new providers in 2018, a podiatrist and an ENT doctor. The CHCC continues to work with healthcare organizations such as Mountain Pacific and participate in nationwide quality improvement projects such as the Hospital Improvement Innovation Network.

Telehealth Services

Telepsychiatry was successfully implemented in 2018, allowing patients the ability to talk privately with a psychiatrist via secure video conference. This compliments telehealth services the corporation already had in place, which continued into 2018, including a partnership with Shriners Hospitals for Children in Hawaii and provider to provider consultation on complex cases.

To compliment current telemedicine services, telepharmacy will be implemented in 2020, allowing the CHCC pharmacy to act as a coordinating pharmacy that can review prescription orders for the remote pharmacies at the THC and RHC. Prescriptions will be filled by the on-site pharmacy technician or intern through audiovisual supervision by licensed pharmacists working at the Saipan campus. The remote pharmacists will also be available to patients on Tinian and Rota for private counseling.

Pharmacy

The CHCC Outpatient Pharmacy opened in January of 2018 with the goal of assisting low income CNMI residents in affording prescription and other medications, as well as providing an additional revenue stream for the CHCC.

Public Health

The CHCC DPHS has been consistently active in national initiatives and conferences, with the goal of collaborating with other members of the USAPIJ and federal partners on the best strategies for tackling public health challenges. The DPHS hosted two significant conferences on Saipan in 2018; the Pacific Chronic Disease Counsel Learning Session was conducted in June of 2018, and the 2018 Pacific Islands Tuberculosis Control Association Conference was hosted in September. Both included colleagues from the other USAPIJ and focused on the discussion of successes, challenges, and strategies that jurisdictions use to provide comprehensive diabetes care and TB prevention and control respectively. The DPHS MCHB was also accepted as a member of HRSA's Child Safety Learning Collaborative and is the only U.S. territory in this program.

The DPHS continues to leverage national expertise as part of efforts towards implementing culturally adapted programs and services that are backed by science to improve population health. Centering Healthcare Institute, Healthy Families America, Bixby Center for Global Reproductive Health, Regional Hemophilia Networks, and the Pacific Southwest Addictions Technology and Transfer Center are examples of national organizations that the DPHS has partnered or collaborated with to bring evidenced proven programs and services to the CNMI community. These efforts included a focus on building capacity among the DPHS workforce to address our population health challenges.

The success of DPHS programs can be measured in tangible health improvements in the CNMI community. Teen birth rates are down over previous years, and the rate of births with no prenatal care is down 20% from 2017. Vaccination rates are up, with an increase of 21% in coverage of the HPV vaccine– an important cancer preventative measure – and a 50% decrease in the amount of immunization delinquent students enrolled in schools and day care centers.

Bureau of Environmental Health

The Bureau of Environmental Health (BEH) is tasked to ensure the protection of the general public and consumers against adverse effects that may result from hazardous environmental health and unsanitary conditions. The BEH administers the islands environmental public health programs ranging from food safety to vector control. The BEH provides environmental health and safety education through routine monitoring and inspection of over 2000 plus permitted activities/establishments, and 150+ annual food safety workshops to an estimated 6,000+ certified food handlers, not inclusive of various community groups engaging in private or public food events.

There are a total of 18 FTEs for the islands of Saipan, Tinian and Rota responsible for the enforcement of sanitary regulations at all permitted establishments as well as conducting certificate verification for foreign vessels, routine vector monitoring and responding to unsanitary premise complaints. Procurement of new vehicle fleets to replace the current BEH fleet will significantly support inspection and enforcement efforts for the protection of environmental public health.

The BEH continues to seek funding for the renovation of N-6 building in Navy Hill, which was completely damaged during typhoon Soudelor in 2015. The renovation will enable the BEH to implement an interactive training center for food safety education and demonstrations that will increase awareness and compliance to food and sanitary requirements. In combination with the training center, the implementation of a mini mosquito lab to support vector surveillance activities in response to potential vector-borne disease threats is also sought.

CNMI Women, Infants, and Children Program

The CNMI WIC Program is ahead of implementation deadlines for two 2020 goals: breastfeeding initiation rates and eWIC services. The WIC Program surpassed the Healthy People 2020 target breastfeeding initiation rate of 81.9% in 2018, and was awarded a WIC Breastfeeding Performance Bonus by the USDA. This bonus is given to states and territories that display “outstanding achievement in improving breastfeeding rates among WIC participants.” The CNMI WIC Program is also two years ahead of the national mandate to fully implement eWIC services, and has fully phased out of printed Food Instruments and Cash Value Vouchers.

Behavioral Health

Behavioral Health services are conducted by the Community Guidance Center (CGC) through a

variety of prevention, treatment and recovery, and wellness programs that serve populations across the lifespan. The CGC works closely with interagency, State, Regional, and Federal partners to improve sustainable systems and increase health and wellness among Behavioral Health consumers and families. To highlight several programs, the Garrett Lee Smith Youth Suicide Prevention and Early Intervention Program began providing services to the community in 2018; the program focuses on providing support to youth and young adults who may be affected with suicidal thoughts and ideations. The Systems of Care Program was recognized with an honorable mention by SAMHSA for their program service brochure during the 2018 Excellence in Community Communications and Outreach awards. In response to Super Typhoon Yutu and Typhoon Mangkhut, crisis counseling programs were established, one on Rota and one on Saipan and from Tinian, to assist disaster survivors understand and mitigate situations, reactions, and stress factors; provide emotional support; and encourage linkages with other resources and disaster recovery options to assist in and support their recovery process.

Typhoons Yutu and Mangkhut

The DPHS Immunization Program vaccinated over 5,000 residents during Yutu response and recovery operations through home, shelter, and village-based medical outreach, just one of many successes as a result of the outreach performed post-typhoon. The hospital was able to resume services, including dialysis, less than 48 hours after Yutu and, despite challenges, the CHCC was able to support the affected community and conduct effective and efficient responses to both Yutu and Mangkhut.

The Northern Marianas Workforce Act

The U.S. President signed the Northern Marianas Workforce Act on July 24, 2018. It extends the CNMI- only Transitional Worker Program through 2029 and increases the cap on the number of CW-1 visas issued in the territory from 4,999 to 13,000. This has and will greatly benefit the CNMI and the CHCC; many of the corporation's staff, especially nurses, come to work for the CHCC under a CW-1 visa.

Financial Health

Gross Revenue grew from \$54,921,940 in FY 2017 to \$66,365,056 in FY 2018, a growth of \$11,443,116. The majority of CHCC revenue comes from up-front hospital payments and third-party payor revenue, and the majority of non-revenue funding comes from federal grants, primarily from the USDA, SAMHSA, CDC, and HRSA. The total amount of grant funding in FY 2018 was \$14,010,656 – just over 15% of income from revenue and other funding sources.

Unfortunately, despite the growth in revenue, the CHCC incurred \$18,329,708 in uncompensated care costs in FY 2018, up from \$12,790,178 in FY 2017. Uncompensated care costs at the CHCC are partially a result of un-funded programs, such as inter-island medical referrals, but in the majority arise from the lack of insurance availability for individuals in the CNMI and ongoing Medicaid financing challenges.

Health Services on Tinian

Health and medical services on Tinian are provided by the Commonwealth Healthcare Corporation at the Tinian Health Center. Tinian Health Center was built in 1987 and was renovated in September 2018, and is the island's only medical facility. The health center, which has a five-bed capacity as well as an emergency room and outpatient clinic, provides emergency services, laboratory, X-ray, ultrasound, pharmacy, and public health services. If necessary, patients can be evacuated from the Tinian Health Center to the Commonwealth Health Center on Saipan via airplane or U.S. Coast Guard.

Health Services on Rota

On Rota, health and medical services are provided by the Commonwealth Healthcare Corporation at the Rota Health Center. Rota Health Center was built and completed by 1987 and was renovated to include a new wing in 2005, and is the island's only medical facility. The health center, which has a 12-bed capacity as well as an emergency room and outpatient clinic, provides emergency services, laboratory, X ray, ultrasound, pharmacy, and public health services. If necessary, patients can be evacuated from the Rota Health Center to the Commonwealth Health Center on Saipan or Guam via airplane or U.S. Coast Guard. There is currently no permanent dentist and community members have expressed the need for expanded professional health services. Recently, CHCC has been sending specialists such as pediatricians and OB/GYN to support community health needs, and efforts are underway to establish a permanent dental clinic.

Each division within the CHCC plans its own goals for the upcoming year, but the corporation as a whole focused on several major themes in 2019, including professional development; maintaining CMS accreditation; and increasing transparency and communication with both external and internal stakeholders.

Hospital Upgrades

The final equipment to complete the upgrade of the NICU has been ordered and is expected to arrive in early 2019. This will help to further the overall goal of improving patient monitoring and documentation, which requires new and modernized equipment that can interface with EHR infrastructure. The hospital will also be expanding its ICU to ease overcrowding and bring the facility into compliance with the 10-bed minimum for CMS accredited facilities.

Medicaid Funding

The CNMI, and by extension the CHCC, will be facing a Medicaid funding crisis in 2019. Unlike U.S. states, territories face a statutory cap on the total amount of federal dollars available for the program, regardless of the local government contribution to the program. This is coupled with a low Federal Medical Assistance Percentage. Additional Medicaid funding that was provided to territories by the Affordable Care Act has run out in the CNMI, and would regardless expire at the end of 2019. If nothing changes before then it is likely that many providers in the CNMI will stop accepting Medicaid, increasing the burden of program participants and the uninsured on the CHCC. This will be a challenge for the corporation, and leadership has already begun working with the CNMI Medicaid office to ensure that residents will have access to high quality and uninterrupted health services.

Data Collection and Integration

The CHCC hospital and public, environmental, and behavioral health divisions are committed to improving EHR usage and better collecting and interpreting data on health concerns in the CNMI. The DPHS and ELC program will work with the IT department to implement participation in the National Electronic Disease Surveillance System, making the CNMI the second of the USAPIJ to do so. This system was developed by the CDC to improve public health monitoring of contagious diseases. It is a complex reporting system that will allow standardized disease surveillance information to be uploaded into a federal database, making it easier to analyze trends, monitor and mitigate disease outbreaks, and compare CNMI data to national data. An enhanced ability to collect and analyze data is part of a push to integrate services between different clinical and non-clinical CHCC divisions. In 2019 there will be significant efforts made, in conjunction with upgrades to data collection, communication, and available technology, to further promote the integration of services between the DPHS and CGC and with the clinical units of the hospital.

Communications and Increased Transparency

The corporation plans to hire a communications specialist early in 2019 who will create, manage, and oversee processes for both internal and external CHCC communications. This will be part of a push towards increased transparency for the CHCC. We want the CNMI community to be both informed and empowered to make healthier decisions towards healthy lifestyle behaviors. The corporation strives to connect and strengthen our relationships with the community we serve, to not only major healthcare organization but to be the choice healthcare organization of the CNMI.

Professional Development

The inception of the Professional and Organization Development Coordinator began the CHCC's increased focus on professional development within the corporation. That focus will be increased in 2019 for both clinical and non-clinical staff, focusing on professional "soft skills" such as leadership and customer service, and also on best-practices in the industry for the respective programs and divisions. Every program in the CHCC has plans for increased training and professional development in 2019, with a specific focus on cross-training other departments and integrating CHCC divisions and programs.

In 2019 the HR department also intends to increase its role in the certification of employees under the National Incident Management System. All employees are required to be certified in basic ICS courses, and higher-level staff are required to take the courses to become certified in ICS 300 and 400. HR will be provided a roster by PHEPP and will assist in ensuring that employees complete the proper certification courses. They will also assist in maintaining the disaster response rosters for the AOC and will oversee the activation of employees on said rosters in the event of an emergency.

Expanding Providers and Services

In 2019, the CHCC extended its support staff to include a dedicated CHCC physician recruiter and expand and provide stronger oversight for physician recruitment on Rota and Tinian. An oncologist also came on board in 2019 to begin providing services, and the expansion and introduction of telemedicine services will further reduce the need for off-island referrals for basic specialty care and assist in the adjudication of complex cases more quickly.

Despite these efforts, health system challenges remain as demonstrated by CNMI's first population-based Non-Communicable Diseases (NCDs) household survey from January – April 2016. Respondents answered questions about their alcohol and tobacco use, dietary habits, physical activity, health access, oral health, health conditions, and concern screening. Key findings reported by the Commonwealth Healthcare Corporation include:

General Health & Access to Health

- Almost half of CNMI adults (46.1%) do not have health care insurance;
- Only one-third (35.7%) of adults reported having an annual medical checkup in the past year;
- Almost half (42.3%) of adults in the CNMI perceive their health as fair or poor;

Non-Communicable Disease

- Over half (56%) of CNMI adults are estimated to have hypertension;
- One out of five (17.3%) CNMI adults are estimated to have high cholesterol;
- It is estimated that 12.5-18.7% of adults in the CNMI have diabetes.

Lifestyle and healthcare access are seen as contributing to these NCD trends in the CNMI. In fact,

NCDs are the leading causes of deaths and of premature deaths in CNMI. Heart disease, stroke, and diabetes, as well as kidney disease and lung cancer have been the top five causes of death in CNMI for the last ten-year assessment period (Figure 42). “Self-harm” was listed as a higher cause of premature death than road injuries in 2017, although the total percentage of deaths from both of these categories fell over the assessment period (Figure 43).

What causes the most deaths?

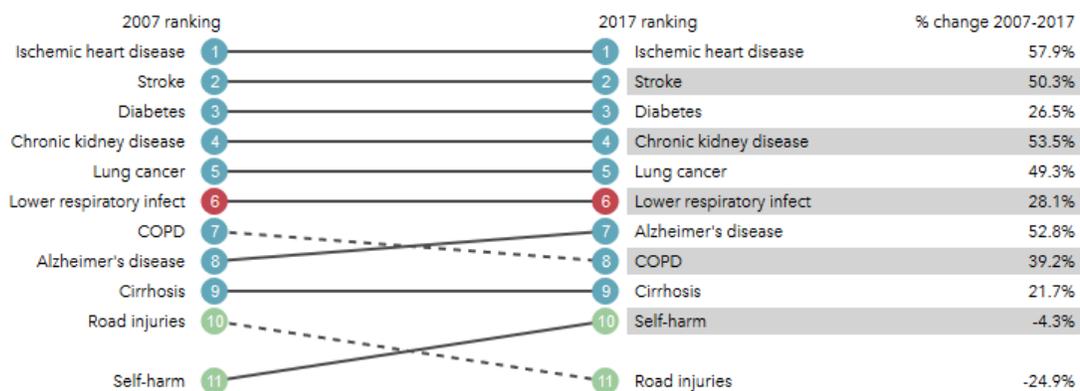


Figure 42 - Top 10 causes of death in 2017 and percent change, 2007-2017, all ages (IHEM, 2019)

What causes the most premature death?

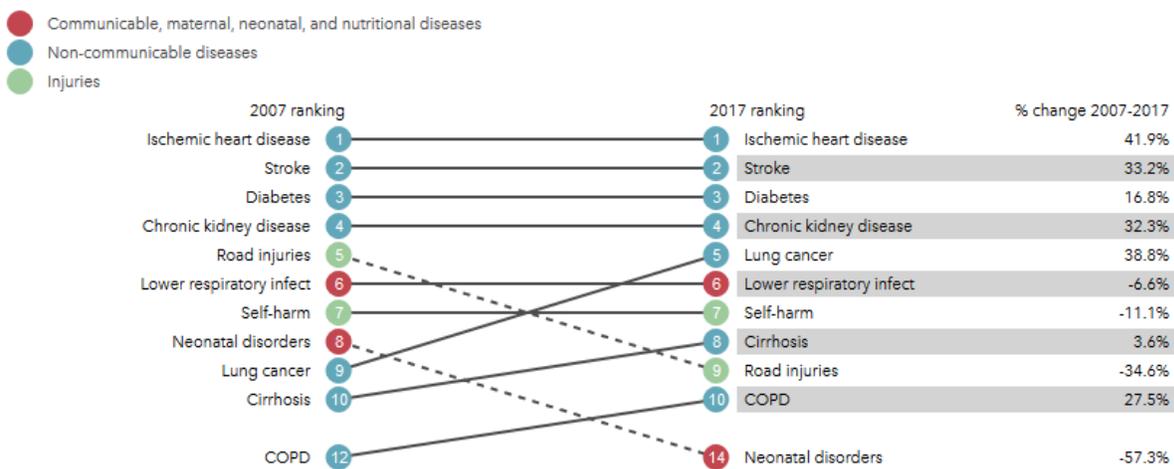


Figure 43 - Top 10 causes of years of life lost (YLLs) in 2017 and percent change, 2007-2017, all ages (IHEM, 2019)

The Institute for Health Metrics and Evaluation (IHME) reports an average 2017 life expectancy of 76.45, over two years less on average than the total U.S. population average of 78.6 years. Asthma prevalence is 11.1% in CNMI, more than double the U.S. average of 5.45% (IHME, 2017). Lifestyle diseases such as diabetes, obesity, and hypertension are challenges that are being prioritized through comprehensive planning dialogs that further support redevelopment dialogs. For example, in addition to expanding the local hospital, located adjacent to Garapan, revitalization planning conversations are including prioritization of walkable communities to address health and socio-

economic development objectives.

Aligning Primary Care Across the Marianas

As reported in CHCC's November 8, 2019 press release, the hospital is launching a campaign to break down barriers to health care in the CNMI and bring parity to Tinian and Rota health services by aligning operations across all of its clinical settings. With the goal of achieving health equity for Tinian and Rota residents, the continual care advancements made on Saipan will be made simultaneously at the Tinian and Rota health centers under the new structure. Closer alignment of services across the islands will increase operating efficiency and each setting will be transformed to provide comprehensive, patient-centered primary care.

Since the CHCC acquired the management responsibilities of the health centers on Tinian and Rota from the respective local governments, there have been few changes to the organizational structure of either clinic. Each health center has been largely operating in isolation, missing opportunities for mutual support, innovation, and modernization within the corporation.

Community members on Tinian and Rota have long expressed the desire to establish relationships with their primary care provider, which is difficult when providers are rotating in and out from Saipan. Other challenges cited by residents have been the limited on-island ancillary services and medical record exchange with the hospital on Saipan. With this feedback and other community wishes in mind, the CHCC has begun transforming each island's health center.

Planned improvements include additional medical providers at each island's health center, who will live on-island full-time for care continuity. Electronic scheduling systems will be implemented to connect patients with a regular primary care provider on an appointment basis, and patient records will be captured using the CHCC's shared electronic health record for easy reference of patient information at any CHCC location. Assessments of radiology and laboratory capabilities are being undertaken to explore opportunities for service growth, and Tinian and Rota patients will soon have private, direct access to a Saipan pharmacist via live video. Patients will also be able to refill medications more quickly on-island. The Tinian Health Center is the first to undergo these enhancements, with staff from the Rota Health Center included in the Tinian transition process to prepare for similar advancement on Rota.

Recommendations

To support these efforts, continued funding for and implementation of data collection programs is critical. This is especially true with the Noncommunicable Disease survey which was completed in 2016 and is slated to occur every five (5) years. It is recommended that a timeline for data collection be included in the health section of the comprehensive sustainable development plan to ensure ongoing data collection and monitoring and to leverage opportunities to align survey efforts and gather more granular information where it may be helpful to support achievement of healthcare goals.

Community meetings on Tinian and Rota highlighted challenges of living in these more isolated locations. Residents stressed the importance of ensuring modern medical services are readily available in order to ensure a healthy, well-served population with good medical support facilities throughout the CNMI. To address these needs, it is further recommended that CHCC reach out to the legislature and CNMI agency partners to align ongoing efforts to support expansion of services and facilities with the goals of achieving health equity, increasing operating efficiency, and providing comprehensive, patient-centered primary care for all.

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Snapshot: Employment and Social Services

Employment and demand for subsidized social services are correlated and therefore are addressed together in this section. The Department of Commerce’s Central Statistics Division’s 2017 Household Income and Expenditures Survey (HIES) report provides some demographic trend analysis on selected key data points on the CNMI population characteristics between the 2016 and the 2005 (HIES). Their analysis includes population characteristics, housing information, and expenditures. The 2016 HIES was the third survey of the expenditure series since the first one in 1998. Questionnaire surveys and a “daily diary” assessment method were used. Information here highlights employment and income data and change from the 2005 survey, and concludes with the current status of social service programs such as Supplemental Nutrition Assistance Program (SNAP) and Medicaid.

Status, Impacts, and Responses

Percent in Labor Force

The CNMI uses the U.S. Census Bureau conventions for employment and unemployment. For a person to be in the labor force, a person must be 16 years and over and either in paid employment, temporarily on leave from paid employment, or unemployed but looking for work (including first time employees). This definition excludes those doing only subsistence activities. Many Pacific Islands countries have large parts of their populations doing subsistence only, which affects the employment and unemployment rates using the United Nations definition of labor force participation, but very few people in CNMI do subsistence activities only, so the rates would be comparable to those for Guam and the U.S. but not with other Pacific Islands’ countries. By the U.S. definition, about 4 in 5 adults were in the labor force in 2005 but that percentage decreased to about 7 in 10 in 2016, partly because of the end of the garment industries, but before the rise in tourism (which so far has not offset the decline in the former.) Only Rota saw an increase in labor force participation, from about 63 percent to 75 percent during the period. All the other Districts and Tinian saw decreases. Tinian’s decrease was steepest, from about 9 in 10 adults all the way down to 7 in 10 in 2016. District 4’s decrease was from 84 percent to 65 percent, the most substantial decline of the Saipan districts (Figure 43). Unemployment rates increased from 8.2 to 12.8% during this reporting period, with the highest rates on Tinian at 21.6% (Figure 44).

Figure 44 – Percent in the Labor Force, CNMI: 2005 and 2016, (HIES, 2016)

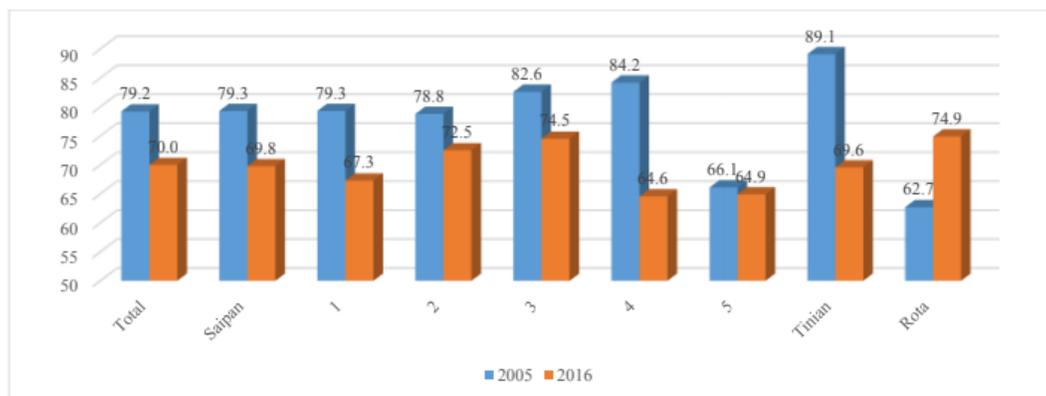
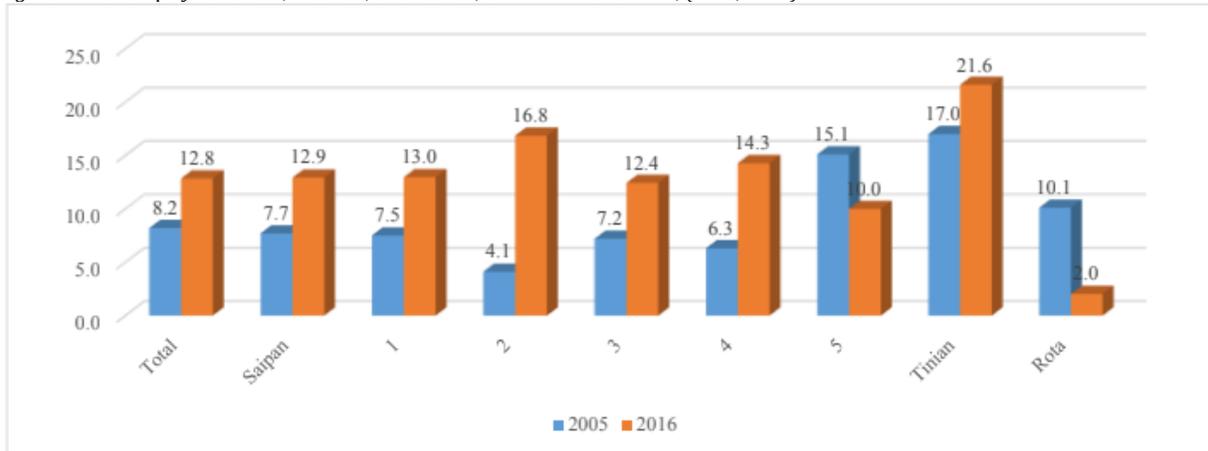
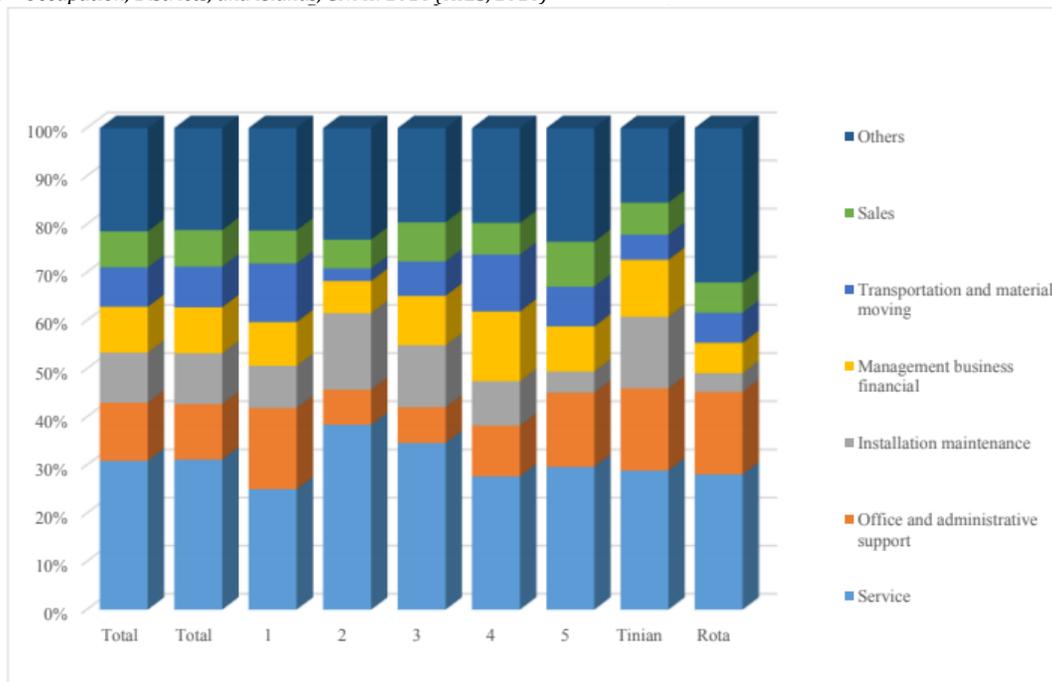


Figure 45 – Unemployment Rate, Districts, and Islands, CNMI: 2005 and 2016, (HIES, 2016)



The occupation categories changed between 2005 and 2016. A separate publication will look at the changes in occupation between 2005 and 2016. The data for 2016 show service occupations as the largest category for the islands and districts (Figure 45).

Figure 46 – Occupation, Districts, and Islands, CNMI: 2016 (HIES, 2016)



Median Household and Per Capita Income

The median household income, adjusted for inflation, decreased between 2005 and 2016. Median income is the usual measure, rather than mean or average income to account for outliers. Although CNMI uses the data collected from the HIES to determine a new market basket and then the Consumer Price Index to determine changes in buying power and inflation, usually income measures apply the U.S. standard inflation factors when assessing changes in incomes across time. That value was 1.255 for the period 2004 to 2015, measuring income in the year before the census. By this measure, the median household income in the CNMI decreased from just over \$20,000 in 2004 to somewhat less than \$20,000 in 2016. All the Saipan Districts except District 4 saw decreases over

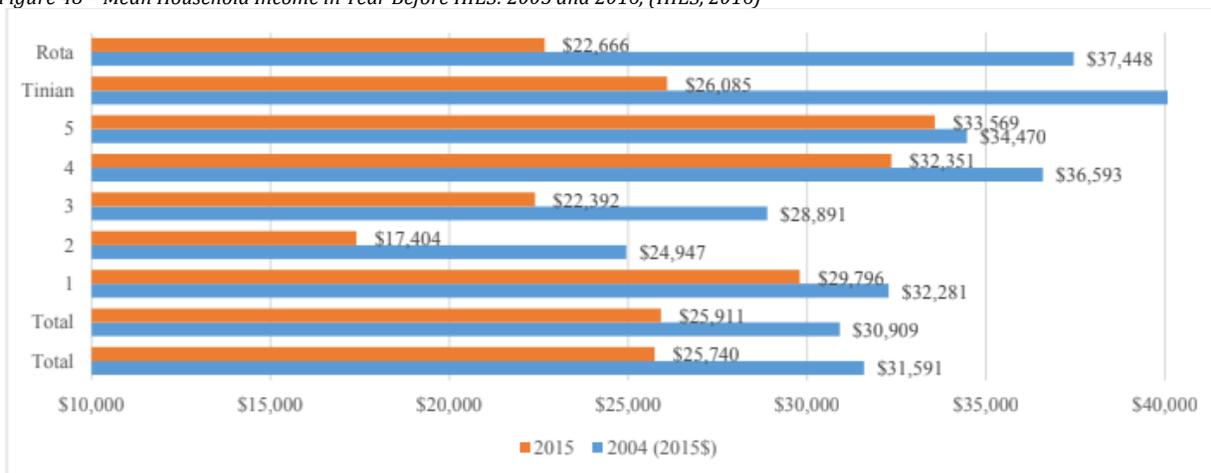
the period, but District 4 increased from a household median income of about \$24,000 to almost \$30,000. Tinian’s median household income decreased by about one-third during the period, while Rota’s decreased by about half (Figure 46).

Figure 47 - Median Household Income in Year Before HIES: 2005: 2016, (HIES, 2016)



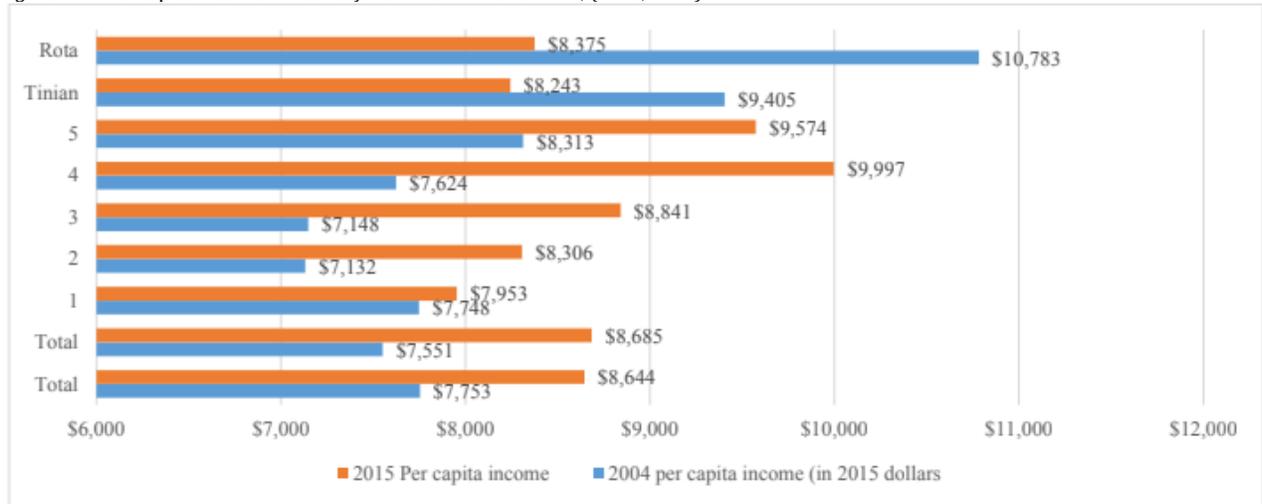
The mean household income does include outliers, so those households making significantly more income will push the average up. By this measure, again with inflation applied to the 2004 values, the mean household for the CNMI decreased from about \$30,000 in 2005 to about \$25,000 in 2016. All the Saipan Districts saw decreases as did both Tinian and Rota, which decreased by half, assuming the inflation factor used for the States applies for the CNMI (Figure 47).

Figure 48 - Mean Household Income in Year Before HIES: 2005 and 2016, (HIES, 2016)



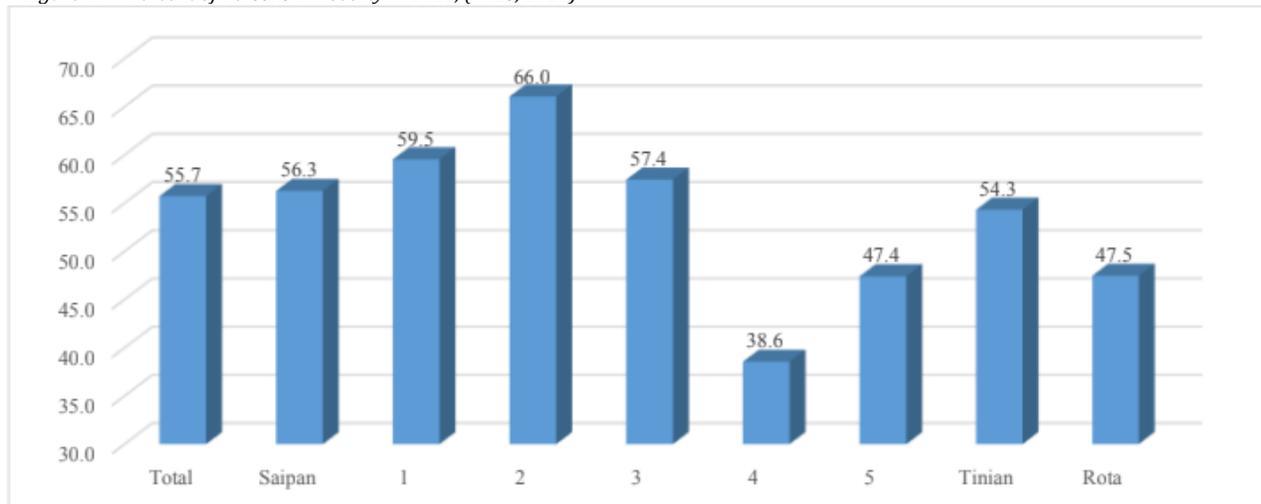
Per capita income is obtained by dividing all the income earned by all paid workers by everyone living on the islands at the time. For our purposes, we applied the U.S. inflation to the 2005 total earned income. The per capita income increased from less than \$8,000 in 2004 to more than \$8,000 in 2016. All the Districts on Saipan saw increases in per capita income during the 11 years. However, both Tinian and Rota saw decreases, with Rota seeing a decrease of about \$2,000 a year per person (Figure 48).

Figure 49 – Per capita income in Year before HIES: 2005 and 2016, (HIES, 2016)



About 56 percent of CNMI’s population was living in poverty in 2015 by the U.S. Census Bureau’s definition. This rate is higher than it would be if access to traditional lands and housing were monetized, and if the CNMI had and could maintain a work force at the U.S. minimum wage. But the values are very high, and require various Federal Programs like State Nutritional Assistance Program and CNMI’s Women, Infants, and Children Program to offset the low wages and other incomes in the Commonwealth. The percentage in poverty was highest in District 2, where 2 of every 3 people were below the poverty threshold compared to less than 2 in 5 in District 4. About 54 percent of those in Tinian were in poverty compared to about 48 percent (so less than half) of Rota’s population (Figure 49).

Figure 50 – Percent of Persons in Poverty in 2015, (HIES, 2016)



Women, Infants, and Children (WIC) and Nutrition Assistance Program (NAP)

WIC Program

To support the vision of “healthy mothers, happy children, empowered families, and a resilient community,” the CNMI Supplemental Nutrition Program for Women, Infants, and Children (WIC Program) is a short-term intervention program for a lifetime of nutrition and breastfeeding health benefits. The WIC Program aims to promote the health and well-being of the women, infants, and children of the Northern Mariana Islands through nutrition education and services, breastfeeding

promotion and support, supplemental nutritious foods, and referrals to appropriate health services delivered with the highest level of efficiency. As DCCA-CCLP details, WIC is available to CNMI’s pregnant, breastfeeding, and postpartum women, infants and children under the age of five who are at nutritional risk and who are at or below 185 percent of the federal poverty guidelines below. A pregnant woman is considered two family members.

WIC Income Eligibility Table By Family Size Effective May 8, 2019					
Family Members in Household	Yearly Household Income	Monthly Household Income	Twice-Monthly Household Income	Bi-Weekly Household Income	Weekly Household Income
1	\$23,107	\$1,926	\$963	\$889	\$445
2	31,284	2,607	1,304	1,204	602
3	39,461	3,289	1,645	1,518	759
4	47,638	3,970	1,985	1,833	917
5	55,815	4,652	2,326	2,147	1,074
6	63,992	5,333	2,667	2,462	1,231
7	72,169	6,015	3,008	2,776	1,388
8	80,346	6,696	3,348	3,091	1,546
Each Add'l Member Add	+8,177	+682	+341	+315	+158

Table 12 – WIC Program Eligibility Effective May 8, 2019. DCCA-CCLP, <http://www.cnmiclp.gov/mp/woman-infants-and-children-program-wic/>

All WIC Income Eligibility Guidelines are based on GROSS Income, meaning before taxes or other deductions. A person or certain family members who participate in other benefits programs, such as the Nutrition Assistance Program (NAP) or Medicaid automatically meet the income requirement.

NAP

Nutrition Assistance Program (NAP) in the CNMI, also known as the Food Stamp Program, was established to promote the general welfare and to safeguard the health and well-being of Commonwealth residents by raising the levels of nutrition among low income, zero-income, and needy families and individuals. Moreover, NAP supports and stimulates the local economy by earmarking 30 percent of the Monthly Food Stamp Allotment (commonly known as Local Coupons) for each Household Case or family household and individual strictly for the purchase of foods grown, raised, caught, or processed in the CNMI as a finished food product for family consumption.

The DCCA Nutrition Assistance Program (NAP) FY 2019 Income Eligibility Standards and Benefit Level Adjustments establishes maximum monthly income standards and benefit allotments based on gross monthly income and household size. In FY18 DCCA reported 8,210 qualifying NAP participants in CNMI.

Maximum Monthly Income Standards Effective Oct. 1, 2018 – Sept. 30, 2019		Maximum Benefit Allotment Effective May 1, 2018 – Sept. 30, 2019			
Household Size	Rota, Tinian, and Saipan	Household Size	Rota and N.I.	Tinian	Saipan
1	\$1,005	1	\$344	\$299	\$283
2	\$1,354	2	\$629	\$546	\$519
3	\$1,702	3	\$901	\$782	\$743
4	\$2,050	4	\$1,150	\$998	\$944
5	\$2,399	5	\$1,360	\$1,180	\$1,121
6	\$2,747	6	\$1,544	\$1,417	\$1,345
7	\$3,095	7	\$1,808	\$1,569	\$1,487
8	\$3,444	8	\$2,057	\$1,785	\$1,699

Table 13 - Maximum Monthly Income Standards and Benefit Allotments as of Sept. 30, 2019, DCCA.

In addition to the income eligibility standards, NAP also determines eligibility from two other criteria: the resources eligibility standards and the citizenship/alien status requirement. Generally, these three criteria have to be met in order to qualify for nutrition assistance. The U.S. Department of Agriculture (USDA), Food and Nutrition Service (FNS) administers the Supplemental Nutrition Assistance Program (SNAP) in all 50 States, the District of Columbia, and the U.S. territories of Guam and the U.S. Virgin Islands. In lieu of SNAP, FNS oversees a block grant to the Commonwealth of the Northern Mariana Islands (CNMI) to fund its Nutrition Assistance Program (NAP).

In 2016 the USDA reported that under NAP, the CNMI receives a block grant that pays both benefits and administrative costs. Since it was established in 1982, NAP has largely remained a manual operation and benefit amounts have not kept pace with food costs. Because total funding for NAP has not changed substantially in the past 5 years, the CNMI restricts program eligibility and benefits to the most financially needy households; almost 90 percent of the 8,500 NAP participants live in households with income below half the poverty level.

Section 8

The Northern Marianas Housing Corporation (NMHC) manages the Section 8 Housing Choice Voucher Program. In 2016, Director Jesse Palacios described ongoing administrative and technical program challenges – the program is only able to accommodate 500 applicants for housing assistance for Saipan, Tinian, and Rota combined. Applicants must submit income and household information and be interviewed before they can be assisted, and NMHC also experiences difficulties in housing families who have been awarded housing choice vouchers. As the Guam Daily Post reports, Director Palacios explained that NMHC proves families 30 to 60 days to find suitable housing, and while some find housing units to rent, others come back and ask for extensions to find housing.

NMHC is addressing this housing shortage through the Low-Income Tax Credit Program, which supports the development of qualifying low-income rental facilities. Tasi Homes, a 49-unit single building apartment complex opened in 2016 and Saipan Comfort Home opened 40 two-bedroom residential units across from the Northern Marianas College in 2017. The Division of Coastal Resources Management reports two additional low-income housing development project proposals are under review at the time of the writing of this report.

Medicaid

As the Medicaid and Children's Health Insurance Program (CHIP) Payment and Access Commission (MACPAC) reports, the Commonwealth of the Northern Mariana Islands became a U.S. territory in 1978 and began participating in Medicaid in 1979. The Medicaid program is administered by the Office of the Governor after moving from the Department of Public Health in 2012. Eligibility for Medicaid in the Northern Mariana Islands is tied to income and resource requirements for Supplemental Security Income (SSI). Individuals receiving SSI cash benefits are automatically eligible for Medicaid. Medicaid additionally covers individuals who meet up to 150 percent of the income and resource requirements for SSI but who are not necessarily disabled. After exemptions and deductions are applied, this translates to a monthly income of \$1,735.5 and assets of \$4,500 for a couple. The Commonwealth allows a medically needy spend down for residents whose income is in excess of the established limits.

The Northern Mariana Islands use CHIP funds as an additional source of funding for children in Medicaid, but do not offer coverage to children whose incomes are above the threshold for Medicaid eligibility. As of September 2017, 15,472 people were enrolled in Medicaid, or

approximately one-third of the Northern Mariana Islands population.

Under their 1902(j) waiver, the Northern Mariana Islands are exempt from providing mandatory services under Medicaid. However, they cover all mandatory Medicaid benefits except for freestanding birth center services, as there are no such facilities in the Northern Mariana Islands. In addition, the Northern Mariana Islands cover many optional benefits such as outpatient prescription drugs and dental services. Enrollees may obtain Medicaid-covered services outside of the territory in certain circumstances, including for laboratory, X-ray, or inpatient or outpatient hospital services with prior authorization, when medically necessary, and when services are not available in the Northern Mariana Islands. Medicaid enrollees face no cost-sharing requirements. The Medicaid program is entirely fee for service. Most of the health care services in the Northern Mariana Islands are provided at the Commonwealth Health Center, a territory-owned hospital on the island of Saipan operated by the Northern Mariana Islands Department of Public Health. The Northern Mariana Islands provide cost-sharing assistance to dually eligible individuals who are eligible for full Medicaid benefits. They do not provide Medicare cost-sharing assistance to individuals who may qualify as partial dually eligible individuals through Medicare Savings Programs in the states because these programs are not available in the Northern Mariana Islands. Medicaid covers Medicare Part B premiums for individuals dually eligible for Medicare and full Medicaid benefits.

No Medicare Part D plans are available in the Northern Mariana Islands, but dually eligible individuals can receive subsidies under the Enhanced Allotment Plan, also referred to as 1935(e) funding. The Enhanced Allotment Plan provides additional allotments to territories to help low-income beneficiaries purchase prescription drugs. The allotment is not countable toward the ceiling on federal financial participation and can only be used for this purpose.

Federal Medicaid funding to the Northern Mariana Islands is subject to an annual funding ceiling specified in statute, which grows with the medical component of the Consumer Price Index for All Urban Consumers (CPI-U) (§ 1108(g)). The Northern Mariana Islands' CHIP allotment is determined by the Centers for Medicare & Medicaid Services (CMS) based on prior year spending, the same methodology used for states. In fiscal year (FY) 2017, federal funding was \$6.3 million for Medicaid and \$6.7 million for CHIP (Table 13).

Table 14 - Medicaid and CHIP Funding and Spending in the Northern Mariana Islands FYs 2011 – 2017
Source of Funds (Millions)

Year	Federal ceiling	Federal spending	Islands spending	Total spending	Federal allotment	Federal spending	Islands spending	Total spending
FY 2017	\$6.3	\$17.0	\$13.4	\$30.4	\$6.7	\$9.6	\$0.7	\$10.3
FY 2016	\$6.1	\$20.6	\$16.0	\$36.6	\$1.0	\$6.4	\$0.6	\$6.4
FY 2015	6.0	16.2	12.2	28.4	1.2	0.9	0.3	1.2
FY 2014	5.9	19.7	15.7	35.4	1.0	1.0	0.4	1.4
FY 2013	5.6	16.4	13.4	29.8	0.9	0.9	0.4	1.3
FY 2012	5.5	13.8	11.3	25.1	0.9	0.9	0.4	1.3
FY 2011	6.5	14.3	12.6	26.9	0.9	0.9	0.4	1.3

Notes: FY is fiscal year. Federal Medicaid ceilings reflect the annual ceilings for federal funds that territories receive under Section 1108(g) of the Social Security Act, while the actual federal spending reflects utilization of the additional allotments provided by the ACA, as well as spending not subject to the ceiling on federal financial participation. Federal CHIP allotments are provided under Section 2104 of the Social Security Act. If states and territories exhaust their own available CHIP allotments, they may receive additional funding from unused state CHIP allotments. The Northern Mariana Islands received these redistributed funds in FYs 2016 and 2017.

Source: MACPAC 2018b; MACPAC 2018 analysis of CMS-64 financial management report net expenditure data and CMS regional office narrative reports for FYs 2011-2018.

In general, once the Northern Mariana Islands exhaust the federal Medicaid and CHIP ceilings, they must fund the program with local funds. However, Section 2005 of the Patient Protection and Affordable Care Act (ACA, P.L. 111-148, as amended) provided the territories with a total of \$6.3 billion in additional federal funds for their Medicaid programs. Section 2005 funds for the Northern Mariana Islands totaled \$100.1 million, which is available to be drawn down between July 2011 and September 2019. Section 1323 provided an additional \$1 billion to the territories, \$9.1 million of which was directed to the Northern Mariana Islands. These funds are available to be drawn down between January 2014 and December 2019. The Northern Mariana Islands must contribute a non-federal share to access these funds. Once these funds expire or are exhausted, the Northern Mariana Islands generally will not be able to spend federal dollars beyond the ceiling for Medicaid, which is approximately \$6.8 million in FY 2019.

The Federal Medical Assistance Percentage (FMAP) for the Northern Mariana Islands and the other territories is set statutorily at 55 percent, unlike that of the states, which are set using a formula based on states' per capita incomes (§ 1905(b) of the Act). The CHIP enhanced FMAP is 91.5 percent. Like the states and other territories, the Northern Mariana Islands' federal matching rate for almost all program administration is set at 50 percent (§ 1903(a)(7) of the Act).

The territories cannot claim the newly eligible FMAP of 100 percent available to states expanding to the new adult group; they are eligible for the expansion state enhanced FMAP for adults without dependent children that states were eligible to receive for expansions prior to the ACA, which is 93 percent in calendar year (CY) 2019. However, the Northern Mariana Islands had not claimed expenditures under this FMAP as of July 2018. In addition, the Northern Mariana Islands received a 2.2 percentage point temporary increase in their regular FMAP between January 1, 2014 and December 31, 2015.

The Northern Mariana Islands finance their share of Medicaid and CHIP program costs using a mix of certified public expenditures and general fund revenues, depending on the type and location of service. The major hospital where almost all health care services are provided is owned by the territory, and most of the expenses incurred there for services provided are certified public expenditures. In FY 2017, federal Medicaid spending in the Northern Mariana Islands was \$17 million, or less than 1 percent of total federal Medicaid spending in the territories. Federal CHIP funding totaled \$9.6 million, or 4 percent of total federal CHIP spending in the territories.

The Commonwealth Healthcare Corporation's 2019 Citizen Centric Report (CCR) noted that 44% of FY19 revenue was paid by Medicaid. It further details that the operation of the CHCC is highly dependent on the CNMI Medicaid Agency's ability to pay for services. If cuts are made, the CHCC would likely see an increase in charity and uncompensated care. Roughly 28% of the CNMI population relies on Medicaid in order to affordably access health care services. Despite the high poverty rate (52%), many CNMI residents don't qualify for Medicaid because they do not hold the necessary immigration status to be eligible. As of 2010, forty-three percent (23,184) of all CNMI residents were non-U.S. citizens, with fewer than one fifth of them holding the immigration status necessary to be eligible for CNMI Medicaid assistance. Even with the severe financing challenges described above, the CHCC has made significant strides towards financial stability, with further gains expected in the future. However, without improvements to Medicaid and other third party reimbursements, and a reduction in the uninsured population, the CHCC will be significantly encumbered when trying to meet our goals. Reducing the rate of uninsured patients in the CNMI through mechanisms such as employer-sponsored and government-sponsored health insurance would significantly improve the CHCC's financial stability.

Recommendations

- Conduct more in-depth analysis of social service needs to support planning prioritization dialogs, with special attention paid to opportunities to address housing and job shortages to reduce reliance on Section 8 as well as nutritional and medical assistance programs;
- Assess employment diversification opportunities further to support 2020 CEDS update with a focus on developing high paying jobs for community members to reduce reliance on social support services;
- Assess opportunities to reduce reliance on Medicaid and the rate of uninsured patients in the CNMI through mechanisms such as employer-sponsored and government-sponsored health insurance;
- Include key financial planning, public health, education, and social services agencies as well as businesses and non-governmental organizations in development planning dialogs to identify cross-cutting socio-economic needs and priorities.

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Snapshot – Law Enforcement

Under the Commonwealth Code, 1 CMC § 8282, law enforcement officers are broadly defined to include public safety officers from a range of regulatory agencies. This includes public health and safety officers, special investigators, and conservation officers. Under the Special Act for Firearms Enforcement (SAFE), 6 CMC § 10101(y), “law enforcement” officers authorized to carry firearms to support their duties are listed. This definition of “law enforcement officer” includes any police officer employed by the Department of Public Safety, enforcement officers of the Commonwealth Ports Authority, correctional officers of the Department of Corrections, probation officers of the Office of Adult Probation, the sergeant-at-arms of both the House of Representatives and the Senate, conservation officers of the Division of Fish and Wildlife, and the investigators of the CNMI Homeland Security and Emergency Management Office, among several others. There is therefore a distinction between deputized armed enforcement officers and non-armed “compliance” officers that support other regulatory tasks. A review of staffing trends for compliance and sworn officers on Saipan, Tinian, and Rota indicates there are 78 “compliance officers” under various regulatory divisions and 574 deputized law enforcement officers excluding the Department of Corrections and the Attorney General’s office. Compliance and sworn in law enforcement officers are responsible for enforcing statutes, laws, and regulations designed to protect life and property, and natural resources. Furthermore, many of these officers have received training for state wide preparedness and resiliency against acts of terrorism and natural disaster responses. Because Public Law 20-20 focuses on “safety”, this section on law enforcement is specific to public safety trends as reported by the Department of Public Safety.

The Department of Public Safety (DPS) is tasked with providing effective police protection to inhabitants of the Commonwealth; enforcing motor vehicle and traffic laws and regulations; safeguarding public property and buildings, public officials, and keeping the peace at public ceremonies and official meetings; providing for the civil defense of the Commonwealth; and other provisions outlined in the Commonwealth Code (2 CMC § 2504). As the 2010 Census Maps highlight, there are higher population densities on Saipan than on Tinian or Rota (see Appendix R). No national standard exists for how many officers departments should have per capita, in part due to the fact that population totals don’t fully reflect demands placed on law enforcement agencies or differences across jurisdictions. One assessment of data for all police agencies serving jurisdictions of at least 25,000 that are recorded in the FBI’s Uniform Crime reporting (UCR) data reported ranges from as high as 70.9 Officers per 10K Population in Atlantic City, New Jersey, to as low as 4.2 Officers per 10K Population in Lincoln, California. Of 773 departments with jurisdictional populations between 25,000 – 50,000 community members, the average total officers per 10k Population was 17.0 and the average total personnel per 10K Population was 21.2. However, some public safety advocates suggest many U.S. cities employ too few police, and estimate that every dollar spent on policing approximately \$1.60 is saved in “victimization costs” (see Chalfin & McCrary, 2012). Enforcement trends and challenges for public safety are detailed for Saipan, Tinian, and Rota in this section.

Saipan

According to the Saipan Tribune, in 2015 “more than 15,000 crimes, car collisions, and criminal complaints were reported to the Department of Public Safety (DPS) in the CNMI, a number that, according to DPS Commissioner James C. Deleon Guerrero, is a “staggering sad reality.” The article goes on to highlight that, “[o]n the methamphetamine or “ice” problem alone, Deleon Guerrero disclosed that over the last two years, the joint DPS, Customs, and U.S. Drug Enforcement

Administration Task Force seized over \$720,000 worth of “ice” off the streets and confiscated over \$84,000 in assets in the process.” Additionally, although there were over 15,000 incidents reported, the Department of Public Safety had less than 100 police officers on Saipan to respond to these incidents.

In 2018, the Department of Public Safety reported that crime plummeted as a result of its war on drugs, with the crime rate is down 63 percent since 2013. Crime statistics for the past five years show reported domestic violence offences have fallen by over 78 percent and property crimes are down by 58 percent, leading to an overall decline in criminal offenses of more than 60 percent. CNMI police also said their awareness campaign on the dangers of drunk driving has reduced the rate of driving under the influence offences by nearly 80 percent. Master Transmittal Statistics for “deaths under investigation” and “sexual violence” in 2018 are summarized in the chart at right.

Date	Deaths Under investigation	Sexual Violence
18-Jan	3	23
18-Feb	5	11
18-Mar	7	24
18-Apr	4	14
18-May	2	12
18-Jun	6	21
18-Jul	4	27
18-Aug	3	22
18-Sep	4	26
18-Oct	8	27
18-Nov	3	23
18-Dec	6	30
Total	55	260

Compiling this data in terms of reported crimes provides an initial reporting point for Sustainable Development Goal 16, “Peace, Justice, and Strong Institutions”. Specifically, indicator 16.1.1 assesses the number of victims of intentional homicide, 16.1.2 documents “conflict related deaths” and 16.1.3 measures the proportion of population subjected to physical, psychological or sexual violence in the previous 12 months. For the purposes of this data collection and tracking effort, “dead persons” are reported as “deaths under active DPS investigation” for 16.1.1, and “domestic violence, sexual assault, sexual assault of a minor, stalking, and indecent exposure reports under DPS investigation” are include for reporting under 16.1.3. Although it is acknowledged that there may be some overlap between monthly reports and that reported crimes likely to not capture all crimes over a given year.

Based on the DPS data these indicators have been modified to report rates to establish baseline data as follows:

SDG Indicator	CNMI Modified Indicator	2018 DPS Crime Rate Reported
16.1.1	Number of victims of deaths under DPS investigation in the previous 12 months	56
16.1.2	<i>Combined with 16.1.1</i>	
16.1.3	Proportion of population reporting physical, psychological, or sexual violence in the previous 12 months	260

Tinian

The CNMI Department of Public Safety (DPS) has a 24-hour operations center with police, fire, criminal investigations, and motor vehicles sections on Tinian. The DPS facilities in the village of San Jose are staffed by 31 police officers and 28 firefighters. The Tinian International Airport Aircraft Rescue and Firefighting (ARFF) department has two firefighting vehicles and a staff of 10 personnel who have dual roles as ARFF personnel and Ports police officers. There is a police lockup on Tinian which feeds into other correctional facilities, including a detention facility, jail, a women’s unit, and a work release unit, located on Saipan.

Rota

The law enforcement agencies on the island of Rota consist of the Department of Public Safety, the Commonwealth Ports Authority, the Division of Fish and Wildlife, the Bureau of Environmental and Coastal Quality, Alcohol Beverage Tobacco Control, and the Department of Fire and Emergency Management Services. Each agency is responsible in carrying out the mandates set forth and the execution and enforcement of laws. Training and equipment are vital to meeting these standards and the success in terms of the multi-law enforcement agencies approach to responding to threats to public health and safety including terrorism and natural disasters.

The CNMI Department of Public Safety (DPS) has a 24-hour operations center that consists of criminal investigations, patrol/traffic, boating safety, school resource officer, and motor vehicles sections on Rota. The DPS facility in the village of Songsong is staffed by 52 police officers. There is a detention facility on Rota. Other correctional facilities, including a corrections facility, a women's unit, a juvenile's unit, and a work release unit, are located on Saipan. A recent increase in death investigations has been observed. There are also concerns about drug use and trafficking. DPS is working to expand capacity to prevent, educate, and work with partners to provide resources to maintain public safety, which is vital to the identity of the island of Rota.

Status, Impacts, and Responses

Saipan

DPS Saipan continues to work with law enforcement partners to control illegal drug use to address the "ice" epidemic. They have also initiated a seatbelt awareness campaign to improve traffic safety. As outlined in the 2019 DPS Citizen Centric Report (CCR), the average population in custody has gone down since 2015 while the number of officers and civilian personal has increased.

AVERAGE POPULATION IN CUSTODY PER YEAR (Adult Prisoners & Juvenile Clients)						
Average Population in Custody	Year	2015	2016	2017	2018	2019
	Total	220	260	260	170	170
*Based on October of each year						

Figure 51 - Average Population in Custody 2015 - 2019, DPS CCR, 2019.

Number of Active Employees	2015	2016	2017	2018	2019
Officers (Sworn Personnel)	88	72	87	114	109
Civilian Employees	5	5	7	8	11
TOTAL	93	77	94	122	120
*Based on January of each year					

Figure 52 - Staffing Details 2015 - 2019. DPS CCR, 2019.

Tinian

The Department of Public Safety is entrusted with the unique responsibility of enforcing the laws, statutes, and ordinances applicable to the Commonwealth. Members of the Department are a special kind of employees dedicated to carry out this responsibility and to protect life and property, maintain peace, order and detect crime and apprehend criminals in essence to keep peace in our community". Projects for the Tinian Department of Public Safety is set on getting the proposals/grants needed to fund what is needed for this organization. This 2019 project list is an overview as to what Tinian DPS plans are for this upcoming fiscal year, which include the following:

- June 2019 Department of Public Safety Personnel recertified their firearms over at the shooting range
- Project Proposal for additional restroom for Motor Vehicle Bureau
- Project Proposal includes a vehicle compound for DPS
- Project Proposal will include a plan to construct an impound lot vehicle compound

Rota

DPS Rota is working to achieve the goal of creating the long-term capacity needed on the force to proactively control the drug epidemic, increase visibly, and decrease response times to maintain and improve public safety. Projects that have been proposed and are underway include:

- Reestablishment of narcotics unit w/ canine capabilities and drug enforcement task force to address narcotics challenges / weaknesses observed by the force with the goal to create a taskforce to work collaboratively with central government to address ice epidemic;
- Creation of substation under public land to reduce response times to Sinapalo village;
- To expand boating safety capacity by building a warehouse and procuring equipment;
- To construct a building for a shooting range that can be used to safely train and recertify officers to meet law enforcement needs at the state and possibly federal level as well as afford the community a safe place to discharge firearms;

Northern Islands

Installation of satellite radio services is underway for inhabited islands of Pagan and Alamagan to support emergency response needs on these islands.

Future Outlook

As outlined in the 2019 DPS Citizen Centric Report's "Future Outlook" section, goals and objectives include:

1. To complete ongoing legal to those affecting the correctional system existing laws and policies formulated in accordance with the standards established by the American Correctional Association, as ordered and approved in granting the CNMI a Final Termination of the Consent Decree on May 20, 2014;
2. Identify and apply for federal funding opportunities to urgently address existing inoperable or unreliable building maintenance systems to protect the safety, security and health of employees and individuals confined in its facility. These systems include but not limited to Fire Alarm and Sprinkler System, Boiler System, Security Surveillance System, Reverse Osmosis (RO) System; Touch Screen Security Control System (TSSCS);
3. Revisit the statutory requirement of the Juvenile Detention Unit with regards to oversight administrative and operational responsibilities;
4. Fully staff the Medical Unit with a Physician and Nurse to provide regular and or urgent medical care attention for persons confined in the institution; and,
5. Continue to provide employees, especially officers, training opportunities, on-island or abroad, to enhance skills and knowledge on current issues, correctional modules and modern techniques that work.

Other key initiatives focus on (1) Staff Recruitment and Retention, (2) Building Management System (BMS), (3) Training, (4) Health and Medical Services, (5) Fire Alarm and Overhead Fire-Fighting Sprinkler System installation at facilities, (6) Touch Screen Security Control System (TSSCS), and (7) Avoiding catastrophic incidents and ensure no escapes.

Recommendations

Further time bound and action-oriented planning would help to address the vision to “maintain and enhance community safety in the CNMI” and achieve outlined goals and objectives highlighted in the 2019 DPS Citizen Centric Report. Including DPS as a member of the PDAC or at minimum establishing a planning point of contact to attend relevant PDAC Socio-economic and Disaster Risk Reduction Taskforce Meetings would help to establish goals for public safety within comprehensive planning dialogs and ensure greater coordination between DPS and complementary planning and development initiatives.

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Snapshot: Cultural Heritage and Historic Sites

Commonwealth policy favoring the preservation of cultural and historic properties is articulated in Section 3 of Article XIV of the Constitution, which directs that “places of importance to the culture, traditions, and history of the people of the Northern Mariana Islands” and “(a)rtifacts and other things of cultural or historical significance... shall be protected and preserved,” and in Section 3 of the Commonwealth Historic Preservation Act of 1982, which declares the policy “to promote and preserve historic and cultural properties in the Commonwealth.”

As reported in the CNMI Department of Community and Cultural Affairs’ (DCCA) 2019 Citizen Centric Report, DCCA is charged with the oversight of CNMI functions in the areas of human and social services, historic and landmark conservation and preservation, activities to preserve Chamorro and Carolinian heritages and traditions, public arts and sports programming. Public Law 3-39, the Commonwealth Historic Preservation Act of 1982, 1 CMC '§ 2381-2382 and 2 CMC '§ 4811-4842, created the Historic Preservation Office (HPO) within DCCA and an independent Historic Preservation Review Board. In 1994, Executive Order 94-3 reorganized the Commonwealth government’s executive branch, changed agency names and official titles, and effected numerous other revisions including abolishing the Review Board and transferring its functions to HPO. As such, HPO functions to regulate and maintain culture resources and implements regulations with the goal to balance “preservation of cultural and historic properties against the needs of development and continuing use of land and other resources” (2 CMC § 55-10-101). HPO’s regulations further declare its policy “to foster conditions under which our modern society and our prehistoric and historic resources can exist in productive harmony and fulfill the social, economic, and other requirements of present and future generations.” These goals are supported by regular planning, reporting, and program implementation duties that include site recording, maintained, and community education.

There is a rich cultural history in the CNMI. The historic and cultural resources left behind by nearly 4,000 years of human occupation are found throughout the CNMI. It has been stated that “by A.D. 1700, almost every inhabitable part of the Mariana Islands supported residential complexes, temporary campsites, simple concentrations of broken pottery, at at least some material sign of cultural use of the landscape” (Carson 2016:221). Subsequent Spanish, German, Japanese, and US colonialism, as well as becoming key pieces in World War II, have shaped the history, landscape, people, and culture of the CNMI. In recognition of the scientific, cultural and economic importance of these tangible links with the islands' past, the CNMI Legislature passed the Historic Preservation Act of 1982 (Public Law 3-39). This law created the Historic Preservation Office (HPO) and protects important historic, archaeological, architectural and cultural resources on public and private lands throughout the Commonwealth. In addition to Public Law 3-39, significant sites are also afforded protection under federal laws and regulations, primarily Section 106 of the National Historic Preservation Act of 1966, as amended, and associated 36 CFR Part 800.

HPO maintains its central office on Saipan that is headed by the Historic Preservation Officer, and branch offices on the islands of Rota and Tinian. Branch offices are headed by Coordinators who report to the Historic Preservation Officer. The program receives annual grant assistance from the

National Park Service under the Historic Preservation Fund program and annual appropriations from the CNMI legislature. Other funding is secured from a variety of grant sources, primarily to support specific preservation projects. The program receives essential advice and guidance from the Historic Preservation Review Board appointed by the Governor.

The State Historic Preservation Plan is a document required by the National Park Service's Historic Preservation Fund program. It is a five-year planning document intended to outline how Historic Preservation activities will integrate with other CNMI agencies. It also discusses current challenges faced by the program as well as outlines broad-based goals and specific objectives to address during the span of the document. The current Historic Preservation Plan is the 2011–2015 Historic Preservation Plan; it was extended due to natural disasters (Super Typhoon Soudelor in 2015 and Super Typhoon Yutu in 2019) and an update is pending (see Appendix S).

Historic preservation activities are supported by a number of local, regional and international organizations. Locally, they include the CNMI Museum of History and Culture, the CNMI Public School System, the Northern Marianas College, the CNMI Council for Arts and Culture, the Joeten-Kiyu Public Library, the NMI Council for the Humanities, the CNMI Division of Environmental Quality, and the Coastal Resources Management Office. Regional organizations include the Micronesian Endowment for Historic Preservation, the Micronesian Area Research Center, the Micronesian Seminar, the Guam Preservation Trust, and the University of Hawaii. International partners include a wide variety of preservation professionals including archaeologists and historians, and universities in the United States, Japan, Australia, and Europe. Major historic preservation activities fall within several general program priority areas including survey, registration, project review, and public education and cultural preservation.

Survey

As mandated under federal and local laws, the HPO is responsible for completing a comprehensive survey to locate and document all significant archaeological, historic, architectural and cultural resources in the CNMI. Surveys are undertaken in-house by HPO staff and under contracts with professional archaeologists. Surveys are also undertaken in advance of land-use projects. Large areas of Saipan, Tinian and Rota have been subjected to systematic archaeological surveys. By contrast, with the notable exception of Pagan, the rugged Northern Islands have received virtually no survey coverage.

Registration

Historic resources identified by archaeological, architectural and historic surveys are fully documented and site information is added to the HPO's site inventory listing. This listing contains thousands of sites and associated features. Efforts are underway to computerize the HPO's site inventory. In addition to the inventory listing, significant resources are also listed on the U.S. National Register of Historic Places. The National Register is a formal listing of the nation's most significant sites and is maintained by the National Park Service. Currently, 35 sites in the CNMI are listed on the National Register. Of these, twelve are ancient Chamorro sites, two are traditional Carolinian sites, twelve date to the Japanese period, and nine are associated with World War II. Finally, nationally significant sites may be designated National Historic Landmarks, a program also administered by the National Park Service. Two National Historic Landmarks have been designated in the CNMI, both following the theme of the War in the Pacific.

Land-Use Reviews

The HPO reviews land-use projects in conjunction with two principal permitting agencies.

Large-scale projects or those that will be undertaken within sensitive environmental areas are reviewed under the Coastal Resource Management (CRM) program. In most cases, these project areas are subjected to professional-level surveys and potential adverse effects to important historic resources are identified and mitigated through specific requirements incorporated into CRM permits. Mitigation measures may include one or more of the following: in-place preservation; relocation; data recovery, back-filling; intensive recordation; interpretive development; and monitoring. Smaller-scale projects are reviewed under the Division of Environmental Quality Earthmoving permit process. Typically, such project areas are surveyed by staff of the HPO. Needed mitigation measures as previously discussed are then made a part of the earthmoving permit. Federal undertakings are reviewed under the Section 106 review process. This process requires federal agencies to consider potential effects their undertakings may have on properties on or eligible to be on the U.S. National Register of Historic Places. Areas to be impacted by federally-assisted projects are normally subjected to professional-level archaeological surveys and any required mitigation actions are stipulated in formal agreement documents.

Public Education

An important component of historic preservation is the dissemination of archaeological and historic research conducted in the CNMI. The HPO maintains two publication series: the Micronesian Archaeological Survey report series, established in 1981, presents the results of important archaeological investigations. Historical research is published through the HPO's Occasional Historical Papers series. HPO conducts lectures on local history, archaeology and historic preservation and sponsors guided tours to significant sites. It has also initiated an interpretive project that involves placing multi-language signs at significant historical sites. It also recently completed work to develop a self-guided tour of underwater sites in the Saipan Lagoon. Publications on other topics, including culture, are produced by other agencies and organizations including the NMI Council for the Humanities.

Cultural Preservation

In light of rapid changes ushered in by economic development, the HPO has sponsored projects to strengthen indigenous cultural systems, practices and knowledge. Referred to as cultural preservation, this program area is undertaken in coordination with other agencies in the CNMI including the NMI Council for the Humanities, the Commonwealth Council for the Arts and Culture, the Language Commission, the Office of Indigenous Affairs and the Carolinian Language Commission. Cultural preservation projects are varied and have included oral histories, traditional sailing canoe reconstructions, workshops to provide training in local medicinal practices, celestial navigation, and fishing, and the documentation of other traditional skills and crafts that are important to the indigenous cultures.

A Vision for Historic Preservation in the CNMI

HPO envisions that now and in the future, historic preservation will play a key role in improving the quality of life for all residents of the CNMI. As the 2011-2015 CNMI Historic Preservation Plan describes this vision encompasses the Historic Preservation Office as well as schools and the community at large. Although an update to the Historic Preservation Plan is pending, the vision and discussion of challenges and opportunities are included here for additional context.

The 2011-2015 Historic Preservation Plan's vision includes aspirations that:

- Historic and cultural resources will be considered by CNMI residents as irreplaceable links to our past whose preservation and study will add to our understanding of the archipelago's unique cultures and history.
- Educators will take full advantage of historic preservation by ensuring that important historical and cultural data generated by archaeological and historical research is integrated into school curricula. Students will take inspiration from the past and use it as a compass to navigate an uncertain and challenging future.
- The legislature will recognize the importance of historic preservation and will appropriate adequate levels of funding to ensure that historic and cultural resources are identified, protected, studied and interpreted. The legislature will also enact stronger laws which will provide preservationists and others with the tools necessary to ensure that important resources are respectfully considered and afforded appropriate treatment.
- Historic Preservation will be integrated fully into economic development and historic resources will be viewed by developers as assets rather than liabilities. Preservationists and developers will recognize common ground, thus avoiding adversarial relationships.
- Visitors to the CNMI will be provided opportunities to learn about the history and cultures of the Northern Mariana Islands and residents will take rightful pride in the many accomplishments of their ancestors. Cultural tourism will be embraced and will serve as an important drawing attraction for visitors from around the world.

When discussing challenges and opportunities, the plan identified eight “issues” or challenges in accomplishing the vision as well as goals and objectives for achieving these goals. These include needs for (i) adequate funding for Historic Preservation, (ii) integration of historic preservation into the visitor industry of the CNMI, (iii) land use conflicts, (iv) public participation, (v) expanded survey, inventory, and registration of cultural and historic resources, (vi) federal agency cooperation, (vii) public education, and (viii) cultural preservation. The discussion of challenges, goals, objectives, and the planning process for the 2011-2015 Historic Preservation Plan are included for further reference in Appendix S. A plan update is currently under way and the Historic Preservation Office intends to complete the 2015-2020 revision in tandem with the Office of Planning and Development’s comprehensive sustainable development planning process.

Status, Impacts, and Responses

Current HPO leadership and staff report that progress towards the 2011-2015 vision, goals, and objectives have been slow. Challenges have included high staff turn-over and insufficient staffing to fulfil annual grant tasks and support program expansion as well as conduct and complete the update of the 2011-2015 Historic Preservation Plan update which was slated for 2016 but was delayed by tyhpoons, staff and grantor turnover, and multiple states of emergency. As such, updating the Historic Preservation Plan is a high priority for the office, especially as the current plan was written a decade ago in 2010, before the latest influx of foreign investment that has driven large-scale development, as well as before the multiple military build-up proposals across the CNMI. Additionally, recent events in the past decade have made it apparent additional challenges in HPO’s laws, local and federal permitting processes, public outreach, and internal research role. Efforts to develop and maintain a computerized site inventory system are also ongoing. This includes digitization of site records as well as populating and maintaining a geospatial database of sites recorded in the CNMI. Additionally, since the publication of the 2011-2015 Historic Preservation Plan, HPO has digitalized a geospatial layer of “National Historic Landmarks and

Sensitive Areas” for Saipan (see image at right with lilac boundaries depicting landmarks and salmon-colored boundaries indicating sensitive cultural areas). HPO hopes to develop additional geospatial data to help inform the public and developers of potential presence of resources of concern early in the project development process to help reduce risks of impacts to these resources.



The vision, objectives, and goals of the Historic Preservation Plan align closely with the modified Sustainable Development Goal (SDG) 11. Indicator 11.4.1 which aims to measure the “total expenditure (public and private) per capita spent on preservation, protection, and conservation of all cultural and natural heritage, by type of heritage (cultural, natural, mixed, World Heritage Center designation), level of government (national, regional, and local/municipal), type of expenditure (operating expenditure / investment) and type of private funding (donations in kind, private non-profit sector, sponsorship)” to monitor progress towards meeting the target to protect and safeguard cultural and natural heritage.

In Taskforce workgroups modification of this indicator as an objective to measure progress towards SDG 11 to “make cities and human settlements inclusive, safe, resilient and sustainable” was proposed for CNMI as follows: “By 2025 CNMI’s recreation plan is updated to include conservation status of cultural, natural, and mixed-designation sites with area- and resource-specific plans and data collection including number of cultural and historical sites that are recorded and inventoried, with at least 50% annual preservation of newly discovered cultural heritage resources; public annual expenditures remain constant; private preservation data is collected.” HPO reports that federal program funding could be easily reported, however, recommends that state, public, and private investment tracking would also be informative for their program. As such, OPD proposes to work closely with HPO to develop and conduct a survey to collect initial baseline data on this indicator.

As of the DCCA’s 2019 Citizen Centric Report and the FY19 CNMI Appropriations (Public Law 20-67), HPO is supported by a federal grant award of \$416,394.00. HPO Saipan’s annual budget is \$225,361 for personnel and \$36,248 for operations; HPO Tinian budgets \$102,391 for personnel and \$8,956 for operations, and HPO Rota budgets \$70,159 and \$11,232 respectively, totalling \$454,347 for the year. In FY19 a total of \$462,984 was budgeted for the CNMI Museum. Together these budget allocations demonstrate a \$917,331 annual commitment, or 0.005% of the \$171,589,677 appropriated in FY19. OPD proposes to work closely with HPO to collect additional baseline data on this indicator and support associated planning efforts moving forward.

Recommendations

- Coordinate plan update with comprehensive planning visioning;
- Update plan objectives to include “SMART” descriptions of “specific, measurable,

- attainable, relevant, and time-bound” tasks with supporting action plans;
- Expand partnerships to monitor progress using SDG 11.4.1 and accomplish management objectives identified in updated plan;
- Update HPO’s enabling legislation (3-39), regulations (55-10), and procedures and policies;
- Coordinate additional HPO programs and tasks, such as greater public outreach, heritage tourism, underwater archaeology, etc.; and
- Include HPO on PDAC or Socio-economic taskforce to support integration of cultural resources planning element into comprehensive planning efforts.

References

Commonwealth Historic Preservation Act of 1982, 1 CMC '§ 2381-2382 and 2 CMC '§ 4811-4842, 2 CMC § 55-10-101

Executive Order 94-3 Reorganizing the Commonwealth Government’s Executive Branch

Public Law 20-67, H.B. No. 20-173, SSL, CCSL, entitled: '·To make appropriations for the operations and activities of the Government of the Commonwealth of the Northern Mariana Islands, its agencies, instrumentalities, and independent programs, and to provide budget authority for government corporations for Fiscal Year 2019; and for other purposes."

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2019 DCCA Citizen Centric Report

Snapshot: Education

Public education in the CNMI has expanded significantly in the past ten years. Issues surrounding the need to train the local workforce to take on jobs currently held by non-immigrant contract workers have also placed the impetus on public education entities to respond accordingly and immediately, thus resulting in an urgent compulsory rate of growth and development for all. Currently, four educational institutions are awarded funding from “CW visa” applications to support workforce training needs: the Northern Marianas College, the Northern Marianas Technical Institute, the Public School System, and the Latte Training Academy. These and related educational institutions and programs are summarized in more detail in the discussion of “status, impacts, and responses” below.

The United Nations Agenda 2030 Sustainable Development Goals include education in discussion of goals, targets, and indicators. Specifically, to meet Goal 4 – Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all, relevant indicators, and CNMI data are as follows:

SDG Target	SDG Indicator	CNMI Data	Data Trend
4.1 - By 2030, ensure that all girls and boys complete free, equitable, and quality primary and secondary education leading to relevant and effective learning outcomes	4.1.1 - Proportion of children and young people: (a) in grades 2/3; (b) at the end of primary; (c) at the lower end of secondary achieving a minimum proficiency level in (i) reading and (ii) mathematics by sex	(a, b, c) 100% enrolment reported; (i) overall reading proficiency (ready or exceeding) 28% grades 3-10; (ii) overall mathematics proficiency 20%	<i>Inquiry regarding gender differentiation and trends for 2015 and 2016 pending.</i>
4.3 - By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university	4.3.1 Participation rate of youth and adults in formal and non-formal education and training in the previous 12 months, by sex		<i>Inquiry regarding gender differentiation and trends for 2015 and 2016 pending.</i>
4.6 By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy	4.6.1 Percentage of population in a given age group achieving at least a fixed level of proficiency in functional (a) literacy and (b) numeracy skills, by sex	PSS assessment indicated overall support needs as follows: English - 6% Reading - 70% Math - 80%	<i>Data may be tracked without gender differentiation for the purposes of baseline data, goal setting, and trends analysis</i>
4.a Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all	4.a.1 Proportion of schools with access to: (a) electricity; (b) the Internet for pedagogical purposes; (c) computers for pedagogical purposes; (d) adapted infrastructure and materials for students with disabilities; (e) basic drinking water; (f) single-sex basic sanitation facilities; and (g) basic handwashing facilities (as per the WASH indicator definitions)	100% Attainment goal	<i>Schools currently in recovery post Typhoon Yutu but provision of necessary facilities a high priority identified in CEDS</i>

Modification of indicators to fit existing data will support use of this information for initial establishment of baseline data that can be tracked to measure progress over time.

Status, Impacts, and Responses

The 2018 typhoon season significantly impacted facilities and class schedules across CNMI’s educational institutions. Extensive damage necessitated requests for numerous repairs which are being implemented with support from the Federal Emergency Management Agency (FEMA), the Economic Development Administration (EDA), and others, with the goal to rebuild school structures that can provide safe shelter facilities during storms and reduce disruption of educational services after storm events. This section summarizes academic trends and existing programs, as well as stated goals and objectives in place to achieve improved outcomes for educational systems and facilities in the CNMI.

Academics

In 2017 the National Center for Education Evaluation and Regional Assistance (NCEERA) conducted a large-scale evaluation of the Northern Marianas College. The report, entitled “Comparing enrollment, characteristics, and academic outcomes of students in developmental courses and those in credit-bearing courses at Northern Marianas College” identified educational opportunities in respect to recent graduating high school classes in regards to English and math placement in college. Specifically, the report found that most students entering Northern Marianas College in 2008–10 were initially placed in non-credit-bearing developmental courses. In English, 80 percent of full-time first-time freshmen students seeking associate degrees were placed in developmental courses. In math, 91 percent were placed in developmental courses. Implications of this study highlighted that “very high percentages of high school graduates are unprepared for college coursework”. A complete set of readiness level charts from the 2017 report and comparison to 2016 and 2015 results are included in Appendix R.

	PSS 2017 Exceeding	PSS 2017 Ready	PSS 2017 Close	PSS 2017 Need Support	National 2017 Exceeding	National 2017 Ready	National 2017 Close	2017 National Need Support
English	42%	29%	36%	6%	42%	30%	22%	5%
Math	1%	6%	13%	80%	4%	6%	36%	41%
Reading	2%	10%	18%	70%	6%	15%	24%	55%
Science	2%	7%	13%	79%	6%	12%	19%	62%
Writing	2%	26%	27%	26%	3%	25%	37%	35%

- Few students were placed in credit-bearing courses: about 20 percent in English and about 8 percent in math.
- Female students were more likely to be placed in credit-bearing English courses; students with less economic need were more likely to be placed in credit-bearing math courses.
- Students’ placement in credit-bearing courses and in different levels of developmental English and math courses was related to their enrollment in Advanced Placement courses, cumulative grade point average, scores on the SAT-10, and, for math placement, grades in Algebra 2 and highest high school math course taken.
- Students who had enrolled in Advanced Placement courses in English and math were more likely to be placed in credit-bearing courses in those subjects.
- Students who had a higher cumulative grade point average and higher Stanford

Achievement Test, 10th edition, (SAT-10) scores were more likely to be placed in credit-bearing English and math courses.

- Students who had earned a grade of A or B in Algebra 2 or had taken math courses beyond Algebra 2, such as precalculus, calculus, or statistics, were more likely to be placed in credit-bearing math courses.
- Many students who had a high cumulative grade point average and high standardized test scores were placed in developmental courses. About 45 percent of students with a cumulative grade point average of 3.75 or higher were placed in developmental English courses, and about 73 percent of students with a SAT-10 math score at or above the 75th percentile rank were placed in developmental math courses.
- Students who had better high school academic preparation were more likely than their less prepared peers to be placed in higher levels of developmental courses.

Table 15 – Demographic characteristics and academic preparation of students in credit-bearing or developmental English courses, 2010/11 – 2013/14

Student characteristic	Overall	Placed in credit-bearing courses	Placed in developmental courses
All students (n = 846; percent)	100	19.6	80.4
Demographic characteristic			
<i>Gender</i>			
Male (n = 383; percent)	45.3	15.7**	84.3**
Female (n = 463; percent)	54.7	22.9**	77.1**
<i>Race/ethnicity</i>			
Chamorro (n = 339; percent)	40.1	22.1	77.9
Filipino (n = 279; percent)	33.0	19.7	80.3
Other (n = 228; percent)	27.0	15.8	84.2
<i>Pell grant status</i>			
Received (n = 737; percent)	87.1	18.6	81.4
Did not receive (n = 109; percent)	12.9	26.6	73.4
<i>Primary language spoken at home</i>			
English (n = 609; percent)	72.0	20.7	79.3
Other (n = 237; percent)	28.0	16.9	83.1
Academic preparation			
<i>Advanced Placement English courses</i>			
Enrolled in one or more (n = 174; percent)	20.6	39.1***	60.9***
Did not enroll in any (n = 672; percent)	79.4	14.6***	85.4***
Cumulative grade point average ^a (n = 773; mean)	2.7	3.2***	2.6***
Stanford Achievement Test, 10th edition, reading ^b (n = 755; percentile rank for the average student)	39	66***	32***

Table 16 – Demographic characteristics and academic preparation of students in credit-bearing or developmental math courses, 2010/11 – 2013/14

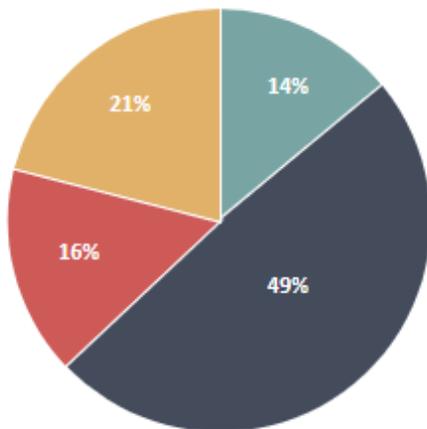
Student characteristic	Overall	Placed in credit-bearing courses	Placed in developmental courses
All students (n = 769; percent)	100	7.8	92.2
Demographic characteristic			
<i>Gender</i>			
Male (n = 344; percent)	44.7	9.6	90.4
Female (n = 425; percent)	55.3	6.4	93.6
<i>Race/ethnicity</i>			
Chamorro (n = 301; percent)	39.1	5.0	95.0
Filipino (n = 266; percent)	34.6	9.4	90.6
Other (n = 202; percent)	26.3	9.9	90.1
<i>Pell grant status</i>			
Received (n = 665; percent)	86.5	5.4***	94.6***
Did not receive (n = 104; percent)	13.5	23.1***	76.9***
<i>Primary language spoken at home</i>			
English (n = 557; percent)	72.4	6.8	93.2
Other (n = 212; percent)	27.6	10.4	89.6
Academic preparation			
<i>Advanced Placement math courses</i>			
Enrolled in one or more Advanced Placement math courses (n = 53; percent)	6.9	45.3***	54.7***
Did not enroll in any Advanced Placement math courses (n = 716; percent)	93.1	5.0***	95.0***
Cumulative grade point average ^a (n = 704; mean)	2.7	3.4***	2.7***
Stanford Achievement Test, 10th edition, math ^b (n = 684; percentile rank for the average student)	52	86***	46***
<i>Grades in Algebra 2^c</i>			
B or better (A or B) (n = 268; percent)	35.4	19.0***	81.0***
C or below (C, D, or F) (n = 489; percent)	63.6	1.6***	98.4***
<i>Highest math course^d</i>			
Algebra 2 (n = 636; percent)	83.8	4.2***	95.8***

NMC reports that it is working to update its 2015-2020 plan to include consideration of impacts from Super Typhoon Yutu in order to build resiliency of the institution. Despite the destruction the NMC campus sustained from Super Typhoon Yutu in October 2018, NMC reported a 12% increase in enrollment to 1,276 students for Fall 2019 compared to the prior year.

Public School System

The CNMI's Public School System (PSS) reports that in the 2016 school year total student enrollment in CNMI was 3,523 students in Junior and Senior High Schools, 1,920 middle school students, 4,252 elementary students, and 427 early learning students. In the SY2018-2019 PSS reported total enrollment of 9,611 students with an average student to teacher ratio of 1:22.

As detailed further in the PSS report in Appendix T, CNMI has high enrollment and low dropout rates in primary and secondary education, however there are slightly higher rates of enrollment for males in early learning and special needs programs. Overall, 62% of enrolled students were eligible for the free meal program. Statistical data indicated a 1.77% dropout rate in School Year (SY) 2016-2017, down from 1.85% in SY15-16 and 2.0% in SY14-15. Of graduating Seniors in 2017, 49% of survey respondents attended a post-secondary institution, 21% were seeking employment, and 16% were joining the Armed Forces.



Overall Senior Graduates Survey Results

After graduation, I plan to:

1. Attend a Post Secondary Institution	311
2. Attend the Armed Forces	100
3. Be Employed or Seek Employment	135
4. Other/No Response	92
Total	638

Compiled: June 2017
Source: School Exit Surveys Culled by Students First

The Public School System which provides free and appropriate public education for K-12 has expanded its services to include enrollment of participants from birth to three (3) years of age. This is made possible by the support of the federally funded Head Start and Early Head Start Programs. In retrospect, this has provided stay-home parents the opportunity to work outside of the home and contribute their skills and knowledge to the local workforce needs.

Private Schools in CNMI

There are a total of seven private schools on Saipan, as well as two private primary schools on Tinian. The Private School Association has not provided enrollment or graduation data as of the time of the publication of this report.

Scholarship and Workforce Development

The CNMI Scholarship Office Act of 2013, Public Law 18-40, established the CNMI Scholarship Office as an autonomous agency, governed by a board of directors. Their primary mission is to provide financial assistance to eligible Commonwealth of the Northern Mariana Islands (CNMI) residents who wish to pursue their postsecondary education. This mission is designed to enhance the government's support of our students, and their families, leading to the prosperity and economic growth of the people in the CNMI. Also, to further the government's efforts in ensuring our communities' economic sustainability through strategically placing our resources throughout our communities in Saipan, Tinian, and Rota. The CNMI Scholarship Office is working to align all efforts in locating, educating, training, and participating in all other initiatives with the CNMI workforce needs, especially that of the CNMIs economic sectors.

Beginning academic year 2016/2017, through collaboration with and approval of the CSO Board of Directors, the Scholarship Office established a list of Priority Fields of Study based on what has been reported and data collected from numerous reports such as the USCIS, CNMI Contract Workers

counts, CNMI W2 reports, CNMI Department of Commerce Census Reports, CNMI Department of Labor, CNMI Prevailing Minimum Wage Report etc. Priority “tier 1” areas include construction trades, building service, food service, and labors, as well as medicine and health occupations. “Tier 2” priority areas include administrative specializations, managers and executives occupations, social workers, administrative support specialists, computer services, agricultural, forestry, and fishing workers, and entertainment and recreation professionals. Tier three priority areas include education, writing, engineering and surveying specialists, and others. Available scholarship funding in FY18 totaled \$1,949,700. These funds are used to support scholarships at the Northern Marianas College, Northern Marianas Trades Institute, and the Latte Training Academy.

Northern Marianas College

Northern Marianas College was established in May 1981 when Governor Carlos S. Camacho created the College as an official governmental entity. In June 1985 the college received its initial accreditation from the Accrediting Commission for Community and Junior Colleges (ACCJC) of the Western Association of Schools and Colleges (WASC). The accreditation was reaffirmed in 1990, 1996, 2001, and 2009. In March 2001, the Accrediting Commission for Senior Colleges & Universities of WASC granted NMC initial accreditation for offering a Bachelor of Science degree in Elementary Education. This marked the first time in history of WASC that a two-year community college offered a four-year degree. Since its beginning, NMC has focused on meeting the higher education and vocational training needs of the CNMI. From the times of its first program in teacher education, NMC has developed a comprehensive set of academic programs and services to meet the social, cultural, occupational and economic development needs of its island communities. Today, students are enrolled in various educational programs of study leading to Certificates of Completion, Associate Degrees, and Bachelor of Science in Elementary Education. In addition, there are hundreds of students enrolled in credit and non-credit, continuing adult education courses. Throughout the years, more than 20,000 people have enrolled in regular NMC degree and certificate courses, over 3000 persons have been awarded certificates and/or degrees in programs offered or coordinated by NMC; and more than 12,000 individuals have been served in our community. The institution has also been engaged in significant strategic planning efforts, including the “PROA Strategic Plan 2008-2012”, which identified four strategic goals, established a number of priority initiatives that extended beyond 2012. The *Northern Marianas College Five Year Strategic Plan 2015-2020—Full Speed Ahead* provides guidance for the overall direction for prioritizing future key initiatives, which will ultimately link to the allocation of resources. As adopted by the Board of Regents in 2013, NMC’s vision is to “serve as the engine to drive the economic growth and the social and cultural vitality of the Commonwealth” and their mission is that “Northern Marianas College, through its commitment to student learning, provides high quality, affordable and accessible educational programs and services for the individual and people of the Commonwealth.” To support achievement of this vision and mission, twenty-four benchmarks for success were identified, as detailed in Appendix U.

Objectives, or “imperatives”, which are detailed further in Appendix U, were identified as follows:

- Imperative One: Increase Relevance to CNMI Workforce and Community Needs
- Imperative Two: Ensure Continued Accreditation
- Imperative Three: Accelerate Time to Completion
- Imperative Four: Improve Student Success and Support
- Imperative Five: Strengthen Operations and Resource Development

The Northern Marianas College (NMC) continues to play a central role in the professional development and educational growth of its residents. It has experienced an increase of over 55% of its student enrollment from 2008 to 2018. The College offers degree programs in Education,

Business Management, Nursing, and Criminal Justice to name a few, and also offers short term training in various areas such as Tour Guide Training, Safety in the Workplace, IT Bootcamp Network and Security, and Entrepreneurship.

More recently, the NMC penned an agreement with the University of Guam (UoG) to expand program offerings for the CNMI community, starting with the extension of the UoG four-year degree in Criminal Justice to NMC's two-year Criminal Justice graduates. A critically important part of this agreement is that NMC students will not need to leave the CNMI to enroll in this program. This will allow NMC students who are working to continue to contribute to the workforce while pursuing higher education. This will be made possible through the use of online instructional methods as well as in the UoG faculty commuting to Saipan to offer their courses. This is one of several academic programs that NMC and UoG are considering as a part of the extension of programs at NMC.

For NMC, this agreement along with many others in the plan will provide higher education credentials to those who seek to become employed in particular fields, and also support their growth in their current professions. A large number of graduates of NMC hold leadership and managerial positions in both the private and public sectors in the CNMI.

The most recent expansion of public education entities in the CNMI materialized through public law 20- 106 which turned the non-profit Northern Marianas Technical Institute into a government trades institute. With this, the NMTI must now function as a public trades training agency, funded by CNMI appropriations. Many challenges exist for these education institutions beginning with the need to continue to expand and strengthen the local workforce to replace all soon-to-be expiring Contract Worker visa holders. The challenge implicates the PSS in preparing college and career ready graduates, NMC in delivering higher education graduates to fill both leadership positions and mid-level positions vacated by the non- immigrant CW visa holders, and NMTI in providing career and technical training to replace entry-level and specialized trades position holders.

Northern Marianas Technical Institute

The Northern Marianas Technical Institute's vision is to "provide a world-class regional training center with a state-of-the-art facility, equipment, and instructional tools handling at least 200 students." Their mission statement is to "provide quality technical trades and other related occupational programs designed to expand the quantity and quality of the CNMI's labor pool of skilled workers, and, hereby, support the Commonwealth's economical development." Current programs include Automotive Technology, Construction, Maintenance Trades, Culinary Arts, Hotel and Restaurant Operations, Power Generation, and the Adult Vocational Technical High School (AVTHS) diploma program. Enrollment has been increasing at NMTI since 2015 as detailed in the chart below.

<i>Year</i>	<i>Number of Students Enrolled*</i>	<i>% Employed at Graduation</i>	<i>% Continuing Training/ Education</i>	<i>% Unable to Locate Work / Other</i>
2015	89	77%	2%	21%
2016	73	71%	18%	11%
2017	443	75%	17%	8%
2018	782	68%	18%	14%

**Includes NMTI Trade Courses, Adult Vocational Technical School, and PSS High School Accelerated Enrollees*

The Latte Training Academy, Inc. is governed by a Board of Directors comprised of community members residing in the CNMI and Guam. While the Board governs organizational strategy, operational strategy is managed by the organization's contracted Executive Director. To maximize efficiency and minimize costs, the Latte Training Academy, Inc. utilizes a business model which leverages partnerships with reputable firms tasked with program delivery, business management, and administrative management.

The Latte Training Academy, Inc. (LTA) is a 501c3 non-profit organization located in the U.S. Commonwealth of the Northern Mariana Islands (CNMI). The organization was founded in 2013 in response to the need to develop the local workforce in the CNMI. Since its inception in 2013, LTA has partnered with the CNMI Public School System (PSS), the CNMI Department of Labor, the CNMI Department of Commerce, the CNMI Small Business Development Center (SBDC), the CNMI Scholarship Office and the United States Department of Agriculture (USDA) to provide a wide array of training programs.

While the Latte Training Academy, Inc. is committed to its mission of workforce development, the organization holds true to its designation as a Federal 501c3 non-profit. The organization's leadership is devoted to giving back to the communities in which it operates. In 2015, the Board of Directors established the Founders Scholarship Program with \$11,000.00 in college scholarships for LTA participants available each year. To date, the organization has awarded more than \$22,000.00 to PSS graduates to support their efforts during their college careers. The Latte Training Academy, Inc. believes that the continued education and career development of its students is essential to the long-term success of the individual, as well as the overall community in which the student resides.

Recommendations

Educational systems and facilities received significant attention in the 2019 CEDS update, reflecting the recognition of the connection between robust educational institutions and overall economic growth. Continuing to prioritize educational needs and expanding data tracking to ensure equal educational opportunities are being afforded to all students will support overarching sustainable development goal objectives for the CNMI. Continued emphasis on coordination between primary and secondary schools and continuing education institutions is encouraged to further accomplish these objectives. Including facility needs and aligning complementary needs such as shelter hardening and ensuring compliance with the 2018 International Building Code when conducting repairs and structure enhancements is also encouraged. As NMC, NMTI, and PSS update their periodic planning documents, inclusion of structural resilience goals and coordinated discussions regarding opportunities for alignment to achieve shared objectives may be beneficial. To incorporate education into comprehensive planning initiatives, at minimum, a representative from the CNMI's educational institutions should have a place on the Planning and Development Advisory Council (PDAC).

References

Comparing enrollment, characteristics, and academic outcomes of students in developmental courses and those in credit-bearing courses at Northern Marianas College, National Center for Education Evaluation and Regional Assistance (NCEERA), 2017
NMC Strategic Plan 2015-2020
NMC Enrollment Up 12%, Saipan Tribune, Aug. 27, 2019
PSS SY2017-2018 Facts and Figures Report

Snapshot – Mitigation to Vulnerability of Natural Hazards

In 2005, Public Law No. 14-63 created and established the Office of Homeland Security under the Office of the Governor. In 2013 Public Law No. 18-4 reorganized the Office of Homeland Security and the Office of Emergency Management, unifying these branches to create the Commonwealth Northern Marianas Island's (CNMI) Homeland Security and Emergency Management (HSEM). HSEM's mission is to "protect lives and property by effectively preparing for, preventing, responding to and recovering from all threats, crimes, hazards and emergencies by coordinating the efforts of the first response community to effectively manage incidents, and to collaborate with public, private, and community partnerships." As noted in the 2018 Standard State Mitigation Plan, HSEM receives "preparedness funding" to support disaster risk reduction planning.

The Federal Disaster Mitigation Act of 2000 requires all U.S. states and territories to develop an approved mitigation plan. The CNMI adopted the first Standard State Mitigation Plan (SSMP) in 2004 with the aim to develop effective strategies that will promote hazard mitigation, reduce vulnerabilities, and ensure the CNMI can respond to the many hazards and threats that affect socio-economic, environmental, cultural, and historical resources. The approved plan allows the CNMI to remain eligible for funding assistance under Categories C through G (Permanent Restoration Work) under the FEMA Public Assistance Program following a major disaster. The CNMI's eligibility for Categories A (Debris Removal) and B (Emergency Protective Measures) was not affected by the Disaster Mitigation Act of 2000. The SSMP is updated in compliance with the 5-year hazard mitigation planning cycle, with the next update anticipated by 2024.

The 2014 SSMP update notably included a community vulnerability assessment (CVA), which referenced in the 2014 Standard State Mitigation Plan (SSMP, 2014) provides a factual basis for activities proposed in the mitigation strategy to reduce losses from identified natural hazards in the CNMI. The CVA makes a clear connection between the vulnerability and the proposed hazard mitigation actions. The CVA process focuses attention on areas most at risk by evaluating where populations, infrastructure, and critical facilities are vulnerable to hazards, and to what extent injuries or damage may occur. However, the CVA discussion notes shortcomings of this assessment – it was limited to the island of Saipan, and flooding risk assessments were projected using a bathtub model approach.

The CNMI is currently using the October 2018 SSMP, which was adopted in 2019. Both the 2014 and 2018-2019 updates were narrow in scope, resulting in minimal collection of new data which pertained primarily to updates to the Inventory of Assets, as well as incorporation of climate change as a new hazard under Hazards Profile & Analysis. For the 2014 update, review of the Facilities Assessment Matrix was focused only on facilities that required updated information for a number of reasons, including relocation, or closure. Minor updates were also made to loss estimation for various hazards like typhoon, flooding, earthquakes, tsunamis, and wildfire. As detailed in the subsections that follow, the SSMP describes additional hazard specific risk summaries and reported potential losses and assessment values, as well as numbers of vulnerable people based on data from the 2010 Census.

The 2018 update noted that "information and sections contained within the 2014 SSMP remains largely unchanged, reflecting little change in the CNMI's key identified threats and hazards but also highlighting planning deficiencies experienced throughout the update, including limited time and resources common among small government agencies. Participants in the update submitted

mitigation actions on behalf of their respective entities, updated any information relating to critical facilities within their responsibility, and validated the CNMI's threats and hazards profiles. In the 2018 Update, Section 6 (Loss Estimates) and 9 (Plan Evaluation and Maintenance) were removed from the scope of work along with data updates for Rota, Tinian, and the Northern Islands. Key updates included integrated 2014-2018 mitigation plans and projects including mitigation goals, capacity assessments, and readiness actions from the 2017 State Preparedness Report, additional discussion of hazard profiles and impacts, updated CNMI demographics and statistical data correcting errors in the 2010 census data from the 2014 report, and addition of upgrades to CNMI telecommunications, weather monitoring, and infrastructure information. The report's Executive Summary notes that the CNMI, through preparedness funding available to HSEM, will perform a more thorough, comprehensive update to the SSMP within the 5-year planning cycle with incorporation of updated loss estimates, plan maintenance, program integration, and island-specific updates. Reviewer notes contained in Appendix Z further highlight opportunities for plan updates to build out vulnerability analysis to identify which jurisdictions are most vulnerable to specific hazards discussed in the plan.

Typhoons

The CNMI is located in an active typhoon zone in the Pacific Ocean. As the SSMP describes, typhoons are severe tropical cyclones that occur within the Western Pacific and attain a minimum sustained wind speed of 74 mph. Typhoons are characterized as giant whirlwinds in which air moves around a center of low pressure, reaching maximum velocity in a circular band extending outward 20 or 30 miles from the rim of the eye (center). Previous wind speeds during severe typhoons have been recorded with gusts as high as 160 to 235 mph. During a typhoon, high winds, marine over wash, storm surge and small-scale wind bursts may damage or destroy homes, businesses, public buildings, and infrastructure. Termed “microbursts” and “mini-swirls”, these localized winds may reach wind speeds in excess of 200 miles per hour. In addition to severe winds, typhoons have several other characteristics. Barometric pressure is typically very low – usually 29 inches of mercury or less, and typhoon winds are directly related to the lowest barometric pressure reading at the center of the storm. Typhoon winds are strongest near the Radius of Maximum Winds, the area within the storm path near the lowest central pressure. The general concept is that the larger the radius, the larger the area of maximum destruction. The strongest winds are usually on the right side of the eye, as one faces the direction the storm is moving. Wind speeds decrease as the distance away from the radius of maximum winds increase. Typhoon hazards therefore include wind, rain, waves, flooding, and storm surge which can be exacerbated by local tides and local coastal configuration. Appendix S of the 2014 SSMP lists a total of 200 facilities and 16,361 people at risk of total losses in the event of typhoons in CNMI.

CVA- Potential Total Loss Estimates for a Typhoon

Hazard Type: Typhoon	Replacement Value (RV)	RV Damage %	Loss to Structure	Content Value (CV)	CV Damage %	Loss to Content	Vulnerable Population
Rota	\$11,126,680	70%	\$7,788,676	\$20,926,571	70%	\$14,648,600	895
Saipan	\$104,217,945	70%	\$72,952,562	\$287,555,000	70%	\$201,288,500	11,579
Tinian	\$23,555,308	70%	\$16,488,716	\$20,614,300	70%	\$14,430,010	3,887
Total	\$138,899,933		\$97,229,953	\$329,095,871		\$230,367,110	16,361

Appendix S- CVA Listing of Facilities Vulnerable to Typhoons

1. Rota Loss Estimate:
 - 111 Total Facilities
2. Saipan Loss Estimate:
 - 61 Total Facilities
3. Tinian
 - 28 Total Facilities

Additionally, in 2017, the CNMI adopted a Catastrophic Typhoon Response Plan. As discussed further in the subsequent subsection on resource specific risk management plans, this document analyzed relevant Core Capabilities in the development of response strategies that increase collaboration, coordination, and information-sharing prior to (in preparedness), during (in response) and after (in recovery) a catastrophic typhoon impacting CNMI and will ultimately result in a more secure and resilient nation when executed.

Flooding

Due to topography and heavy rainfall events, the islands of the CNMI are prone to land-based and sea-based flooding. Floods are a temporary inundation of water with a landmass that stems from excessive rainfall or wave action. Flooding is the result of large-scale weather systems that generate prolonged rainfall patterns or on-shore winds. Flood problems can exist where development has encroached into flood plains, which are identified land areas that are adjoining to a channel, stream, ocean, or some other watercourse or body that is susceptible to flooding such as lakes and wetland areas. Floods have the potential and capability to undermine buildings and bridges, erode shorelines and coastal plain areas, destroy vegetation, and wash out access routes and transportation nodes. Coastal flooding can be defined as coastal inundation caused by a rise in sea level due to such phenomena as seismic sea waves, high surf, storm surge, or prolonged strong onshore flow of wind and high astronomical tides. Storm surge is a phenomenon caused by the extreme low pressure and strong winds that exist around the eye of a typhoon, which causes a dome of water to form at levels higher than the surrounding ocean surface. Large swells, high surf, and wind-driven waves ride atop this dome as it impacts land areas, causing severe flooding in coastal areas, particularly when storm surge coincides with normal high tides, thereby creating conditions of inundation and flooding to occur in the low-lying coastal areas below elevations of 10 feet. Appendix T of the 2014 SSMP lists a total of 130 facilities and 5,575 people at risk of total losses in the event of flooding in the CNMI.

CVA-Potential Total Loss Estimates for a Flooding Hazard

Hazard Type: Flooding	Replacement Value (RV)	RV Damage %	Loss to Structure	Content Value (CV)	CV Damage %	Loss to Content	Vulnerable Population
Rota	\$3,828,120	43%	\$1,646,092	\$16,060,791	65%	\$10,439,514	1,398
Saipan	\$20,817,760	26%	\$5,412,618	\$140,834,000	39%	\$54,925,260	2,633
Tinian	\$47,251,471	43%	\$20,318,133	\$25,895,481	65%	\$16,832,063	1,544
Total	\$71,897,351		\$27,376,842	\$182,790,272		\$82,196,837	5,575

Appendix T- CVA Listing of Facilities Vulnerable to Flooding

1. Saipan Loss Estimate:
 - 21 Total Facilities
2. Tinian Loss Estimate:
 - 98 Total Facilities
3. Rota Loss Estimate

- 11 Total Facilities

Earthquakes

Engineers, seismologists, architects, and planners have carefully evaluated earthquake hazards related to building construction, devising a system of classifying seismic hazards on the basis of the expected strength of ground shaking and the probability of the shaking actually occurring within a specified time. The results are included in the International Building Code (IBC) seismic provisions. According to the U.S. Geological Survey, one problem in assigning seismic hazard zones within the CNMI is that the ground shaking during a strong earthquake may vary within a small area. This variation is due to the nature of the underlying ground, whether it is mainly lava bedrock or soil (certain soils are prone to liquefaction). In addition, local topography strongly affects earthquake hazards. During earthquakes, steep slopes composed of loose material may produce large landslides. The risk from living in a seismically active area, unlike that of living in an area prone to being covered by lava, also depends to a large degree on the type of construction used in a given home. Earthquake shaking may damage certain types of houses, while leaving other types of construction unscathed. For these reasons, earthquake hazards are highly localized, and it is difficult to define broad zones with the same relative degree of hazard. Appendix U of the 2014 SSMP lists a total of 130 facilities and 5,575 people at risk of total losses in the event of an earthquake in the CNMI.

CVA-Potential Total Loss Estimates for an Earthquake Hazard

Hazard Type: Earthquake	Replacement Value (RV)	RV Damage %	Loss to Structure	Content Value (CV)	CV Damage %	Loss to Content	Vulnerable Population
Rota	\$43,656,360	24%	\$10,477,526	\$40,943,191	12%	\$4,913,183	4,918
Saipan	\$302,854,910	24%	\$72,685,178	\$364,967,520	12%	\$43,796,102	26,056
Tinian	\$47,251,471	24%	\$11,340,353	\$25,895,481	12%	\$3,107,458	12,620
Total	\$393,762,741		\$94,503,058	\$431,806,192		\$51,816,743	43,594

Appendix U- CVA Listing of Facilities Vulnerable to Earthquakes

1. Saipan Estimate
 - 234 Total Facilities
2. Tinian Estimate
 - 98 Total Facilities
3. Rota Estimate
 - 66 Total Facilities

Tsunamis

A tsunami is a series of waves generated in a body of water by an impulsive disturbance that vertically displaces the water column. Tsunamis are characterized as shallow-water waves with long periods and wavelengths. A tsunami possesses the potential to have a wavelength in excess of 100 km and a period on the order of one hour. For coastal areas that are situated at sea level, there is no safe place during a tsunami. On low-lying shorelines such as in the coastal plains and inland valleys that characterize much of the Northern Mariana Islands, a tsunami may occur as a rapidly growing high tide that rises over several minutes, inundating the low coastal regions with surge flooding. The return of these floodwaters to the sea causes much damage. At headlands the refractive focusing of the wave crest leads to energy concentration and high magnitude run-up. Appendix V of the 2014 SSMP lists a total of 160 facilities and 22,049 people at risk of total losses in the event of tsunamis in the CNMI.

CVA-Potential Total Loss Estimates for a Tsunami Hazard

Hazard Type: Tsunami	Replacement Value (RV)	RV Damage %	Loss to Structure	Content Value (CV)	CV Damage %	Loss to Content	Vulnerable Population
Rota	\$4,263,340	43%	\$1,833,236	\$16,303,120	65%	\$10,597,028	1,632
Saipan	\$138,810,270	26%	\$36,090,670	\$222,868,520	39%	\$86,918,723	16,333
Tinian	\$21,718,471	43%	\$9,338,943	\$19,338,943	65%	\$12,741,455	4,084
Total	\$164,792,081		\$47,262,849	\$258,773,879		\$110,257,206	22,049

Appendix V- CVA Listing of Facilities Vulnerable to Tsunamis

1. Saipan Estimate
 - 116 Total Facilities
2. Tinian Estimate
 - 31 Total Facilities
3. Rota Estimate
 - 13 Total Facilities

Wildfire

One of the major impacts of drought that contributes to environmental, economic, and social impacts are wildland fires. In general, the three necessary ingredients for a fire to ignite include oxygen, a heat source, and fuel. Wildfires can be classified into several varieties. According to the National Oceanic Atmospheric Administration (NOAA), there are four types of wildfires: Ground Fires, Surface Fires, Crown Fires, and Spotting Fires. Ground fires burn the humus layer of the forest floor, surface fires burn forest undergrowth and surface litter, and crown fires advance through the tops of trees. Atmospheric factors such as temperature, humidity, and rainfall are important factors in determining the combustibility of a given natural habitat. The 2014 SSMP estimates 117 total facilities and 7,740 people are vulnerable to wildfire hazards in the CNMI.

CVA-Potential Total Estimates for a Wildfire Hazard

Hazard Type: Wildfire	Replacement Value (RV)	RV Damage %	Loss to Structure	Content Value (CV)	CV Damage %	Loss to Content	Vulnerable Population
Rota	\$7,600,000	10%	\$760,000	\$18,949,600	10%	\$1,894,960	267
Saipan	\$86,032,200	10%	\$8,603,220	\$223,169,000	10%	\$22,316,900	4,848
Tinian	\$18,470,000	10%	\$1,847,000	\$17,432,000	10%	\$1,743,200	2,625
Total	\$112,102,200		\$11,210,220	\$259,550,600		\$1,743,200	7,740

Appendix W- CVA Listing of Facilities Vulnerable to Wildfires

1. Saipan Estimate
 - 61 Total Facilities
2. Tinian Estimate
 - 39 Total Facilities
3. Rota Estimate
 - 17 Total Facilities

Additionally, as detailed further in the following section, the 2014-2024 Draft CNMI State Wildland Fire Plan reports that most wildfires are caused by unattended fires or by fires set intentionally by Hunters, with many acres being burnt annually. As a result, loss or destruction of native forest and its ecosystem increases by approximately 2% annually.

Climate Change and Sea Level Rise

As the 2014 SSMP detailed, the most recent climate models and projections suggest a wide range of

changes to the global climate system over the next century and beyond. The potential impacts of these changes vary greatly across time and space, however, there is a high level of confidence that the Western North Pacific will experience changes such as:

- Increase in mean surface air temperature
- Increase in frequency of heavy precipitation and proportion of mean annual rainfall
- Rise in mean sea level
- Enhanced wave energy level and more extreme ocean wave environments
- Increase in sea surface temperature and ocean acidification.

These changes are likely to exacerbate some natural hazards such as flooding from sea level rise and storm surge associated with typhoons, which may also become more frequent and more intense as ocean surface temperatures rise. Sea level rise inundation scenarios using a bathtub model approach for Saipan are included in Appendix R of the 2014 SSMP.

In 2017, the Bureau of Environmental and Coastal Quality's Division of Coastal Resources Management (DCRM) supported a sea level rise (SLR) mapping update using a modified bathtub model that allows for mapping of changes in still-water levels over a high-resolution conditioned digital elevation model. The bathtub approach does not consider future changes in shoreline due to coastal processes such as erosion and accretion, nor does it account for wave run-up or the influence of certain hydraulic features such as stormwater/sewer infrastructure. The 2017 updates to the Saipan SLR and Coastal Flooding maps resulted in 6 new spatial data layers reflecting increased future sea levels due to both climate change-driven processes (referred to as SLR), as well as seasonal extremes estimated for a 100-year return period (referred to as SLC). Both drivers of sea level rise/change were analyzed using local and regional data, primarily from Saipan and Guam tide gauges. DCRM reports that updated scenarios for Tinian and Rota are in development to support updates to hazard mapping and implementation of Smart, Safe Growth principles throughout planning efforts in the CNMI.

Status, Impacts, and Responses

The 2018 SSMP describes how development of the 5-year planning update assists HSEM and other agencies within CNMI to plan for grant funding opportunities provided by FEMA/DHS and other grantors with hazard specific awards, including the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), and the Flood Mitigation Assistance Program (FMA), as well as funding from the Homeland Security Grant Program (HSGP) and others. Past mitigation projects have included infrastructure hardening and evacuation route signage. The 2018 update noted that in the wake of an active 2015 typhoon season including Typhoon Soudelor, CNMI availed of major disaster recovery funding through FEMA supporting recovery of a total of 4,864 individual assistance applications and \$39,411,830 in public assistance grants. The 2018 SSMP describes that Typhoon Soudelor prompted planning efforts to minimize future typhoon impacts including the development and addition of the 2017 CNMI Catastrophic Typhoon Plan as an annex to the FEMA Region IX All Hazards Plan.

Although the 2018 and 2014 SSMPs included sufficient hazard profile and mitigation information to meet FEMA requirements, numerous data gaps were identified in the plan itself that may warrant further data collection and analysis. For example, as depicted in the chart below, the CNMI Hazards Matrix noted that additional data collection is needed to assess vulnerability and losses by

jurisdiction and by state facilities. Additional data gaps were identified in earthquake, volcano, tsunami, and wildfire profiles. Although flooding data was reported as current in 2014, the Division of Coastal Resources Management’s Section 309 Assessment and Strategy Report 2011-2015 noted the most recent flood zone update from FEMA was conducted in 2007, and listed the need to update coastal hazards data. CNMI, FEMA Flood Insurance Risk Maps were reported as updated in 2007, however, FEMA typically updates maps every five to ten years or at the request of the jurisdiction.

CNMI Hazards Matrix

Hazard Type	Profile Hazard Events	Assess Vulnerability by Jurisdiction	Assess Vulnerability by State Facility	Estimate Losses by Jurisdiction	Estimate Losses by State Facility
Typhoon	C	A	A	A	A
Flooding	C	C	A	A	A
Earthquake	BA	A	A	A	A
Volcanic Eruption	A	A	A	A	A
Tsunami	A	A	A	A	A
Drought	B	B	A	A	A
Wildfire	A	A	A	A	A
Climate Change	C	A	A	A	A

Codes: A-Requires Data Collection; B-Data Available, Need Update; C-Current Data Available

The 2018 SSMP highlights how Capital Improvement Program (CIP) project funding, a federal funding stream through the U.S. Office of Insular Affairs provided to CNMI pursuant to section 702 of the Covenant, is being allocated to support implementation of high priority mitigation and development projects. The 2018 SSMP notes that this includes providing funding to the Commonwealth Utilities Corporation (CUC) to meet court-stipulated requirements and support planning, design, and implementation of new solid and liquid waste management facilities. In FY17, \$5 million was also awarded for the repair of fuel storage tanks at the CUC power plant to meet required American Petroleum Institute storage standards. A list of 2018 CIP and Technical Assistance Program (TAP) grants can be found in Appendix X of the 2018. The Hazard Mitigation Office submitted a pre-disaster mitigation proposal to support the update of the 2018 plan in January 2020 and intends to continue to update the plan at least every five years.

Recommendations

The SSMP notes that “although there are a few pocket areas of high population density on each major island in the CNMI, the issue of vulnerability has less to do with high density than it does with assuring that these populations have adequate access to evacuation routes, food, water and subsequent medical services during and after a disaster.” It is recommended that this goal be kept in mind when engaging in community-specific disaster risk reduction planning dialogs moving forward.

Additional observations and planning recommendations to support DRR include:

- Support comprehensive SSMP update, including revision of hazard maps, in coordination with relevant resource management agencies and planning partners;
- Conduct assessment of post disaster impacts for actual cost on mitigation for reference that include real property, energy, food, port security, capital items, etc. as well as community response to assess mobility / evacuation / shelter capacity and needs. This assessment will

also verify if there is a shift in priority, identify successes, and challenges encountered from the SSMP – area-specific updates regarding infrastructure and community vulnerability would be helpful;

- The Community Vulnerability Assessment completed in the 2014 SSMP identifies Drought and Climate Change as a hazard with a high-risk priority but no Community Vulnerability Assessments were identified; expanded vulnerability assessments would be helpful;
- Request updated Flood Insurance Rate Map update from FEMA and incorporate updates into future risk planning dialogs and SSMP updates;
- Adopt a sea level rise scenario or scenarios to support hazard risk reduction planning for new and existing infrastructure and development projects;
- Future updates should incorporate more information on the impacts to vulnerable structures/populations and accompanying loss estimates from Climate Change.

Through preparedness funding available to HSEM, CNMI will perform a more thorough, comprehensive update to the SSMP within the 5-year planning cycle with incorporation of updated loss estimates, plan maintenance, program integration, and island-specific updates. It is recommended that this update begin early in the planning cycle (by 2020 at the latest) and utilize OPD's Planning and Development Advisory Council and Taskforces to support the comprehensive update to address gaps and opportunities outlined above. High priority objectives, strategies, and tasks from hazard mitigation plans should be incorporated into the CNMI Comprehensive Sustainable Development Plan to support the achievement of relevant cross cutting community safety and development goals.

References

Commonwealth of the Northern Mariana Islands Standard State Mitigation Plan 2018

Commonwealth of the Northern Mariana Islands Standard State Mitigation Plan 2014

2014-2024 Draft CNMI State Wildland Fire Plan, DNLR-Forestry

2017 Saipan Sea Level Rise and Coastal Flooding Assessment, BECQ-DCRM

Snapshot – Resource / Hazard Specific Mitigation Plans

The CNMI's Disaster Mitigation Planning Process (DMPP) provides an organized and coordinated consistent set of goals for reducing or minimizing the loss of human life and property, major economic disruption, degradation of ecosystems and critical habitats, and the destruction of cultural and historical resources from natural disasters. The DMPP process is the basis for intergovernmental coordination related to natural hazard mitigation at the state and local municipal levels. Each municipal does not have its own local mitigation plan. The CNMI SSMP planning process and the mitigation strategy identifies activities/actions for each of the three major islands. The identified goals of the planning process for disaster mitigation in the CNMI include the following:

- To promote sustainable development by reducing the vulnerability to natural hazards in existing and planned development;
- To improve public awareness and decision making for land use planning by accurately mapping hazard-prone areas;
- To improve hazard risk management by the insurance industry and to help maintain
- Adequate protection against any catastrophe for the region; and
- To promote community-based disaster preparedness and prevention activities with support from both the public and private sector.

Typhoon Response Annex

The 2017 Commonwealth of the Northern Mariana Islands (CNMI) Catastrophic Typhoon Plan is an annex to the FEMA Region IX All-Hazards Plan and is CNMI's first joint deliberate catastrophic plan. This operational response plan was developed in accordance with Presidential Policy Directive 8 (PPD-8) – National Preparedness and is in alignment with the Federal Interagency Operations Plan (FIOP). The Plan addresses Critical stakeholder actions (activation and deployment of resources and capabilities) to save and sustain lives and restore the region's critical infrastructure presented here informs a Whole Community response to the physical and operational impacts of a catastrophic from a Category 4 typhoon impacting CNMI while setting the conditions for a successful recovery. Whole Community partners were engaged in the development of this plan and are its intended audience. This plan analyzed relevant Core Capabilities in the development of response strategies that increase collaboration, coordination, and information-sharing prior to (in preparedness), during (in response) and after (in recovery) a catastrophic typhoon impacting CNMI and will ultimately result in a more secure and resilient nation when executed.

The Commonwealth and federal emergency managers ensure unity of effort when establishing a joint commonwealth/federal Unified Coordination Group (UCG) to coordinate disaster response activities consistent with the priorities set by the Governor of CNMI. These priorities address specific objectives for response and recovery of which include the following:

1. Provide emergency power to maintain continuity of essential operations.
2. Restore the power infrastructure.
3. Stabilize the water distribution and wastewater systems.
4. Deliver fuel to maintain continuity of essential operations and services.
5. Conduct mass care services and sheltering of survivors.
6. Facilitate recovery of the marine transportation system.
7. Distribute essential commodities and immediate response resources.

8. Re-establish public health and medical services at critical emergency medical facilities.
9. Environmental Response/Health and Safety
10. Fire Management and Suppression
11. Mass Search and Rescue Operations
12. On-scene Security, Protection, and Law Enforcement

The twelve objectives are then broken down into operations and then furthermore into phases that allows tasks to be grouped into common operating periods. It also allows multiple commonwealth and federal agencies to task organize in support of incident objectives, which is critical in a successful unified response. The 2017 CNMI Catastrophic Typhoon Response Plan is slated to be updated every five years.

CNMI State Wildland Fire Plan

The 2014-2024 Draft CNMI State Wildland Fire Plan reports that most wildfires are caused by unattended fires or by fires set intentionally by hunters, with many acres being burnt annually. As a result, loss or destruction of native forest and its ecosystem increases by approximately 2% annually. Repeated burning of the grasslands perpetuates its standing condition. The removal of grass cover by burning, thus leaving the soil unprotected, increases the potential for soil erosion and inundation of non-native species. The expected threat on these areas is considered between the months of March through July during the dry season.

The Commonwealth of the Northern Mariana Islands, specifically the islands of Saipan, Tinian, and Rota are faced with an increased hazard of losses with regards to Wildland-Urban Interface (WUI) areas due to increasing relocation of homeowners from urban setting into rural settings. Efforts are being made to address these issues in order to prevent major fire losses to these residents. To reduce the threat of wildfire impacts, the objectives of the state fire assistance plan are:

- A. Provide the community with an increased awareness on rural fire protection and safe burning practices.
- B. Maintain and improve fire protection effectiveness and efficiency on federal and non-federal lands.
- C. Provide a consistent information and education campaign on an annual basis to homeowners relating to fire prevention.
- D. Maintain and update the Commonwealth of the Northern Mariana Islands Fire Prevention Assessment Plan.
- E. Enhance communication capabilities with other State Cooperators relating to program needs.
- F. Provide homeowner assistance relating to hazard fuel reduction and implementation of defensible spaces around structures.
- G. Provide adequate rural fire protection and suppression services to interface and intermix settings.
- H. Establish a working relation with the general community such as farmers, ranchers, and outdoor users on the importance of safeguarding our natural resources specifically forested areas.
- I. Achieve higher funding benefits that exceed regular funding level earmarked for the Commonwealth of the Northern Mariana Islands (CNMI).

CNMI Tsunami Evacuation Plan

Basic tsunami preparedness and response information is posted on the CNMI Homeland and Emergency Services Management Agency's (HSEM) website at <http://www.cnmihsem.gov.mp/natural-disasters/tsunami/tsunamisafetyadvise>.

HSEM reports that updates to the tsunami impact zone and evacuation routes are currently underway. This plan will be included in the updated State of the Resources Report when it becomes available. Additionally, the Offices of Guam Homeland Security and Civil Defense (GHS/OCD), in close coordination with the National Weather Service – Guam Weather Forecast Office, the Pacific Tsunami Warning Center, and the United Nations Educational, Scientific and Cultural Organization/Intergovernmental Oceanographic Commission's International Tsunami Information Center, took part in the Pacific Wave 2018 (PacWave18) Exercise, a Joint Guam-Commonwealth of the Northern Marianas (CNMI) Tsunami Communication Exercise, on Wednesday, April 4, 2018. This exercise was intended to provide a valuable opportunity for Pacific communities to test new products, review tsunami response procedures, and test internal communication systems. One of the objectives for the exercise is to validate respective agency/departments' alert notification planning procedures and identify changes that can improve its effectiveness. This feedback will be incorporated into ongoing planning processes.

Other Emergency Response and Recovery Planning Efforts

The CNMI Homeland and Emergency Services Management Agency reports that the Emergency Operations Base Plan is currently under review by the Governor's Legal Counsel. Once approved by the Governor and all cabinet members involved in response and recovery it will be adopted. Any information related to emergency recovery is overseen by the CNMI Office of Management and Budget (OMB), which also houses the Public Assistance (PA) and Hazard Mitigation (HM) Offices. Both PA and HM are locally implemented federal programs that receive annual appropriations and disaster related funding. The State Standard Mitigation Plan update, required every five years, are supported by the HM program.

Status, Impacts, and Responses

Risk-specific plans are recommended but not required through the State Standard Mitigation Plan and related hazard mitigation planning processes. Currently, only the adopted risk-specific plan is the Catastrophic Typhoon Plan, with the adoption of the draft 2014-2024 CNMI State Wildland Fire Plan pending. One benefit of risk-specific planning is that these exercises support development of more robust risk mitigation strategies. When developed as preparedness and risk reduction plans with community engagement, they also provide opportunities for education and iterative risk reduction planning. Lacking this type of bottom-up engagement, some of the most vulnerable community members may be least prepared and therefore more at risk to various hazards. Some of these hazards such as typhoons and earthquakes are inevitable, but studies show that when homeowners have taken basic preparation and mitigation steps, risks of loss and damage can be considerably reduced. Other hazards such as flooding are avoidable if the risk is well understood. In both cases, expanded community engagement in the planning process provides opportunities to educate, as well as address gaps in preparedness and risk reduction.

Mitigation Planning, the Sendai Framework, and SDG Alignment

Sustainable Development Goal #1 focuses on ending poverty by addressing systemic challenges. Therefore, it is no surprise that focus of this effort is to build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability. Target 1.5 aims to "build resilience to environmental, economic, and social disasters". Progress towards this goal is

measured through the adoption and implementation of national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015–2030 which outline the following seven (7) goals and four (4) priority action items:

- (1) Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality rate in the decade 2020-2030 compared to the period 2005-2015;
- (2) Substantially reduce the number of affected people globally by 2030, aiming to lower average global figure per 100,000 in the decade 2020 -2030 compared to the period 2005-2015.
- (3) Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030.
- (4) Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030.
- (5) Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020.
- (6) Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this Framework by 2030.
- (7) Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030.

The Sendai Framework Four Priorities for Action:

Priority 1. Understanding disaster risk

Disaster risk management should be based on an understanding of disaster risk in all its dimensions of vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment. Such knowledge can be used for risk assessment, prevention, mitigation, preparedness and response.

Priority 2. Strengthening disaster risk governance to manage disaster risk

Disaster risk governance at the national, regional and global levels is very important for prevention, mitigation, preparedness, response, recovery, and rehabilitation. It fosters collaboration and partnership.

Priority 3. Investing in disaster risk reduction for resilience

Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the economic, social, health and cultural resilience of persons, communities, countries and their assets, as well as the environment.

Priority 4. Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction

The growth of disaster risk means there is a need to strengthen disaster preparedness for response, take action in anticipation of events, and ensure capacities are in place for effective response and recovery at all levels. The recovery, rehabilitation and reconstruction phase is a critical opportunity to build back better, including through integrating disaster risk reduction into development measures.

Although the CNMI’s State Standard Mitigation Plan (2018) has been adopted and updated at least every five years, it does not explicitly address the targets and priorities for action outlined by the Sendai Framework. Some of the Sendai targets are not applicable in the CNMI but could be reframed for improved local context. However, numerous targets and action items are in fact incorporated into existing CNMI plans – for example, investing in early warning systems as remained a priority of CNMI Homeland Security and Emergency Management, as highlighted in their 2019 Citizen Centric Report. Similarly, principles that support “building back better” outlined by priority action item 4 is reflected in the 2018 “Smart, Safe Growth” Guidance Manual.

Additionally, CNMI's hazard mitigation planning goals do support the aim of Sustainable Development Goal Target 11.5, to "reduce the adverse effects of natural disasters" as outlined by the SSMP goals in the "snapshot" discussion above. As such, opportunities exist to more explicitly emphasize the connection between ongoing hazard risk reduction efforts and sustainable development goals, targets, and indicators to track progress towards overall safety, resiliency, and disaster risk reduction across sectors in the CNMI.

Recommendations

Despite the periodic approval and adoption of the State Standard Mitigation Plan (SSMP), which aims to be a comprehensive planning document, it appears additional data collection and analysis could address hazard-specific planning gaps. These include but are not limited to updated tsunami risk zones, fault zone data for the islands of Tinian and Rota, and updated flood hazard zones to include current and future sea level rise conditions. There also appears to have been limited community and interagency involvement in preparedness and risk reduction planning. Initial recommendations for comprehensive risk reduction planning include:

- Future iterations of the SSMP and related hazard-specific plans should include updated land use and development data. For example, updates could include high wind zones and micro-wind zones in mapping hazard-prone areas to support future land use planning. If such data is not available, CNMI should collect and incorporate changes in development and updates to CNMI's built environmental/infrastructure inventory during the annual review process to ensure that this information is then incorporated into the Updated Plan. Participatory community supported vulnerability assessment and mapping processes are encouraged to produce more robust risk reduction planning.
- A community resiliency component should be included in CNMI's comprehensive sustainable development plan in order to ensure alignment between cross-cutting sectoral management priorities and resiliency priorities for people and our economy as well as the built and natural environment. Project planning should be consistent with identified "Safe, Smart Growth" principles and supporting implementation guidance should be developed and applied consistently.
- In general, it would be helpful if plan updates should include evaluation criteria. Example criteria to consider include:
 - Whether the goals and objectives still address current and expected conditions.
 - Have the nature and magnitude of hazard problems and/or development changed.
 - Are the current resources appropriate for implementing the plan.
 - Are there implementation problems, such as technical, political, legal, or coordination with other agencies, and if so, how can those challenges be addressed to achieve desired outcomes.
- Tsunami plans are in development for Saipan, Tinian, and Rota based on existing geospatial data and run-up projections. However, Guam has recently completed dynamic tsunami models that can be used to assess localized impacts in more detail. Follow-up is pending to see if this data can be shared with the CNMI. If so, this data should be incorporated into future SSMP and hazard-specific planning updates. If not, CNMI may wish to consider conducting similar modelling to support future updates and risk reduction planning dialogs.
- Connecting existing plans to targets and priority actions of the Sendai Framework may support alignment with numerous planning efforts in the next SSMP update.

References

Commonwealth of the Northern Mariana Islands Homeland Security and Emergency Management Agency, Tsunami Safety Advice, <http://www.cnmihsem.gov.mp/natural-disasters/tsunami/tsunamisafetyadvise>

Commonwealth of the Northern Mariana Islands Standard State Mitigation Plan 2018 (SSMP, 2018)

Commonwealth of the Northern Mariana Islands Standard State Mitigation Plan 2014 (SSMP, 2014)

Guam Homeland Security Office Press Release, March 30, 2018, *Joint Guam-CNMI Tsunami Communication Exercise*, <https://www.ghs.guam.gov/joint-guam-cnmi-tsunami-communication-exercise>

2014-2024 Draft CNMI State Wildland Fire Plan, DNLR-Forestry

DHSEM 2019 Citizen Centric Report

Section 4: Summary and Recommended Next Steps

Numerous planning alignment and project collaboration opportunities exist across CNMI's agencies and sectors that can support sustainable development objectives. Key recommendations include continuing to share information about plans, needs, and priorities through PDAC meetings to align ongoing management efforts. OPD will continue to coordinate data sharing and plan coordination with the PDAC and Planning Partners, and recommends that representatives from key sectors attend relevant taskforce and PDAC meetings. Initial visions, interim strategies, and action items will be identified in 2020 as we work together to create CNMI's first comprehensive sustainable development plan (CSDP).

Given the range of planning interests and timelines, an adaptive management approach is suggested to allow for periodic reassessment of how we are doing in meeting our goals. The CSDP should include guidance for further aligning planning elements and horizons to support numerous management principles. Based on the analysis in this assessment, several CNMI agencies are already using Sustainable Development Goals to chart and measure progress. While these goals capture many planning considerations, the CSDP should allow flexibility for CNMI to include locally relevant targets and adjust indicators as needed so that information we already collect can serve as metrics for where we are and where we want to be.

To that end, at the December 17, 2019 PDAC meeting when this draft report was reviewed, and in subsequent correspondence, PDAC members reviewed initial SDG alignments and suggested updates to support a CNMI-focused framework moving forward. Adaptive management planning allows for flexibility, and so this report and its recommendations are intended to be regularly revisited and updated.

Although numerous recommendations are included in the "overview" of each resource section, generally recommendations from these resource sections fall into three main themes:

Build Resiliency of Natural, Built, and Human Systems through Smart, Safe Growth

Smart, safe growth achieves development goals that reduce vulnerability and increase adaptive capacity of people, our economy, and our environment. By incorporating these principles using an approach that considers long-term resiliency outcomes, investment priorities and growth plans can be achieved more efficiently and sustainably. Mainstreaming Smart, Safe Growth principles will help to identify and address procedural as well as substantive resource management challenges identified in this report.

Maintain Efficient Governance and Social Safety Nets

The "social safety net" is a collection of services provided by the state or other institutions such as friendly societies. It can include nutritional programs, healthcare, unemployment benefit, free education, housing, legal aid, victims' rights, consumer protection, homeless shelters, and sometimes subsidized services such as public transport, which prevent individuals from falling into poverty beyond a certain level. By increasing coordination and implementing long-term plans to maintain and grow necessary government and private sector services to meet the needs of vulnerable people while sustaining essential public health and safety protection programs and supporting wise development.

Grow Inclusive, Cohesive Community to Achieve Shared Visions and Sustain the CNMI

"Community cohesion" describes the ability of communities to function and grow in harmony

together rather than in conflict. It has strong links to concepts of equality and diversity given that community cohesion can only grow when society as a whole recognizes that individuals have the right to equality (of treatment, access to services etc.) and respects and appreciates the diverse nature of our communities. Forming strong and positive relationships between people from different backgrounds helps empower communities to address inequalities and developing a positive climate of opinion to support diversity and accomplish shared visions for the future.

These themes and key recommendations will be explored further as OPD works with the PDAC, our planning partners, and the community at large to support comprehensive sustainable development planning in the CNMI.

Next Steps

The Office of Planning and Development will continue to work with the PDAC and partners in the public and private sector to achieve short- and long-term objectives in furtherance of the mandates established in Public Law 20-20. As previously discussed, this “Resources Report” is a living document, intended to provide a snapshot of where we are so we can better discuss where we would like to be to ensure critical resource management planning needs are met. Baseline information and the SDG indicators identified in this report are intended to be used as data points that will be iteratively updated to support goal tracking. This planning process will ensure application of existing information and baseline data in the development a multi-sector resources plan that can be fully integrated into a stakeholder supported comprehensive development plan with short- and long-range guidance on development objectives, standards, and principles that reflects and is operationalized through supporting plans and projects as well as rules and policies across agencies and sectors in the CNMI.

To meet the mandate to work with the PDAC to create a comprehensive sustainable development plan, the following performance objectives and outcomes will be necessary to (i) develop a multi-sector plan that is informed by existing information and supplemental reports and research where necessary and (ii) ensure integration of resource management planning into a stakeholder supported comprehensive development plan that is linked to Sustainable Development Goals and metrics scaled for the Commonwealth of the Northern Mariana Islands.

Objective 1: Based on feedback from the PDAC and support from established resource-specific working groups, OPD will finalize baseline assessment report including SDG indicator selection and initial planning recommendations for report finalization and public distribution by March, 2020.

Objective 2: To support baseline assessment finalization and initial sustainable development plan drafting, including identification of island-specific planning recommendations, OPD shall hold at least one follow-up meeting with community members from Saipan, Tinian, Rota, and the Northern Islands in accessible and convenient locations in winter of 2020.

Objective 3: OPD shall iteratively engage stakeholders to refine comprehensive sustainable development planning elements and recommendations in order to compile a draft plan for publication and comment solicitation by June, 2020 in order to ensure plan finalization and submission for adoption by September, 2020, at the latest.

Moving forward, this information will be shared with community members at geographically and resource-focused meetings to support growth visioning exercises and inform development of recommendations for the comprehensive sustainable development plan. Meeting dates will be published online and in the local papers as well as announced on the radio when this outreach phase begins. OPD looks forward to engaging the CNMI community at large in this comprehensive and iterative planning process. Together we can plan for and achieve sustainable growth for the CNMI.

Appendix A –

Plans and Reports Posted / Referenced as of December, 2019

BECQ

- DCRM
 - Climate / SLR
 - [2017 Coastal Flooding Map Update](#)
 - [2015 Rota / Tinian Vulnerability Assessment](#)
 - [2014 Saipan Vulnerability Assessment](#)
 - Saipan Lagoon
 - [2017 Saipan Lagoon Use Management Plan](#)
 - [2013 Saipan Lagoon Aquatic Ecosystem Restoration Study](#)
 - Watersheds / Wetlands
 - [2013 Garapan Conservation Action Plan](#)
 - [2012 Talakhaya / Sabana Conservation Action Plan](#)
 - [2009 Laolao Bay Conservation Action Plan](#)
 - [2008 Coastal and Estuarine Land Conservation Plan](#)
- DEQ
 - Watersheds / Wetlands / Water Quality
 - [2018 CNMI 305\(b\) and 303\(d\) Water Quality Assessment Integrated Report](#)
 - [2002 Watershed Restoration Action Strategy](#)

CHCC

- [2015-2020 Strategic Plan](#)
- [2007-2012 Comprehensive Cancer Control Plan](#)

CIP / HSEM

- [2018 CNMI Standard State Mitigation Plan](#)
- [2017 CNMI Catastrophic Typhoon Plan](#)
- [2014 CNMI Standard State Mitigation Plan](#)

COTA

- [2017 – 2020 CNMI Territorial Highway Implementation Plan & Commonwealth Office of Transportation Authority Transportation Improvement Plan](#)
- [2013 Saipan Fixed-Flex Route and Paratransit Systems Feasibility Study](#)

CPA

- [1995-2002 Statistics \(Passenger departures / arrivals & Cargo\)](#)
- [2018 Tinian Harbor Master Plan](#)
- [2018 Rota West Harbor Master Plan](#)
- 2017 Tarmac Delay Emergency Contingency Plans: [Saipan](#), [Tinian](#) & [Rota](#)

CUC

- [June 2019 CUC Profile Report](#)
- [2015 Drinking Water and Wastewater Master Plan – Rota \(Final Draft\)](#)
- [2015 Drinking Water and Wastewater Master Plan – Tinian \(Final Draft\)](#)
- [2015 Wastewater Master Plan – Saipan \(Final Draft\)](#)
- [2013 Energy Action Plan](#)
- Power distribution maps for [Saipan](#), [Tinian](#), [Rota](#) (PDFs)
- [Water Distribution / Water Quality Reports - 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017 Saipan, Rota, & Tinian](#)

Dept. of Commerce

- [2016-2021 Comprehensive Economic Development Strategy](#)
- [2016 CNMI Household Income and Expenditures \(HIES\) Report](#)
- [2016 CNMI Prevailing Wage and Workforce Assessment Study](#)
- [2009-2014 Comprehensive Economic Development Strategy](#)
- [2013 CNMI Broadband Mapping Report](#)
- [2018 Pacific Islands Comprehensive Economic Development Strategy](#)

DLNR

- [DLNR – Action Plan For Oryctes rhinoceros, Coconut Rhinoceros beetle, 2018 – 2023](#)

DFW

- [2015 Marine Protected Areas \(MPAs\) of the CNMI - Pertinent Laws and Regulations](#)
- [2015 - 2020 State Wildlife Action Plan](#)
- [2005 Management Plan for the Managaha Marine Conservation Area](#)

Forestry

- [2014 – 2024 State Wildland Fire Plan \(Draft\)](#)
- [CNMI Forestry Statewide Assessment and Resource Strategy 2010-2015](#)

Parks & Rec

- [Five-year strategic plan for Parks and Recreation, CNMI 2019-2024](#)

DPL

- [1989 Public Land Use Plan](#)
- [2019 Public Land Use Plan Update](#)
- [2019 Comprehensive Public Land Use Plan Update GIS Mapbook \(PDFs\)](#)
- Maps: Rota ([Dugi](#), [Sinapalo I](#), [Sinapalo II](#), [Sinapalo III](#), [Songsong](#), [Tatachok](#), [Tenetu](#)) (PDFs)
- Maps: Saipan ([As Matuis](#), [Cap. Hill](#), [Chalan Kanoa](#), [Dandan](#), [Kagman](#), [Koblerville](#), [Lower Navy Hill](#), [San Antonio](#), [San Jose](#), [San Roque](#), [San Vicente](#), [Sugar King](#), [Susupe](#), [Tanapag](#)) (PDFs)
- Maps: Tinian ([Carolinas Heights](#), [Marpo Heights](#), [San Jose](#)) (PDFs)

DPW

- [Territorial Highway Implementation Program 2017 – 2020](#)

- Highway Maps (PDFs):
 - [Saipan](#)
 - [Tinian](#)
 - [Rota](#)

Dept. of Finance

- [2003 Revised Property Management Policies and Procedures Manual](#)

Garapan Revitalization Planning

- [2007 Garapan and Beach Road Revitalization Plan](#)

Mayor of Rota

- [Mayor of Rota Citizen Centric Report, 2019](#)
- [Rota Municipal Council Citizen Centric Report, 2019](#)

Mayor of Saipan

- [Citizen Centric Report, 2019](#)
- [Saipan & Northern Islands Municipal Council Citizen Centric Report, 2019](#)

Mayor of Tinian & Aguiguan

- [Citizen Centric Report, 2019](#)
- [Tinian Municipal Council](#)

MVA

- [2017 MVA Tourism Feasibility and Sustainability Study](#)
- [2012-2016 Northern Mariana Islands Tourism Master Plan](#)

NMC

- [Northern Marianas College Strategic Plan 2015-2020](#)

NMC-CREES

- [2011-2015 Aquaculture Development Plan](#)

NOAA

- [2003 Survey of Abandoned Vessels: Guam and the CNMI](#)

USGS

- [2003, Ground-Water Resources of Saipan, CNMI](#)

Appendix B – SDGs Indicator Tracking for Trends Analysis

Green shading identifies indicators with current trends data; yellow indicates continued data collection will support trends analysis. Discussion on relevant indicators is included in the analysis sections of this resources report.

Sustainable Development Goal	Indicator	Data Request Status	Data Received
Goal 1. End poverty in all its forms everywhere			
1.2 By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions	1.2.1 Proportion of population living below the national poverty line, by sex and age 1.2.2 Proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions	NMHC, Commerce CDS updates pending	Household income data provided in 2015 Yearbook current through 2010 - additional information needed
1.3 Implement nationally appropriate social protection systems and measures for all, including floors, and by 2030 achieve substantial coverage of the poor and the vulnerable	1.3.1 Proportion of population covered by social protection floors/systems, by sex, distinguishing children, unemployed persons, older persons, persons with disabilities, pregnant women, newborns, work-injury victims and the poor and the vulnerable	Commerce SY2017	Commerce SY2017 Chart NAP 2004 by population SY2017 2001-2004 by ethnicity
1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance	1.4.1 Proportion of population living in households with access to basic services 1.4.2 Proportion of total adult population with secure tenure rights to land, with legally recognized documentation and who perceive their rights to land as secure, by sex and by type of tenure	Commerce SY outdated, needs updates 1.4 Check DLNR for population land rights including lease agreements (court).	SY2014 home internet access Residential Phones
Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture CHCC+			
2.3 By 2030, double the agricultural productivity and incomes of small-scale food	2.3.1 Volume of production per labor unit by classes of	Commerce, NMHC reports	SY2017 Value of Commercial Fishing

producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment	farming/pastoral/forestry enterprise size 2.3.2 Average income of small-scale food producers, by sex and indigenous status	DOA follow-up needed	SY2017 Market Value of Agricultural Products Sold In CNMI SY2017 Animal Farms SY2017 Amount and Value of Commercial Fish Landing
2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	2.4.1 Proportion of agricultural area under productive and sustainable agriculture	Commerce, NMHC reports Follow-up on DOA, CPA, and identify private landowners with farms.	SY2017 Total Farms and Acreage
Goal 3. Ensure healthy lives and promote well-being for all at all ages CHCC+			
3.1 By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births	3.1.1 Maternal mortality ratio 3.1.2 Proportion of births attended by skilled health personnel	3.1 CHCC reports 84.9 / 1000 (annual data tracking)	CNMI 2015 Yearbook reports mortality rates through 2014, additional data pending from CHCC / CDS follow-ups
3.2 By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births	3.2.1 Under-five mortality rate 3.2.2 Neonatal mortality rate	3.2.1 CHCC reports 2 / 1000 (annual data tracking); 3.2.2 CHCC reports 4.2 / 1000 (annual data tracking); 3.2.1 - 99.7	Yearbook reports mortality rates by age (<5) through 2014, additional data pending from CHCC / CDS follow-ups
3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases	3.3.1 Number of new HIV infections per 1,000 uninfected population, by sex, age and key populations 3.3.2 Tuberculosis incidence per 1,000 population 3.3.3 Malaria incidence per 1,000 population 3.3.4 Hepatitis B incidence per	3.6 CHCC reports 20.9 / 1000 (annual data tracking)	Yearbook reports "certain infectious disease" - follow-up pending w/ CNMI CHCC - Vital Statistics

	100,000 population		
	3.3.5 Number of people requiring interventions against neglected tropical diseases		
3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being	3.4.1 Mortality rate attributed to cardiovascular disease, cancer, diabetes or chronic respiratory disease 3.4.2 Suicide mortality rate	CHCC data request pending	CHCC data pending
3.5 Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol	3.5.1 Coverage of treatment interventions (pharmacological, psychosocial and rehabilitation and aftercare services) for substance use disorders 3.5.2 Harmful use of alcohol, defined according to the national context as alcohol per capita consumption (aged 15 years and older) within a calendar year in liters of pure alcohol	CHCC data request pending	CHCC data pending
3.6 By 2020, halve the number of global deaths and injuries from road traffic accidents	3.6.1 Death rate due to road traffic injuries	3.6 CHCC reports 78.4 / 1000 (annual data tracking)	CNMI 2015 Yearbook reports accidents through 2004; additional data requests pending
3.7 By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programs	3.7.1 Proportion of women of reproductive age (aged 15-49 years) who have their need for family planning satisfied with modern methods 3.7.2 Adolescent birth rate (aged 10-14 years; aged 15-19 years) per 1,000 women in that age group	3.7.2 CHCC data request pending	2015 Yearbook reports that the crude birth rate (births per 1,000 population) increased from about 19.9 in 2009 to 2011 to about 21.1 during 2012 to 2014. Additional data requests pending
3.8 Achieve universal health coverage, including financial risk protection, access to	3.8.1 Coverage of essential health services (defined as the average	3.7.2 CHCC data request pending	2015 Yearbook reports "about 36,000 (2 out of every 3) people had health

quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all	coverage of essential services based on tracer interventions that include reproductive, maternal, newborn and child health, infectious diseases, non-communicable diseases and service capacity and access, among the general and the most disadvantaged population) 3.8.2 Number of people covered by health insurance or a public health system per 1,000 population	3.8.2 - Coverage discussed in 2015 Yearbook using 2010 data; CHCC updated provided - needs follow-up re frequency of NCO survey 1/23	insurance in 2010, so about 1/3rd did not have health insurance. Of those under 18, though, only about 17 percent did not have health insurance coverage.” Additional data requests pending
3.a Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate	3.a.1 Age-standardized prevalence of current tobacco use among persons aged 15 years and older	3.a CHCC reports 27.2 / 1000 (annual data tracking)	Juvenile tobacco arrests tracked in 2015 Yearbook through 2002, additional data requests needed
3.b Support the research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines, in accordance with the Doha Declaration on the TRIPS Agreement and Public Health, which affirms the right of developing countries to use to the full the provisions in the Agreement on Trade-Related Aspects of Intellectual Property Rights regarding flexibilities to protect public health, and, in particular, provide access to medicines for all	3.b.1 Proportion of the population with access to affordable medicines and vaccines on a sustainable basis 3.b.2 Total net official development assistance to medical research and basic health sectors	CHCC follow-up needed	CHCC follow-up needed
3.c Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing States	3.c.1 Health worker density and distribution	CHCC follow-up needed	2015 Yearbook reports number of healthcare workers through 2012 (725) - can extrapolate proportion / and possibly distribution, follow-up needed re updated numbers
3.d Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks	3.d.1 International Health Regulations (IHR) capacity and health emergency preparedness	CHCC follow-up needed	CHCC follow-up needed

Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all PSS/NMC/NMTI +			
4.1 By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes	4.1.1 Proportion of children and young people: (a) in grades 2/3; (b) at the end of primary; and (c) at the end of lower secondary achieving at least a minimum proficiency level in (i) reading and (ii) mathematics, by sex	PSS data request pending	PSS data request pending
4.2 By 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education	4.2.1 Proportion of children under 5 years of age who are developmentally on track in health, learning and psychosocial well-being, by sex 4.2.2 Participation rate in organized learning (one year before the official primary entry age), by sex	PSS data request pending; Follow-up potential w/ WIC, Headstart, Early Childhood Development	PSS data request pending; general enrollment numbers reported in 2015 Yearbook through 2010 - additional data requests pending
4.3 By 2030, ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university	4.3.1 Participation rate of youth and adults in formal and non-formal education and training in the previous 12 months, by sex	PSS data request pending	PSS data request pending
4.6 By 2030, ensure that all youth and a substantial proportion of adults, both men and women, achieve literacy and numeracy	4.6.1 Percentage of population in a given age group achieving at least a fixed level of proficiency in functional (a) literacy and (b) numeracy skills, by sex	Requested, feedback pending Source: NMC Placement test & 2ndary level stats Director, Office of Admissions: PENDING	Pending feedback via email as of 1/17/2019 (proficiency is available, but not w/ sex breakdown)
4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development	4.7.1 Extent to which (i) global citizenship education and (ii) education for sustainable development, including gender equality and human rights, are mainstreamed at all levels in: (a) national education policies, (b) curricula, (c) teacher education and (d) student assessment	Potential priority education target? To discuss tracking potential.	Note globally agreed methodology has not been set for this UN SDG Indicator

4.a Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all	4.a.1 Proportion of schools with access to: (a) electricity; (b) the Internet for pedagogical purposes; (c) computers for pedagogical purposes; (d) adapted infrastructure and materials for students with disabilities; (e) basic drinking water; (f) single-sex basic sanitation facilities; and (g) basic handwashing facilities (as per the WASH indicator definitions)	PSS inquiry pending	Follow-up needed to discuss education indicators -> proposal to meet with PSS, NMC, NMTI (others from private sector) to collect baseline data
4.c By 2030, substantially increase the supply of qualified teachers, including through international cooperation for teacher training in developing countries, especially least developed countries and small island developing States	4.c.1 Proportion of teachers in: (a) pre-primary; (b) primary; (c) lower secondary; and (d) upper secondary education who have received at least the minimum organized teacher training (e.g. pedagogical training) pre-service or in-service required for teaching at the relevant level in a given country	PSS inquiry pending;	Some teacher-student ratio data reported in 2015 Yearbook but not specific re training level of teachers
Goal 5. Achieve gender equality and empower all women and girls WORK WITH WOMEN'S AFFAIRS OFFICE			
5.5 Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life	5.5.1 Proportion of seats held by women in national parliaments and local governments	LEGISLATURE	
	5.5.2 Proportion of women in managerial positions	SAIPAN CHAMBER OF COMMERCE	
5.b Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women	5.b.1 Proportion of individuals who own a mobile telephone, by sex	DOCOMO & IT&E	CDS data available, no gender breakdown - updates pending
Goal 6. Ensure availability and sustainable management of water and sanitation for all			
6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all	6.1.1 Proportion of population using safely managed drinking water services	CUC / BECQ?	2015 Yearbook reports water sources - additional information request pending

6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations	6.2.1 Proportion of population using safely managed sanitation services, including a hand-washing facility with soap and water	CUC / BECQ?	2015 Yearbook reports homes w/o improved plumbing by % as of 2010 - additional information request pending
6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	6.3.1 Proportion of wastewater safely treated 6.3.2 Proportion of bodies of water with good ambient water quality	CUC / BECQ-DEQ / EPA?	Sewage production data from 2015 Yearbook tracks trends through 2010 - need to confirm "safely treated" status.
6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity	6.4.1 Change in water-use efficiency over time 6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources	CUC / BECQ-DEQ / EPA	Additional information request pending
6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes	6.6.1 Change in the extent of water-related ecosystems over time	BECQ-DCRM / DEQ / ACE	Additional information request pending
6.a By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programs, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies 6.b Support and strengthen the participation of local communities in improving water and sanitation management	6.a.1 Amount of water- and sanitation-related official development assistance that is part of a government- coordinated spending plan 6.b.1 Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management	CUC / BECQ-DEQ / EPA?	Additional information request pending
Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all			
7.1 By 2030, ensure universal access to affordable, reliable and modern energy services	7.1.1 Proportion of population with access to electricity	CUC	2015 Integrated Report provided, additional details requested

	7.1.2 Proportion of population with primary reliance on clean fuels and technology	Follow up on total LP gas, solar, and other clean fuel businesses for total (2015 Integrated report says 0)	
7.2 By 2030, increase substantially the share of renewable energy in the global energy mix	7.2.1 Renewable energy share in the total final energy consumption	CUC request submitted	2015 Integrated Report provided, additional details requested
7.3 By 2030, double the global rate of improvement in energy efficiency	7.3.1 Energy intensity measured in terms of primary energy and GDP	CUC follow-up needed	2015 Integrated Report provided, with carbon intensity projections but additional details / discussion would be helpful - to follow up
7.a By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology	7.a.1 Mobilized amount of United States dollars per year starting in 2020 accountable towards the \$100 billion commitment	CUC follow-up needed - 7.a.1 may not be directly applicable but could revise based on CNMI Renewable Energy Standard and discussion planning next steps?	CUC follow-up needed
7.b By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States and landlocked developing countries, in accordance with their respective programmes of support	7.b.1 Investments in energy efficiency as a percentage of GDP and the amount of foreign direct investment in financial transfer for infrastructure and technology to sustainable development services	CUC follow-up needed - 7.b.1 may not be directly applicable but could revise based on CNMI Renewable Energy Standard and discussion planning next steps?	2015 Integrated Report provided, CUC follow-up needed
Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all - SEDC / COMMERCE / SCC / CDA			
8.1 Sustain per capita economic growth in accordance with national circumstances and, in particular, at least 7 per cent gross domestic product growth per annum in the least developed countries	8.1.1 Annual growth rate of real GDP per capita	<u>Decadal census data provided SY2015; percent change provided 2008 - 2016 in 2017 Report</u>	To follow up with Commerce-CSD re per capita growth and updated information
8.2 Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labor-intensive sectors	8.2.1 Annual growth rate of real GDP per employed person	Commerce GDP SY2017	To follow up with Commerce-CSD re per capita growth and updated information
8.3 Promote development-oriented policies	8.3.1 Proportion of informal	Tracked in US 2010 Census	

that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services	employment in non-agriculture employment, by sex		
8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value	8.5.1 Average hourly earnings of female and male employees, by occupation, age and persons with disabilities 8.5.2 Unemployment rate, by sex, age and persons with disabilities	YEARBOOK - provides non-gender specific info; 2010 Census provides gender breakouts YEARBOOK?	To follow up with CSD regarding updated data / processing options
8.6 By 2020, substantially reduce the proportion of youth not in employment, education or training	8.6.1 Proportion of youth (aged 15-24 years) not in education, employment or training	OFFICE OF YOUTH AFFAIRS	
8.8 Protect labor rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment	8.8.1 Frequency rates of fatal and non-fatal occupational injuries, by sex and migrant status 8.8.2 Increase in national compliance of labor rights (freedom of association and collective bargaining) based on International Labor Organization (ILO) textual sources and national legislation, by sex and migrant status	DEPT OF LABOR	Follow-up pending
8.9 By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products	8.9.1 Tourism direct GDP as a proportion of total GDP and in growth rate 8.9.2 Number of jobs in tourism industries as a proportion of total jobs and growth rate of jobs, by sex	MVA - SUSTAINABILITY STUDY MVA	
8.10 Strengthen the capacity of domestic financial institutions to encourage and expand access to banking, insurance and financial	8.10.1 Number of commercial bank branches and automated teller machines (ATMs)	COMMERCE/SCC	

services for all	per 100,000 adults		
	8.10.2 Proportion of adults (15 years and older) with an account at a bank or other financial institution or with a mobile-money-service provider	GREAT INDICATOR! SCC / SEDC for possible banking connections?	
Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation			
9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all	9.1.1 Proportion of the rural population who live within 2 km of an all-season road	DPW	
	9.1.2 Passenger and freight volumes, by mode of transport	CPA / CUSTOMS	
9.2 Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries	9.2.1 Manufacturing value added as a proportion of GDP and per capita	COMMERCE / SCC	Follow-up pending
	9.2.2 Manufacturing employment as a proportion of total employment	SCC / COMMERCE	
9.3 Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets	9.3.1 Proportion of small-scale industries in total industry value added	SCC / COMMERCE	
	9.3.2 Proportion of small-scale industries with a loan or line of credit	SCC / BANKS	
9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending	9.5.1 Research and development expenditure as a proportion of GDP	CREES	Follow-up pending
	9.5.2 Researchers (in full-time equivalent) per million inhabitants	NMC / CREES	
9.c Significantly increase access to information and communications technology and strive to provide universal and affordable access to the	9.c.1 Proportion of population covered by a mobile network, by technology	PUC / Docomo / ITE? 2015 Yearbook provides 2014 Broadband Survey	2015 Yearbook provides 2014 Broadband Survey; follow-up needed for updated data

Internet in least developed countries by 2020			
Goal 10. Reduce inequality within and among countries			
10.1 By 2030, progressively achieve and sustain income growth of the bottom 40 percent of the population at a rate higher than the national average	10.1.1 Growth rates of household expenditure or income per capita among the bottom 40 percent of the population and the total population	SYB	Follow-up pending
10.2 By 2030, empower and promote the social, economic and political inclusion of all, irrespective of age, sex, disability, race, ethnicity, origin, religion or economic or other status	10.2.1 Proportion of people living below 50 per cent of median income, by age, sex and persons with disabilities	SYB	
10.3 Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard	10.3.1 Proportion of the population reporting having personally felt discriminated against or harassed within the previous 12 months on the basis of a ground of discrimination prohibited under international human rights law	NMPASI / MICRONESIAN LEGAL SERVICES	Follow-up pending
10.4 Adopt policies, especially fiscal, wage and social protection policies, and progressively achieve greater equality	10.4.1 Labor share of GDP, comprising wages and social protection transfers	LEGISLATURE/CENTRAL GOVT.	
10.5 Improve the regulation and monitoring of global financial markets and institutions and strengthen the implementation of such regulations	10.5.1 Financial Soundness Indicators	COMMERCE - BANKING SECTION, CDA	Follow-up pending
Goal 11. Make cities and human settlements inclusive, safe, resilient, and sustainable			
11.2 By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons	11.2.1 Proportion of population that has convenient access to public transport, by sex, age and persons with disabilities	COTA	Data provided re access to bus stops by distance
11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable	11.3.1 Ratio of land consumption rate to population growth rate	11.3.1 - Zoning / DPL / DLNR?	Zoning / DPL / DLNR follow-up needed

human settlement planning and management in all countries	11.3.2 Proportion of cities with a direct participation structure of civil society in urban planning and management that operate regularly and democratically	11.3.2 - Can track public involvement in planning processes (establish % community engagement as planning goal?)	
11.4 Strengthen efforts to protect and safeguard the world's cultural and natural heritage	11.4.1 Total expenditure (public and private) per capita spent on the preservation, protection and conservation of all cultural and natural heritage, by type of heritage (cultural, natural, mixed and World Heritage Centre designation), level of government (national, regional and local/municipal), type of expenditure (operating expenditure/investment) and type of private funding (donations in kind, private non-profit sector and sponsorship)	11.4.1 - HPO / DCCA	HPO reports federal funding for program can be tracked, notes interest in tracking private and nonprofit investment further; DCCA follow-up needed
11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations	11.5.1 Number of deaths, missing persons and persons affected by disaster per 100,000 people 11.5.2 Direct disaster economic loss in relation to global GDP, including disaster damage to critical infrastructure and disruption of basic services	11.5.1 HSEM / FEMA 11.5.2 HSEM / FEMA / CUC / GAR?	
11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management	11.6.1 Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated, by cities 11.6.2 Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities (population weighted)	11.6.1 DPW info request 11.6.2 BECQ-DEQ info request	OGM reports solid waste study is pending. No response from DPW / BECQ inquiries as of 1/22

11.7 By 2030, provide universal access to safe, inclusive and accessible, green and public spaces, in particular for women and children, older persons and persons with disabilities	11.7.1 Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities 11.7.2 Proportion of persons victim of physical or sexual harassment, by sex, age, disability status and place of occurrence, in the previous 12 months	11.7.1 Zoning / DPL / DLNR info request (perhaps just track open space access and include ADA accessible as tier II question / tracking?)	
Goal 12. Ensure sustainable consumption and production patterns			
12.1 Implement the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries	12.1.1 Number of countries with sustainable consumption and production (SCP) national action plans or SCP mainstreamed as a priority or a target into national policies	SCC / SEDC?	No official plans yet for US / CNMI -> Goal 12 as possible point of discussion for SCC / SEDC?
12.2 By 2030, achieve the sustainable management and efficient use of natural resources	12.2.1 Material footprint, material footprint per capita, and material footprint per GDP 12.2.2 Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP	Unclear if data re resource flows (ex Economy Wide Material Flows Accounting i.e. biomass, fossil fuels metal ores, and non-metallic minerals) is being tracked - possible BECQ follow-up?	DPW/BECQ follow-up?
12.3 By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses	12.3.1 Global food loss index	May not be applicable due to informal piggery pick-up programs - NMHA / BECQ for follow-up / verification	BECQ follow-up?
12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse	12.4.2 Hazardous waste generated per capita and proportion of hazardous waste treated, by type of treatment	12.4.1 N/A 12.4.2 - DPW / BECQ	

impacts on human health and the environment			
12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse	12.5.1 National recycling rate, tons of material recycled	12.5.1 - DPW	
12.6 Encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle	12.6.1 Number of companies publishing sustainability reports	12.6.1 - SCC / SEDC? Commerce?	
12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature	12.8.1 Extent to which (i) global citizenship education and (ii) education for sustainable development (including climate change education) are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment	PSS request - proxies for indicators? Tracking climate education / application of climate change curricula?	
12.b Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products	12.b.1 Number of sustainable tourism strategies or policies and implemented action plans with agreed monitoring and evaluation tools	MVA data request	2017 Sustainability Study provided
12.c Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities	12.c.1 Amount of fossil-fuel subsidies per unit of GDP (production and consumption) and as a proportion of total national expenditure on fossil fuels	CUC data request re fuel consumption; subsidies are federal so perhaps discuss reframing? Follow-up needed	Follow-up pending
Goal 13. Take urgent action to combat climate change and its impacts			
13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	13.1.1 Number of countries with national and local disaster risk reduction strategies	Consider reframing to villages / agencies?	HSEM reports planning is prescribed; no village plans provided, however, PSS and CPA do appear to have some emergency

	13.1.2 Number of deaths, missing persons and persons affected by disaster per 100,000 people		plans on the books - flagging for further discussion.
13.2 Integrate climate change measures into national policies, strategies and planning	13.2.1 Number of countries that have communicated the establishment or operationalization of an integrated policy / strategy / plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other	Consider reframing indicator to track frequency of planning updates?	Adaptation planning proposed component of sustainable development plan (so, in development)
Goal 14. Conserve and sustainably use the oceans, seas, and marine resources for sustainable development			
14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution	14.1.1 Index of coastal eutrophication and floating plastic debris density	DEQ Water Quality inquiry submitted – eutrophication data in WQ report; plastic debris density not being tracked	See WQ discussion.
14.2 By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans	14.2.1 Proportion of national exclusive economic zones managed using ecosystem-based approaches	DLNR inquiry pending	Follow-up pending
14.3 Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels	14.3.1 Average marine acidity (pH) measured at agreed suite of representative sampling stations	DCRM / DEQ inquiry pending	
14.4 By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based	14.4.1 Proportion of fish stocks within biologically sustainable levels	DLNR-DFW inquiry pending	

management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics			
14.5 By 2020, conserve at least 10 percent of coastal and marine areas, consistent with national and international law and based on the best available scientific information	14.5.1 Coverage of protected areas in relation to marine areas	DFW mapping request - to follow up w/ DLNR	
14.7 By 2030, increase the economic benefits to small island developing States and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism	14.7.1 Sustainable fisheries as a percentage of GDP in small island developing States, least developed countries and all countries	DFW data request - to follow up w/ DLNR	Limited public data available - follow-up needed
14.a Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries	14.a.1 Proportion of total research budget allocated to research in the field of marine technology	DFW / NMC-CREES	Follow-up pending
14.b Provide access for small-scale artisanal fishers to marine resources and markets	14.b.1 Progress by countries in the degree of application of a legal /regulatory/policy/institutional framework which recognizes and protects access rights for small-scale fisheries	DFW data request - to follow up w/ DLNR	Limited public data available - follow-up needed
Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss			
15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands,	15.1.1 Forest area as a proportion of total land area 15.1.2 Proportion of important sites	Old Data is available. New data will be available this year; will follow-up w/ DLNR-DFW	See also DPL draft land use plan data - discuss updated layers when available

mountains and drylands, in line with obligations under international agreements	for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type		
15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally	15.2.1 Progress towards sustainable forest management	Follow-up w/ DLNR-DFW	2010 Statewide assessment provided - possible follow-ups
15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world	15.3.1 Proportion of land that is degraded over total land area	Follow-up w/ DLNR-DFW	2010 Statewide assessment provided - possible follow-ups
15.4 By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development	15.4.1 Coverage by protected areas of important sites for mountain biodiversity 15.4.2 Mountain Green Cover Index	Follow-up w/ DLNR-DFW	2010 Statewide assessment and 2015 State Wildlife Action Plan provided - possible follow-ups
15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species	15.5.1 Red List Index	Follow-up w/ DLNR-DFW - request status or proxy (ESA listing status?)	
15.8 By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species	15.8.1 Proportion of countries adopting relevant national legislation and adequately resourcing the prevention or control of invasive alien species	DLNR invasive species management plan / status requested	
15.b Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation	15.b.1 Official development assistance and public expenditure on conservation and sustainable use of biodiversity and ecosystems		CNMI Yearbook reports government expenditures for economic development 1995-2002; additional information requests / follow-ups pending
Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels			
16.1 Significantly reduce all forms of violence and related death rates everywhere	16.1.1 Number of victims of intentional homicide per 100,000	DPS - Data requested for homicide	CNMI Yearbook reports homicide trends 1995-2004; additional data requested

	<p>population, by sex and age</p> <p>16.1.2 Conflict-related deaths per 100,000 population, by sex, age and cause</p> <p>16.1.3 Proportion of population subjected to physical, psychological or sexual violence in the previous 12 months</p> <p>16.1.4 Proportion of population that feel safe walking alone around the area they live</p>	CHCC - Data required for morbidity reports	
16.2 End abuse, exploitation, trafficking and all forms of violence against and torture of children	<p>16.2.1 Proportion of children aged 1-17 years who experienced any physical punishment and/or psychological aggression by caregivers in the past month</p> <p>16.2.2 Number of victims of human trafficking per 100,000 population, by sex, age and form of exploitation</p> <p>16.2.3 Proportion of young women and men aged 18-29 years who experienced sexual violence by age 18</p>	Availability of data sources unclear - AG / DPS / Criminal Justice Planning Agency (?) follow-up needed	2014 Sexual Assault Funding tracked - possible proxy indicator http://www.cjpa.gov.mp/pdf/2014AR.pdf
16.3 Promote the rule of law at the national and international levels and ensure equal access to justice for all	<p>16.3.1 Proportion of victims of violence in the previous 12 months who reported their victimization to competent authorities or other officially recognized conflict resolution mechanisms</p> <p>16.3.2 Unsentenced detainees as a proportion of overall prison population</p>	Availability of data sources unclear - AG / DPS / Criminal Justice Planning Agency (?) follow-up needed	

16.6 Develop effective, accountable and transparent institutions at all levels	<p>16.6.1 Primary government expenditures as a proportion of original approved budget, by sector (or by budget codes or similar)</p> <p>16.6.2 Proportion of the population satisfied with their last experience of public services</p>		Expenditures reported in 2015 Yearbook through 2012 - follow-up needed regarding updated numbers
16.7 Ensure responsive, inclusive, participatory and representative decision-making at all levels	<p>16.7.1 Proportions of positions (by sex, age, persons with disabilities and population groups) in public institutions (national and local legislatures, public service, and judiciary) compared to national distributions</p> <p>16.7.2 Proportion of population who believe decision-making is inclusive and responsive, by sex, age, disability and population group</p>		Potential for survey follow-up for 16.7.2
16.9 By 2030, provide legal identity for all, including birth registration	16.9.1 Proportion of children under 5 years of age whose births have been registered with a civil authority, by age	CHCC to verify (100% recording?)	CHCC follow-up needed
16.10 Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements	16.10.1 Number of verified cases of killing, kidnapping, enforced disappearance, arbitrary detention and torture of journalists, associated media personnel, trade unionists and human rights advocates in the previous 12 months	DPS follow-up needed	DPS follow-up needed
Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development			
Finance			
17.1 Strengthen domestic resource mobilization, including through international support to developing countries, to improve	17.1.1 Total government revenue as a proportion of GDP, by source	Commerce-CDS / Finance	Gross Revenue by Source reported in 2015 Yearbook through 2002 - updates needed, CDS discussion pending

domestic capacity for tax and other revenue collection	17.1.2 Proportion of domestic budget funded by domestic taxes		2002 Tax Data from Finance Tax and Rev in 2015 Yearbook - possible to expand to include tax and non-tax revenue for CNMI as a whole?
17.3 Mobilize additional financial resources for developing countries from multiple sources	17.3.1 Foreign direct investments (FDI), official development assistance and South-South Cooperation as a proportion of total domestic budget	FDI assistance N/A	2015 Yearbook includes Govt. Funding (2002) and Gov. Revenue Sources (2003) - Updates / Finance follow-up needed
	17.3.2 Volume of remittances (in United States dollars) as a proportion of total GDP	Possible to obtain personal remittance data from Finance?	
17.5 Adopt and implement investment promotion regimes for least developed countries	17.5.1 Number of countries that adopt and implement investment promotion regimes for least developed countries	CDA / SCC / SEDC?	Indicator would need modification but possible connection to "Business investment zone" initiative?
Technology			
17.6 Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge-sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism	17.6.1 Number of science and/or technology cooperation agreements and programmes between countries, by type of cooperation	17.6.1 - possible to modify to reflect local business partnerships / initiatives?	Follow-up needed - POC for CPUC / ITE / Docomo?
	17.6.2 Fixed Internet broadband subscriptions per 100 inhabitants, by speed	17.6.2 - CPUC / Docomo / ITE follow-up needed	
17.7 Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed	17.7.1 Total amount of approved funding for developing countries to promote the development, transfer, dissemination and diffusion of environmentally sound technologies	CDA / SCC / SEDC?	Indicator would need modification but possible connection to local initiatives?
17.8 Fully operationalize the technology bank and science, technology and innovation capacity-building mechanism for least	17.8.1 Proportion of individuals using the Internet	CPUC / Docomo / ITE follow-up needed	CSD 2015 Yearbook - Phone data current through 2004, 2014 survey highlights below:

developed countries by 2017 and enhance the use of enabling technology, in particular information and communications technology			2015 CNMI Statistical Yearbook reports that the CNMI's Central Statistics Division has collected random samples of broadband internet use in recent years. In the 2014 Broadband survey, when the sample was weighted to the 2010 census count, about 88 percent of CNMI population had access to the internet. The percentages were similar for the islands – 88 percent on Saipan and Rota and 85 percent on Tinian.
Trade			
17.10 Promote a universal, rules-based, open, non-discriminatory and equitable multilateral trading system under the World Trade Organization, including through the conclusion of negotiations under its Doha Development Agenda	17.10.1 Worldwide weighted tariff-average	Today, the U.S. applies a weighted average tariff of 1.6 percent on its imports, one of the lowest rates worldwide, according to World Bank data Mar 23, 2018; need to confirm if additional tariffs apply in CNMI - Customs?	Possibly not applicable as this is a national tariff, but could report using data from World Bank.
17.11 Significantly increase the exports of developing countries, in particular with a view to doubling the least developed countries' share of global exports by 2020	17.11.1 Developing countries' and least developed countries' share of global exports	N/A but data on imports and exports could be used as proxy indicator	Import data reported in 2015 Yearbook through 2004, online imports through 2017 and export data from CPA through 2017
17.12 Realize timely implementation of duty-free and quota-free market access on a lasting basis for all least developed countries, consistent with World Trade Organization decisions, including by ensuring that preferential rules of origin applicable to imports from least developed countries are transparent and simple, and contribute to facilitating market access	17.12.1 Average tariffs faced by developing countries, least developed countries and small island developing States	N/A, see 17.11	N/A, see 17.11
Systemic issues - Policy and institutional coherence			
17.13 Enhance global macroeconomic stability, including through policy coordination and	17.13.1 Macroeconomic Dashboard	N/A but see note	<u>Not available, but could be included in Commerce's online system development?</u>

policy coherence			See EU example
17.14 Enhance policy coherence for sustainable development	17.14.1 Number of countries with mechanisms in place to enhance policy coherence of sustainable development	Possible to modify and report / track in assessment in terms of SD policy development	Note: A globally agreed methodology has not been set for this UN SDG Indicator.
17.15 Respect each country's policy space and leadership to establish and implement policies for poverty eradication and sustainable development	17.15.1 Extent of use of country-owned results frameworks and planning tools by providers of development cooperation	CNMI would be tracking progress upon adoption of proposed plan w/ incorporation of refined SDG indicators	Note: A globally agreed methodology has not been set for this UN SDG Indicator.
Systemic issues – Multi-stakeholder partnerships			
17.16 Enhance the Global Partnership for Sustainable Development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the Sustainable Development Goals in all countries, in particular developing countries	17.16.1 Number of countries reporting progress in multi-stakeholder development effectiveness monitoring frameworks that support the achievement of the sustainable development goals	N/A but CNMI would be tracking progress upon adoption of proposed plan w/ incorporation of refined SDG indicators	Note: A globally agreed methodology has not been set for this UN SDG Indicator.
17.17 Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships	17.17.1 Amount of United States dollars committed to public-private and civil society partnerships	Possible to obtain donation tracking info from SCC / SEDC / MNGO?	Note: A globally agreed methodology has not been set for this UN SDG Indicator. Possible to get some info from SCC / SEDC / Commerce-CSD?
Systemic issues – Data, monitoring and accountability			
17.18 By 2020, enhance capacity-building support to developing countries, including for least developed countries and small island developing States, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts	17.18.1 Proportion of sustainable development indicators produced at the national level with full disaggregation when relevant to the target, in accordance with the Fundamental Principles of Official Statistics 17.18.2 Number of countries that have national statistical legislation that complies with the Fundamental	Possible to adopt SD indicators in CNMI Plan - flagging for further discussion / consideration 17.18.2 - Discuss FPOS with CDS - likely reportable via PL 7-35	See Fundamental Principles of Official Statistics - confirm status w/ CDS

	Principles of Official Statistics		
17.19 By 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity-building in developing countries	<p>17.19.1 Dollar value of all resources made available to strengthen statistical capacity in developing countries</p> <p>17.19.2 Proportion of countries that (a) have conducted at least one population and housing census in the last 10 years; and (b) have achieved 100 per cent birth registration and 80 per cent death registration</p>	<p>17.19.1 N/A</p> <p>17.19.2 Decadal census reportable</p>	<p>17.19.2 - Need to verify (b) w/ CHCC, but (a) is covered w/ decadal U.S. Census</p>

Appendix C – Smart, Safe Growth – Summary Recommendations

Appendix C – Smart, Safe Growth Guidance – Recommendations

Excerpts provided for context; please see full publication: [CNMI's Smart, Safe Growth Guidance Manual](#)

Purpose

This Guidance Manual introduces “Smart, Safe Growth” (SSG) and discusses adaptation measures, recommendations for government action, planning resources, regulatory instruments, and tools to work towards SSG in the Commonwealth of the Northern Mariana Islands (CNMI). This Guidance Manual presents key issues and tools to facilitate leadership and action towards SSG. This Guidance Manual aims to help the CNMI Government evaluate planning and development initiatives for conformance with SSG Principles in a consistent and uniform manner. Information presented here can be worked into regular CNMI processes and policies such as updates to planning documents and regulations. This approach supports incremental change over the long-term and empowers CNMI communities to work toward SSG.

1.0 INTRODUCTION

Natural hazards pose significant risks to communities as they develop and grow. Disasters caused by extreme weather and climate change are increasing with ever growing loss and recovery costs (Hoeppe, 2016; Smith & Katz, 2013). State and territorial governments must increasingly respond to severe weather events, such as extreme precipitation, wave inundation, extreme heat, drought, and wildfires. These events threaten life and property and cause billions of dollars in damage. The National Oceanic and Atmospheric Administration (NOAA, 2018) reports that in 2017 damages from natural disasters cost the US Government an estimated \$300 billion. In 2015, Super Typhoon Soudelor caused over \$20 million in damage to Saipan communities (Ridgell, 2015). Natural disasters cannot be avoided; however, risks can be assessed and mitigation actions taken to reduce impacts and improve the resiliency and recoverability of our communities, environment, and economy.

Smart, Safe Growth (SSG) is a set of development strategies focused on improving the resiliency of the built environment. Through SSG, state and territorial governments work to develop communities that maximize public health and safety, provide economic opportunity and life-style choices, and that can withstand changes in climate and extreme weather events to reduce societal and economic burdens of recovery after a natural disaster. This Guidance Manual introduces SSG and discusses adaptation measures, recommendations for government action, planning resources, regulatory instruments, and tools to work towards SSG in communities of the Commonwealth of the Northern Mariana Islands (CNMI).

This Guidance Manual incorporates information and assessments from the Climate Vulnerability Assessments for the Islands of Saipan (2014), Rota and Tinian (2015) and the CNMI Standard State Mitigation Plan (2014). Climate change imposes new risks to communities. Adaptation to increases in extreme weather events and conditions of a changing climate will require a shift in current planning and policy instruments. The incorporation of SSG Principles into future CNMI development will improve community resiliency and mitigate recovery costs in the course of future events.

This Guidance Manual aims to help the CNMI Government evaluate planning and development initiatives for conformance with SSG Principles in a consistent and uniform manner. Information presented here can be worked into regular CNMI processes and policies such as updates to planning documents and regulations. This approach supports incremental change over the longterm and empowers CNMI communities to work toward SSG.

2.0 SMART, SAFE GROWTH

The SSG approach presented here is complementary of three well-established communities of practice: 1) smart growth, 2) hazard mitigation, and 3) climate change adaptation. To achieve growth that is smart and safe, communities integrate SSG Principles into development-related policies and planning initiatives. Among the small land masses of the Pacific Islands Countries and Territories, the SSG approach is tailored for local and community-specific hazards and vulnerabilities. SSG is enhanced by combining and overlapping strategies from the three communities of practice and incorporation into planning and development documents (Figure 2.1).

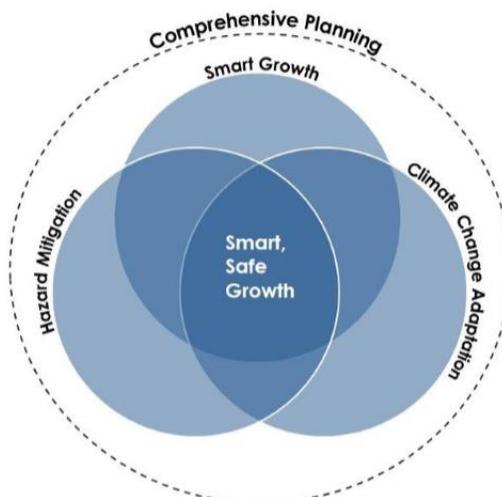


Figure 2.1 Smart, Safe Growth emerges from an overlap of strategies.

Smart Growth

Smart growth is a set of strategies and principles aimed at creating great communities with increased economic and social opportunities, a range of life-style choices and personal freedoms, good return on public investments, a thriving natural environment, which together lead to increased community health and well-being. Smart Growth strategies are flexible to address community-specific challenges and desired end-states. Many government agencies and private organizations provide technical assistance and programs to assist communities with implementing Smart Growth. For example, in 2016 the Federal Emergency Management Agency (FEMA) and the Environmental Protection Agency (EPA) signed a Memorandum of Agreement to work in partnership to help communities become safer, healthier, and more resilient. Selected Smart Growth resources and tools are included in subsequent sections and in the master bibliography (Appendix C).

Climate Change Adaptation

The Earth's climate and weather patterns are changing. Over the past several decades, extreme weather events have occurred with increased frequency. These events endangered human safety and lives and caused billions of dollars in damage to the built environment. Climate change will affect weather-related natural hazards into the future. Identifying risks from short- and long-term impacts as well as building adaptive capacity of communities, the built, and the natural environment is central to building resilience and involves developing processes and capacities that enable continued response to a changing and uncertain climate over time. Planning for and implementing measures to adapt to conditions of a changing climate can help increase community resiliency to these events, reduce damage, and lower recovery costs.

Hazard Mitigation

Hazard mitigation seeks to reduce the risks from geophysical hazards, such as earthquakes and volcanic activity, as well as metrological hazards, like severe weather. Hazard mitigation is an incremental, long-term application of strategies to improve community resiliency by addressing and reducing vulnerability to natural hazards. Hazard mitigation aims to reduce loss of life and property by lessening the impacts of natural hazards, particularly severe weather events that result in disasters.

Because recovery costs are escalating, the Federal Government requires hazard mitigation planning for state and territorial governments as a condition to receive post-disaster financial assistance. Hazard mitigation plans are key to breaking the cycle of damage, reconstruction, and repeated damage, by empowering identification of high-hazard areas and encouraging development to concentrate in less vulnerable areas; thus, helping to reduce post-disaster recovery costs. Hazard mitigation is optimally supported by long-term mitigation planning efforts such as the CNMI Standard State Mitigation Plan (2014). Although Standard State Mitigation Plans work towards minimizing hazards over the long-term, FEMA regulations require updates at least every five-years to address, analyze and incorporate changing hazards, especially hazards intensified by a changing climate, and to explore alternative or new mitigation actions.

With climate change, the frequency of weather-related hazards is increasing, but the frequency of geophysical hazards has not changed (Hoeppe, 2016). Traditionally, hazard mitigation measures were based on existing climate conditions, but with climate change occurring, future climate conditions must be considered to effect enduring mitigation measures. For example, in the wake of Super Storm Sandy, New York City began considering 100- and 500-year sea level rise and flood scenarios, a planning effort that is anticipated to reduce mitigation costs by as much as 25 percent (Greenhalgh, n.d.). Because severe weather causes more loss of life and property than geophysical hazards, the primary focus of this Guidance Manual is on severe weather and associated extreme events such as storm surge and flash flooding, and recognizing that climate change presents a new dimension to conventional weather hazards.

2.0 Smart, Safe Growth

The list of SSG Principles was derived from the extensive literature of practice for smart growth, hazard mitigation, and climate change adaptation (Table 2.1). The principles express the practical aspects of SSG. The purpose and intent of incorporation of SSG Principles is to enable well informed development decision-making that reduces exposure to avoidable risks and enhances project and community resilience. CNMI can work toward SSG by incorporating these principles into policy and planning instruments. A range of potential instruments are presented and discussed in Section 5.0. The SSG Principles are organized by short-name followed by an expanded definition (see table on next page).

Table 2.1 Smart, Safe Growth Principles.

Principle	Definition
1 Climate Change	Consider long-term climate change impacts of sea level rise, coastal inundation, increased storm intensity, variabilities in precipitation, and drought in planning, design, and cost determination for infrastructure and development projects as well as natural area preservation and enhancement planning.
2 Retreat	Plan to retreat from the areas of highest risk by discouraging or regulating development in these areas and promoting alternative uses of high-risk land, such as walkable public waterfront parks and recreation areas.
3 Retrofit	Retrofit existing structures and infrastructure located in hazard-prone areas to reduce vulnerabilities.
4 Critical Facilities Location	Locate new critical facilities (e.g., water and sewer systems, roads, hospitals, power plants, transmission and communication lines, and public safety facilities) outside of high-risk zones.
5 Development Incentives	Utilize regulatory and financial incentives to locate new development away from high risk areas into lower risk areas or to areas where risk can be reduced through management measures.
6 Sustainable Development BMPs	Establish regulatory policies that recommend/require the use of " <i>CNMI Sustainable Development Manual: Best Management Practices</i> " for commercial/public/multifamily developments.
7 Ecosystem Services	Maintain sufficient key natural resource areas (e.g., coral reefs, wetlands, mangroves, riparian zones, and vegetated slopes) that support and enhance ecosystem services, to protect infrastructure investments and developed areas.
8 Green Infrastructure	Encourage green infrastructure, soft stabilization measures and living shoreline alternatives at development sites, island open spaces and infrastructure deployment.
9 Development Decision Process	Ensure that development decision processes are predictable, fair, and transparent.
10 Early Collaboration	Encourage early-stage government agency collaboration and stakeholder engagement in development planning and decision making.
11 Knowledgeable SSG Communities	Promote a community of leaders and networks knowledgeable in the principles of smart, safe growth.
12 Adaptive Management	Integrate adaptive management approaches to smart, safe growth development and incorporate lessons learned into future planning and development efforts. Periodic assessments and updates to be scheduled and funded.

3.0 ADAPTATIONS TO NATURAL HAZARDS IN THE CNMI

Natural hazards will continue to impact the CNMI. Extreme weather, especially tropical cyclones like Super Typhoon Soudelor (2015) and Super Typhoon Yutu (2018), have caused disruptions to businesses and communities and cost millions of dollars for recovery efforts (Figure 3.1). As climate change alters the patterns of severe weather, the processes for planning, design and construction must adjust accordingly or costs to repair poorly-sited or constructed development will continue to escalate.



Figure 3.1 Storm-damage to the power distribution system from *Super Typhoon Soudelor* (left) and wreckage from *Super Typhoon Yutu* (right).

4.0 RECOMMENDATIONS FOR GOVERNMENT ACTION

The progression of SSG will require strong leadership and commitment from the CNMI Government. Government action via legislation and regulations that incorporate SSG Principles will provide support and legitimacy and help ensure consistency among CNMI planning efforts, and cohesion in approach among agencies.

Core government actions to promote Smart, Safe Growth include:

- 1) Adoption of a climate change policy that identifies plausible scenarios for projected climate change conditions as the basis for planning initiatives, and Office of the Governor mandate that requires centralized approval for all CNMI agency planning initiatives and establishes policies to encourage cross-agency planning that minimizes isolated efforts (i.e., stove pipes).
- 2) Revise regulations, permitting processes and land use planning for alignment with SSG Principles, regulatory authorities, and ensure project sequencing is coordinated with service providers (e.g., CUC, DPW, CHCC). It is especially important that utilities and services can meet demands of new developments;
- 3) Adopt long-range planning and funding horizons for utilities and services based on growth;
- 4) Revitalize and empower the CNMI Resilience Working Group; and
- 5) Fund and implement SSG through prioritization and alignment with federal funding opportunities and engagement with community stakeholders.

4.1 Top-Down Driver for Planning Context; Official Climate Change Scenario

Comprehensive, long-range planning must consider likely environmental conditions to adequately adapt design and construction to reduce vulnerability to a changing future of natural hazards. Strong government leadership is needed to support and legitimize long-range plans to adapt to long-range climate change. Government leadership must establish a range of specific climate scenarios for key variables that are projected to have a local impact (e.g., SLR, changes in precipitation, increased storm intensity). Providing top-level government support will equip government decision-makers and planners with a framework in which tools necessary for mitigating and adapting to anticipated changes in climate impacts can be used. Establishing official climate change scenarios will promote consistency across CNMI planning efforts and provide a basis for amending regulations and land use plans. For more information on climate change scenarios visit the IPCC (n.d.) Emissions Scenarios website (click [here](#)) or NCA4 website (click [here](#)) or refer to (Keener et al., 2013).

Government Agency Incorporation of Sea-Level Rise for Infrastructure Expansion and Development Projects

Changing sea level is a serious threat to coastal development and infrastructure in CNMI. The combined effects of SLR and SLC will increase coastal flooding and marine inundation hazards, especially in western Saipan. Sea level changes will also increase the loss of coastal ecosystems and beaches, which will have negative consequences for the CNMI tourism industry and economy.

Adopting government endorsed standards for coastal flooding based on SLR and SLC is strongly recommended. A government-supported standard is a critical foundation for legislative and regulatory action to reduce future vulnerabilities to coastal flooding by directing development away from future inundation zones. Planning for future sea level heights can happen incrementally and progressively over the long-term, but immediate action is recommended to establish the planning and regulatory framework to allow CNMI the time needed to adapt to higher seas.

In 2017, the Saipan SLR & Coastal Flooding maps were updated to show potential scenarios for future sea level heights (R. Greene, personal communication, August 2017). To generate the coastal flooding scenarios, both climate change-driven SLR and seasonal extreme SLC were analyzed using local and regional data. SLC was modeled using sea level data for 20-year and 100-year return intervals (i.e., an extreme value predicted to return every 20 or 100 years). SLR was estimated from National Oceanic and Atmospheric Administration (NOAA) data curves, which were refined using Guam tidal data in the US Army Corp of Engineers Curve Calculator tool. A “high” SLR curve was selected for modeling CNMI coastal flooding scenarios because of increased large-scale investment and development near the coast, especially in western Saipan. Once built, there is little flexibility or adaptive capacity to reduce vulnerabilities to development from future coastal flooding. See Greene (2017) for a detailed explanation of the data sources and analyses used to estimate SLR and SLC for the coastal flooding maps.

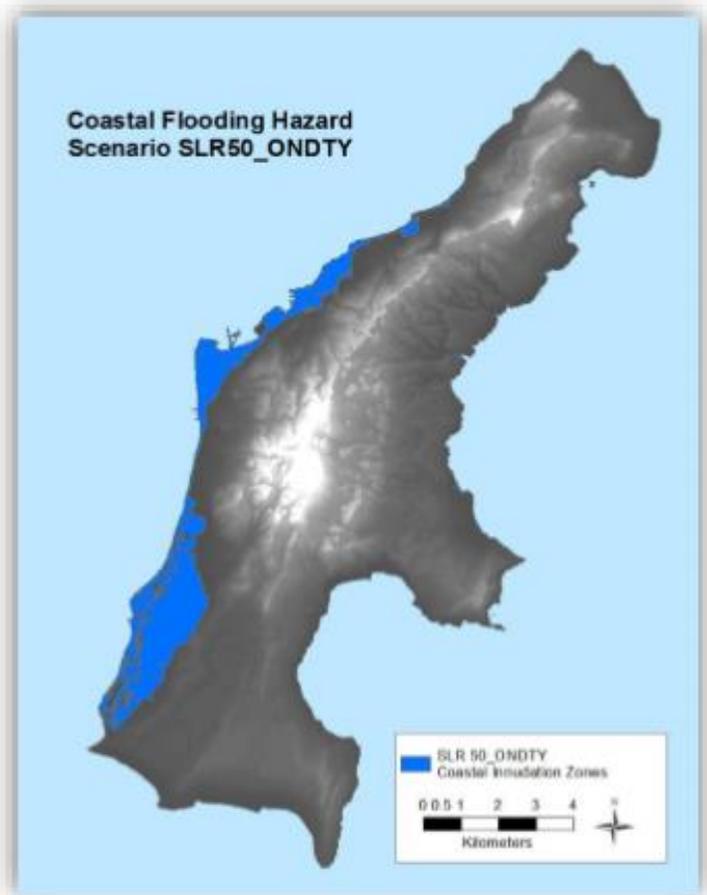


Figure 4.1 Projected coastal flooding hazard zones based on the selected SLR and SLC scenario SLR50_ONDTY.

An ad hoc sea level planning committee was convened by the Office of Planning and Development and facilitated by NOAA to select and agree on a recommended flood hazard scenario for new infrastructure and development. The committee recommended a scenario with a standard of cumulative sea-level change of 3.16 meters above the current level by the year 2067, which is based on both SLC and SLR. Estimates for SLC are based on seasonal extremes for CNMI between October and December (OND) for a 100-year return interval coupled with higher seas due to tropical cyclone activity. SLR is estimated for 50 years of incremental increase. Based on current planning and land lease practices in CNMI, and risk aversion for new development investments, a 50-year planning envelope was used for this scenario.

Table 4.1 The CNMI proposed coastal flooding hazard.

Scenario	Seasonal Extreme (m)	Seasonal Extreme Description*	Sea Level Rise (m)	Sea Level Rise Description**	Cumulative Sea Level Change (m)
50 years SLR + OND Seasonal Typhoon Year (Typhoon Year)	1.85	Historically derived (1978-2003) maximum sea level for 100-year recurrence at Saipan Harbor, during the months of October - December including data from years with typhoon passage.	1.31	Sea level rise projection for 2067 based on NOAA 2017 "High" curve and US Army Corps sea level curve calculator for Apra Harbor tide gauge (local vertical land movement)	3.16

Adapted from R. Greene, personal communication, August 2017.

*See Chowdhury, Md. R., Chu, P., Zhao, X., Schroeder, T.A., and Marra, J.J. (2010). Sea level extremes in the U.S.-Affiliated Pacific Islands—a coastal hazard scenario to aid in decision analyses. *Journal of Coastal Conservation*. 14:1, pp 53-62.

**See <http://corpsclimate.us/ccaceslcurves.cfm> (Revised 2017) and U.S. Army Corps of Engineers (2011). Sea Level Change Considerations for Civil Works Programs. US Army Corps Circular 1065-2-212. http://corpsclimate.us/docs/EC_1165-2-212%20-Final_10_Nov_2011.pdf

Following the formal adoption of a coastal flooding scenario with standards for SLR and SLC, all CNMI agencies should incorporate the coastal flooding hazards into plans and regulations updates. Coastal flooding hazard maps are developed, updated, and maintained by the Bureau of Environmental and Coastal Quality and are available on line at: [DCRM Maps](#)

Mandate for the Office of Planning and Development

CNMI Public Law 20-20 established the Office of Planning and Development (OPD) in 2017 to improve the planning process and improve effectiveness and coordination among CNMI agencies and Federal partners. This law also re-organized the Capital Improvement Program (CIP) Office under the OPD, which is now designated as the territorial agency for capital improvement planning purposes. The OPD is intended to be the clearinghouse for all information related to development, planning, and resource use in CNMI. By reviewing and appraising all CNMI plans, OPD can serve a coordinating function to ensure resources, such as power and water, are committed responsibly and that infrastructure can keep pace with development pressures.

An essential function of OPD is coordinating government-wide planning programs and projects to ensure coordinated and consistent approach to gradually implement SSG development over the long-term. OPD is the coordinating function that provides a “whole government” approach to SSG and adaptation. Taking this approach will require OPD leadership that is not easily swayed by political shifts and institutional turnover and will require high levels of coordination among agencies.

In addition, OPD should lead the effort to identify and apply for funds to implement SSG projects. Currently, agencies may lack the capacity and expertise to fully participate in and take advantage of the many federal programs with funding available to improve resilience or to prepare for climate change. By having a position dedicated to the exploration and alignment of funding opportunities, OPD can persistently seek funds for high-priority projects and control the direction and pace of SSG development.

4.2 Government Agency Revision of Regulations for Land Use Practices to Accommodate SSG

The CNMI government is well situated to implement SSG because they exercise authority over resources through land use planning, zoning, capital investment programs, building codes, permitting, and deployment of utilities and transportation infrastructure. Updating regulation and land use plans to feature SSG Principles are “no-regrets” strategies that should be taken immediately. Proactive land use planning is one of the most cost effective actions to reduce future vulnerabilities and to maintain future adaptive capacity. As discussed in more detail in Section 6.0, the CNMI regulations are already robust, but could be improved by integrating SSG Principles to guide planning and development. For a summary of relevant CNMI regulations and recommendations for updates, see Appendix C (of the SSG Report).

In addition to updating regulations, the CNMI should incorporate SSG Principles into land use planning to begin adapting to future climate conditions. Through land use planning, OPD can leverage their authority to encourage and ensure that agencies and private developers work towards SSG.

In addition to OPD, the Departments of Public Works (DPW) and Public Lands (DPL) and the Commonwealth Utilities Corporation (CUC) could realize short- and long-term benefits to critical resources from the integration and implementation of SSG Principles. DPW can improve resiliency and recovery of critical CNMI infrastructure as well as meet mandates to address resiliency for some federal funding opportunities. DPL can adjust regulations and land use planning for shorelines and coastal properties to help develop SSG Principles in the tourism and coastal recreation sectors. CUC can consider opportunities to build system resilience and reduce dependency on fossil fuels. This Guidance Manual provides tools in Section 7.0 to assist with implementing SSG.

In conjunction with regulations updates, permitting authorities should be empowered to influence planning. Permitting authorities require the ability and authority to ensure projects proposed by private developers do not over-tax public services, such as power, drinking water, and wastewater. Moreover, permitting authorities need the ability to sequence projects to ensure CNMI agencies can provide adequate oversight and inspections and enforcement.

4.3 Planning and Funding Horizons for Utilities and Services

Planning horizons are governed by the durability of the planned structure and are often coupled with the capacity to serve an intended population over a period of projected growth. For example, the materials to construct a bridge may be selected to last 30 years and the number of lanes (bridge width) will be based on the expected population growth in the area over the same period. However, with the progression of climate change, planners will need to look at longer and more uncertain planning horizons to account for and adjust to changing natural hazards. In 30 years, the climate conditions may be increased precipitation or stronger storm winds and a bridge built today should be designed to manage those anticipated conditions. To protect today’s investments the designs of today must address the hazards of tomorrow.

However, long-term planning is often hampered by short-term political and budget cycles. To support more SSG integrated and resilience planning outcomes, decision frameworks need to encompass at least 30-year horizons.

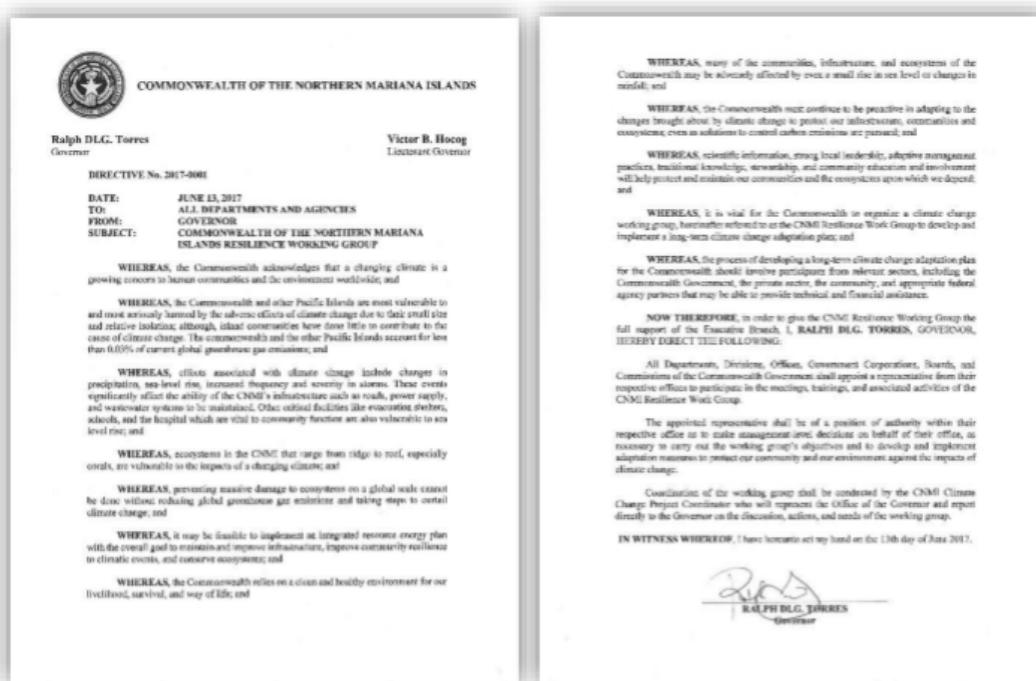
The current planning envelope in CNMI for buildings, utilities, and services ranges between 30 and 50 years with some large-scale projects aiming for a 75-year lifecycle. Land is often leased for 55 years, which can also influence planning horizons. The land use planning horizon in CNMI should be coupled with forecasts for coastal flooding through 2067 (50-year horizon). Additionally, designs and construction techniques should consider future climate conditions, such as an increase in high-intensity tropical cyclones.



Figure 4.2 New CUC ferro-cement water storage tank will not rust.

4.4 Revitalization of the Resilience Working Group (formerly CCWG)

Since 2005, the CNMI Government has worked with other Pacific Island governments, via the Pacific Islands Framework for Action on Climate Change, to increase capacity to be resilient to the impacts of climate change. In 2012, CNMI established the Climate Change Working Group (CCWG) to identify and assess vulnerabilities to climate change impacts. The working group was comprised of 33 participating CNMI and federal government agencies, business and tourism associations, and nongovernmental organizations. The CCWG transitioned into the Resilience Working Group (RWG) and several workshops were held in 2016 and 2017 to increase agency coordination for climate related issues. In 2017, the CNMI Climate Change Directive, issued by Governor Torres formally established the Resiliency Working Group and directed CNMI agencies to participate. The RWG can provide essential entry points to integrate SSG into short- and long-term agency planning and construction efforts. Previously the Climate Change Project Coordinator position was funded by the Office of Insular Affairs; however, this funding expired in 2018 and was not extended. To support planning continuity, OPD is taking steps to establish a similar coordinator position to facilitate integration of SSG to address climate-related impacts in CNMI planning efforts. Agency leads that participate in the RWG can act as liaisons to present agency needs and to help integrate SSG into agency practice. Agency leads can also help identify critical gaps in knowledge such as inadequate hazard maps or tools to select, design, and build adequate adaptations. All agency leads participating in the RWG should receive adequate training in climate change science, be familiar with hazards identified in the CNMI Standard State Mitigation Plan (2014) and the Climate Vulnerability Assessments for the Islands of Saipan (2014) and Rota and Tinian (2015), and be familiar with SSG Principles, adaptation tools, and potential funding sources, to promote SSG. Because lack of funding and capacity were challenges identified in prior adaptation planning conversations, expanded support – financial and technical – from the Office of the Governor and the CNMI legislature as well as assessment of other potential sources of assistance, will further bolster the viability of the RWG efforts.



Source: CNMI Office of the Governor, Directive No. 2017-0001, CNMI Resilience Working Group.

GIS User's Group

Reliable access for all CNMI agencies to the same information base regarding existing and planned development, land use designations, and current and projected natural hazard zones, is essential to provide a consistent platform for unified decision-making and planning efforts. Sharing information across agencies can be challenging without a single agency mandated to assemble, curate, and standardize data and information. Additional challenges may arise from conflicts in regulations regarding proprietary or sensitive information or agency authorities. To improve coordination and transfer of knowledge between agencies, the CNMI should allocate resources to develop a centralized GIS and information database. Expanding the present system at the BECQ to create a CNMI-wide usable system may be the most efficient way forward. As the clearinghouse for all planning related information, OPD should administer these GIS information resources and provide technical assistance to develop, maintain, and utilize the GIS information. Several agencies such as BECQ and DPL have well-developed GIS data about natural hazards, land use practices, and several local government functions. Through OPD coordination and administration, GIS data from multiple agencies should be shared to establish comprehensive GIS collections to provide consistent and standardized geospatial information for planning, development, and construction activities.

4.5 Building SSG Capacity via Federal Funding Programs and Community Support and Actions

Federal agencies are mandated by Executive Order 13843 to address the resilience of federal infrastructure and operations, and several federal agencies have regulatory requirements to address climate change via state-level planning initiatives and grants programs. CNMI has the opportunity to leverage federally-required planning processes to align with SSG Principles, especially resilience, to prepare competitive, high-quality applications for federal grants and other funding opportunities. As previously recommended in Section 4.1, a position within OPD should be dedicated to identify federal programs and prioritizing and aligning funding opportunities for implementing SSG and improving resilience. Without dedicated attention, many funding opportunities to improve

CNMI communities are missed or only pursued opportunistically without clear connection to larger planning trajectories and development goals. By developing competent staff and agency capacity, the CNMI can effectively compete for federal funds to implement SSG projects that increase resilience.

Building capacity among community stakeholders also is critical to work toward SSG. SSG support from political leaders and agency heads will help CNMI mainstream principles through new legislation, regulation updates, and resource management and development efforts. Community understanding and support for SSG initiatives can help influence political will and action. Moreover, informed and knowledgeable communities and individuals may take autonomous adaptation actions to protect vulnerable resources, such as voluntarily undertaking a shoreline or watershed revegetation project. Educating private-sector developers about potential cost-saving via environmentally friendly building designs can leverage their resources to further SSG Principles voluntarily or via the permitting process. Through expanding understanding and capacity, SSG Principles will be incorporated into multiple planning levels to support more resilient projects and communities in CNMI.



Figure 4.3 Smart, Safe Growth Workshop, 17 July

Climate Change in the Commonwealth of the Northern Mariana Islands: Indicators and Considerations for Key Sectors

Key Issues

- Dramatic increase in hot days and decrease in cold nights
- Fewer but stronger typhoons and storms
- Coral reef bleaching and loss
- Sea level rise

Indicators of Climate Change

Temperature

Indicator	How has it changed?	Projected future change
Hot days	↑	↑
Cold nights	↓	↓
Average air temperature	↑	↑

The number of **hot days** (above 90°F/32°C) in the Marianas have dramatically increased with nearly zero days in the early 1950s and a recent maximum of 120 days in 2016 (Marra and Kruk 2017). The best available data (the longest continuous record) is from the nearest weather station located at Andersen Air Force Base in Guam.

Hot days over 90°F are projected to increase by 115 days to 257 days on average by the end of this century (Marra and Kruk 2017). In other words, more than 70% of days in the year are expected to see temperatures over 90°F (Zhang et al. 2016).

Similarly there has been a dramatic drop in the number of **cold nights** (below approximately 65°F, or 18°C) from an average of 40 per year in 1950 to an average of zero cold nights annually since 2005 (Marra and Kruk 2017).

Average air temperature, as measured at Anderson Air Force Base, has risen overall since measurements started in 1953 (Marra and Kruk 2017). The first half of the record shows a stronger warming trend, with a slight cooling trend since 1980. However, overall air temperatures are increasing (Fig. 2). Average daily temperatures in Guam are projected to rise by 2.7-3.6°F (1.5-2.0°C) under a medium warming scenario and by 5.4-6.3°F (3.0-3.5°C) under a high scenario by 2080-2099 (Zhang et al. 2016; Wang et al. 2016).

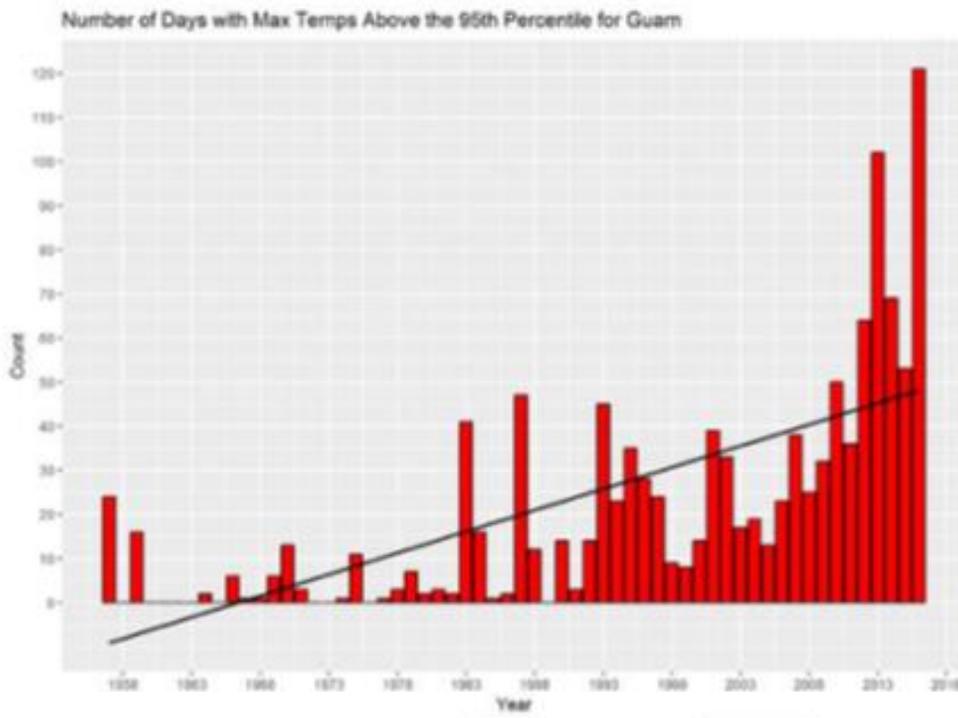


Figure 1. Annual count of days with maximum temperature greater than approximately 90° F (32° C) at Andersen Air Force Base in Guam. There has been a dramatic increase in the annual number of hot days. Source: Marra and Kruk 2017.

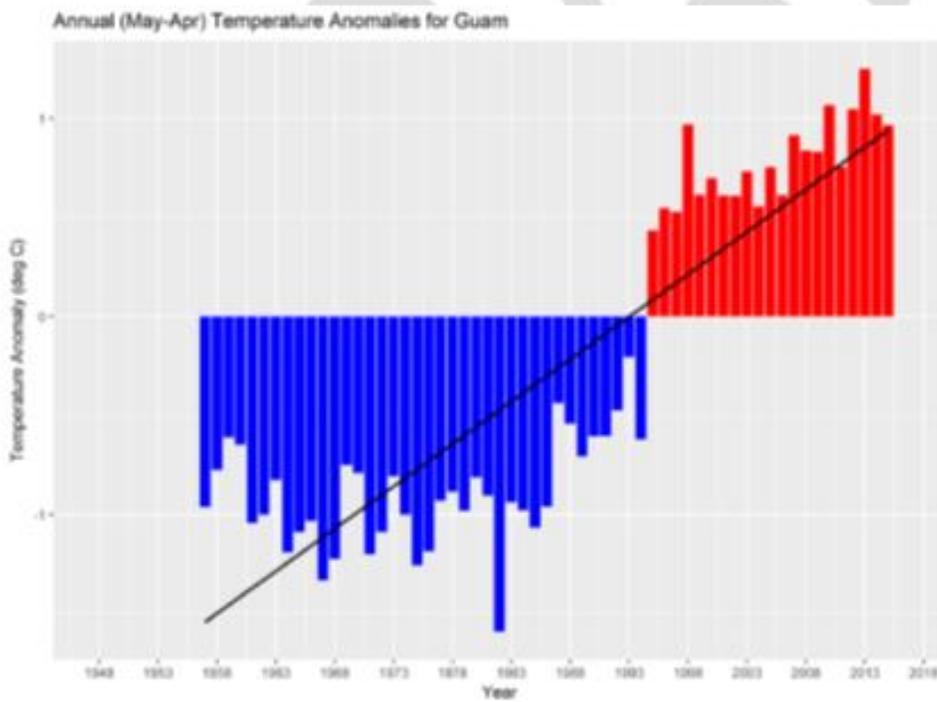


Figure 2. Annual temperature anomaly in the Mariana Islands (May-Apr). Data from Andersen Air Force Base in Guam. Source: Marra and Kruk 2017.

Appendix E – DLNR-DP&R Public Facilities List

Placeholder – Update with 2020 SCORP report details, publication pending

SUBCHAPTER 85-50.2

COMMONWEALTH PARKS, RECREATIONAL FACILITIES, AND TOURIST SITES

Public Beach Parks

1. Afetna Beach Park
2. San Isidro Beach Park
3. Susupe Regional Beach Park
4. Civic Center Beach Park
5. Kilili Beach Park
6. Garapan Shoreline Beach
7. Lower Base Beach (Across from DFW office)
8. Tanapag Beach Park
9. Paupau Beach Park
10. Marine Beach Park
11. Laulau Dive Site
12. Ladder Beach
13. Obyan Beach
14. Makaka Beach

Public Parks

1. San Antonio Youth Center
2. Garapan Central Park
3. Capitol Hill Open Ground Park
4. Kagman Homestead Park
5. Dandan Homestead Park

Recreational Facilities

1. Koblerville Softball Field (across from Koblerville Elementary School)
2. Koblerville Basketball Court and Open Grounds
3. San Antonio Basketball Court
4. Chalan Kanoa District #1 Basketball Court
5. Chalan Kanoa District #3 Basketball Court
6. Susupe, District #5 Basketball Court
7. Joaquin S. Tudela Memorial Park (San Vicente Basketball Court)
8. Gualo Rai Basketball Court
9. China Town Basketball Court
10. Navy Hill Open Field
11. Tanapag Basketball Court
12. Capitol Hill Basketball and Tennis Court
13. Kagman Basketball Court
14. Dandan Basketball Court
15. San Roque Basketball Court
16. As Matuis Basketball Court
17. Lower Navy Basketball Court

Tourist Sites

1. Korean Peace Memorial
2. Okinawa Peace Memorial
3. Last Command Post
4. Japanese Peace Memorial
5. Banzai Cliff Lookout
6. Grotto Dive Site
7. Bird Island Lookout
8. Kalabera Cave
9. Suicide Cliff Lookout
10. Japanese Jail
11. Susupe Peace Memorial
12. San Jose Memorial
13. Marpi Road Shoulder

CHAPTER II PROPOSED GOALS, OBJECTIVES AND POLICIES

Proposed goals, objectives and policies are presented first because once adopted they will influence the way the CNMI plans and manages its public lands in the future. Moreover, these statements establish a set of assumptions, principles, priorities, strategies and specific recommendations for the use of public lands. The remainder of the plan document must be consistent with and supportive of the intentions contained herein.

The terms "goal", "objective", and "policy" can have different meanings depending upon the context they are used. For the purposes of this Plan, they are defined as follows.

Goal

The long-term ideal or desired end product.

Objective

A statement that establishes a guideline for actions which achieve the goal, and may be quantitative.

Policy

Either an assumption or an action statement that is a step in implementation of an objective.

A. THE GOAL

The goal of the Public Land Use Plan is to assure that there are sufficient land resources to meet demands on public lands for services and the homestead program through the year 2015 and, as a second priority, to support the economic development of the CNMI.

B. THE OBJECTIVES

Four objectives have been identified for the CNMI Public Land Use Plan. These objectives are intended to provide guidance but also to allow for flexibility in response to various situations that cannot be anticipated.

1. Utilize the public land resources of the CNMI in an equitable* and efficient** manner.

- * equitable refers to equal access, allowing people of various income categories the use/access of public lands.

- ** efficient refers to land used at its highest and best use and in a manner which provides for public services in a cost effective manner.

2. Manage public lands to direct overall physical growth in a socially responsible manner.
3. Provide land resources to supply the demand for housing for the residents of the CNMI as provided by law.
4. Utilization of public lands to provide revenues for the management of public lands and for physical development that serves a public purpose.

C. THE POLICIES

The policies are divided into three categories.

- Overall policies are actions by the CNMI government which have an impact on the development of both private and public lands throughout the Commonwealth. These policies can be considered as assumptions since this planning effort has no direct ability to influence overall CNMI policy or enforcement measures. It is necessary to make these assumptions as they set the context for growth and are integral to an expected growth scenario.
- Public land-specific policies are those actions intended to apply only to publicly owned land.
- Island-specific policy is focused on a particular island and can be for either island-wide public and private lands, or specifically for public land.

1. Overall Policies

- 1.1 The CNMI will emphasize reserving land resources (public and privately owned) so that they will be available for future generations; appropriate sites will be developed as the long-term need is established.

- 1.2 The CNMI government will limit leases for large foreign-owned hotel and other foreign-owned commercial developments in favor of management policies and practices that emphasize developed and undeveloped uses by present and future generations of residents.
- 1.3 The agencies of the CNMI government will work together to coordinate all development efforts, and to ensure that infrastructure improvements keep pace with, and are appropriately located for commercial and residential development.
- 1.4 The CNMI will aggressively pursue policies that promote the protection of water resources by not allowing any use that could potentially contaminate aquifers and surface waters.
- 1.5 The CNMI will manage land resources through effective zoning and building codes for public and private lands.
- 1.6 Major developments on public or private lands that demand utility and other services must provide for their own infrastructure requirements on a self-sufficient basis, or pay an appropriate impact fee for upgrading infrastructure capacity. In addition, these developments must provide living quarters for their non-resident employees.

2. Public Land-Specific Policies

- 2.1 The CNMI government will set aside and protect prime agricultural land and other open space land uses that do not conflict with the provision of public services and programs.
- 2.2 The CNMI government will limit lands to be developed; lands that are developed will be developed according to an established priority order for each island, and be adequately supported by infrastructure and public services.

In particular, public lands served with existing infrastructure and public services will be developed before lands which are not served by infrastructure and services.
- 2.3 Labor-intensive industries will not be eligible for public land leases, the visitor industry excepted.
- 2.4 Lease pricing policies will reflect the social value of the use, and not necessarily maximize total lease revenues to the CNMI; such leases will contain provisions to ensure future uses are consistent with the original intent of the lease.

When, for social reasons, lease prices are not maximized based on the "highest and best" use of the land, this will be recognized as a subsidy for this use. This subsidy will be itemized on a case-by-case basis so that decision makers are aware of the actual cost, so as to make informed decisions.

- 2.5 When public lands are leased for private uses and developed in an "irreversible manner" (i.e. major construction) which is the "highest and best" (maximized economic return) use of the land, assuming this use is suitable to the site, the use will be allowed to remain; the lease amount will be based on market rates. Market rates are calculated by one of the following methods: comparable rents on private property, replacement cost, value of sales price of comparable land, all of the sale prices within the last six months.
- 2.6 The CNMI will adopt a land exchange policy whereby public lands will be offered in exchange for private lands in particular areas where existing public land resources are not sufficient to service the community.

As a corollary, when homestead areas that, due to land configuration and site planning, do not provide private lands suitable and convenient for private sector neighborhood commercial development, (an important form of community economic base,) public lands will be offered to private entrepreneurs for sale or exchange. In this situation the CNMI government will pursue a policy of land exchange to encourage neighborhood commercial development on privately owned land within homestead areas.

- 2.7 Existing conservation areas (forests, wildlife habitats, wetlands) should be exchanged for other vacant public land when all the conditions below are true:
 - a) The other public land is of equal or better utility;
 - b) The conservation area to be exchanged is suitable for development for a public purpose, and;
 - c) The other public land is not suitable for development, i.e., a slope of 20% or greater.
- 2.8 Priority for public land allocations will be given first to health and public safety, secondly to homesteads and other public services, then for economic activities including industry, tourism, commerce, and agriculture.

- 2.9 Not all public land resources are designated for a specific use at this time. Some lands are kept in a reserve category so that future decision makers may decide the best use of the land as the socioeconomic situation evolves. Lands in reserve capacity could be used in temporary status for conservation, recreation or agriculture.
- 2.10 The Homestead Program will include alternative housing styles so as to allow town houses and walk-up condominiums.
- 2.11 Selected public lands will be identified as multi-family home sites that will be sold at a discount to residents. This would be particularly suitable on small, isolated public lots and, in the case of Saipan, in the "Strategic Corridor."
- 2.12 Public land in the immediate vicinity of a wastewater treatment facility and/or power generation facility should be reserved for the anticipated expansion of these activities to meet current unmet and projected demand. The land may be developed in a non-permanent fashion until expansion needs are realized. In addition, public lands already developed in this vicinity for non-priority activities may be condemned and replaced. Privately owned land in the vicinity may also be condemned if needed for expansion purposes.

3. Island-Specific Policies

- 3.1 As currently practiced on Saipan, non-resident labor residential quarters will not be allowed on public land. However, if it can be demonstrated that public land proposed for non-resident housing is not suitable for a public use, then the request may be justified, particularly when this results in urban in-fill. Alternatively, the public land could be exchanged for private lands thereby maintaining net public land resources. This type of exchange can be executed on the same island or on an interisland basis.
- 3.2 Zoning within the Saipan Strategic Corridor will support and encourage increased density and urban in-fill.
- 3.3 Given the particular situation on Saipan, that it is experiencing rapid growth with a limited amount of developable public land resources, it is not prudent to allow additional private use of public land through leases which result in development in an irreversible manner (including golf courses) for non-public purposes unless one of the situations below is true:
- The land is unsuitable for any public purpose;
 - The prospective developer will replace the public land with private land of equal or better utility and value for a public purpose; or,
 - Public use of the land is not compatible with the existing surrounding development, or the public use would not have a "synergistic"* impact on the surrounding area.
- * *The term synergistic is used to denote that land uses, in addition to being compatible, are actually supportive of each other and add to each other's value. In such a case the value of synergistic uses are greater than the sum of the individual parts. For example, an elementary school and a housing development, a drug store and a food market, a hotel and a restaurant. Each of these pairs demonstrates land uses and activities that are supportive of each other, thereby giving them greater value than if they were not located near each other.*
- Note: the purpose of Policy 3.3 is not meant to freeze public lands as public. This policy is intended to maintain the amount of public lands. A land exchange between public and private ownership which does not diminish the amount of usable public lands on Saipan is consistent with this policy.
- 3.4 On Saipan, the relative share of homestead units in the multifamily category will reach 50% by the year 2015. Rota and Tinian will have a lower percentage unless demand is expressed for multifamily style housing.
- 3.5 Public lands in the Northern Islands will remain in their current designation as conservation areas.

CHAPTER III

THE CNMI PLANNING SCENARIO

The Public Land Use Plan is developed without the advantage of a Commonwealth-wide land use scheme for both public and private lands. Plans for the use of public and private lands are generally developed concurrently. In this way, the plans provide a proper context for each other and are, by design, integrated under the same legal and administrative framework and based on the same development scenario. As an example, most communities have an area designated as residential development at a certain density of units per specified area. From this, the government can estimate future demands for utilities, roads, parks, and services such as schools, fire and police. In addition, there is no explicit legal and administrative structure for land development and control (with the exception of certain Coastal Resources Management regulations and impending regulations for a zoning code).

Given this situation, there is a critical need to establish a contextual base line (an expected growth scenario) prior to the development of a plan for public lands.

Two levels of analysis have been pursued in the formulation of the CNMI Public Land Use Plan. The first level of analysis is at the macro level, evaluating socioeconomic trends and public policy implications and estimating the impact of land use overall on Saipan, Rota, and Tinian, referred to here as the Planning or Expected Growth Scenario. The second approach is to specifically analyze the demands and supply of public land resources through the year 2015 with a variety of analytic models utilizing socioeconomic data and principles of land use planning. There are a total of 11 analytic computer-assisted planning models that support the plan. These models are further described in the Plan Management chapter under "Prediction and Decision Models."

A. FIRST LEVEL ANALYSIS: THE EXPECTED GROWTH SCENARIO

Three growth scenarios were developed for the MPLC and discussed in detail at a three-day workshop among government and private sector representatives in March 1989. The results of that workshop form the foundation for the CNMI Planning Growth Scenario used as the basis for this Public Land Use Plan.

It should be noted that the Planning Growth Scenario is not necessarily the "preferred" path for growth but, instead, the "most likely" path of growth. Consequently, it is that "most likely" growth which forms the background for this Public Land Use Plan.

The First Level Analysis of the Expected Growth Scenario covers three areas:

- The levels of economic activity for the "basic" sectors of the CNMI economy: the visitor industry, garment industry, fishing and agriculture, and government, including resultant population projections for residents, non-residents, and visitors.
- Land use estimates for the major categories of land uses: residential, commercial, agricultural, institutional, industrial, recreation and an undesignated reserve for future planning purposes.
- Anticipated spatial growth patterns in terms of predominate land uses and densities.

1. ECONOMIC AND EMPLOYMENT PROJECTIONS FOR THE EXPECTED GROWTH SCENARIO

As a result of the economic forces impacting the CNMI and due to the influence of the proposed public policy, projections can be made about the future in terms of economic activity, employment, overall land use demands, and the spatial consequences of these demands.

The expected economic and employment projections for the CNMI through the year 2015 are presented in Table III-1, "Economic and Employment Projections Model." This model presents estimated growth in value of output (in constant dollars) for the visitor industry, garment and other manufactures, government, and agriculture and fisheries. Employment is estimated by using a ratio of Basic GIP per job. This model assumes that all employment in the CNMI is related to one of these sectors. It is assumed that resident workers will be employed first, and as 100% employment is reached the remaining labor demand will be supplied by non-resident workers.

Table III-1 provides a conservative estimate of growth, although only a few years ago such a projection would have seemed excessively high. For comparison purposes, a model has been constructed as Table III-1A, Rapid Visitor Industry Growth. This table indi-

TABLE III-1 ECONOMIC AND EMPLOYMENT PROJECTIONS

Year	Visitor Expenditure (\$1,000)	Garment & Manufacture (\$1,000)	Government (\$1,000)	Agriculture & Fishery (\$1,000)	Basic GIP (\$1,000)	% Employment Change	Annual Resident Workers	Annual Change	Efficiency	Change Foreign Workers	Total Foreign Workers
1987	\$196,407	\$30,000	\$130,000	\$2,000	\$358,407	14.651	5,174		1.00		9,477
1988	\$246,075	\$33,000	\$145,600	\$2,000	\$426,675	17.442	5,389	216	1.00	2,575	12,052
1989	\$318,358	\$34,650	\$151,424	\$2,000	\$506,432	20.702	5,614	225	1.00	3,036	15,088
1990	\$382,029	\$34,650	\$157,481	\$2,000	\$576,160	23.377	5,839	225	1.03	2,451	17,539
1991	\$439,334	\$34,650	\$163,780	\$2,000	\$639,764	25.909	6,072	234	1.04	2,299	19,837
1992	\$500,840	\$34,650	\$170,331	\$2,000	\$707,822	28.619	6,315	243	1.05	2,466	22,304
1993	\$560,941	\$34,650	\$177,145	\$2,000	\$774,736	31.341	6,568	253	1.05	2,470	24,774
1994	\$617,035	\$34,650	\$184,230	\$2,000	\$837,916	33.911	6,830	263	1.05	2,307	27,081
1995	\$678,739	\$34,650	\$191,600	\$2,000	\$906,988	36.721	7,104	273	1.05	2,537	29,617
1996	\$712,676	\$34,650	\$199,264	\$2,000	\$948,589	38.407	7,388	284	1.05	1,402	31,020
1997	\$748,309	\$34,650	\$207,234	\$2,000	\$992,194	40.175	7,683	296	1.05	1,472	32,492
1998	\$785,725	\$34,650	\$215,524	\$2,000	\$1,037,898	42.028	7,990	307	1.05	1,546	34,037
1999	\$825,011	\$34,650	\$224,145	\$2,000	\$1,085,806	43.970	8,310	320	1.05	1,623	35,660
2000	\$866,262	\$34,650	\$233,110	\$2,000	\$1,136,022	46.006	8,642	332	1.05	1,704	37,364
2001	\$883,587	\$34,650	\$242,435	\$2,000	\$1,162,672	47.078	8,988	346	1.05	726	38,090
2002	\$901,259	\$34,650	\$252,132	\$2,000	\$1,190,041	48.179	9,348	360	1.05	741	38,832
2003	\$919,284	\$34,650	\$262,217	\$2,000	\$1,218,151	49.310	9,722	374	1.05	756	39,588
2004	\$937,669	\$34,650	\$272,706	\$2,000	\$1,247,026	50.471	10,110	389	1.05	772	40,360
2005	\$956,423	\$34,650	\$283,614	\$2,000	\$1,276,687	51.663	10,515	404	1.05	788	41,148
2006	\$975,551	\$34,650	\$294,959	\$2,000	\$1,307,160	52.888	10,936	421	1.05	804	41,952
2007	\$995,062	\$34,650	\$306,757	\$2,000	\$1,338,470	54.146	11,373	437	1.05	821	42,773
2008	\$1,014,964	\$34,650	\$319,028	\$2,000	\$1,370,641	55.438	11,828	455	1.05	837	43,610
2009	\$1,035,263	\$34,650	\$331,789	\$2,000	\$1,403,701	56.766	12,301	473	1.05	855	44,465
2010	\$1,055,968	\$34,650	\$345,060	\$2,000	\$1,437,678	58.130	12,793	492	1.05	872	45,337
2011	\$1,066,528	\$34,650	\$358,863	\$2,000	\$1,462,040	59.100	13,305	512	1.05	459	45,796
2012	\$1,077,193	\$34,650	\$373,217	\$2,000	\$1,487,060	60.096	13,837	532	1.05	464	46,260
2013	\$1,087,965	\$34,650	\$388,146	\$2,000	\$1,512,761	61.119	14,390	553	1.05	469	46,729
2014	\$1,098,845	\$34,650	\$403,672	\$2,000	\$1,539,166	62.170	14,966	576	1.05	475	47,204
2015	\$1,109,833	\$34,650	\$419,818	\$2,000	\$1,566,302	63.249	15,565	599	1.05	481	47,685

TABLE III-1A RAPID VISITOR INDUSTRY GROWTH ECONOMIC AND EMPLOYEMENT PROJECTIONS

Year	Visitor Expenditure (\$1,000)	Garment & Manufacture (\$1,000)		Government (\$1,000)	Agriculture & Fishery (\$1,000)	Basic GIP (\$1,000)	% Employment Change	Annual Resident Change Workers	Annual Change	Efficiency Workers	Change Foreign Workers	Total Foreign Workers
		Manufacture (\$1,000)	Garment (\$1,000)									
1987	\$196,407	\$30,000	\$130,000	\$130,000	\$2,000	\$358,407	14.651	5,174	216	1.00	1.00	9,477
1988	\$246,075	\$33,000	\$145,600	\$145,600	\$2,000	\$426,675	17.442	2,791	216	1.00	2,575	12,052
1989	\$318,358	\$34,650	\$151,424	\$151,424	\$2,000	\$506,432	20.702	3,260	225	1.00	3,036	15,088
1990	\$382,029	\$34,650	\$157,481	\$157,481	\$2,000	\$576,160	23.377	2,675	225	1.03	2,451	17,539
1991	\$458,435	\$34,650	\$163,780	\$163,780	\$2,000	\$658,865	26.690	3,313	234	1.04	3,080	20,618
1992	\$550,122	\$34,650	\$170,331	\$170,331	\$2,000	\$757,103	30.633	3,943	243	1.05	3,700	24,318
1993	\$660,146	\$34,650	\$177,145	\$177,145	\$2,000	\$873,941	35.397	4,763	253	1.05	4,511	28,829
1994	\$858,190	\$34,650	\$184,230	\$184,230	\$2,000	\$1,079,071	43.769	8,372	263	1.05	8,109	36,939
1995	\$1,115,647	\$34,650	\$191,600	\$191,600	\$2,000	\$1,343,897	54.581	10,812	273	1.05	10,539	47,477
1996	\$1,450,342	\$34,650	\$199,264	\$199,264	\$2,000	\$1,686,255	68.562	13,981	284	1.05	13,697	61,174
1997	\$1,812,927	\$34,650	\$207,234	\$207,234	\$2,000	\$2,056,811	83.695	15,133	296	1.05	14,837	76,011
1998	\$2,266,159	\$34,650	\$215,524	\$215,524	\$2,000	\$2,518,332	102.545	18,851	307	1.05	18,543	94,555
1999	\$2,719,396	\$34,650	\$224,145	\$224,145	\$2,000	\$2,980,185	121.409	18,864	320	1.05	18,544	113,099
2000	\$3,127,299	\$34,650	\$233,110	\$233,110	\$2,000	\$3,397,059	138.433	17,024	332	1.05	16,692	129,791
2001	\$3,283,664	\$34,650	\$242,435	\$242,435	\$2,000	\$3,562,749	145.189	6,756	346	1.05	6,410	136,201
2002	\$3,447,847	\$34,650	\$252,132	\$252,132	\$2,000	\$3,736,629	152.279	7,090	360	1.05	6,730	142,931
2003	\$3,620,240	\$34,650	\$262,217	\$262,217	\$2,000	\$3,919,107	159.720	7,441	374	1.05	7,067	149,998
2004	\$3,801,252	\$34,650	\$272,706	\$272,706	\$2,000	\$4,110,608	167.529	7,809	389	1.05	7,420	157,418
2005	\$3,991,314	\$34,650	\$283,614	\$283,614	\$2,000	\$4,311,578	175.724	8,195	404	1.05	7,791	165,209
2006	\$4,190,880	\$34,650	\$294,959	\$294,959	\$2,000	\$4,522,489	184.324	8,601	421	1.05	8,180	173,389
2007	\$4,400,424	\$34,650	\$306,757	\$306,757	\$2,000	\$4,743,831	193.351	9,026	437	1.05	8,589	181,978
2008	\$4,620,445	\$34,650	\$319,028	\$319,028	\$2,000	\$4,976,123	202.823	9,473	455	1.05	9,018	190,996
2009	\$4,851,467	\$34,650	\$331,789	\$331,789	\$2,000	\$5,219,906	212.765	9,942	473	1.05	9,469	200,464
2010	\$5,094,041	\$34,650	\$345,060	\$345,060	\$2,000	\$5,475,751	223.199	10,434	492	1.05	9,942	210,406
2011	\$5,144,981	\$34,650	\$358,863	\$358,863	\$2,000	\$5,540,494	225.820	2,621	512	1.05	2,109	212,515
2012	\$5,196,431	\$34,650	\$373,217	\$373,217	\$2,000	\$5,606,298	228.483	2,663	532	1.05	2,131	214,646
2013	\$5,248,395	\$34,650	\$388,146	\$388,146	\$2,000	\$5,673,191	231.190	2,707	553	1.05	2,153	216,800
2014	\$5,300,879	\$34,650	\$403,672	\$403,672	\$2,000	\$5,741,201	233.941	2,751	576	1.05	2,176	218,975

cates growth rates that are necessary to meet all the currently planned or proposed projects on Saipan, the full development of the mega-resorts on Rota in two to three years, and the impact of casino gambling on Tinian which may come into play in about five years. After 1997, these developments will begin to mature with declining growth rates; after the year 2000 the growth rate steadily declines. The results of such a growth scenario depicted in Table III-1A are startling and are included in the plan document as a reference point for rapid growth in tourism. Table III-1A does not constitute a recommendation or represent what is expected to occur. Table III-1 illustrates the expected growth scenario.

The results of the Expected Growth Model are described below, sector by sector, with reference to the Rapid Visitor Growth Scenario when appropriate.

a. The Visitor Industry

Growth in the visitor industry has been accelerating. There was 15% growth in 1987 over 1986, 25% growth in 1988 over 1987, and there was a 36% growth in arrivals during 1989 as compared to arrivals in 1988. It seems clear that moderate to high growth will continue into the near future.

Eventually, however, growth rates are expected to decline for several reasons, including:

- Competing destinations will divert visitors from the CNMI.
- Insufficient water supplies.
- Increasing costs of development due to marginal costs of infrastructure improvements.
- Air transportation facilities and carriers will be inadequate to support rapid growth.
- Labor shortages will hinder the construction and operation of tourist related activities.
- Hotel construction will not be able to keep pace with demand.
- The impact of gambling on Tinian will not be significant.
- The social/political response to growth will become increasingly negative.
- Introduction of government regulations and land use controls will slow the pace of growth and make it more expensive.

Based on these assumptions the current surge in visitor arrivals will steadily decline to an annual growth rate of approximately 2% beginning in the year 2001,

and to 1% in 2010. Even so, it is estimated that by 2015 there will be over a million visitors to the CNMI (Table III-2). The assumptions presented here must be monitored with adjustments made to growth projections accordingly.

If these assumptions are relaxed the Rapid Visitor Industry Expansion Model sets the high end of growth possibilities. In this model the number of yearly visitors approaches 5 million by the year 2015 and, to support this, there must be over 35,000 hotel rooms and visitor-used condominiums.

In Tables III - 3, 3A and III - 4, 4A, are presented the change in the number of visitors, hotel rooms and condos, and the number of non-residents necessary to fill the direct and indirect jobs created by the visitor industry, for both expected and rapid growth possibilities (rapid growth tables demoted by "A"). In Table 4 and 4A the figures are broken down by island: Saipan, Rota, and Tinian.

b. Garment And Other Manufacturing

After dramatic increases in the garment industry in recent years manufacturing growth will slow to 5% in 1989 and no growth in 1990. Interest has been expressed for as many as five new garment factories to be located on Tinian (all on private land). Because of this, increases in the garment industry over the next several years are a possibility. Until these plans are realized, however, the garment industry is actually expected to decline but this decrease will be offset by other manufacturing gains so that the net result will remain the same. This sector must be closely monitored with projections updated if new garment industries start up.

c. Government

Government expenditures were expected to decrease by 4% in 1989 after annual increases of 24% and 12% in 1987 and 1988 respectively. Government expenditures should remain at a 4% annual increase matching resident population growth, and perhaps a little more for current unmet demands for services. Land demands for government administration on Saipan will be marginal, as use of existing public lands on Capitol Hill and Lower Base can be intensified.

However, while growth in government administration is not expected to result in marked demand for public land resources, the growth in general community based services, such as for schools and neighborhood recreation, will be significant and will exert concurrent demand for additional public land. Those increases will be directly related to growth in the resident population and, to a lesser degree, to non-residents and visitors.

TABLE III-2 EXPECTED AND RAPID VISITOR INDUSTRY GROWTH IMPACTS MODEL

Year	EXPECTED GROWTH SCENARIO					RAPID VISITOR INDUSTRY GROWTH SCENARIO				
	Visitor Expenditure (\$1,000)	% Change	Estimated Arrivals	Rooms Required	Rooms @ 75% Occupancy	Visitor Expenditure (\$1,000)	% Change	Estimated Arrivals	Rooms Required	Rooms @ 75% Occupancy
1987	\$196,407		186,203	1,020	1,360	\$196,407		186,203	1,020	1,360
1988	\$246,075	20%	233,291	1,278	1,704	\$246,075	20%	233,291	1,278	1,704
1989	\$318,358	23%	301,818	1,654	2,205	\$318,358	23%	301,818	1,654	2,205
1990	\$382,029	20%	362,182	1,985	2,646	\$382,029	20%	362,182	1,985	2,646
1991	\$439,334	15%	416,509	2,282	3,043	\$458,435	20%	434,618	2,381	3,175
1992	\$500,840	14%	474,820	2,602	3,469	\$550,122	20%	521,542	2,858	3,810
1993	\$560,941	12%	531,798	2,914	3,885	\$660,146	20%	625,850	3,429	4,572
1994	\$617,035	10%	584,978	3,205	4,274	\$858,190	30%	813,605	4,458	5,944
1995	\$678,739	10%	643,476	3,526	4,701	\$1,115,647	30%	1,057,686	5,796	7,727
1996	\$712,676	5%	675,650	3,702	4,936	\$1,450,342	30%	1,374,992	7,534	10,046
1997	\$748,309	5%	709,432	3,887	5,183	\$1,812,927	25%	1,718,740	9,418	12,557
1998	\$785,725	5%	744,904	4,082	5,442	\$2,266,159	25%	2,148,425	11,772	15,696
1999	\$825,011	5%	782,149	4,286	5,714	\$2,719,390	20%	2,578,110	14,127	18,836
2000	\$866,262	5%	821,257	4,500	6,000	\$3,127,299	15%	2,964,827	16,246	21,661
2001	\$883,587	2%	837,682	4,590	6,120	\$3,283,664	5%	3,113,068	17,058	22,744
2002	\$901,259	2%	854,436	4,682	6,242	\$3,447,847	5%	3,268,721	17,911	23,881
2003	\$919,284	2%	871,524	4,775	6,367	\$3,620,240	5%	3,432,157	18,806	25,075
2004	\$937,669	2%	888,955	4,871	6,495	\$3,801,252	5%	3,603,765	19,747	26,329
2005	\$956,423	2%	906,734	4,968	6,625	\$3,991,314	5%	3,783,953	20,734	27,645
2006	\$975,551	2%	924,869	5,068	6,757	\$4,190,880	5%	3,973,151	21,771	29,028
2007	\$995,062	2%	943,366	5,169	6,892	\$4,400,424	5%	4,171,809	22,859	30,479
2008	\$1,014,964	2%	962,233	5,273	7,030	\$4,620,445	5%	4,380,399	24,002	32,003
2009	\$1,035,263	2%	981,478	5,378	7,171	\$4,851,467	5%	4,599,419	25,202	33,603
2010	\$1,055,968	2%	1,001,107	5,486	7,314	\$5,094,041	5%	4,829,390	26,462	35,283
2011	\$1,066,528	1%	1,011,118	5,540	7,387	\$5,144,981	1%	4,877,684	26,727	35,636
2012	\$1,077,193	1%	1,021,230	5,596	7,461	\$5,196,431	1%	4,926,461	26,994	35,992
2013	\$1,087,965	1%	1,031,442	5,652	7,536	\$5,248,395	1%	4,975,725	27,264	36,352
2014	\$1,098,845	1%	1,041,756	5,708	7,611	\$5,300,879	1%	5,025,483	27,537	36,716
2015	\$1,109,833	1%	1,052,174	5,765	7,687	\$5,353,888	1%	5,075,737	27,812	37,083

TABLE III - 3 VISITOR, ROOM DEMAND, AND NON-RESIDENT LABOR PROJECTIONS 1989 - 2015				
Year	Visitors	Visitors Per Day	Hotel Rooms/Condos Demanded	Non-resident Labor Less Garment Workers
1989	301,818	2,977	2,205	11,388
2015 (est.)	1,052,174	10,378	7,687	43,985
Change	750,356	7,401	5,482	32,597

TABLE III - 3A RAPID VISITOR INDUSTRY GROWTH VISITOR, ROOM DEMAND, AND NONRESIDENT LABOR PROJECTIONS 1989 - 2015				
Year	Visitors	Visitors Per Day	Hotel Rooms/Condos Demanded	Non-resident Labor Less Garment Workers
1989	301,818	3,002	2,223	11,388
2015 (est.)	5,075,737	50,479	37,392	217,474
Change	4,773,919	47,478	35,169	206,086

These models assume that visitors stay an average of 3.63 days, spend \$293 per day and generate an occupancy rate of 1.8 persons per hotel room with hotels at 75% occupancy.

TABLE III - 4 NUMBER OF HOTEL ROOMS, VISITORS, AND NON-RESIDENT WORKERS BY ISLAND, 1989 - 2015						
	No. Existing 1989	Rooms Projected 2015	Percent of Total	No. of Visitors in 2015	No. Daily Visitors in 2015	Non-resident Labor Less Garment in 2015
Saipan	2,000	5,937	77%	812,639	8,015	33,971
Rota	100	1,250	16%	171,096	1,688	7,152
Tinian	40	500	7%	68,439	675	2,861
Total	2,140	7,687	100%	1,052,174	10,378	43,985

d. Agriculture And Fisheries

Agriculture and fisheries are expected to remain constant in terms of value of GIP. But this steady state will only be possible with increases in fisheries as agriculture declines. Agriculture will necessarily decline as demand for developable land for community development supplants agricultural uses both in the private and public domain. With careful programming, however, agriculture (especially cultiva-

tion) can become more efficient and target specific local and visitor markets with high value added crops.

e. Employment and Economic Growth

Employment will increase from an estimated 20,702 in 1989 to 59,137 in 2015. Of this number 15,565 will be from the resident work force and 43,572 must be supplied from non-resident labor. If there is rapid expansion of the visitor industry as depicted in Table

TABLE III - 4A						
RAPID VISITOR INDUSTRY GROWTH						
NUMBER OF HOTEL ROOMS, VISITORS, AND NON-RESIDENT WORKERS						
BY ISLAND, 1989 - 2015						
	No. Existing 1989	Rooms Projected 2015	Percent of Total	No. of Visitors in 2015	No. Daily Visitors in 2015	Non-resident Labor Less Garment in 2015
Saipan	2,000	17,500	49%	2,478,042	24,645	106,174
Rota	100	10,745	30%	1,521,518	15,132	65,191
Tinian	40	7,600	21%	1,076,178	10,703	46,110
Total	2,140	35,845	100%	5,075,737	50,479	217,474

III - 1A, there will be 216,634 jobs in the year 2015 with 201,069 positions filled by non-residents. Residents are fully employed under both scenarios at the 15,565 level.

f. Population

Population estimates for the resident population are made irrespective to economic growth. Non-residents, however, are estimated by the number of jobs left vacant due to lack of resident work force. The non-residents are divided by island according to the relative number of hotel rooms per island projected by the year 2015. This projection method is reasonably

accurate, but the factors upon which the model is based are subject to the changing economy experienced by CNMI overall, and by each island. The results are provided in Table III - 5. Table III - 5A presents population growth with rapid growth of the visitor industry.

TABLE III - 5				
ESTIMATED RESIDENT, NON-RESIDENT AND VISITOR POPULATION BY 2015				
	Total	Resident	Non-resident	Visitor
Saipan	97,995	52,309	37,671	8,015
Rota	13,161	4,321	7,152	1,688
Tinian	5,910	2,374	2,861	675
Total	117,066	59,004	47,685	10,378

TABLE III - 5A				
RAPID VISITOR INDUSTRY GROWTH				
ESTIMATED RESIDENT, NON-RESIDENT AND VISITOR POPULATION BY 2015				
	Total	Resident	Non-resident	Visitor
Saipan	186,827	52,309	109,874	24,645
Rota	84,643	4,321	65,191	15,132
Tinian	59,186	2,374	46,110	10,703
Total	330,657	59,004	221,174	50,479

2. PROJECTING LAND USES FOR THE PLANNING GROWTH SCENARIO

A model for projecting land use has been developed for the CNMI Public Land Use Plan. This model projects land uses based on population increases and assumed densities of persons per acre for each land use. Independent models have been constructed for Saipan, Rota and Tinian. The estimated land demanded to support this scenario was based on estimated population and an assumed density level. Estimates for land demands must be an ongoing process of a planning program as actual development trends are realized.

Land uses have been categorized as:

- Undeveloped
- Residential
- Commercial
- CNMI Government
- Industrial
- Tourist
- Agricultural (cultivation only)
- Recreation
- Private Institutional

Changes in land uses (public and private) as generated by the model for the years 1989 and 2015 are provided below by island (Table III - 6).

3. LOCATION AND DENSITIES OF LAND USES

Using the projected land use and development patterns as a guide, it is possible to project future predominant land uses and densities on Saipan, Rota and Tinian. Maps for each island are provided, illustrating projected predominant land uses and densities. Note: The uses of land and densities presented on these maps are a reflection of what is expected to occur, not necessarily what is recommended. (MAP III-1,-2,&3)

These maps use the terminology "low density," "medium density" and "high density." These terms are defined below.

Low Density

- Agricultural use is for grazing or small scale cropping
- Single-family houses are on large lots or surrounded with many vacant lots.
- Commercial activity is not concentrated and is located in buildings less than three stories in height.

- Light industry is present.
- Hotels and resorts are present but generally isolated from each other.

Medium Density

- Typically, land for agricultural uses which is declining in favor of urban uses.
- Single-family houses are concentrated with little open space between lots; few if any vacant lots exist, some multifamily structures may be present.
- There are concentrations of commercial activity (wholesale and retail) with some shopping malls and structures that may exceed three stories.
- Hotels and resorts may form a dominant presence around the shore or other attraction.
- Light industrial uses may be in substantial buildings or clustered in close proximity.

High Density

- Agricultural uses are generally not present.
- Single-family residential areas are fully developed, multifamily structures make up the majority of new residential construction and older single family areas are being replaced with multifamily structures rising above 3 stories.
- Commercial uses occupy the frontage of all major roads and there are major shopping districts/malls with high rise mixed use commercial/office developments.
- Hotels and resorts will become dominant features around the shore and other attractions.
- Light; industries may be in large buildings or clustered in close proximity to each other.

The planning growth scenario; economic, employment and population projections; overall land use projections; and the density and location of growth are macro-factors shaping the CNMI's land use future. The next section focuses on the micro-factors and their impact on public lands specifically.

TABLE III - 6
CURRENT AND PROJECTED LAND NEEDS BY ISLAND
BASED ON THE EXPECTED GROWTH SCENARIO
1989 - 2015

SAIPAN					
EXPECTED GROWTH SCENARIO		Total 84,671	Resident 52,309 Non-residents	Non-resident 26,600 Per/Ac	Visitors 5,762 80
LAND USED AS:	ESTIMATED ACRES 1989	CURRENT DENSITY Per/Ac	EXPECTED DENSITY Per/Ac	ACREAGE NEEDS IN 2015	NEEDS - CURRENT
Undeveloped	26,279	2	4	22,428	(3,851)
Residential	1,275	34	20	3,037	1,762
Commercial	235	195	225	409	174
CNMI Government	409	80	80	903	494
Industrial	321	143	270	341	20
Tourism	520	51	25	1,591	1,071
Agriculture	311	147	450	205	(106)
Recreation	385	119	114	808	423
Private Inst.	25	1833	2400	38	13
TOTAL	29,760			29,760	(0)

Residential density is calculated as marginal increases. For planning purposes the existing residential density is assumed to remain constant; the density figures are for the marginal increases in population. Note: The density figure in the table is for resident population, while the density figure in the title block is for nonresidents.

Government density is calculated with non-residents and visitors having half the weight of residents.

Tourist density is the number of visitors and non-residents.

All other activities use total population.

Needs-Current is the difference between land currently used by a particular activity and that demanded in 2015.

TABLE III - 6(CONTINUED)
ESTIMATED PUBLIC AND PRIVATE LAND USES: 1989 - 2015

ROTA					
EXPECTED GROWTH SCENARIO	Total	Residents	Non-residents	Visitors	
	19,494	4,321	12,123	3,050	
		Non-residents	Per/Ac	80	
LAND USED AS:	ESTIMATED ACRES 1989	CURRENT DENSITY Per/Ac	EXPECTED DENSITY Per/Ac	ACREAGE NEEDS IN 2015	NEEDS - CURRENT
Undeveloped	18,370	0.12	2	14,335	(4,035)
Residential	88	25	20	443	355
Commercial	9	253	250	104	95
CNMI Government	104	19	25	606	502
Industrial	16	142	1000	26	10
Tourism	25	26	10	2,165	2,140
Agriculture	2,151	1	10	2,597	446
Recreation	40	57	50	519	479
Private Inst.	9	253	1500	17	8
TOTAL	20,812			20,812	(0)
TINIAN					
EXPECTED GROWTH SCENARIO	Total	Residents	Non-residents	Visitors	
	8,443	2,374	4,849	1,220	
		Non-residents	Per/Ac	80	
LAND USED AS:	ESTIMATED ACRES 1989	CURRENT DENSITY Per/Ac	EXPECTED DENSITY Per/Ac	ACREAGE NEEDS IN 2015	NEEDS - CURRENT
Undeveloped	5,475	0.33	2	4,460	(1,015)
Residential	79	20	20	190	111
Commercial	39	46	60	119	80
CNMI Government	64	22	25	190	126
Industrial	14	128	300	24	10
Tourism	40	19	12	396	356
Agriculture	522	3	10	712	190
Recreation	5	358	50	142	137
Private Inst.	2	895	1000	7	5
TOTAL	6,240			6,240	0

Appendix H - DPL 2019 PLUP Growth Projections

Excerpts from 2019 Public Land Use Plan (PLUP)



VI. SOCIO-ECONOMIC FORECAST

1. POPULATION TRENDS/PROJECTIONS

As part of the Public Land Use Plan, John M. Knox & Associates, Inc. prepared report titled *Population Forecasts for Master Planning by CNMI, DPL*. (See: Appendix A) the key purposes of the report were:

1. Estimates of “NMD” (Northern Marianas Descent – Chamorro and/or Carolinian) population and Homestead Award Eligibility for 2028, by island.
2. Total Population estimates for 2028, by island, to guide other plan development such as governmental services, infrastructure, conservation and recreation needs.
3. A *secondary* Model purpose involves job estimation which is a critical topic in the CNMI.¹ However, the Model emphasis on NMD population projection requires primary attention to things like natural population increase and net migration age-sex distribution.

The population projections used in the model considered three (3) different scenarios of economic growth for the main inhabited islands of CNMI – Saipan, Tinian, and Rota. The three (3) scenarios are:

Scenario A is a High-Growth scenario. For Saipan, it flows from optimistic visitor arrival scenarios developed for the Marianas Visitors Authority (MVA) in a January 2017 report by consultants Horwath HTL.² For Tinian, it assumes two casino hotels and construction of both military training facilities and a divert airfield. For Rota, it assumes three small upscale hotels.

Scenario B is a Medium-Growth scenario, with limited change. For Saipan, it assumes visitor arrivals plateau at the level considered “sustainable” (in terms of infrastructure capacity) in the Horwath report. For Tinian, it assumes just one casino hotel plus military activities. For Rota, it assumes one upscale hotel.

¹ This chapter was completed in January 2018, before any resolution of the CW-1 visa issue.

² Horwath HTL. *Tourism Development in the US Commonwealth of the Northern Mariana Islands: A Feasibility & Sustainability Study*. Prepared for the MVA. January 2017.

Scenario C is the only one assuming phase-out of CW-1 visa workers and probable attendant economic devastation – a Poor/Negative scenario. Saipan visitor arrivals would plunge, and then slightly recover. Rota and Tinian would have minimal budget-hotel development, and Tinian would be assumed to have the military training but not the divert airfield. (See: Appendix A)

The Model estimates the number of Eligible NMD adults (including those who may already have awards) as the sub-set of total NMD population who are not disqualified due to being married to an NMD spouse and who meet the eligibility criteria of not being current homeowners and having household incomes under \$70,000. Historical research established that NMD net migration patterns have been much less responsive to changes in economic conditions than other CNMI population groups. (See: Appendix A)

Figure 40 to Figure 42 of the population forecast provided in Appendix A show Model estimates for each island, by scenario. For the 2028 target year, Saipan estimates vary from 4,691 to 5,038; Tinian, from 382 minimum to 409 maximum; and Rota, a similar range of from 368 minimum to 421 maximum. On a CNMI-wide base, the 2028 numbers vary from 5,487 to 5,869.

There are important differences between these population-based estimates and data obtained from DPL about awards already made. For Saipan, the estimated number of eligible NMD applicants (including any who may already have received awards) ten years from now is far greater than the number of awards as of 2017. But on Tinian and particularly on Rota, there have already been far more awards made than the estimated future number of eligible applicants. The Rota figure is roughly equal to the island’s current population.

Table No. 6: Homestead Awards as of 2017 Versus Estimated 2028 “Eligible NMD”

	Saipan	Tinian	Rota	Total
TOTAL Homesteads Awarded by 2017:	1,997	912	2,597	5,506
Eligible NMD Applicants by 2028 (Scenario A)	5,038	409	421	5,869
Eligible NMD Applicants by 2028 (Scenario B)	4,769	366	368	5,503
Eligible NMD Applicants by 2028 (Scenario C)	4,691	382	413	5,487

It should be understood that some of the awards made by DPL may have lapsed (due to death of awardees with no heirs). Additionally, for Saipan, about 400 homesteaders who have received agricultural lots under the Homestead Waiver Act remain eligible for

village lots on the island, though without further research there is no way to know if a homesteader has already been awarded both.

Total Population

Total population was calculated as the sum of specific estimates on each island of three different components: (1) NMD; (2) Non-NMD Residents of CNMI; and (3) (Foreign) Non-Residents. Historical data indicate that population levels for the latter two components – which represent the majority of the CNMI population – have varied much more greatly as prevailing economic conditions changed.

Therefore, the total population levels for different islands show much greater variation according to the economic scenarios. Of the population forecast show these estimates for Saipan, Tinian, and Rota by scenarios. Saipan estimates for 2028 vary from a low of 40,457 to a high of 67,414; Tinian, from 2,325 to 8,707; and Rota, from 2,284 to 3,577. On a CNMI-wide basis, the numbers add to represent a range from 45,066 to 79,698.

These numbers are significantly different by scenario, and that is because of the wide range of economic futures that now appear possible for the Commonwealth. The most optimistic Scenario A – primarily driven by some of the visitor arrival assumptions in the Horwath Report commissioned by the Marianas Visitor Authority – assumes ongoing strong increases in tourism (and, implicitly, some sort of solutions to potential infrastructure and labor constraints, as well as political support by residents).

By contrast, the essentially catastrophic Scenario C is based on an equally possible future, characterized by loss of CW-1 workers and a reduction in tourism equivalent to what could happen if the Chinese market is blocked by elimination of “paroles” for visitors from China.

In this much greater range of possibilities (compared to the Eligible NMD figures previously summarized), the minimal 2028 Scenario C number is 64% of the maximal Scenario A number for Rota, 60% for Saipan, and just 27% for Tinian. The range is relatively greater for Tinian because economic activities proposed for that island – particularly casino-hotels, but also military activities – is so wide, especially in comparison to existing population. These activities could involve labor demand far in excess of the island’s supply and so require substantial in-migration.

The population forecast report has attempted to stress not only the CNMI's great uncertainty over economic futures, but also data limitation challenges facing Model development and validity.

The Model could be modified and re-used in future years once 2020 Census data become available. However, this assumes that:

- The 2020 Census for the CNMI overall includes the detailed race/ethnic and other characteristics normally gathered in the American Community Survey (ACS). The Census Bureau has not conducted the ACS in the CNMI or American Samoa in intercensal years - the only two U.S. areas for which ACS numbers have not been collected. It is likely but not certain that the ACS will be done in CNMI in 2020.

- These data will actually be available (either as tables or in Public Use Microdata Samples [PUMS]) in ways that permit separating age-sex characteristics for each of the three key population components considered here - i.e., NMD, Non-NMD CNMI Residents, and (Foreign) Non-Residents. That availability needs to be by island.

Whether directly or through the Central Statistics Division, it is suggested that DPL stay in touch with both the Census Bureau and its Congressional delegate to monitor debates in Congress about adequate funding and questionnaire content for the 2020 Census.

Appendix I – Population Forecasts for Master Planning by the CNMI Dept. of Public Lands, Development and Results of Forecast Model

John M. Knox & Associates Report for DPL PLUP Update, January 31, 2018

Excerpts include Table of Contents, Overview, and Summary of Key Results for Planning Purposes

Full report is available as Appendix A in [2019 DPL PLUP](#)



JOHN M. KNOX & ASSOCIATES, INC.

POPULATION FORECASTS FOR MASTER PLANNING BY CNMI DEPT. OF PUBLIC LANDS

Development and Results of Forecast Model

January 31, 2018

Prepared for:

CNMI Dept. of Public Lands
SSFM-CNMI (PEGS)
Chris Hart and Partners

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John M. Knox & Associates, Inc.

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CONTENTS

1. FORECAST MODEL DEVELOPMENT AND DESIGN	1-1
1.1 Primary Purposes of Model	1-1
1.2 Overview of Model Components	1-1
1.3 NMD Homestead Awards and Eligibility Criteria	1-2
1.4 Historical and Projected Population Data	1-3
1.5 Initial Historical Research	1-4
1.6 Challenges to Forecast Model Development	1-12
1.6.1 CNMI-Wide Economic Uncertainties	1-13
1.6.2 Saipan	1-17
1.6.3 Tinian	1-18
1.6.4 Rota	1-19
1.6.5 Northern Islands	1-19
1.7 Subsequent Approach to Modeling and Scenario Development	1-19
1.7.1 Conceptual Decisions	1-20
1.7.2 Final Scenario Choices	1-24
1.8 Final Model Design	1-25
1.9 Additional Key Model Characteristics	1-29
1.10 Assessment of Model Strengths and Weaknesses	1-31
2. MODEL SPECIFICATIONS AND NEW LABOR DEMAND RESULTS	2-1
2.1 Specific Assumptions for Analysis	2-1
2.1.1 Economic Scenarios (Inputs and Overall Economic Conditions)	2-1
2.1.2 Fixed-Value Inputs	2-8
2.1.3 Assumptions Related to Fertility, Mortality, and NMD Eligibility for Awards	2-8
2.2 Results: Summaries of Labor Demand and Population Estimates by Island	2-13
2.2.1 Saipan	2-13
2.2.2 Tinian	2-17
2.2.3 Rota	2-21
3. DETAILED POPULATION RESULTS	3-1
3.1 Introductory Comments	3-1

3.2	Results: Overall Population Estimates	3-2
3.2.1	Total CNMI	3-2
3.2.2	Saipan	3-2
3.2.3	Tinian	3-2
3.2.4	Rota	3-2
3.3	Results: Overall NMD Population Estimates	3-9
3.3.1	Total CNMI	3-9
3.3.2	Saipan	3-9
3.3.3	Tinian	3-9
3.3.4	Rota	3-9
3.4	Results: Eligible NMD Household Head Estimates	3-16
3.4.1	Total CNMI	3-16
3.4.2	Saipan	3-16
3.4.3	Tinian	3-16
3.4.4	Rota	3-16
3.5	Results: Non-NMD CNMI Resident Population Estimates	3-23
3.5.1	Total CNMI	3-23
3.5.2	Saipan	3-23
3.5.3	Tinian	3-23
3.5.4	Rota	3-23
3.6	Results: Non-Resident (Foreign) Population Estimates	3-30
3.6.1	Total CNMI	3-30
3.6.2	Saipan	3-30
3.6.3	Tinian	3-30
3.6.4	Rota	3-30
3.7	Additional Implications of Results	3-37
3.7.1	Construction-Related Population	3-37
3.7.2	Population Components as Proportions of Overall Populations	3-38
4.	SUMMARY OF KEY RESULTS FOR PLANNING PURPOSES	4-1
4.1	Eligible NMD Adults	4-1
4.2	Total Population	4-3
4.3	Closing Comment: Future Population Data	4-5

1. FORECAST MODEL DEVELOPMENT AND DESIGN

1.1 Primary Purposes of Model

The key Model purposes were considered to be:

1. Estimates of "NMD" (Northern Marianas Descent – Chamorro and/or Carolinian) population and Homestead Award Eligibility for 2028, by island.
2. Total Population estimates for 2028, by island, to guide other plan development.
3. A potential *secondary* Model purpose involves job estimation. This is a critical topic in the CNMI right now.¹ However, the Model emphasis on NMD population projection requires primary attention to things like natural population increase and net migration age-sex distribution. Rough job estimates are used as a way to estimate population rather than as an end in themselves.

1.2 Overview of Model Components

The Model separately considers each of the three main currently inhabited CNMI islands – Saipan, Tinian, and Rota. For each island, there are three very different economic future scenarios:

- A. **Scenario A** is a High-Growth scenario. For Saipan, it flows from optimistic visitor arrival scenarios developed for the Marianas Visitors Authority (MVA) in a January 2017 report by consultants Horwath HTL.² For Tinian, it assumes two casino hotels and construction of both military training facilities and a divert airfield. For Rota, it assumes three small upscale hotels.
- B. **Scenario B** is a Medium-Growth scenario, with limited change. For Saipan, it assumes visitor arrivals plateau at the level considered "sustainable" (in terms of infrastructure capacity) in the Horwath report. For Tinian, it assumes just one casino hotel plus military activities. For Rota, it assumes one upscale hotel.
- C. **Scenario C** is the only one assuming phase-out of CW-1 visa workers and probable attendant economic devastation – a Poor/Negative scenario. Saipan visitor arrivals would plunge, and then slightly recover. Rota and Tinian would have minimal budget-hotel development, and Tinian would be assumed to have the military training but not the divert airfield.

This range of possible outcomes is greater than typical for socio-economic forecasts, but reflects uncertainties about CNMI's future to be addressed later in this chapter.

¹ This chapter was completed in January 2018, before any resolution of the CW-1 visa issue.

² Horwath HTL. *Tourism Development in the US Commonwealth of the Northern Mariana Islands: A Feasibility & Sustainability Study*. Prepared for the MVA. January 2017.

Based on assumptions about (1) natural increase and (2) net migration in response to economic conditions, separate population results for each scenario are generated for three components of the overall population for each island:

- The NMD demographic which is key to DPL;
- Non-NMD residents (U.S. citizens or green-card holders); and
- Foreign Non-Residents (heavily but not entirely consisting of CW-1 workers and dependents).

1.3 NMD Homestead Awards and Eligibility Criteria

An eligible homestead applicant for a village or agricultural lot must be a (1) a person of Northern Marianas descent (NMD);³ (2) someone who does not have any interest in land in the CNMI; and (3) someone who must not have the means to acquire a lot. A married couple (or living in common law) cannot be eligible for two lots and is merged into one application. Additionally, there is a maximum income/assets eligibility criterion that disqualifies those applicants who may not own interest in land in the CNMI, but who have sufficient income and/or assets to acquire a village lot in the CNMI. Annual gross income of more than \$70,000 and/or assets valued at more than \$150,000 disqualifies an applicant (even joint husband wife assets/income).

As of this writing (late 2017), a total of 3,895 homestead lots have been awarded (deeded) in the CNMI. An additional 1,611 lots are currently permitted (they have been awarded but are still under the 2 year probation period) but are likely to become deeded thereafter. This study's projected numbers of future eligible household heads (see Chapter 3, Section 3.4) are for the total NMD population, and do not subtract already awarded numbers below in Table 1.

Table 1: DPL Lots Awarded by Island, 1980-2017

	Saipan	Tinian	Rota	Total
Total Deeded	1,875	912	1,108	3,895
<i>Village</i>	1,875	528	652	3,055
<i>Agricultural</i>	400 ¹	384	456	840
Total Permitted	122	0	1,489	1,611
<i>Village</i>	122	0	338	460
<i>Agricultural</i>	N/A	0	110	110
TOTAL	1,997	912	2,597	5,506

Source: Department of Public Lands. November 2017.

Note: (1) Note: (1) The 400 Agricultural Lots in Saipan were awarded through the Homestead Waiver Act (HWA), as set forth in Public Law 2-13, § 3. It should be noted that if a person (or married couple) has been awarded an agricultural lot through the HWA, he or she is still eligible to apply for a village lot in Saipan.

³ According to Article XII of the CNMI Constitution a NMD person is defined as someone "who is a citizen or national of the United States and who has at least some degree of Northern Marianas Chamorro or Northern Marianas Carolinian blood or a combination thereof."

1.4 Historical and Projected Population Data

Table 2 provides historical data on population counts or estimates for each island, while the subsequent Figure 1 shows various agencies' projections for future populations. These projections for the most part appear to have been developed on the basis of trends prior to the Saipan economic development boom of the past few years – hence largely assume fairly level or even significantly declining populations. Note the exception in Figure 1 is the Pacific Community's (SPC's) somewhat higher levels, including a 2016 figure that is arguably more consistent with recent economic growth. That is why Table 2 below contains two columns for 2016 – one ("2016A") with the published HIES overall and island figures (which hew closely to 2010 Census counts) and the other with the SPC 2016 total figure for CNMI, with all other "2016B" numbers following the HIES proportions reported by the CNMI's Central Statistics Division (CSD).

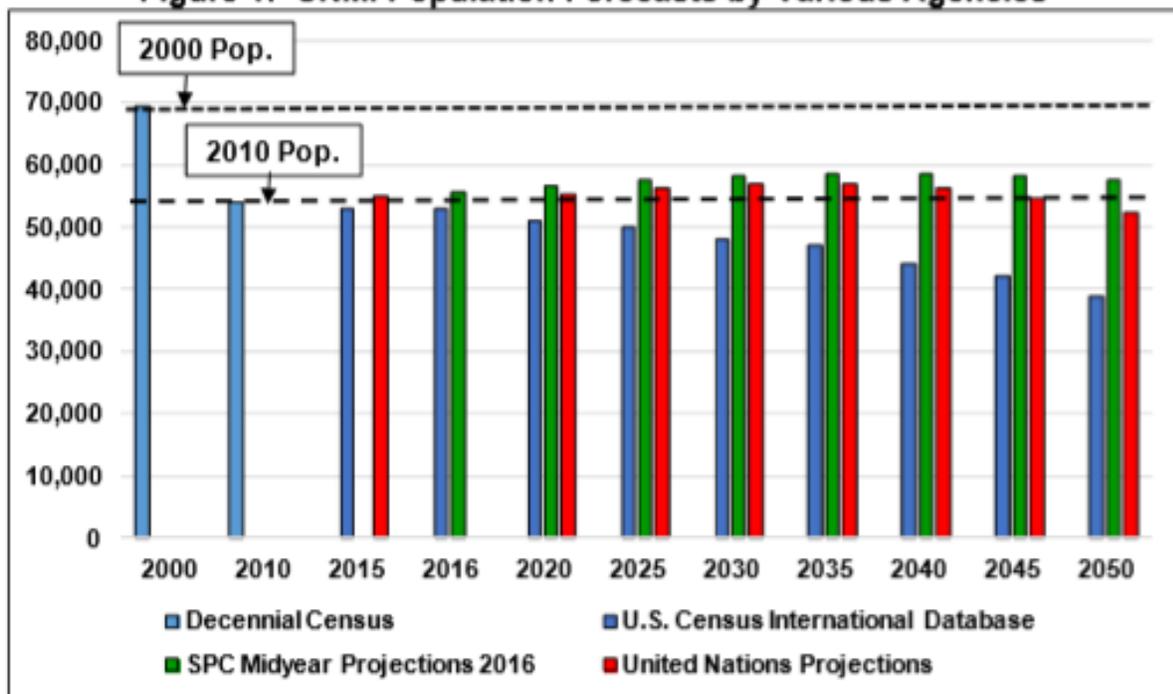
Note that NMD population has declined since 2000 (and subsequent analysis will show much of the gain from 1990 to 2000 was due to natural increase). This relative lack of response to economic change will have important consequences in the analysis.

Table 2: Local and Foreign Population by Island – 1990, 2000, 2010, and 2016

CNMI	1990	2000	2010	2016A	2016B
TOTAL Population	43,345	69,221	53,883	53,890	55,700
Permanent CNMI Resident	20,082	29,094	35,115	33,219	34,335
<i>NMD</i>	17,181	21,784	19,971	18,249	18,802
<i>Non-NMD</i>	2,901	7,310	15,144	14,970	15,473
Foreign Non-Resident	23,263	40,121	24,168	20,671	21,365
SAIPAN	1990	2000	2010	2016A	2016B
TOTAL Population	38,896	62,392	48,220	48,200	49,820
Permanent CNMI Resident	17,171	24,968	26,227	29,280	30,264
<i>NMD</i>	14,416	18,016	16,933	15,758	16,288
<i>Non-NMD</i>	2,755	6,952	9,294	13,522	13,976
Foreign Non-Resident	21,725	37,424	21,993	18,920	19,556
TINIAN	1990	2000	2010	2016A	2016B
TOTAL Population	2,118	3,540	3,136	3,056	3,160
Permanent CNMI Resident	1,286	1,897	1,782	1,950	2,016
<i>NMD</i>	1,226	1,709	1,517	1,146	1,185
<i>Non-NMD</i>	60	188	265	804	831
Foreign Non-Resident	832	1,643	1,354	1,105	1,143
ROTA	1990	2000	2010	2016A	2016B
TOTAL Population	2,295	3,283	2,527	2,635	2,720
Permanent CNMI Resident	1,595	2,229	1,706	1,989	2,053
<i>NMD</i>	1,508	2,054	1,521	1,346	1,389
<i>Non-NMD</i>	87	175	185	643	664
Foreign Non-Resident	700	1,054	821	646	667

Sources: Overall population figures from Census Data, U.S. Census Bureau Decennial Census 1990, 2000, 2010. For 2016A Data: Department of Commerce, Central Statistics Division (CSD), 2016 Commonwealth of the Northern Mariana Islands Household Income and Expenditures Survey (HIES) Report, April 2017. For 2016B, the overall CNMI population estimate is from the Pacific Community (originally the South Pacific Commission and still referred to as SPC), with assumed island figures based on HIES proportions. The breakdown by population component was provided by demographer and former Census Bureau employee Michael Levin, PhD, who assisted with the HIES project and analysis. We appreciate the CSD provision of the 2016 HIES dataset to Dr. Levin for this and other analyses in this report.

Figure 1: CNMI Population Forecasts by Various Agencies



Sources: (a) U.S. Census Bureau Decennial Census 2000, 2010; (b) Pacific Community (SPC). Population Projections. Retrieved at <https://prism.spc.int/> November 2017; (c) U.S. Census International Database. International Programs. <https://www.census.gov/population/international/data/idb/region.php?N=%20Results%20&T=13&A=separate&RT=0&Y=2017&R=-1&C=CQ> Retrieved in November 2017; and (d) United Nations, Department of Economic and Social Affairs, Population Division (2017). Probabilistic Population Projections based on the World Population Prospects: The 2017 Revision. Population Division, DESA. <http://esa.un.org/unpd/wpp/> Retrieved November 2017.

1.5 Initial Historical Research

Model design began with the simultaneous need to (a) address severe data limitations and particular uncertainty about CNMI economic futures (addressed in the following Section.1.6); and (b) conduct primarily Census-based historical research into historical research about the relationship between CNMI economic conditions and population dynamics (addressed in this section).

1. The study’s primary focus on NMD population meant there was a need to specify natural increase and net migration patterns for that NMD group in particular, but also other population components as well. Therefore:
 - The overall population was necessarily divided into the three previously-noted components: (a) NMD; (b) Non-NMD Residents of CNMI, and (c) (Foreign) Non-Residents. (The latter group would be primarily CW-1 visa workers and dependents, though would likely include a small number entering the CNMI through other means.)

- A critical question for modeling was: “To what extent will economic change produce normal labor mobility (i.e., in-migration or out-migration) among NMD and Non-NMD Residents before there are effects on supply of foreign workers?” This is a particularly difficult modeling issue, because in reality the availability of U.S. workers (from Guam, the Freely Associated States, other American islands, or even the U.S. Continent) will depend on economic conditions in the source areas and the intensity of recruitment/training efforts by CNMI’s government and employers. For modeling purposes, though, the available data are largely limited to historical evidence that can be used to indicate how much in- or out-migration was actually observed among different age-sex groups for NMD and Non-NMD residents during recent historical periods that somewhat parallel the economic scenarios to be used later in forecasting.
- Therefore, this first phase of Model development focused not on economic futures but rather on **historical research** into basics of population dynamics for each of these three groups. The ultimate purpose of this historical analysis was to try to understand probable **net migration patterns** of various population groups (NMD, Non-NMD, and Foreign Non-Residents) under different economic conditions that parallel those to be used for each scenario for future forecasting.

In theory, this can be done by using presumed age-specific fertility and mortality rates to “age” the population observed in, say, 1990 for ten years to determine what it would be in 2000 if nobody moved in or out. The difference between these hypothetical 2000 age-sex numbers and the actual observed age-sex numbers from the 2000 Census is conventionally attributed to net migration, allowing understanding both of the *ratio* of migration to natural increase and also of the age-sex *characteristics* of in-migrants or out-migrants.

Again in theory, the periods 1990-2000, 2000-2010, and 2010-16⁴ represent overall economic conditions roughly comparable to a “high-growth” economic scenario (the 1990s, which were a boom period for the CNMI), a “collapse” scenario (the 2000s, when garment factories all closed and the Great Recession hit), and an intermediate scenario (the 2010s to date, during which there was both initial decline and recent strong recovery – net slow growth).

2. To carry out the above theoretical approach to determining net migration patterns under different conditions, comparable data about actual age-sex population distributions would be needed for each of the four defining years – 1990, 2000, 2010, and 2016. The current U.S. Census Bureau made a significant effort to be helpful but lacked access to some past electronic datasets. Former Census Bureau statistician Michael Levin, PhD, a frequent statistical consultant to the CNMI government, assisted us in using the limited available data to generate basic age-sex cohort numbers for each possible population component for the overall CNMI from the Censuses of 1990, 2000, and 2010, as well as the CNMI’s 2016 HIES,

⁴ These periods are anchored by available population from the 1990, 2000, and 2010 Census, as well as the 2016 Household Income and Expenditure Survey (HIES).

which he helped analyze.⁵ He also assisted by providing data needed to develop assumptions about fertility and mortality rates needed to project change over time by natural increase, as well as proportions of NMD households eligible for DPL awards.

Unfortunately, available Census data for 1990, 2000, and 2010 did not permit *island-specific* analysis of age-sex data for each specific population group (e.g., for NMD only). And even at the CNMI-wide level, it was possible only to develop numbers for the NMD group. We could at least subtract these NMD numbers from Total Population numbers to get data for “Combined Non-NMD,” but could not further break the data down into Non-NMD U.S. Residents and Foreign Non-Residents.

3. Therefore, JMK Associates used the CNMI-wide 1990 NMD age-sex data and other assumptions to “age” the NMD age-sex numbers and estimate net migration for that group. This same exercise was repeated for the NMD group for the periods from 2000 to 2010 and from 2010 to 2016. The same was done in each of the three periods for “(Combined) Non-NMD” numbers. We also looked at total population age-sex characteristics, which of course *could* be done at the island level.
4. This initial analysis with CNMI-wide NMD and (Combined) Non-NMD numbers established that:
 - As per Figure 2, CNMI’s overall NMD population has consistently had an age-sex distribution very different from the (Combined) Non-NMD population pattern. The NMD pattern is closer to a classic expected distribution, with more children than adults, but has usually been characterized by a particularly steep drop-off in the late teens or early 20s, suggesting substantial out-migration in those age groups. The Combined Non-NMD Residents and Foreign Non-Residents have fewer dependents under 18 and a much greater bulge in mid-aged working years.
 - And as per Figure 3 (for reasons of space limited to three Census results), the Total Population age-sex patterns are consistently highly similar for all three islands. This suggests that when and if island-specific data may be lacking, it is reasonable to impute overall CNMI patterns to all islands. This gave credence to the idea that CNMI-wide migration characteristics could legitimately be applied in the same way to all islands.
 - However, resultant net migration characteristics in Figure 4 posed some problems for the analysis. As expected, both population groups showed overall in-migration

⁵ There were necessary approximations in this process. To estimate “NMD” numbers from available Census data, Dr. Levin had to include separate data on part-Chamorros and part-Carolinians, such that a small number of people who were *both* part-Chamorro *and* part-Carolinian were likely double-counted. Also, the 2016 HIES collected race/ethnicity data via different question wording than did the Census. The CNMI’s subsequent 2017 Labor Force Survey (LFS) would have provided a more “apples-to-apples” dataset in terms of NMD definitions, but it was not completed in time for this analysis. This is also an issue for subsequent Model development, as it was necessary to use the 2016 HIES data for baseline information rather than the more recent LFS. The Model, of course, could someday be re-run with baseline data from the 2017 LFS instead.

during the good times of the 1990s, out-migration during the bad times of the 2000s, and more indeterminate patterns during the 2010s – i.e., ***net migration patterns do respond to economic conditions and must be estimated.***

At the same time, the data for this study's key population group showed that ***NMD net migration has historically been less responsive than other groups to economic conditions for overall population, but rather has exhibited shifts in demographic composition.*** Even in the good economic times of the 1990s, young NMD adults were out-migrating,⁶ while there was probable in-migration by older NMD adults and strong (almost improbable) levels of in-migration by NMD children. The average annual migration percentage for the overall NMD population in the 1990s was not much above zero, and the young adult out-migration effectively balanced the in-migration from other working ages.

Furthermore, none of the patterns for any of the time periods in Figure 4 resemble the age-sex characteristics for overall settled populations in Figure 2. Except during the 2000s, some age groups showed in-migration and others showed out-migration (which is why males and females were combined for Figure 4). And as noted, results for children were sometimes strange, possibly reflecting inevitable statistical ranges of error in survey samples.⁷ The observed historical patterns in Figure 4 should therefore be regarded as basically true but legitimately subject to some "smoothing" to reduce oddities such as the high levels for children or the occasional staggered patterns of in- and out-migration among consecutive older age groups.

5. Therefore, the actual observed historical patterns in Figure 4 were "smoothed" or altered in generally small ways to produce final figures charted in Figure 5, which can be seen as mostly differing only slightly from those in Figure 4. The text boxes in Figure 5 summarize key changes for each group in each period.

Specific needed numbers from this historical analysis for the subsequent forecasts were, for each population group and for each time period corresponding to the three scenarios sketched out in Section 1.2, (1) assumed ratios of migrants to natural increase, and (2) assumed age-sex distribution of in-migrants or out-migrants. Figure 5 indicates the ratios for each "smoothed" migration pattern. (The full age-sex distributions from the analysis are given in Table 7 at beginning of Chapter 2.)

⁶ Note in the upper part of Figure 4 that young NMD adults dominated out-migration among adults in the other two historical periods as well, although teen-agers and adolescents were also heavily out-migrating in the much more economically mixed 2010s to date.

⁷ This analysis was a limited one, and a truly complete exploration would likely have to consider factors such as relative economic conditions in Guam or other nearby islands, as well as educational/employment opportunities in the rest of the U.S.

Figure 2: CNMI Age-Sex Percentage Pyramids, NMD and Combined Total Non-NMD – 1990, 2000, 2010, and 2016

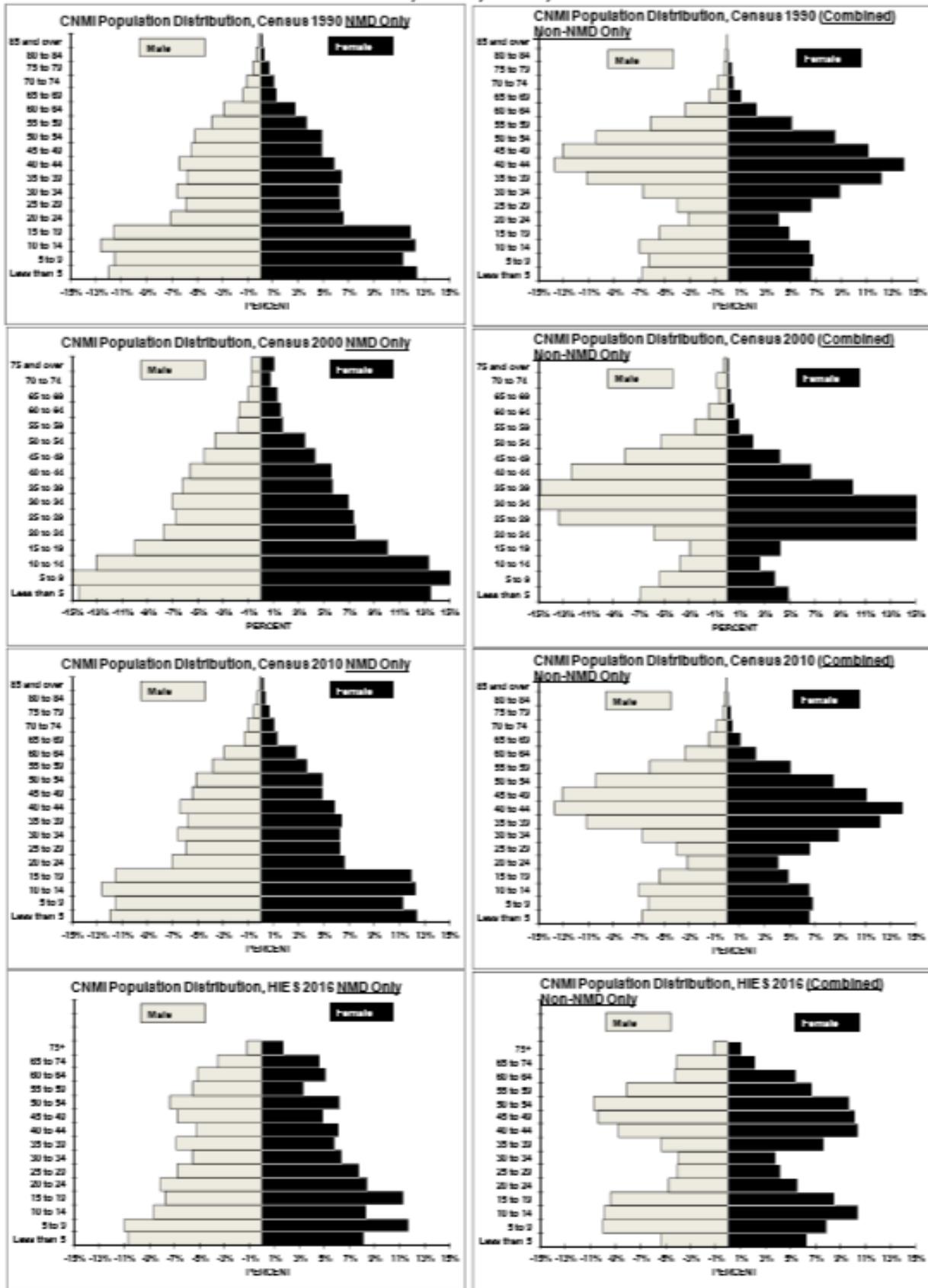


Figure 3: Island Age-Sex Percentage Pyramids, Total Population – 1990, 2000, and 2010

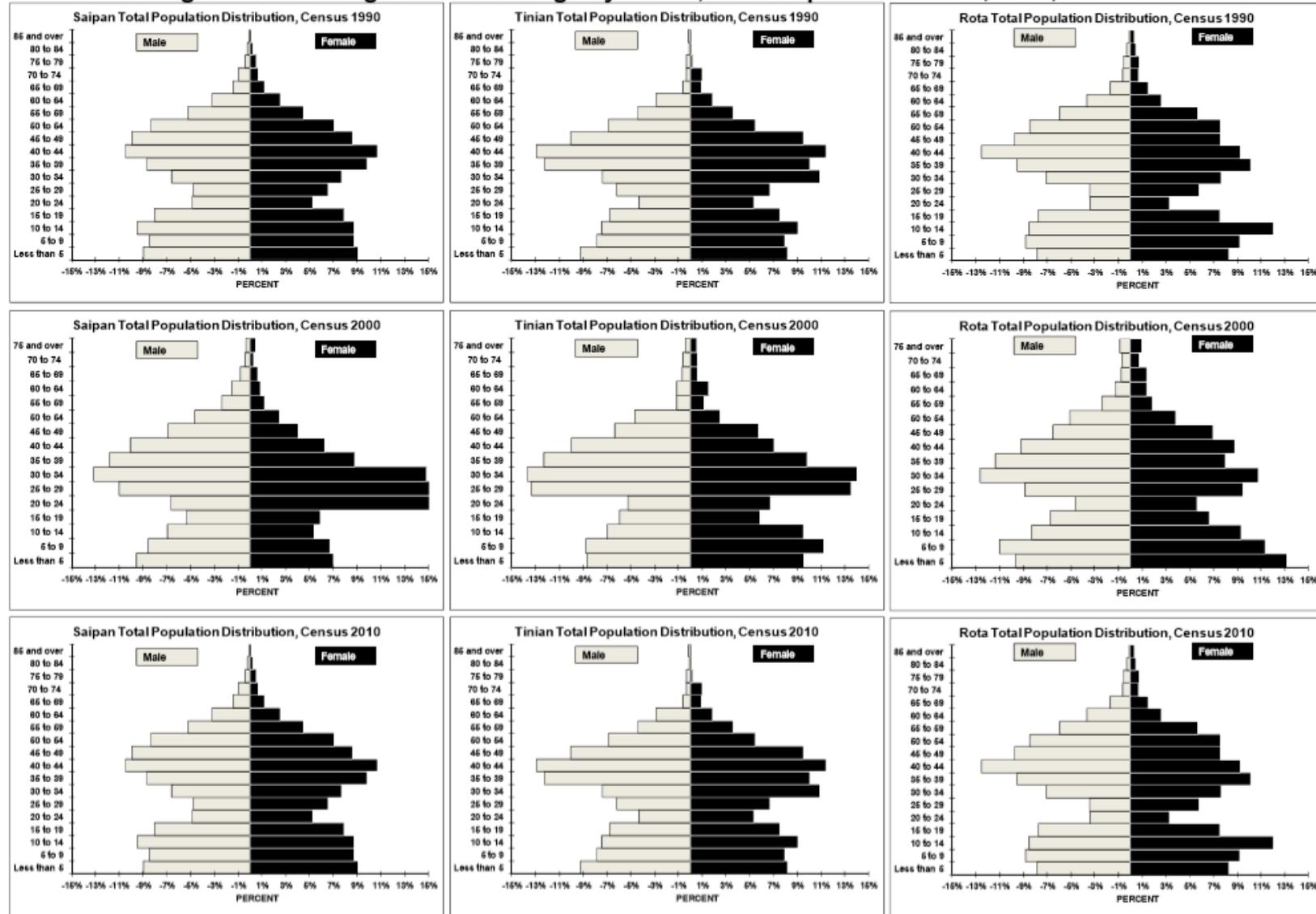
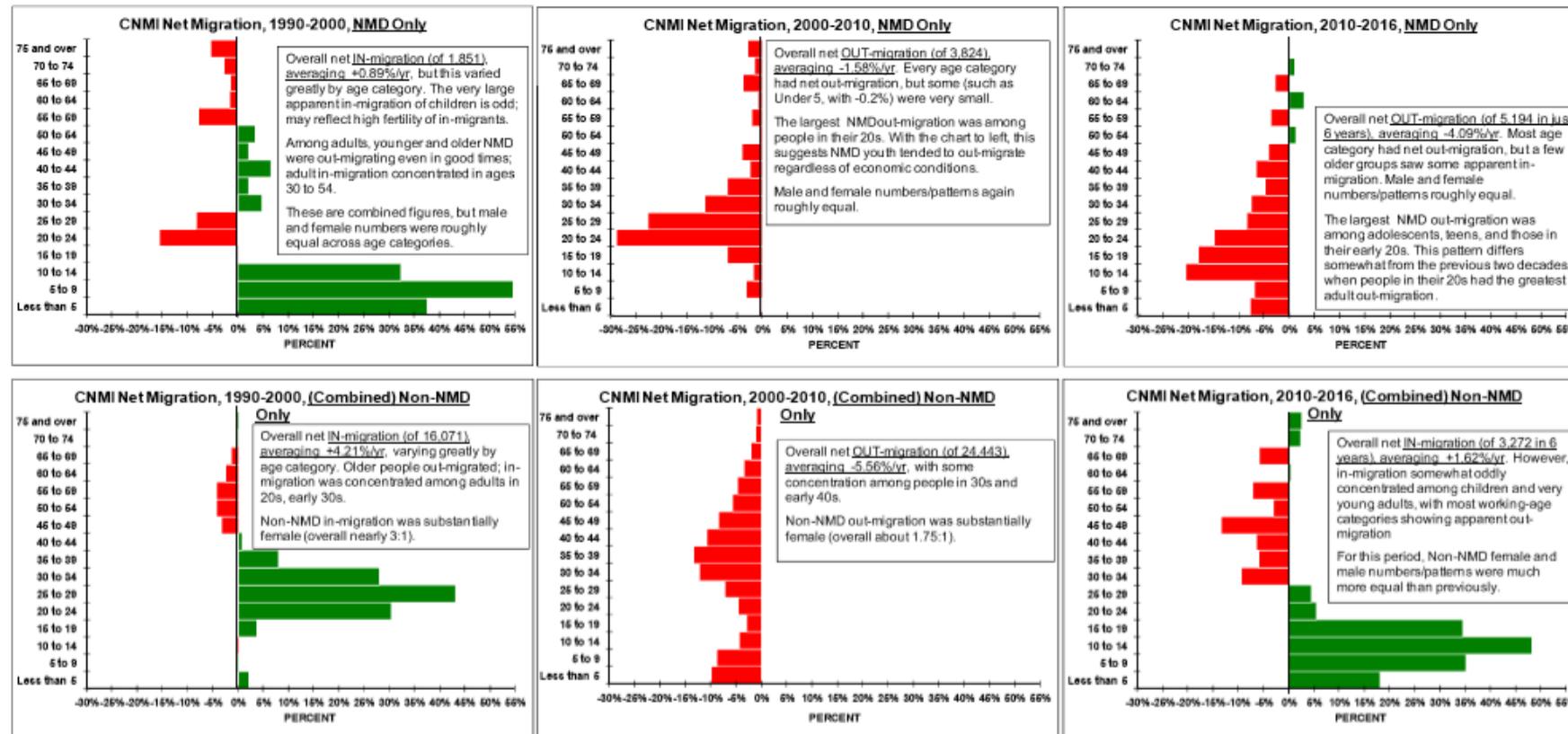
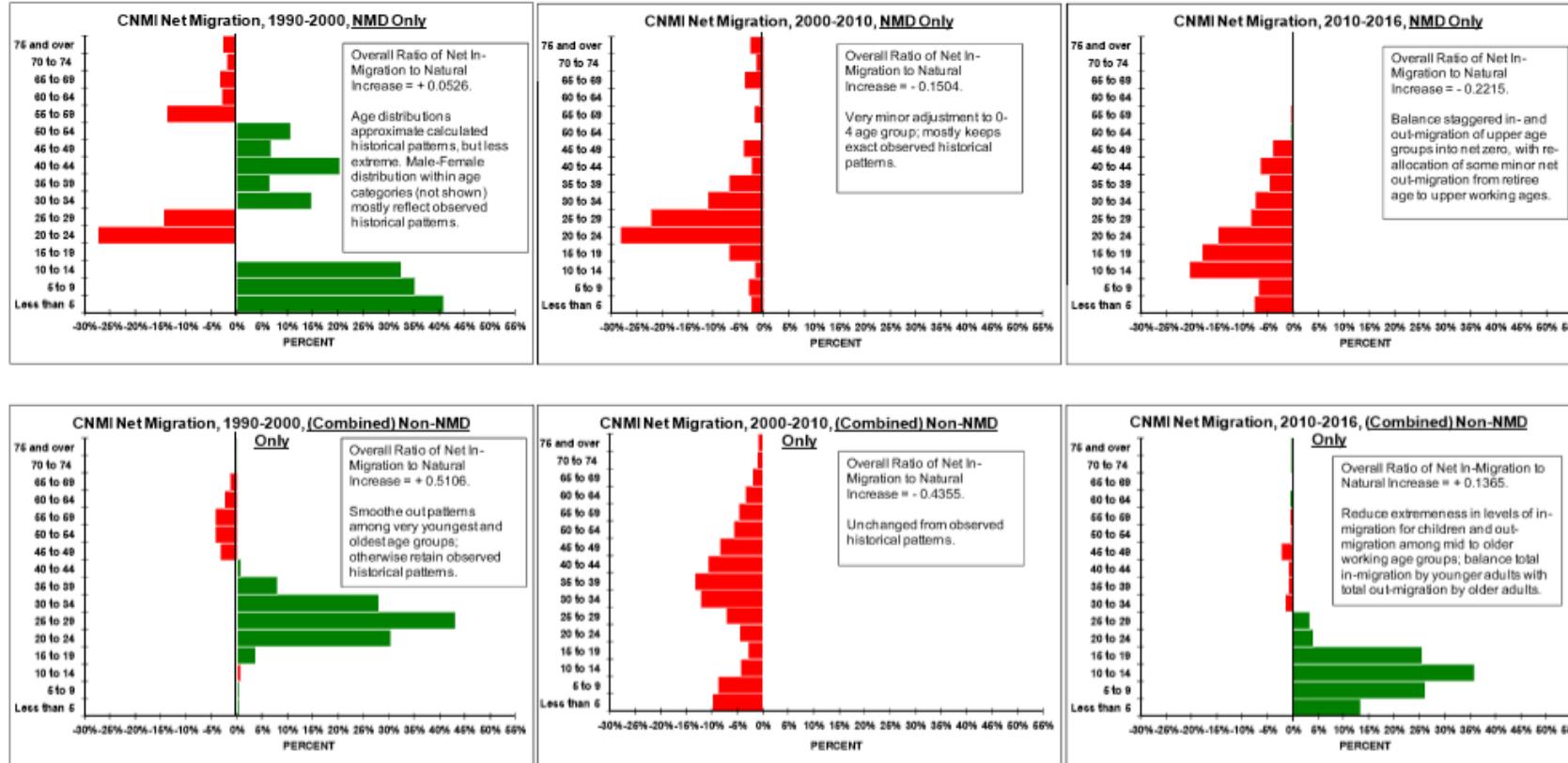


Figure 4: Net Migration Characteristics (NMD vs. Combined Non-NMD) by Age Group for Three Recent Historical Periods



(Note that scales for both NMD and Non-NMD charts are in percentage terms, and thus look similar. However, the total numbers mentioned in the text boxes show that, for both the 1990s and the 2000s, in- and out-migration was much greater for Non-NMD populations. This changed in the 2010s.)

Figure 5: Final “Smoothed” Net Migration Characteristics and Assumed Ratios of Migration to Natural Increase



In regard to estimated ratios of migrants to natural increase: For the 1990s, the model for a future “high-growth scenario,” the NMD ratio is just + 0.0526.⁸ This means the Model will assume very limited natural in-migration of NMD workers/ population in response to improving economic conditions – for every 100 new NMD workers produced by natural increase, only five NMD in-migrant workers will be assumed.⁹ By contrast, for Non-NMD residents, the ratio of + 0.5106 means that for every 100 new workers from natural increase, there will also be 51 in-migrants in response to expanding labor demand. These assumptions are based on historical evidence, but do mean the Model will assume substantial Non-NMD (and probably Foreign) in-migration for positive growth scenarios – thus, ongoing dilution of NMD residents as a percentage of overall population.

1.6 Challenges to Forecast Model Development

Forecast models always face challenges, such as whether cause-effect assumptions built into the models are valid in real life and whether input numbers are correct. However, two other key challenges were present for this effort –

1. **Serious Data Limitations:** CNMI is a small place that went through effective Depression conditions for a decade, only recently emerging from this (at least on Saipan). Government resources are just now permitting new studies and data. Lack of a current CNMI Input-Output (I-O) Model remains a particularly serious constraint to modeling that directly links economic growth to population change.¹⁰ As suggested in Table 2 and Figure 1, there are also uncertainties about actual “current” (2016) population, a key starting point for forecasting future population. There are also limitations in available published Census data regarding the three population components of interest.¹¹

⁸ The Model in some circumstances sets negative ratios to zero in cases where the focus is on in-migration in positive economic scenarios.

⁹ NMD in-migrants of working age would come from limited external pools at any rate. Figure 4 and Figure 5 suggest they would generally be 30 years of age or older – likely often people who out-migrated in their 20s for education or employment opportunities elsewhere – and would be people attracted home as much by personal as employment considerations, given CNMI's lower salaries.

¹⁰ The commercial firm IMPLAN does market an annually-updated I-O Model for the CNMI, and we obtained the most recent version (based on 2015 data) and ultimately used a few job-to-job multipliers from it. However, the IMPLAN model for our purposes is overly specified and more useful for estimating impacts of discrete particular economic changes rather than large-scale forecast modeling.

¹¹ Detailed population characteristics, such as race/ethnicity by population age-groups that are readily available in every other U.S. State and all Territories are not available for the CNMI. For example, American Community Survey (ACS) data released by the U.S. Census Bureau each year provide one-year and five-year estimates of all States and Territories *except* the CNMI and American Samoa. These demographic profile estimates offer greater depth of data (i.e., selected populations are asked more questions), as well as more recent figures between decennial censuses. Also, as discussed later, available published data have limitations in regard to breaking out age-sex data for the three key population components – NMD, Non-NMD Residents, and Foreign Non-Residents – in “apples-to-apples” comparable ways for the Census and for the 2016 HIES data.

- 2. Current Deep Uncertainty about CNMI's Economic Future:** The biggest uncertainty as of this writing is – given limited on-island labor supply – the future availability of foreign workers to construct and operate potential new tourism-related developments (casinos, hotels, etc.), as well as fill societal support positions such as health care. However, there are also other uncertainties – e.g., continuation of tourist visas for the increasingly important Chinese market; potential impact on tourism of new military activities; or availability of capital for casino or other tourism development on Tinian and Rota.

Adding to this sense of economic uncertainty, CNMI has a significant history of “boom-bust” economic patterns over time – i.e., its economy has historically been unstable. The longest available historical data series that illustrates this is MVA data on Visitor Arrivals, which show near-exponential growth till 1997, then a general sharp downward trend to 2011, followed by upturn. (See Figure 6, following page.) Real Gross Domestic Product (GDP) is a better overall economic indicator, though the U.S. Bureau of Economic Analysis has published this only for years from 2002. However, it shows a similar decline to 2011, followed by recovery (Figure 7, following page).

1.6.1 CNMI-Wide Economic Uncertainties

This section will discuss uncertainties with potential to impact the future of labor demand and population growth in the CNMI. The following is likely not a comprehensive inventory of all future possible alternatives, but three issues could particularly sway future CNMI development in the CNMI: (1) an uncertain labor pool; (2) uncertainties about likely growth despite infrastructure limitations; and (3) a sustained tourism market.

Uncertain Labor Pool: The CNMI hospitality industry (including accommodation, construction workers, and food services) is particularly dependent on foreign labor, with more than 80 percent of workers from outside CNMI or the United States.¹² Until 2008, CNMI exercised sole authority over the distribution of tourist visas and foreign labor permits. However, in the midst of the last economic downturn, the U.S. Congress approved the Consolidated Natural Resources Act of 2008 (“CNRA”) which initiated a transition to U.S. immigration laws beginning in November 28, 2009.¹³ To ease the economic burden of a more restrictive immigration policy, two new categories of visas were created solely for CNMI:

- The CW visa program allowed companies to utilize transitional foreign workers for construction and hotel operation labor. CW-1 permits were issued to foreign workers, while CW-2 permits were issued to the spouses and dependents of those workers.
- Additionally, E2-C permits were created for foreign “investors” in the CNMI (though these permits are used far less often than the CW permits).

¹² U.S. Government Accountability Office (GAO). May 2017). “Implementation of Federal Minimum Wage and Immigration Laws”. Retrieved Nov. 2017. <http://www.gao.gov/assets/690/684778.pdf>

¹³ Robert J. Misulich. “A Lesser-Known Immigration Crisis : Federal Immigration Law in the Commonwealth of the Northern Mariana Islands” (PDF). Digital.law.washington.edu.

Figure 6: Total Visitor Arrivals CNMI (FY) 1978-2017

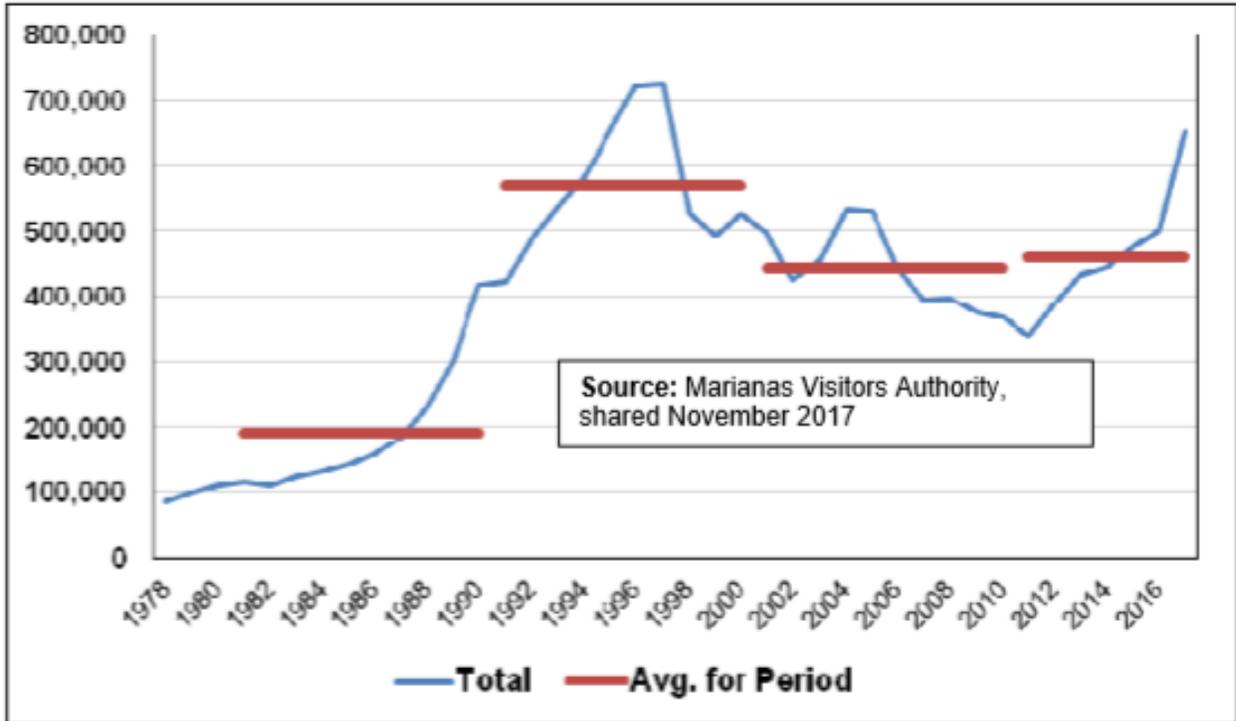
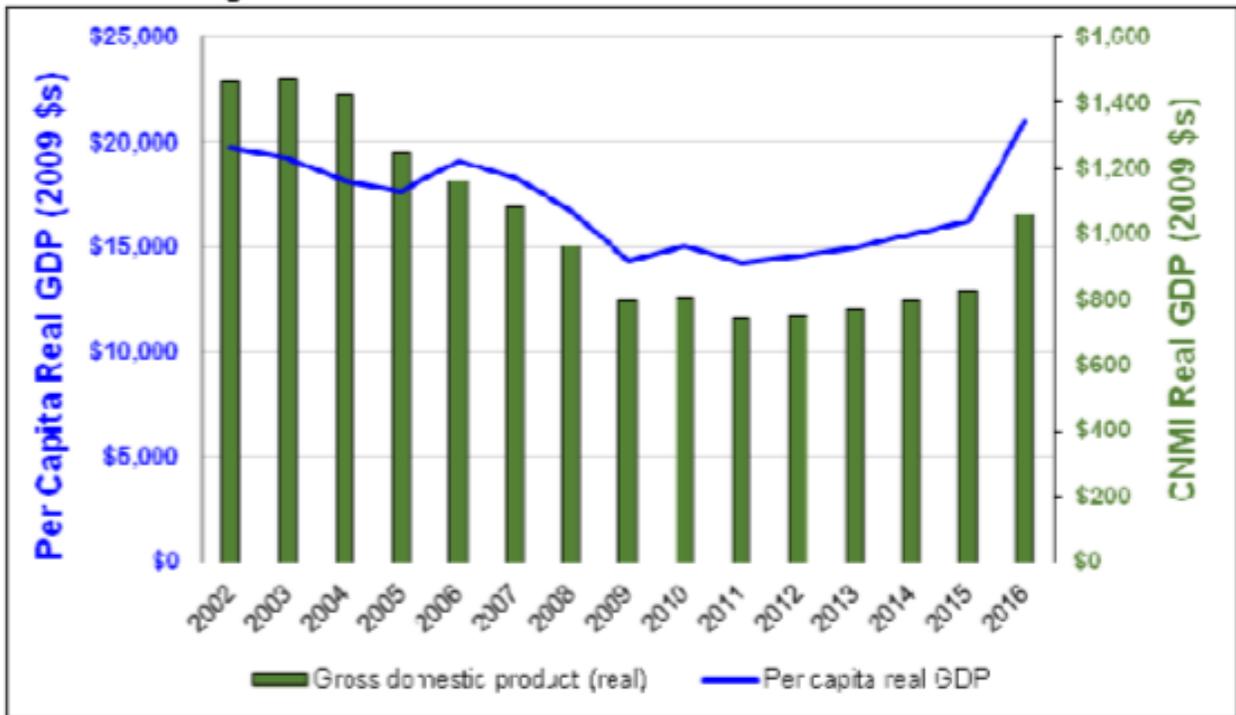


Figure 7: CNMI Real Gross Domestic Product 2002-2016



Source: U.S. Department of Commerce. Bureau of Economic Analysis. Release Date: October 15, 2017. Retrieved November 2017. https://www.bea.gov/national/gdp_territory.htm

Note: Estimates of population for 2013-2016 reflect the incorporation of updated information from the U.S. Census Bureau's International Data Base.

These measures were always intended to be temporary, to allow the CNMI to reduce its dependence on foreign labor while it developed sustainable sources of U.S. labor. Both the CW and E2-C permits were intended to be reduced over a period of five years (2009-2014), and then another five-year extension period (2014-2019) when the program would eventually be phased-out, and foreign workers routed into the nationwide foreign labor permit program (which is capped at 65,000 permits for all of the U.S. including CNMI). A May 2017 report by the U.S. Government Accountability Office estimated that the removal of all CW-1 workers would cause the CNMI GDP to decline by 26 to 62 percent from 2015 levels.¹⁴ Despite this assessment, the deadline for the Program's phasing out remains December 31, 2019, though the battle is ongoing in Congress.

This is perhaps the most obvious and critical uncertainty facing all the CNMI islands. It is generally believed among the public- and private-sector officials interviewed for this effort that CNMI's economy will crash without CW-1 workers to build and then help operate new hotels and casinos, as well as crucial support jobs in fields like health care.

Soaring Growth vs. Infrastructure Limitations: A significant number of construction projects, including resort-hotel and casino developments, have been proposed in recent years throughout the CNMI. If all proposals actually are built, it will add a total of more than 6,600 hotel units to the CNMI inventory and require a labor pool of more than 8,000 for Operations as well as more than 6,000 for construction (see following Table 3). According to the Hotel Association of the Mariana Islands (HANMI), the total visitor unit count in the CNMI as of January 2016 was 3,444.¹⁵ This sort of growth implies a 92% increase in total rooms over just a few years. It is by no means certain that all the new units, if constructed, will find a market to fill them with high occupancy.

Growth occurring at such high rates also raises questions in regard to the sustainability of the CNMI infrastructure. The recently (2017) MVA-commissioned Horwath Report noted that, while the CNMI overall market has seemingly been booming, "the current situation where relatively quick returns are generated without consideration to longer-term impacts is not sustainable."¹⁶ Furthermore, the report highlights that "Overall, relative to the CNMI's resources and population, this target growth level is unrealistic", and that growth beyond a 750,000 visitor arrivals mark (or at levels comparable 1996-1997 peak levels see Figure 6) could only be made possible "with considerable expansion of the existing infrastructure by scales and timelines that correspond to arrival growth (p.7)." Some of the expansions suggested included addressing shortening arrival wait times at Saipan Airport, as well as renovation of existing properties (suggesting that after the initial boom subsided, the low quality of accommodations will negatively impact CNMI's competitiveness as a tourist destination).

¹⁴ U.S. Government Accountability Office (GAO). May 2017). "Implementation of Federal Minimum Wage and Immigration Laws". Retrieved Nov. 2017. <http://www.gao.gov/assets/690/684778.pdf>

¹⁵ As summarized in MVA reports. Counts for HANMI members only. Excludes vacation rental accommodations, which have not been counted but are estimated by some interviewees for this study to account for up to 35% of total existing inventory. There is also uncertainty about how long some current lodging facilities will remain open due to upcoming lease expirations, as mentioned in subsequent pages.

¹⁶ Horwath HTL. *Ibid.* P. 3

Table 3: Current and Pending CNMI Projects

Island	# Rooms	Employees Needed	Construction Needed	Name of Project	BECQ Status
Saipan	373	540	1,500	Imperial Pacific Resort Hotel	Under Construction
Saipan	51	20	100	Royal View Hotel	Application under review
Saipan	26	8	29	Fantastic Garden	Application under review
Saipan	1,184	560	700	Saipan Garden Resort	Application under review
Saipan	50	20	56	Saipan Vegas	Under Construction
Saipan	312	148	352	Honest Profit Saipan Resort Hotel	Under Construction
Saipan	60	38	49	Surfrider Resort Spa & Beach Club	Under Construction
Saipan	226	96	106	Sugar King Hotel & Dormitories	Under Construction
Saipan	100	70	40	Himawari Commercial Operations	Under Construction
Saipan	536	175	60	Saipan Globe Hotel	Not started
Saipan	100	21	113	Beach Road Ocean View	Not started
Saipan	144	148	250	Ocean Vista Resort	Not started
SUB-TOTAL	3,162	1,844	3,355		
Tinian	300	859	375	Bridge Investment Titanic	Application under review
Tinian	414	1,300	518	Imperial Dynasty	N/A
Tinian	2,500	4,000	2,000	Plumeria Resort	Application under review
SUB-TOTAL	3,214	6,159	2,893		
Rota	225	335	281	Luxury Hotel/ Ecotourism	N/A
SUB-TOTAL	225	335	400		
TOTAL	6,601	8,338	6,648		

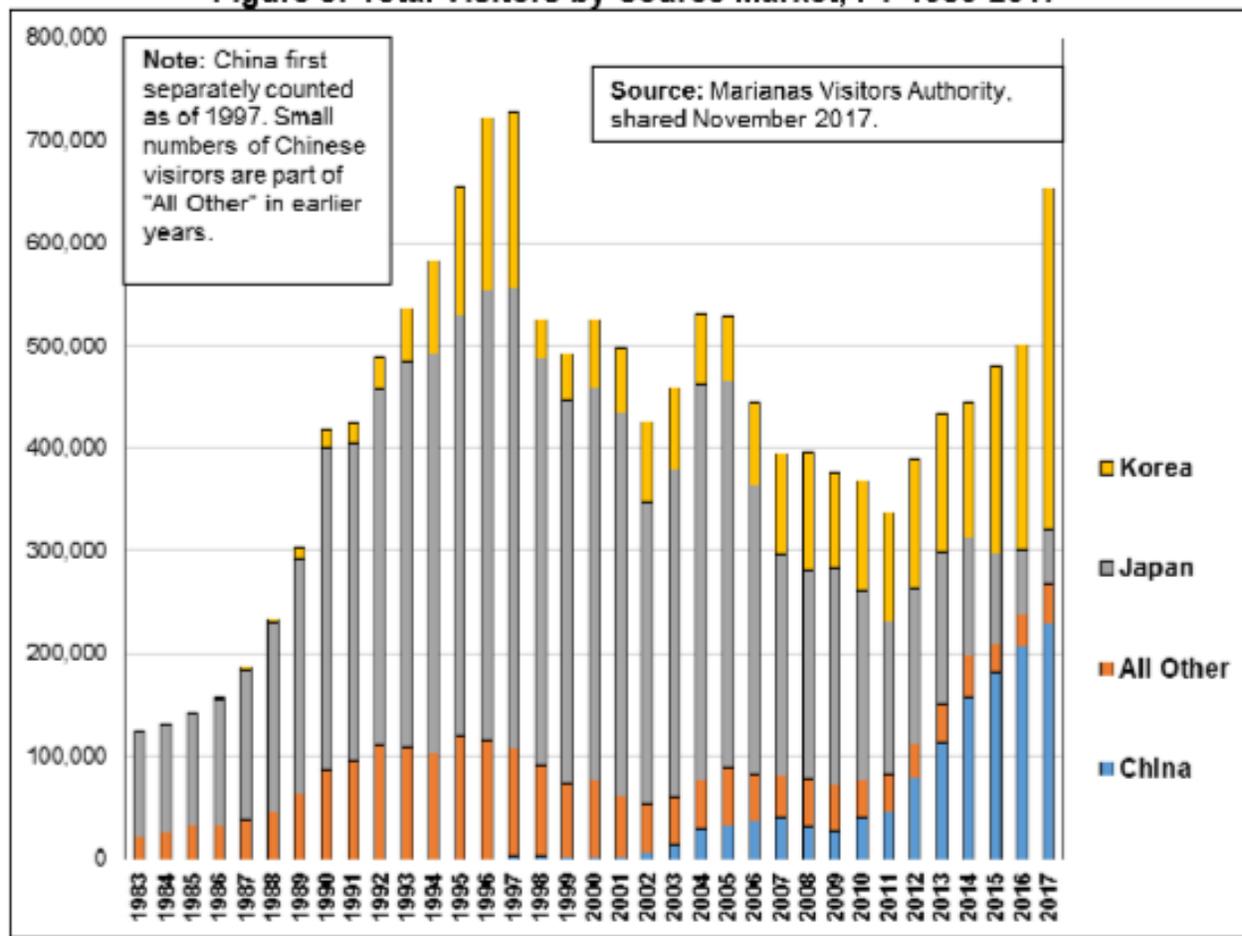
Source: Adapted from data received from the CNMI Bureau of Environmental and Coastal Quality (BECQ). Major Siting Development Chart. 2015-2017. Received in October 2017.

Note: The Tinian Dynasty is currently closed, and no investor has immediate plans to re-open it, but we include it here as a possible future project, should it be purchased. Numbers reflect the number of rooms and employees the Dynasty when it was still in operation. Additionally, while there currently is no official application under review at the BECQ, we have added the possibility of small-scale luxury hotels in Rota, as mentioned to us in interviews with various officials, operators, and investors.

Prospects of a Sustained Tourism Market: Recent increases in visitor arrivals have been marked by a shift from a majority of visitors coming from Japan to a predominant market share of visitors from China and South Korea. From fiscal years 2011 through 2017, the number of visitors from Japan dropped by 65%. Meanwhile, the number of Chinese visitors rose by 123% and the number of South Korean visitors rose by 213% (Figure 8). However, the prospect of a continually growing Chinese tourism market is also dependent on the extension of the U.S. Department of Homeland Security (DHS)'s discretionary parole authority, which allows Chinese (and Russian) visitors to enter the U.S. as temporary visitors for up to 45 days on a case-by-case basis in the CNMI since 2009. The parole program is scheduled to sunset in 2019 (at the same time as the CW and E2-C permits). As of this writing, no Congressional decision has been made in regards to its extension of beyond that.

There are fundamental questions as to how long the recent growth spurts in tourism can continue. Growth was still very strong at the beginning of 2017 (arrivals were up 47% in March 2017 compared to March 2016) but was slowing greatly toward the end of the year (up just 2% by November 2017).

Figure 8: Total Visitors by Source Market, FY 1983-2017



1.6.2 Saipan

While Saipan legalized casino gambling and issued a license to the Macau-based Imperial Pacific International Holdings Inc. (IPI) for a large casino and hotel soon thereafter (in 2014), only the casino had opened as of 2017. The adjacent hotel (for which construction was expected to finish by August 2018), has now been pushed back to August 13, 2023, due to a complicated set of labor issues related in part to current unavailability of CW-1 workers following actions by the U.S. Immigration and Customs Enforcement over safety and illegal hires. IPI proposes a large "Phase 2" to its investment – including an additional casino, hotels, shopping, and other attractions, probably in the Marpi area – but like many other substantial proposals, this is not a certainty at the present time. There are additional questions about whether China will continue to permit external investments in gaming and hotels (as part of a general tightening on foreign investment),¹⁷ likelihood of U.S. federal investigations into future CNMI casinos following the closure of the Tinian Dynasty, etc.

¹⁷ CNBC, Aug. 21, 2017. "No sex, no gambling: China tightens rules on foreign investment." <https://www.cnbc.com/2017/08/21/no-sex-no-gambling-china-tightens-rules-on-foreign-investment.html>

There are currently four hotels or condo-tels under construction on Saipan, and five additional ones with permits under review at the Bureau of Environmental and Coastal Quality (BECQ), totaling a future inventory (if all constructed) of over 2,200 additional rooms on the island. These new rooms would require an estimated 2,000 employees to operate. Again, however, there is no certainty that all "Under Review" projects will actually materialize – nor, as is always the case, is there any assurance that there is sufficient market demand for new hotels, that an over-supply is not being created.

The nature of tourism is changing in Saipan. Apartment-based vacation rentals (not counted in MVA lodging inventories) have been estimated as 35% of total inventory by some visitor industry sources in confidential interviews for this project. And some new projects under development are more in the nature of limited-service "condo-tels" than traditional full-service hotels.

Finally, both interviews and also recent news reports suggest strong industry concern over various DPL hotel leases soon to expire. (In general, off-island investors have long expressed concern over the relative brevity of 40-year leases permitted to non-NMD lessees.) Without certainty over whether they can renegotiate existing leases or must compete with other bidders, owners of major properties are hesitating to invest in repairs and renovations, contributing to possible perceptions of deteriorating hotel inventory in Saipan.

1.6.3 Tinian

The Tinian Dynasty Hotel & Casino opened in 1998. It was the only casino in CNMI for many years, but closed in 2015 after U.S. federal law enforcement fined its owners \$75 million for failing to follow anti-money-laundering procedures. The property remains closed as of January 2018. According to data provided by BECQ, most of CNMI's future planned labor demand is for development on the island of Tinian, where two other casino resorts have been proposed, with an estimated labor demand of 6,359 workers for operations – more than twice the island's population in 2016. The likelihood of any of these project actually materializing is uncertain at this time.

- Alter City Group Holdings Ltd. plans a casino complex accompanied by a large resort.
- Bridge Investment Group proposes a Titanic-themed casino on the coast.
- The Dynasty could be renovated if sold (but there is a lien on the property to pay the \$75 million fine, which is reportedly a major obstacle to finding investors, though there is also the possibility the amount could be negotiated down).

As detailed further in the following Section 1.7, there are also critical questions about the compatibility of tourism with proposed military activities, and these also affect the likelihood of proposed developments becoming a reality.

1.6.4 Rota

Despite the island's beauty and environmental appeal, tourism has a spotty history on Rota and it is unclear what can really succeed there. Although a Gaming Commission exists on the island, there are no current likely prospects for casino development. (One proposal resulted in a lawsuit for the Commission, recently settled.) Interviews with public and private officials for this study suggest that small upscale eco-tourist lodges are now more likely to be developed on the island.

1.6.5 Northern Islands

Modeling the future population growth the Northern Islands is essentially not possible, as there is high uncertainty about future (potentially conflicting) proposals currently being proposed for the area. First, the U.S. military is currently preparing an Overseas Environmental Impact Statement (OEIS) to assess the potential effects new live-fire training on Pagan. Some previous residents have opposed this project, hoping to promote small tourism-related economic development in the form of eco-tourism on the island. Other forms of economic development that have been proposed include a proposal to mine for pozzolan. The socioeconomic study conducted for the military OEIS mentions a 1978 Master Plan for Pagan drafted by the Office of Transition Studies and Planning which noted that exploitation of basalt deposits could be an economic development possibility for the island. However, the socioeconomic study concluded that "Analysis of market conditions and mining operation feasibility indicates that a pozzolan mining operation on Pagan would not be expected to reach profitability or provide an investor with an acceptable rate of return."¹⁸

1.7 Subsequent Approach to Modeling and Scenario Development

While it was initially determined there would be three very different economic scenarios for each island – High Growth, Medium (or Status Quo), and Poor/Negative – the next step of Model development required more detailed specifications. The key drivers for CNMI change that would need to be addressed in each scenario would include:

1. Traditional **tourism** growth – typically measured in the CNMI by visitor arrivals;
2. **Arguably, casino** activities as a separate factor, because casino revenues do not interact with the rest of the economy as normal visitor expenditures do;
3. Potential **military** training activities, which will provide some jobs on Tinian but some fear could suppress tourism on Tinian and Saipan due to air conflicts, image, etc.;
4. **Construction** – although it is sometimes difficult to link this coherently with the more permanent ongoing tourism or military activities above.

¹⁸ U.S. Department of the Navy. Preliminary Draft (Version 3) *Socioeconomic Impact Assessment Study in Support of the Commonwealth of the Northern Mariana Islands Joint Military Training Environmental Impact Statement/Overseas Environmental Impact Statement*. 2015. P. 5. Available at: <http://www.cnmijointmilitarytrainingeis.com/documents>

1.7.1 Conceptual Decisions

This sub-section describes the *general* approaches decided upon to address some of the key topics and uncertainties previously described, and the following sub-section summarizes the overall scenarios decided upon.

General Model Approach to Tourism

Many discussions about potential CNMI (especially Saipan and Tinian) tourism growth center on a current spate of actual or proposed new resort units, varying from hotels to condo-hotels to the uncertain number of private vacation rentals directly marketed over the internet. One such list was presented previously in Table 3.

Our preference was not to rely on units as the main tourism variable if possible, because the mere existence of new hotels or other lodging structures does not guarantee there is enough of a market to fill them. Outside Hollywood, "Build it and they will come" is rarely a viable business plan, and the CNMI has several vacant deteriorating structures that were once struggling hotels.

The ideal variable would be visitor expenditures, because it is money that circulates in the economy and creates demand for other economic activity and for related "ripple effect" new jobs. If the CNMI simply maintained its present visitor counts, but could somehow increase visitor spending by 50% more per day in the local economy, that would produce economic effects roughly equivalent to boosting the visitor count by 50% (if there were no spending increase per visitor).

However, available visitor expenditure data for the CNMI are spotty over time, and a key recent set of possible forecasts (i.e., the Horwath Report for MVA) instead uses visitor arrivals as the critical variable. The Horwath Report's visitor arrival projections are for the CNMI in general, but arrivals now overwhelmingly stay in Saipan, and it is Saipan's infrastructure that is presumably most at stake when Horwath concludes that arrival levels above 750,000 annually may not be "sustainable." Therefore, the first decision in Model scenario design was that Saipan's tourism inputs would be based on different presumed levels of visitor arrivals for each scenario.

However, the Horwath Report is CNMI-wide (with an implicit primary focus on Saipan) and does not provide any range of estimates for Tinian and Rota. For those two small islands, it seems necessary to assume that the level of development being proposed would not greatly outstrip market demand for the relatively short timeframe of this model, and to define scenarios based on how many units exist.

We were thus driven to a hybrid approach in which (a) the Saipan tourism variable is defined by varying assumptions from the Horwath Report about visitor arrivals (which are assumed to apply primarily to Saipan); (b) Tinian and Rota arrivals are separately estimated by assumptions about number of visitor units; and (c) scenarios in which

General Model Approach to Tinian Military Training and Impact on Tourism

Although there is prospective military live-fire training activity in the Northern Islands, it is the activity at Tinian that would (a) provide a modest amount of direct employment there; and (b) according to some in the CNMI, suppress tourism on both Tinian and Saipan.

Tinian Military Options: Although the federal environmental study process continues for the development of military facilities on Tinian, it now appears likely this will occur and so is assumed for all three Tinian scenarios. According to the 2015 Socioeconomic Impact Assessment Study (SIAS) in support of the Joint Military Training Environmental Impact Statement,²² a permanent base camp located on Tinian for 20 weeks per year would create 95 jobs there, with an average annual construction jobcount of 571 during the seven years prior to completion. Of the permanent jobs, 19 would be for military personnel and/or government employees with specialized training and experience, and the rest (76) are expected to be filled by existing Tinian residents. However, our analysis – while it accepts the labor demand figures – assumes local population will fill the jobs only if labor supply is available based on unemployment rates and natural increase *in conjunction with whatever else is also assumed about Tinian casino-hotel development*. Thus, “who gets the jobs” in this Model forecasting study depends on overall scenario specifications.

A second proposed military activity is development of a “divert airfield” (i.e., alternative military airfield if facilities at Guam are unavailable due to military or natural emergencies). The divert airfield would have no or minimal associated permanent jobs but would involve a maximum construction jobcount of 150 during the three years prior to completion, with 50% of these jobs for Tinian residents.²³ (Again, though, our Model assigns jobs to residents or in-migrants based on estimated on-island labor supply vs. cumulative demand.) Given completion of military environmental studies and a December 2016 Record of Decision, it appears likely but not completely certain the divert airfield will be built on Tinian. Therefore, these construction jobs are omitted in the pessimistic Scenario C but included for Scenarios A and B.

The Model assumes both military training facilities and (for the first two scenarios) the divert airfield would be operational by 2028. This is likely an optimistic schedule – the joint military training facilities are actually now scheduled for opening in 2030 – but we

²² U.S. Department of the Navy. Preliminary Draft (Version 3) *Socioeconomic Impact Assessment Study in Support of the Commonwealth of the Northern Mariana Islands Joint Military Training Environmental Impact Statement/Overseas Environmental Impact Statement*. 2015. Available at:

<http://www.cnmijointmilitarytrainingeis.com/documents>

²³ U.S. Air Force. *Final Environmental Impact Statement for Divert Activities and Exercises, Commonwealth of the Northern Mariana Islands*. September 2016. Available at

<http://pacafdivertmarianaseis.com/docs.html>. The study also indicates up to 265 military personnel would come to Tinian for military exercises for up to eight weeks per year, though these would not necessarily be consecutive weeks. This intermittent military population was not included in the Model, nor did we include intermittent training for U.S. Marines and other military personnel associated with the “Joint Military Training” facility.

wanted to be conservative in assessing economic change and associated population impacts for long-term DPL training.

Impact on Tourism: In written comments to the 2015 SIAS, the MVA argued that proposed military activities are deeply incompatible with tourism for both Tinian and nearby Saipan, as well as the Northern Island of Pagan. For this study, we asked MVA about its current position on military-tourism compatibility. Deputy Director Judy Torres provided a lengthy and nuanced response,²⁴ which we attempt to summarize here:

- MVA now supports a Tinian divert airfield, consistent with recent U.S. Dept. of Defense (DoD) promises “to improve port and airport facilities for civilian and tourism uses” along with military uses. However, MVA still anticipates negative Tinian tourism impacts due to military jet aircraft noise and “intermittent unscheduled loss of primary tourism sites in the DoD leased northern two thirds of the island.”
- “While tourism has a chance of co-existing with a divert airfield on Tinian, it has no chance of survival with a full-on live fire training in regime in place” due to the above factors. Current uncertainty about military activities is discouraging casino-hotel development, Ms. Torres wrote. (MVA further maintains its previous position that any military live-fire training use of Pagan would be incompatible with eco-tourism envisioned for that island.)
- Tourism in Saipan and the CNMI generally would also be negatively affected due to (a) interference with tourist-bearing commercial flights encountering sometimes unscheduled conflicts, as normal flight approaches to the Saipan airport go over Tinian; (b) tour agents becoming “reticent” to book CNMI tours if there is indeed a history of flight delays, departing tourists stranded on Saipan, or visitors prevented from reaching the islands; and (c) the possibility that CNMI’s Brand image would be associated with negative environmental impacts and “on-going armed military presence and our skies viewed as subject to periodic closure and even the threat of attack ...”

Such prospective conflict between two primary economic sectors is a serious consideration, subject to debate and counter-arguments²⁵ likely to play out as final studies are prepared and decisions made about Tinian military activities. JMK Associates does not feel qualified to determine whether and to what extent these concerns about military impacts on tourism are justified. We decided not to attempt any scenarios in which military activities had various shadings of impact on tourism on Tinian or Saipan. Rather, subsequent specifications for Scenarios A and B implicitly assume high or moderate tourism military co-existence. Scenario C – while more contingent on presumed loss of CW-1 visa workers – is also consistent with a future in

²⁴ Personal e-mail communication, Dec. 7, 2017.

²⁵ For example, Hawai’i has maintained a successful visitor industry – and has attracted increased numbers of Asian visitors in recent years – despite a heavy military presence and a history of attack (Pearl Harbor).

which live-fire training on Tinian is at least correlated with virtually no tourism development on that island and steep downturns on Saipan.

General Model Approach to Construction

Major construction projects can add significantly – although temporarily – to total island populations, especially on a small island such as Tinian. However, construction workers and dependents rarely remain long enough to add to the population through births, and the timing of their presence is particularly uncertain. Therefore:

- Scenarios somewhat arbitrarily specify estimated construction-related labor demand and associated population with dependents that might reasonably occur in the final year of a projection period preceding the time period in which a major project is assumed to open. (See shortly following Section 1.8 for specification of the time periods used in the Model.) For example, if a scenario assumes a new casino-hotel opening on Tinian in the 2026-28 time period, point-in-time construction jobcounts might be assigned to 2025, the final year of the preceding 2021-25 time period covered by the Model. (The Model does not attempt to account for any and all construction activity, just major “spikes” above normal due to such large projects.)
- Construction-related population is omitted from the principal population estimates, which are assumed to flow from “permanent” or operational jobs. (For this reason, construction-related population is also not added to the population that is “aged” to estimate natural increase in the Model.) However, the results in Chapter 3 do show the additional total population from presumed construction as a sort of footnote to the principal population figures.

1.7.2 Final Scenario Choices

Chapter 2 begins with more specific details for each scenario, but the key parameters decided upon were as follows:

A. Scenario A (“High Growth”) –

- **Saipan:** Visitor arrivals unconstrained by either labor or infrastructure capacity; based on averaged projections from Horwath report, they grow to 1.04 million by 2028; new casino opens in 2026-28 period.
- **Tinian:** Two casino-hotels open or re-open, one by 2020 and other by 2028; all planned military activities (joint military training and divert airfield) constructed by 2028. (Implicit: Military and tourism can co-exist.)
- **Rota:** Three small but very upscale 75-unit hotels are developed – one by 2020, another by 2025, third by 2028.

B. Scenario B (“Medium Growth/Status Quo”) –

- **Saipan:** Infrastructure or other constraints result in visitor arrivals leveling off at Horwath’s “sustainable” level of 750,000; no second casino.
- **Tinian:** Just one casino-hotel, and not till 2028; all planned military activities proceed.
- **Rota:** One small luxury hotel by 2025.

C. Scenario C (“Poor/Negative Growth” and general economic contraction due to phasing out of all CW-1 workers by 2021) –

- **Saipan:** Decimation of visitor industry labor supply causes visitor arrivals to plummet by nearly 300,000 by 2020; then gradual partial recovery but no second casino.
- **Tinian:** Military training developed but no divert airfield; no large casino-hotels but perhaps one small budget hotel by 2028 as part of “adaptive response” to new economic conditions.
- **Rota:** Similarly, no luxury hotels but one small budget hotel by 2028.

1.8 Final Model Design

The Model created for this study merged the two elements discussed in the immediately preceding sections – (1) age-sex population forecasts for three population components; and (2) economic scenarios. This section describes the final Model design and logic, as well as noting strengths and weaknesses.

The **general framework** of the Model involves population groups, island, and time periods:

- A. While some CNMI-wide information is used, each Model is at the island level and attempts to separately track population and labor supply levels for three components of each island’s population: NMD, Non-NMD Residents (U.S. Citizens and green-card holders), and Foreign Non-Residents (roughly equivalent to CW-1 or other temporary work visa holders and dependents).
- B. Five time periods are utilized, extending beyond the 2028 target date to provide additional perspective:
 - “Present” (2016) to 2020;
 - 2021-2025

- 2026-~~2028~~ (DPL Target Year for Planning)
- 2029-2030
- 2031-2035

The ***fundamental conceptual logic of the Model process*** is as follows. Each step is described in terms of the first time period – and, implicitly, for a particular island and population group – but the steps are identical for other time periods, for other islands, and (mostly) for other population groups.

1. Beginning with the known age-sex population distribution for 2016, fertility and mortality assumptions are used to “age” the existing population one year at a time to the end of the period. This is population “natural increase.”
2. Historical data and other assumptions about labor force participation rates and unemployment rates are used to estimate available on-island **labor supply** from natural increase (assuming no net in-migration).
3. The **labor demand** analysis begins with a short chain of assumptions and calculations about “Direct” jobs and ultimately estimates “Total” jobs in the **Tourism** sector. (“Direct” jobs are those created by direct visitor expenditures – not only at hotels or other lodging, but also at retail and restaurant establishments, activities and attractions, transportation, etc. “Indirect” jobs are those created by tourism businesses buying from other businesses, and “Induced” jobs are those created by employees spending money or paying taxes in the economy. “Total” Tourism jobs are the sum of Direct, Indirect, and Induced jobs.)
 - On Saipan, presumed new Visitor Arrivals by the end of the time period – along with assumptions about party size, average nights on island, and occupancy levels – generate assumptions about change in the number of lodging units actually demanded. (On Saipan, the Model thus avoids consideration of possible over-building.) Further assumptions are made about the average number of workers per unit, and the ratio of all Direct jobs to lodging jobs alone.
 - On Tinian and Rota, we necessarily begin with assumptions about new units. Visitor Arrivals are estimated from a backward application of assumptions noted above for Saipan, but this is purely for informational value, to generate comparable information for all three islands. The real analysis follows a logic similar to that for Saipan from this point on – i.e., workers per unit and ratio of all Direct jobs to lodging jobs alone, leading to total new Direct jobs.
 - On all three islands, assumptions mentioned above are adjusted to reflect the existence of non-traditional visitor units distributed throughout each island (i.e., vacation rentals, B&Bs, etc.)
 - On Saipan, a single “Type 2” job-to-job multiplier is applied to calculate Total Tourism jobs. It is assumed that all Indirect and Induced jobs created from

money rippling through the economy are captured by Saipan itself, as this island has by far the CNMI's largest economy.

- On Tinian and Rota, the Indirect and Induced jobs are separately calculated – for Indirect, by applying “Type 1” job-to-job multipliers; and for Induced by use of a multiplier equivalent to subtracting the Type 1 from the Type 2 values. It must be assumed that some of the Induced and even more of the Indirect jobs will flow off-island to Saipan. (Thus, though only to a small extent, Saipan jobcounts reflect assumed economic scenarios on Tinian and Rota as well.)
4. The second component of labor demand is assumed to come from change in **Casino** jobs. Casinos are an aspect of tourism, but most of the economic effects come from the small specialized group of “high rollers” whose net losses are now helping to subsidize the government but whose economic behavior is likely very different from the average tourist.

Therefore, we treat Casinos as a separate sector, and begin that part of the analysis with estimates of Direct Casino jobs for a limited number of possible new operations (depending on the economic scenario).

- As with Tourism, on Saipan we apply a Type 2 multiplier to estimate Total jobs, all assumed captured on Saipan itself.
 - And again as with Tourism, on Tinian and Rota we separately estimate Indirect and Induced jobs, with differing proportions of each of the latter flowing to Saipan.
5. The third component of labor demand is presumed to flow from new Direct **Military** jobs (though only on Tinian). Estimates from available military studies are used for these purposes for each time period. The Indirect and Induced jobs are separately estimated, with differing proportions of each assumed to add to Saipan labor demand.
6. The final component of new labor demand would come from **Construction**. These jobs are very hard to estimate with even remote accuracy due to the differences in labor demand from different types of projects, but they are temporary and generally have only tangential effect on DPL functions and purposes. Therefore we include very, very rough and judgmental estimates in order to acknowledge that island populations can be temporarily expanded at certain times, but these “illustrative” Direct job numbers are separately reported with caveats about their transience.

Furthermore, the numbers are *only for the final year in the period* – they are “point-in-time” rather than the cumulative addition of new permanent jobs as with Tourism, Casino, and Military. So a new hotel presumed to open in, say, 2020 will no longer need construction workers that year; if construction workers are assumed in 2020, it would be for some project that actually comes on-line a year or two later. This Model

does not concern itself with attempting a full accounting of Construction labor demand, because of the lack of connection with permanent population.

However, for any year in which significant Construction workers are assumed, these are Direct jobs, and again the Indirect and Induced jobs are calculated from multipliers. Again, on Saipan this is from a single Type 2 multiplier (as all Indirect and Induced jobs are presumed captured on Saipan), but on Tinian and Rota there would be separate calculations of Indirect and Induced jobs, with differing proportions of each assumed to flow to Saipan.

7. On each island, total new labor demand by the final year of the time period is calculated as the sum of Direct, Indirect, and Induced jobs from the four sectors of Tourism, Casino, Military, and Construction.
8. If total labor demand meets or exceeds total effective labor supply from natural increase, there is a need for net in-migration of workers.
 - Although it may not be sufficient to meet all the labor needs, historical evidence (see preceding Section 1.6.1) indicates there *will* be some net in-migration of additional NMD and Non-NMD Residents in good economic times such as the 1990s were. Depending on the economic scenario, different periods of history provide different statistical perspectives on the ratio of in-migration to natural increase under different overall economic conditions.

In-migrating NMD and Non-NMD Residents are presumed to meet new labor demands before additional CW-1 or other (Foreign) Non-Residents are required to in-migrate.
 - However, if there is still unmet labor demand after considering both natural increase and expected intra-U.S. in-migration residents, then Non-Resident workers are assumed to be needed in all but the "Poor/Negative" Scenario C (which assumes an end to the CW-1 visa program and unlikely issuance of many H-1 or H-2 visas).
9. If total labor demand falls below effective labor supply from natural increase, then net NMD and Non-NMD Resident out-migration is assumed to occur by the end of the time period.
10. Net migration of workers (whether positive in-migration or negative out-migration) is accompanied by dependents. The most recent CNMI data about the ratio of each population group's total numbers (with dependents and all non-workers) to worker numbers alone then yields an estimate about how many people in total will in-migrate or out-migrate. And similar recent historical data shows the age-sex distribution of these net in-migrants or out-migrants, as described in Section **Error! Reference source not found.**

11. For each population group on each island (e.g., NMDs on Saipan), the age-sex matrix for net migrants is added to (or subtracted from) the age-sex matrix for natural increase. The resulting merged age-sex distribution is considered to represent that group's combined new population at the end of the period. It becomes the starting age-sex distribution (refer to Step 1 in this series) for the next time period.
12. For the NMD population only, the population 18 and above is estimated, and then reduced by application of recent estimates on eligibility criteria (elimination of household heads married to NMD spouses, household income, home ownership).

Minus this last step, Figure 9 provides an overview of Model logic.

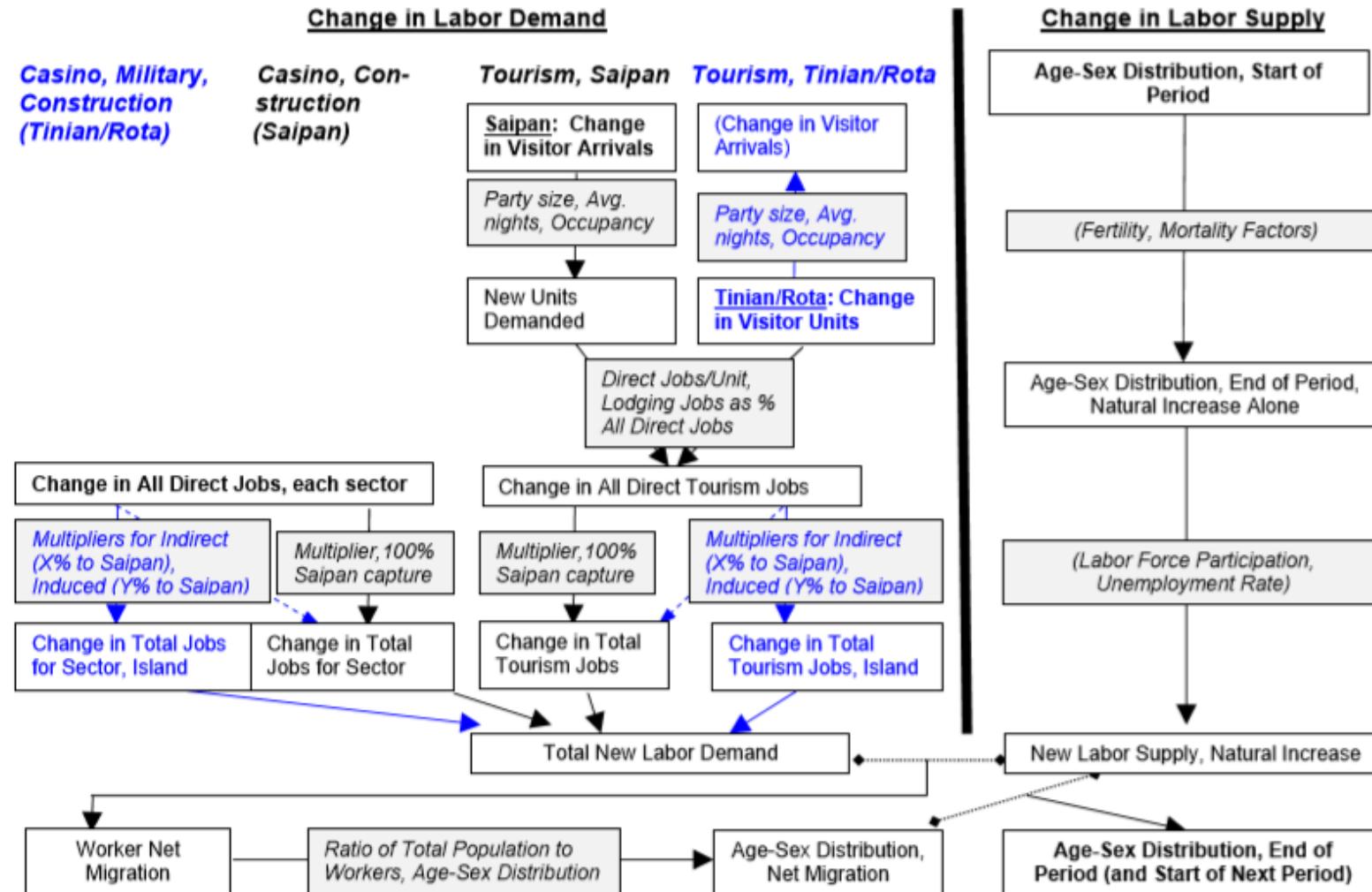
The logic in Figure 9 is particularly applicable to Scenario A and Scenario B. Scenario C follows the same basic approach but subtracts CW-1 workers and dependents from the total available labor supply, as per current federal law to a zero level in 2021. Also for Scenario C, there is very little new labor demand that cannot be met by natural increase, but when that does occur the small numbers are assumed to be met by one-third NMD and two-thirds Non-NMD Resident in-migrants.

Figure 9 includes some specific assumptions – e.g., multiplier effects, labor force participation rates, etc. – for which detailed values and sources will be provided in Chapter 2.

1.9 Additional Key Model Characteristics

- In order to estimate how much “natural in-migration” of NMD or Non-NMD residents will occur in cases of strong labor demand, we relied on historical data from the preliminary research described in Section **Error! Reference source not found.** However, this produced negative ratios for some groups under less positive economic scenarios – i.e., it assumed people will out-migrate a little *more* when the poor times are alleviated by small numbers of new jobs coming on-line. Such negative ratios are an artifact of the analytic method that is sometimes at odds with the logic summarized in Figure 9. Therefore, the Model adjusts negative ratios to become zeroes, resulting in slightly higher NMD and non-NMD population estimates in less positive scenarios than if the negative ratios were kept. This is an appropriately conservative step for this analysis, as it would avoid under-estimating NMD numbers and potential homestead applicants to DPL.
- The Model makes similar adjustments to zero values to adjust for situation when it would otherwise be dividing by zero or when there is any potential for negative new labor demand in some years, etc. This means the Model is able to address the possibility of visitor arrivals or visitor units *decreasing*, as could be the case in “Economic Contraction” scenarios.

Figure 9: Model Logic (for Particular Time Period, Island, and Population Group)



1.10 Assessment of Model Strengths and Weaknesses

Key Weaknesses:

- Most models are a patchwork of assumptions, some of them more valid than others. Due to CNMI data limitations, this Model may have more than the usual share of “heroic assumptions.”
- Inputs particularly open to question include assumed 2016 island baseline populations, the “Non-NMD Resident” ratios of migration to natural increase (because they are based on Combined Non-NMD and Foreign), and some labor force characteristics from the 2016 HIES (the not-yet-available 2017 Labor Force Survey was actually designed to measure these things, as well as ethnicity, more precisely than the HIES). Also, the Model fundamentally assumes that population levels are a sole function of labor supply/demand, when in reality that is just one of many (but not all “model-able”) factors affecting in- and out-migration.
- Given current economic and political uncertainties, particularly about CW-1 visas, there is a possibility that decisions may be made subsequent to Model finalization and analysis in very early 2018 that lead to conditions not envisioned in any of the scenarios used here.

Key Strengths

- This Model includes a fairly complete range of population and labor dynamics. It includes factors that to our knowledge were not previously considered – e.g., natural increase of labor supply, the role of unemployment and labor force participation rates in estimating total labor demand, the need to include multiplier (“ripple”) effects in estimating overall demand, and the likelihood of some “natural in-migration” (mostly by Non-NMD in-migrants) in response to economic opportunity.
- It has been created in such a way as to allow DPL or other designated CNMI statisticians to update it if and as better input assumptions become available for many of the factors. This is true both for scenario inputs (casino jobs/timing, visitor arrival levels, etc.) and for other parameters (e.g., possible subsequent use of 2017 Labor Force Survey inputs for population or labor force characteristics).
- Although some restructuring may be needed, basic Model design could allow adaptation for re-use in the early 2020s if DPL does another plan in five years. (That is why the Model includes time projection periods going past 2028.) There are currently some uncertainties about how the 2020 Census will be designed and what data will be available for the CNMI, but hopefully there will be good 2020 age-sex numbers by island for the three population components of NMD, Non-NMD Residents, Foreign Non-Residents.

4. SUMMARY OF KEY RESULTS FOR PLANNING PURPOSES

Preceding population results in Chapter 3 were comprehensive and reported in the logical order according to Model structure. This chapter is primarily for the purpose of reiterating and summarizing the particular results of most importance for DPL master planning: (1) estimates of NMD adults eligible for DPL homestead awards; and (2) estimates of total population.

4.1 Eligible NMD Adults

The Model estimates the number of Eligible NMD adults (including those who may already have awards) as the sub-set of total NMD population who are not disqualified due to being married to an NMD spouse and who meet the eligibility criteria of not being current homeowners *and* having household incomes under \$70,000.²⁸ Historical research reported in Chapter 1 (Section 1.4) established that NMD net migration patterns have been much less responsive to changes in economic conditions than other CNMI population groups.

Therefore, overall NMD population and its "eligible" sub-set show much less variation across economic scenarios than will be the case for Total Population in the following section. There are also apparent minor inconsistencies according to scenario (i.e., the highest and lowest estimates over time are not always for the same economic scenarios) that do not appear for total population estimates.

To reiterate, Scenario A is, overall, a High-Growth scenario for each island. Scenario B assumes Moderate Growth (and for Saipan a sort of "status quo" situation in which visitor arrivals will soon plateau at "sustainable" levels), while Scenario C is for Poor to Negative economic conditions associated with ending CW-1 visas.

Figure 40 to Figure 42 show Model estimates for each island, by scenario. For the 2028 target year, Saipan estimates vary from 4,691 to 5,038; Tinian, from 382 minimum to 409 maximum; and Rota, a similar range of from 368 minimum to 421 maximum. On a CNMI-wide base, the 2028 numbers vary from 5,487 to 5,869.

This is a relatively narrow range of estimates, with the lowest estimate representing 93% of the highest estimate for Saipan, 89% for Tinian, and 87% for Rota.

²⁸ As noted in foregoing Chapter 3, Section 3.4, inflation trends are difficult to predict for CNMI due to lack of data, so it is difficult to tell to what extent Model output numbers may be eroded in outlying future years due to inflation. (However, high inflation can also present challenges to homeownership, so decreases in eligibility due to rising incomes could also be offset by increases in eligibility due to falling ownership rates.) All the assumptions about percentages of NMD population affected by the disqualification/eligibility criteria come from the 2016 Household Income and Expenditure Survey (HIES), and are set forth in the discussion of Model design and assumptions – see Chapter 2, Section 2.1.3.

Figure 40: Summary of Eligible NMD Adult Estimates by Scenario, Saipan

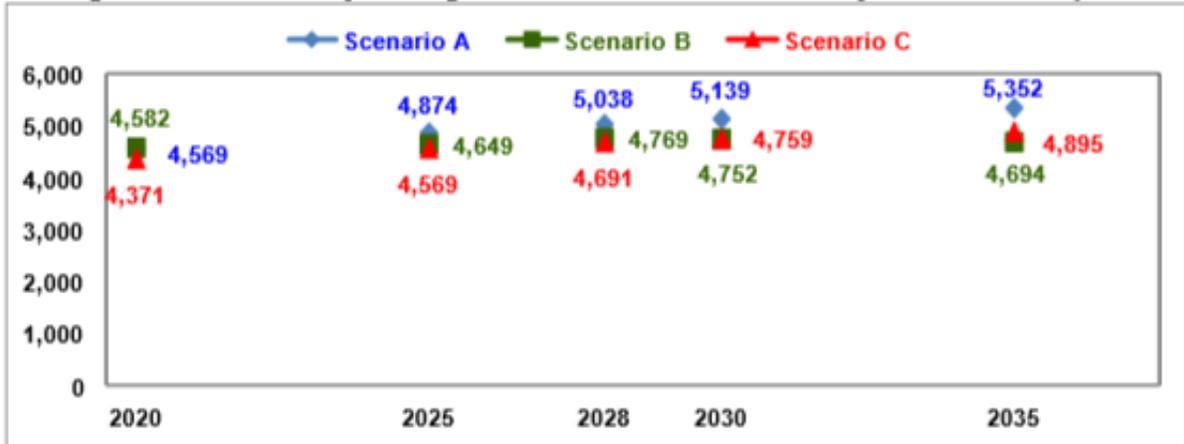


Figure 41: Summary of Eligible NMD Adult Estimates by Scenario, Tinian

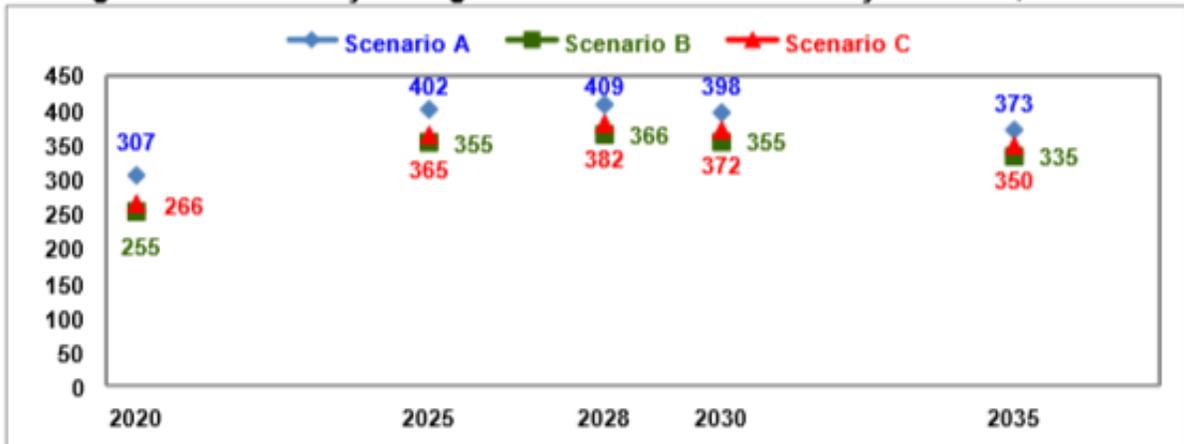
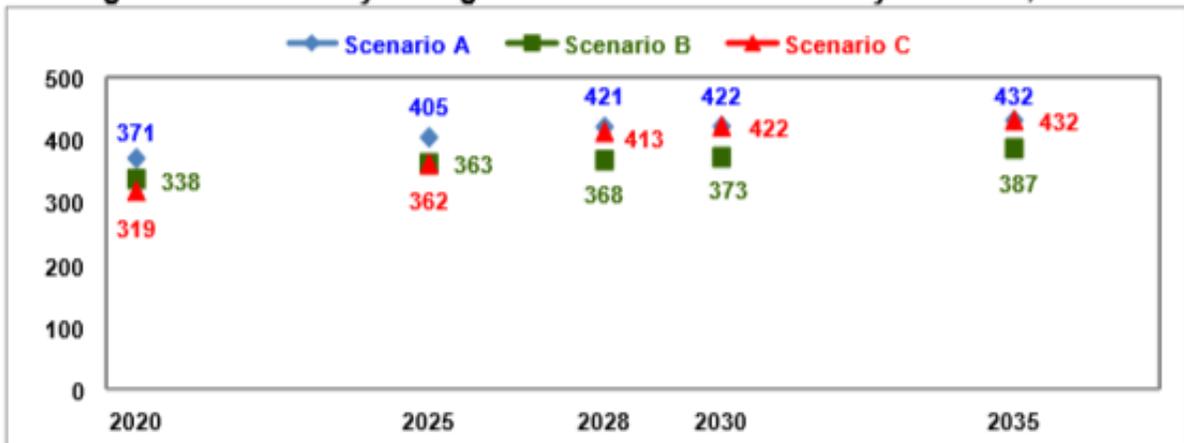


Figure 42: Summary of Eligible NMD Adult Estimates by Scenario, Rota



Not discussed in Chapter 3, but of some import to DPL – there are important differences between these population-based estimates and data obtained from DPL about awards already made. For Saipan, the estimated number of eligible NMD applicants (including any who may already have received awards) ten years from now is far greater than the number of awards as of 2017. But on Tinian and particularly on Rota, there have already been far more awards made than the estimated future number of eligible applicants. The Rota figure is roughly equal to the island’s current population.

Table 51: Homestead Awards as of 2017 Versus Estimated 2028 “Eligible NMD”

	Saipan	Tinian	Rota	Total
TOTAL Homesteads Awarded by 2017:	1,997	912	2,597	5,506
Eligible NMD Applicants by 2028 (Scenario A)	5,038	409	421	5,869
Eligible NMD Applicants by 2028 (Scenario B)	4,769	366	368	5,503
Eligible NMD Applicants by 2028 (Scenario C)	4,691	382	413	5,487

It should be understood that some of the awards made by DPL may have lapsed (due to death of awardees with no heirs). Additionally, for Saipan, about 400 homesteaders who have received agricultural lots under the Homestead Waiver Act remain eligible for village lots on the island, though without further research there is no way to know if a homesteader has already been awarded both.

4.2 Total Population

Total population was calculated as the sum of specific estimates on each island of three different components: (1) NMD; (2) Non-NMD Residents of CNMI; and (3) (Foreign) Non-Residents. Historical data indicate that population levels for the latter two components – which represent the majority of the CNMI population – have varied much more greatly as prevailing economic conditions changed.

Therefore, the total population levels for different islands show much greater variation according to the economic scenarios. Figure 43 to Figure 45 show these estimates for Saipan, Tinian, and Rota by scenarios. Saipan estimates for 2028 vary from a low of 40,457 to a high of 67,414; Tinian, from 2,325 to 8,707; and Rota, from 2,284 to 3,577. On a CNMI-wide basis, the numbers add to represent a range from 45,066 to 79,698.

These numbers are significantly different by scenario, and that is because of the wide range of economic futures that now appear possible for the Commonwealth. The most optimistic Scenario A – primarily driven by some of the visitor arrival assumptions in the Horwath Report commissioned by the Marianas Visitor Authority – assumes ongoing strong increases in tourism (and, implicitly, some sort of solutions to potential infrastructure and labor constraints, as well as political support by residents).

Figure 43: Summary of Total Population Estimates by Scenario, Saipan

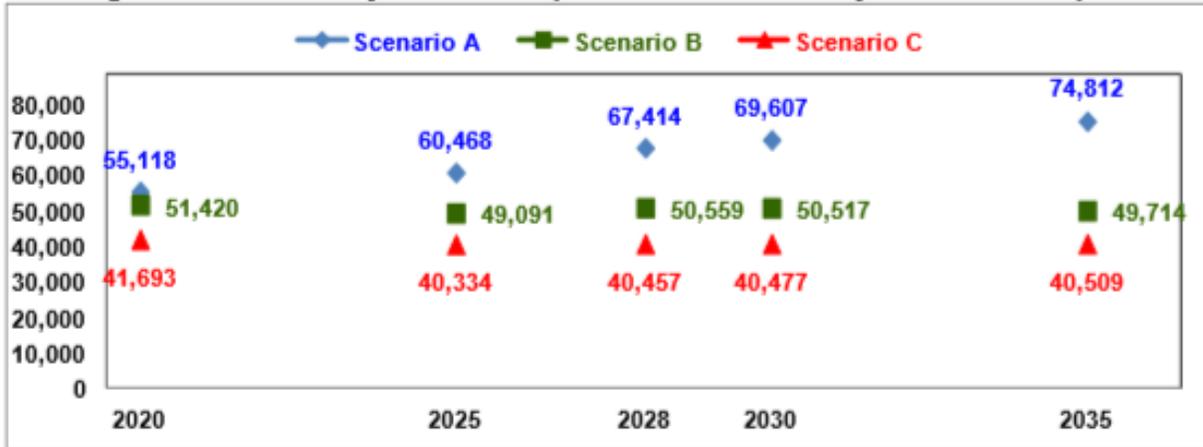


Figure 44: Summary of Total Population Estimates by Scenario, Tinian

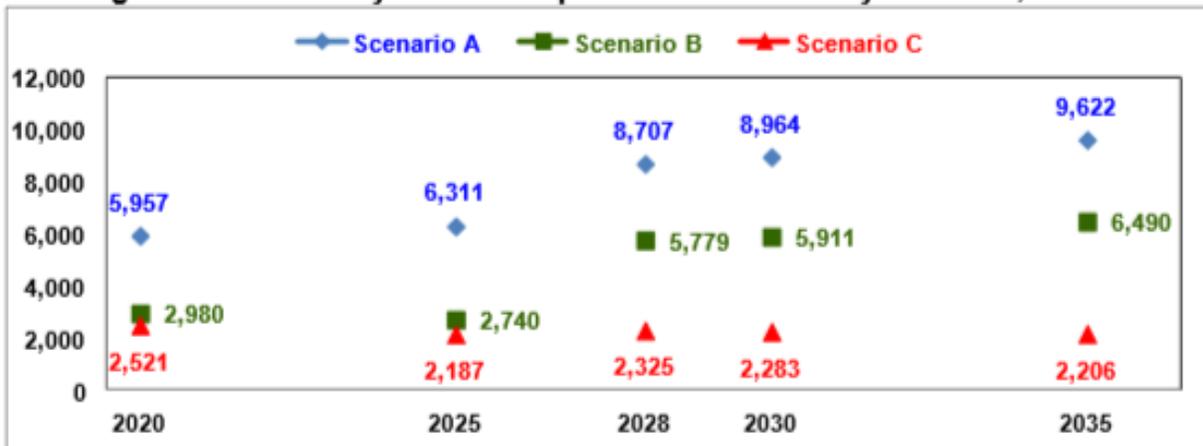
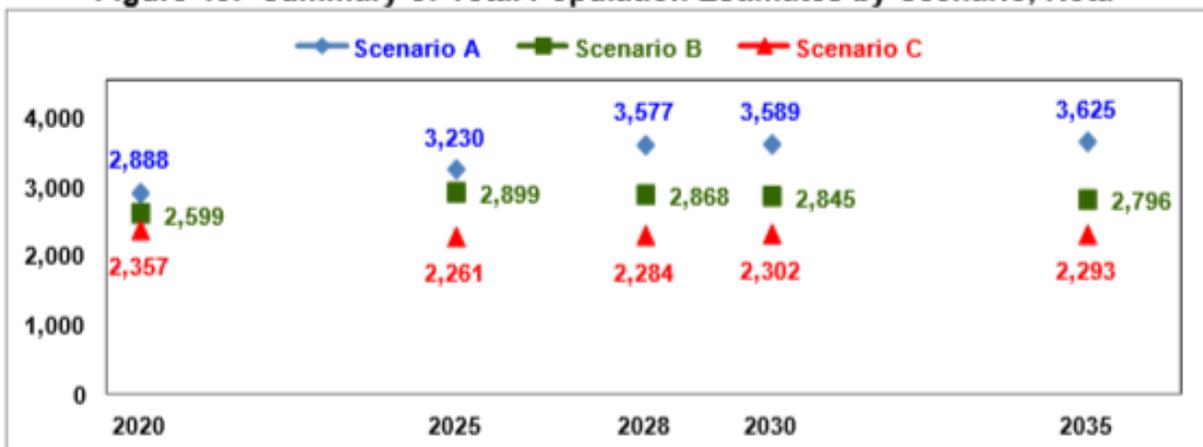


Figure 45: Summary of Total Population Estimates by Scenario, Rota



By contrast, the essentially catastrophic Scenario C is based on an equally possible future, characterized by loss of CW-1 workers and a reduction in tourism equivalent to what could happen if the Chinese market is blocked by elimination of “paroles” for visitors from China.

In this much greater range of possibilities (compared to the Eligible NMD figures previously summarized), the minimal 2028 Scenario C number is 64% of the maximal Scenario A number for Rota, 60% for Saipan, and just 27% for Tinian. The range is relatively greater for Tinian because economic activities proposed for that island – particularly casino-hotels, but also military activities²⁹ – is so wide, especially in comparison to existing population. These activities could involve labor demand far in excess of the island’s supply and so require substantial in-migration.

4.3 Closing Comment: Future Population Data

This report has attempted to stress not only the CNMI’s great uncertainty over economic futures, but also data limitation challenges facing Model development and validity. For example, the fundamental issue of “current” (2016) population baseline figures for each island and the Commonwealth as a whole required a judgmental choice between different available estimates, and may not have been accurate.

The Model could be modified and re-used in future years once 2020 Census data become available. However, this assumes that:

- The 2020 Census for the CNMI overall includes the detailed race/ethnic and other characteristics normally gathered in the American Community Survey (ACS). The Census Bureau has not conducted the ACS in the CNMI or American Samoa in inter-censal years – the only two U.S. areas for which ACS numbers have not been collected. It is likely but not certain that the ACS will be done in CNMI in 2020.
- These data will actually be *available* (either as tables or in Public Use Microdata Samples [PUMS]) in ways that permit separating age-sex characteristics for each of the three key population components considered here – i.e., NMD, Non-NMD CNMI Residents, and (Foreign) Non-Residents. That availability needs to be by island. Additionally, for DPL purposes, it would be very useful to have published data that permits identification of Chamorro *and/or* Carolinian age-sex characteristics (in cases where people report two or more race/ethnic categories).

Whether directly or through the Central Statistics Division, we suggest that DPL stay in touch with both the Census Bureau and its Congressional delegate to monitor debates in Congress about adequate funding and questionnaire content for the 2020 Census. These debates involve national budgetary and ideological issues that go far beyond what is fair or useful for CNMI, but it cannot hurt for the Commonwealth’s voice to be heard in these decisions.

²⁹ There are significant questions about the compatibility of Tinian military activities with tourism activities on that island and perhaps other islands as well. See discussions in preceding Section 1.7.1.

Appendix J – 2019-2022 Strategic Parks and Recreation Plan

Excerpts from [DLNR-DP&R 5-Year Strategic Plan](#) (pg. 25 – 27)

CNMI'S PARKS AND RECREATION BELIEFS, GOALS AND OBJECTIVES

Parks and Recreation's Beliefs: To be loyal to a good cause based on mandated duties "a sense to preserved good deed and faith". Beliefs are convictions that we generally hold to be true, usually without actual proof or evidence. Beliefs grow from what we see, hear, experience, read and think about.

- Parks and recreational activities foster human development, promote health and wellness, strengthen community image and sense of place, efficiently utilize resources, demonstrate fiscal responsibility, develop and cultivate partnership, support economic development, protect environmental resources, develop and empower staff, and increase cultural unity.
- Recreational activities should develop one physically, socially, and emotionally by enhancing cultural, artistic, and life skills.
- Programs should adapt to changing needs, age, and culture of the community.
- Participation in programs enhances one's education, promotes sportsmanship, advocacy, inclusiveness, and develops good citizenship, and overall well-being.
- A variety of recreational opportunities should be available to everyone.
- Amenities should meet the needs of a diverse population by providing a safe, clean, affordable, well-balanced, educational, wholesome, enjoyable, and rewarding experience.
- Investments in parks maintenance and improvements provide dividends that enhance the quality of life, property values, and the community's self-perception.
- Recreational activities enhance the quality of life the CNMI.
- Operations should be efficient.
- Supporting high quality youth programs through collaborative efforts.

Goals and Objectives:

Goal 1: Provide excellent programs, services, places and spaces

- 1.1 :Plan, design, build and maintain a comprehensive system of sustainable facilities, trails and park spaces to high standards to provide attractive places people will use and enjoy
- 1.2 : Plan, design, build and maintain programs and services to high standards to provide dynamic offerings that people will use and enjoy
- 1.3: Improve process for evaluating programs, facilities and services for operational efficiency and effectiveness
- 1.4: Increase community awareness of parks and recreation resources

Goal 2: Enhance and conserve natural and historical resources

- 2.1: Conserve, enhance and acquire natural areas and historical resources
- 2.2: Preserve and improve tree canopy
- 2.3: Advance historical and natural resources education and interpretation
- 2.4: Develop and maintain internal and external partnerships to improve natural resource management
- 2.5: Integrate environmentally sound sustainability practices into park management practices

Goal 3: Build community, promote wellness and ensure equal access for all

- 3.1: Improve civic engagement and provide opportunities for social connection
- 3.2: Identify underrepresented groups and help them participate and feel connected
- 3.3: Increase engagement in physically active recreation, and enjoyment of parks and trails to foster active healthy lifestyles
- 3.4: Further reduce barriers for accessing programs, services, places, spaces and information

Goal 4: Manage assets efficiently and effectively

- 4.1: Work within annually adopted budget and comply with policies and procedures
- 4.2: Maintain and communicate inventories of programs, services, places, and spaces
- 4.3: Maintain and communicate financial and budgetary data
- 4.4: Utilize budgeted resources in a deliberate and systematic manner throughout the entire year
- 4.5: Determine life cycles for equipment and schedule maintenance & replacement or renovation

Goal 5: Cultivate an effective and dynamic workforce

- 5.1: Increase training through professional development opportunities
- 5.2: Expand connections throughout the department and the division
- 5.3: Recognize and celebrate staff excellence and innovation
- 5.4: Implement approaches to improve accountability
- 5.5: Develop practices that encourage a safe and healthy work environment

LONG-TERM AND SHORT-TERM STRATEGIES AND ACTIONS:

Strategy #1: Expand Recreational Programs (dependent on community needs and availability of funding)

Action Steps

1. Identify opportunities to increase social activities, either upon request or as opportunities are made available.
2. Implement year-round opportunities for public recreational Interests.
3. Construct play-grounds for youth recreation.
4. Construct shower heads for those who needs to rinse off salt water.

Strategy #2: Improve Saipan Parks and Recreational Jurisdiction:

Action Steps

1. Create Map of Saipan's Parks and Recreational locations.
2. Create handouts (rules & maps) for all park visitors.
3. Repair and maintain pavilion structures.
4. Use volunteers and business to adopt and improve site of interest. Complete, landscape and beautify all parks.

Strategy #3: Increase funding for parks through Park fees, Federal Grants and Donations. Consider funding for ongoing maintenance costs.

Action Steps

1. Maintain or Increase Park Fee
2. Identify potential grant opportunities.
3. Identify timeline for projects to be completed.

Strategy #4: Prioritize list of known projects.

Action Steps

1. Develop list of all known Parks Capital Projects
2. Prioritize projects with estimated timeline
3. Construct picnic shelters and gazebo
4. Complete trails/sidewalks
5. Complete Landscaping plan
6. Upgrade other features identified in Master Plan
7. Construct new or renovate restrooms as planned
8. Construct Bleachers where they are most needed
9. Improve Parking space and lighting fixtures

Strategy #5: Create a unified approach – theme to beautify parks and recreational facilities

Action Steps

1. Uniform signage and planned themes.

Strategy #6: Deter vandalism throughout Parks and Recreational facilities

Action Steps

1. Keep trash picked up every day.
2. Keep Parks and Recreational facilities free of trash and debris.
3. Repair or replaced what was vandalized within 24 hours.
4. Develop program to collaborate with community resources to deter and clean up graffiti.
5. Use lighting as a deterrent.
6. Explore alternative measures such as security cameras.
7. Work with CNMI Police Department. 8. Station park rangers where public usually use

Strategy #7: Continue updating Strategic Plan annually.

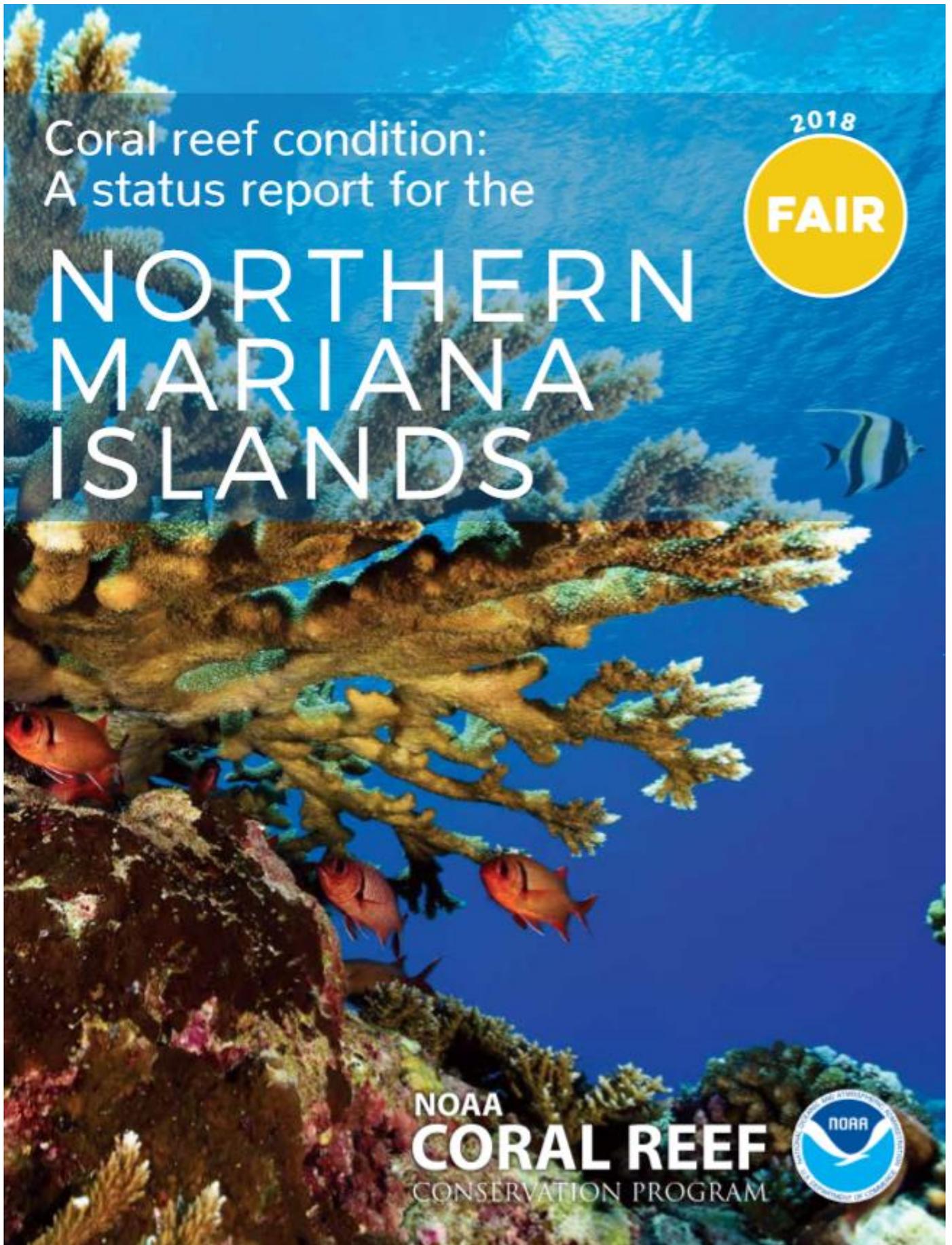
Action Steps

1. Develop a Five-Year Strategic Plan.
2. Review Strategic Plan Annually.
3. Conduct a cost/benefit analysis of recreation programs.
4. Develop a fee philosophy for recreation programs and facility usage.
5. Develop use policies for fields and facilities.
6. Create a timeline of projects to coincide with long term goals. (2016) Update annually.

Strategy #8: Create a long-range capital plan.

Action Steps

1. Create Parks and Recreation Master Plan.
2. Update the Parks and Recreation Master Plan Annually.
3. Identify all capital projects for Parks and Recreation.
4. Develop a capital reserve and investment strategy.
5. Coordinate with affiliated departments for trail and park development and improvement.
6. Continue work with on recreational use of space throughout the Parks and Recreational Facilities.
7. Provide optimal recreational space for efficient events.
8. Evaluate current parks and recreational area and provide workable space to meet community needs.
9. Identify adequate storage for equipment and supplies.
10. Evaluate opportunities for expansion of existing facilities.



CORAL REEFS ARE IMPORTANT

Healthy coral reefs are among the most biologically diverse ecosystems on Earth, with high cultural and economic significance. Located in the western Pacific basin, the Commonwealth of the Northern Mariana Islands (CNMI) is made up of 14 islands extending over 600 kilometers. Coral reefs are important to the people of CNMI because they provide **traditional and subsistence uses, production of commercial food products, recreational opportunities for a healthy tourist economy, and physical protection from storms.**

Culture and Food

The indigenous ethnic groups of the Marianas, the Chamorro and Carolinian, are closely tied to the natural environment. Surveys indicate that about 96% of residents who go fishing, do so to feed their families. Ancient Chamorros and Carolinians were expert fishermen with inherent knowledge of harvesting reef fish species such as tātaga (unicornfish), mafute’ (emperor), and palakse’ (parrotfish). Traditional fishing methods such as spearfishing and talaya (throw-net) help preserve the cultural identity of the islands. The connection between coral reefs and society is integral as the reefs provide habitat for most species as well as numerous ecosystem services, including protection of culturally significant areas along the CNMI coastlines. Surveys of CNMI residents indicate that 91% of respondents agree that coral reefs are important to their culture (NOAA National Centers for Coastal Ocean Science 2018).



Mike Trianni



Alexandra Fries

Tourism

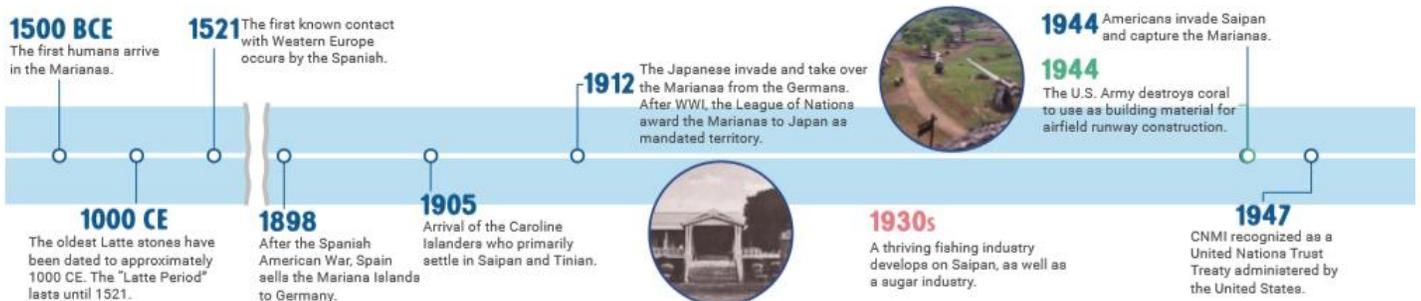
The economic importance of the CNMI coral reef ecosystem is significant. In addition to providing food, shelter, and cultural significance for the citizens of CNMI, the coral reefs generate revenue from tourists and recreational users that are attracted to the beauty of the coral and its inhabitants. Tourists visit CNMI to swim, snorkel, dive, and experience both the beautiful coral reefs and the organisms that call them home. Tourism and development sustain the economy of CNMI. Striking a balance between facilitating economic growth and managing coastal resources in a sustainable manner continues to prove itself a challenge. However, multi-agency partnerships are invaluable towards the implementation of management actions that support economic growth while considering coastal conservation. Conservation and protection of the reefs will allow tourists and locals alike to enjoy the benefits they provide.



NOAA



Krexon Cho



REEFS ARE UNDER THREAT

Coral reefs in the CNMI are threatened by unsustainable fishing practices, climate change, land-based sources of pollution, overuse, and lack of enforcement.

Unsustainable fishing

Unsustainable fishing occurs when too many fish or all of one specific type of fish are taken. This causes fish species to decline on the coral reefs and impacts reef health. It also means that there aren't as many fish available as food, and some species may disappear altogether. Sustainable fishing practices allow fish populations to be maintained and support the coral reef ecosystem. Marine protected areas also help support fish populations.

Climate Change

Globally, climate change stressors, like ocean warming and acidification, are the leading threats to coral reefs. In the CNMI, reefs have undergone mass coral bleaching events during four of the last five years, resulting in reduced coral cover and changes in community composition. It is imperative to reduce local stressors that negatively affect the reef's ability to withstand climatic changes as well as to protect resilient coral populations.

Land based sources of pollution

Nonpoint source pollution is a leading cause of coral reef degradation in the southern CNMI. Water quality is particularly impacted by urban runoff, failing sewage systems, unpaved roads, farms, land clearing, and development. Stormwater that drains to the sea carries sediment and excess nutrients, which smother coral and cause algal blooms, severely compromising reef health and resilience.

Overuse and lack of enforcement

Historically, coral reefs surrounding CNMI have been impacted by human uses. Military defense activities during World War I and World War II impacted reef habitat. Additionally, the anchoring of large commercial and naval vessels on shallow reef platform impacts reef habitat. Tourism is an important economic driver in CNMI, and managing human impacts on coral reefs continues to be a challenge.

WHAT YOU CAN DO TO HELP

There are many threats to coral reefs. Here are a few actions YOU can take to help conserve coral reefs:



Be responsible for the fishing gear that you use.



Only catch enough fish for you and your family and be aware of fisheries regulations.



Do not take fish from marine protected areas.



Reduce energy use and your carbon footprint.



Pick up your own trash and carry away the trash that others have left behind.



Support initiatives to preserve and protect coral reefs.



Plant native vegetation to prevent sediment and pollutants from reaching the reef.



Don't dump household chemicals into streams, gutters, or drains.



Help protect mangroves and wetlands from filling and construction activities.



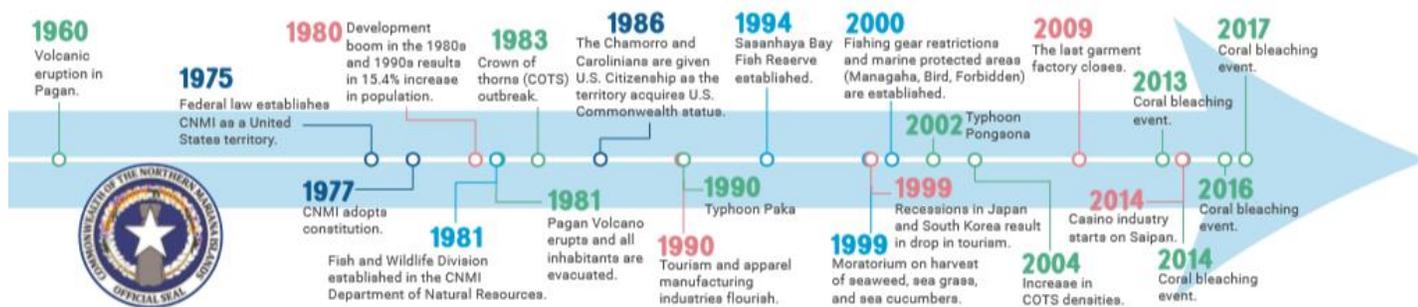
Don't stand on or touch live coral. Don't take pieces of corals home.



Educate yourself about reefs and the creatures they support.



Do not drop your anchor in reef areas, rather use sandy bottom areas.



CORAL REEFS IN CNMI SUPPORT ECONOMY

CNMI's coral reefs support the economy by providing food from subsistence fishing, income from commercial fishing, and tourism from recreational activities such as snorkeling and diving.

Coral reefs are a food source on Saipan worth between \$208,000 and \$1.4 million per year, based on subsistence fishing by household (van Beukering et al. 2006). Hospital and Beavers (2014) surveyed small boat fishermen on Saipan, Tinian, and Rota, and found that they primarily fished on reefs, with 93% of these fishermen acknowledging reef fish were an important source of food.

While subsistence fishing is vital to CNMI's economy, commercial fishing also provides economic benefits. In 2014, the commercial fishery for coral reef fish species was valued over \$150,000 (Western Pacific Fisheries Information Network). The contribution of fishing to CNMI's gross domestic product was \$2.12 million in 2014 (Gillet 2016).



Tourists diving in The Grotto on Saipan. Marine-based tourism in CNMI contributes millions of dollars to the economy. Photo: Peter Edwards.

Tourism is an even larger part of CNMI's economy, and the number of tourist arrivals has been increasing since 2011 (World Bank). Marine-related tourism produces over \$40 million per year, and, on average, 30% of tourists come to Saipan because of marine attractions. More than 350,000 diving or snorkeling trips take place in Saipan annually. These trips generate a direct economic value of over \$4.9 million a year (van Beukering et al. 2006).

With all of these economic contributions based on the coral reef resources in CNMI, it is more important than ever to protect and manage the reefs. Sustainable management of the coral reefs will not only protect the ecosystems, but also support human use of these resources and protect their economic benefits.

FISHERIES SUCCESS IN SAIPAN LAGOON

The Saipan Lagoon is a critical part of the marine ecosystem of the island, as it has been a source of fish and other marine resources since the island's first inhabitants migrated to the Marianas over 4000 years ago. As population and development increased, the demand on marine resources did so as well.



Part of Saipan Lagoon. Photo: CNMI Division of Coastal Resource Management.

Fish market surveys conducted during the 1990's by the CNMI's Division of Fish and Wildlife (DFW) found that CNMI fisheries could benefit from gear-based management (Graham 1994, Trianni 1998). In an attempt to protect habitat, reduce fishing power, and protect fisheries resources by reducing indiscriminate fishing, a net restriction was enacted in 2003. This restricted the use of gill and surround nets except under special permits granted for cultural fiestas. The net restriction was monitored by collecting data from fish extracted from the fiestas and from fisheries-independent underwater visual census of the Saipan Lagoon in 2004, 2007, and 2011. The surveys showed positive changes in certain food fish abundance and biomass within the lagoon (Trianni et al. 2018). This regulation is an example of managing fisheries effectively while being sensitive to cultural use.

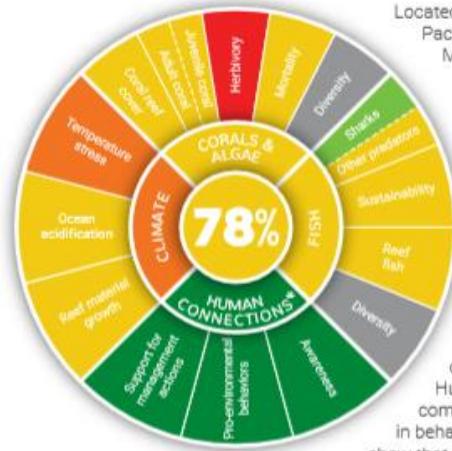


*The Lagoon is home to a variety of fishes including these damselfish (*Chromis viridis*). Photo: John Iguel.*

NORTHERN MARIANA ISLANDS CORAL REEFS



NORTHERN MARIANA ISLANDS



Located just north of Guam in the Western Pacific, the Commonwealth of the Northern Mariana Islands (CNMI) is a three-hundred-mile archipelago consisting of 14 islands. The Northern Mariana Islands were divided into four sub-regions to evaluate condition of four categories—corals & algae, fish, climate, and human connections. CNMI coral reefs are in fair condition overall. Benthic cover is moderately impacted, and herbivory levels are critical. Herbivores around unpopulated islands are in good condition compared to those around populated islands. Most fish indicators are moderately impacted. Overall fish conditions are fair. Temperature stress and ocean acidification are having negative impacts on coral reefs. Overall climate conditions are impaired. Human connections are very good, which means communities are aware of coral reef benefits and engage in behaviors that protect reef ecosystems. These indicators show that CNMI's coral reefs are moderately impacted and that overall conditions are fair. The Territory is struggling against threats, such as pollution, overfishing, and climate change.

While these scores reflect data collected through summer 2017, very recent data suggest coral reef bleaching has resulted in severe impacts. Up to 90% loss for some branching coral species has occurred around Saipan and Tinian. It is unclear what the impact of the latest bleaching event will be on all reefs of the Mariana Islands, but preliminary information suggests widespread loss across the archipelago.

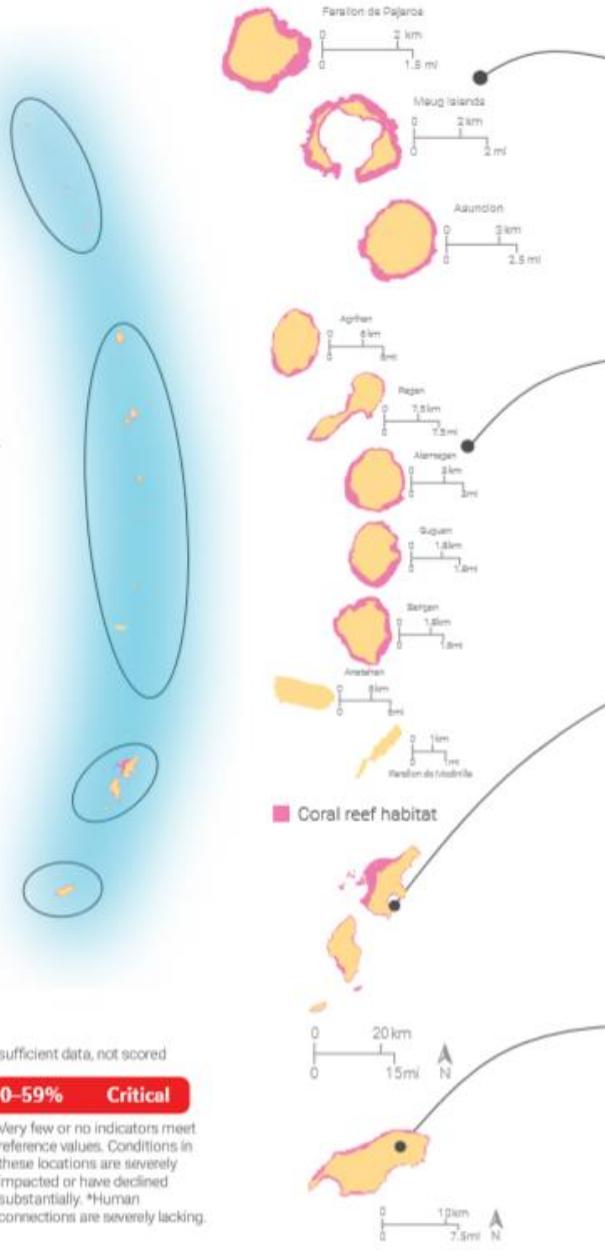
Biodiversity is a measure of the variety of living organisms. High biodiversity of corals, fish, and other organisms helps keep the ecosystem in balance and makes it resilient to environmental impacts. Although we measure biodiversity, the science is not yet mature enough to score biodiversity in an area. As the science and analysis progress, we will look to include biodiversity scores in future status reports.



What do the scores mean?

- 90–100% **Very good**
 - 80–89% **Good**
 - 70–79% **Fair**
 - 60–69% **Impaired**
 - 0–59% **Critical**
- Insufficient data, not scored
- All or almost all indicators meet reference values. Conditions in these locations are unimpacted, or minimally impacted or have not declined. *Human connections are very high.
- Most indicators meet reference values. Conditions in these locations are lightly impacted or have lightly declined. *Human connections are high.
- Some indicators meet reference values. Conditions in these locations are moderately impacted or have declined moderately. *Human connections are moderate.
- Few indicators meet reference values. Conditions in these locations are very impacted or have declined considerably. *Human connections are lacking.
- Very few or no indicators meet reference values. Conditions in these locations are severely impacted or have declined substantially. *Human connections are severely lacking.

*Human connections data are only collected at the overall Northern Mariana Islands level, not the sub-region level.



NATIONAL MONUMENT

The Marianas Trench Marine National Monument protects approximately 95,714 square miles of submerged lands and waters of the Mariana Archipelago. The National Monument includes Farallon de Pajaros, Maug, and Asuncion. Coral reefs in the National Monument are in fair condition. This region had the lowest score for climate, an impaired score. Fish indicators were unimpacted, leading to very good conditions.



NORTHERN ISLANDS

The northern, uninhabited islands from north to south are Agrihan, Pagan, Alamagan, Guguan, Sarigan, Anatahan, and Farallon de Medinilla. Coral reefs in the Northern Islands are in good condition. This was the highest score of all four regions. This region had the highest score for fish, very good, and for corals & algae, fair. Climate conditions were impaired.



SAIPAN, TINIAN, & AGUIJAN

Saipan has the most diverse types of coral reefs and associated habitats in the CNMI. A fringing and barrier reef system protects the majority of the beaches along the western and coastal plains. Saipan has the largest population in the Mariana Islands, 48,220 people. Tinian has a population of 3,136 people. Coral reefs in this region are in impaired condition. This region had the same score as Rota. As is common in populated areas, reef fish populations are depleted, as indicated by relatively small sizes of fishery species and low overall fish biomass.



ROTA

Rota is the southernmost island of the Northern Mariana Islands. It has a land area of 85.5 square kilometers, with fringing reefs surrounding the island. The population is 2,527 people. Coral reefs on Rota are impaired due to fishing pressure, pollution, and climate change. This region had the lowest score for corals & algae, an impaired score. As is common in populated areas, reef fish populations are depleted, as indicated by relatively small sizes of fishery species and low overall fish biomass.



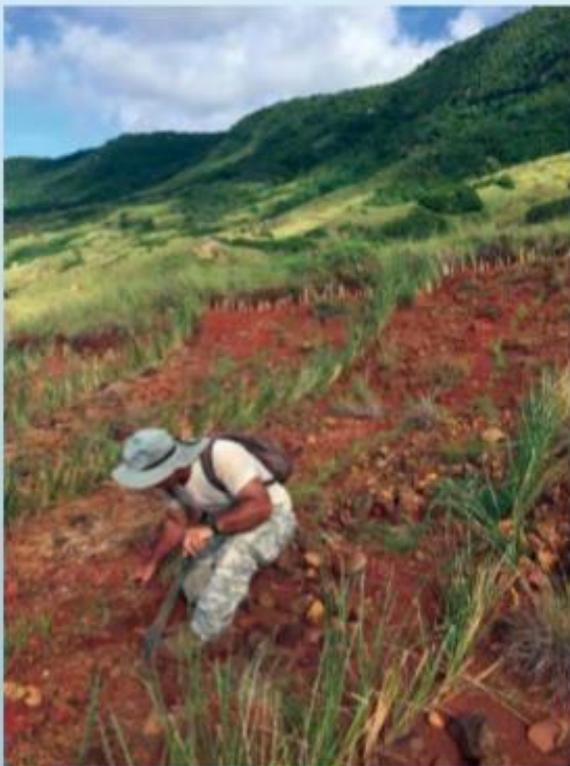
CONSERVATION ACTION PLANS SHOW SUCCESS

The CNMI has three Conservation Action Plans (CAPs) for adaptive 'ridge to reef' management of priority watersheds. They cover the Garapan, Lao Lao, and Talakhaya watersheds.

The Garapan CAP focuses on urban stormwater management, addressing polluted runoff from Saipan's dense center of commerce and tourism.

The Lao Lao CAP helps protect the coral of Lao Lao Bay—a prized cultural, recreational, and tourism resource—from upland erosion and sedimentation.

The Talakhaya CAP highlights reforestation of highly erodible soils in a remote watershed on the island of Rota. Illegal fires, set by hunters to expose deer, have created large barren areas that cause erosion. Over the past ten years, volunteers have re-planted rocky badlands with almost 400,000 vetiver plants, a grass renowned for its ability to naturally prevent erosion. As a result, less harmful sediment washes onto the reef below. The rows of grass also help retain nutrient-rich soil for the establishment of native forest.



Volunteers re-plant grasses to limit erosion as part of the Talakhaya Conservation Action Plan. Photo: Katie Graziano.

KEY THEMES & INDICATORS



CORALS & ALGAE

Corals & algae make up the base of the coral reef ecosystem, providing food and shelter for fish, shellfish, and marine mammals. The five indicators for corals & algae are:

- **Coral reef cover**, which includes corals, algae, and crustose coralline algae.
- **Coral populations**, a measure of the population's ability to reproduce and sustain itself.
- **Herbivory**, a measure of the level of grazing pressure by fish on corals and algae.
- **Mortality**, which measures the amount of recently dead coral.
- **Diversity**, a measure of the number of different species of coral present.



FISH

Coral reefs serve as habitat and food for fish species. Fish are important to the ecology of the reef, the economy, and the livelihoods of local communities. The four indicators chosen for fish are:

- **Reef fish**, a measure of the amount of fish present.
- **Sustainability**, which is indicative of whether fishery stocks still have abundant large breeding-sized fishes.
- **Sharks and other predators**, a measure of the amount of fish that eat other fish.
- **Diversity**, a measure of the number of different species of fish present.



CLIMATE

Climate affects all components of a reef system. Climate change and ocean acidification influence reefs across the globe, but conditions vary at the regional and local level. The three climate indicators are:

- **Temperature stress**, which evaluates the frequency and severity of high temperature events.
- **Ocean acidification**, indicating if the water chemistry is suitable for the growth of corals and other calcifiers.
- **Reef material growth**, which directly measures the increase in reef skeletal material in a particular place.



HUMAN CONNECTIONS

Coral reef management agencies protect reef resources through management plans, public education, and involving communities in managing their resources. The three indicators for human connections are:

- **Awareness**, an indicator of residents' familiarity with threats to and the importance of reefs.
- **Support for management actions**, an indicator of support for reef management activities.
- **Pro-environmental behavior**, an indicator of residents' participation in activities to protect the environment.

CORAL REEF BLEACHING AND RESILIENCE

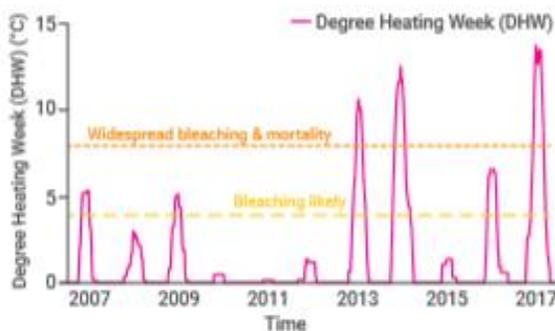
Coral bleaching occurs when water temperatures are warmer than usual for a sustained amount of time. This accumulated thermal stress can be measured in Degree Heating Weeks ($^{\circ}\text{C}$ weeks). At 4°C weeks, bleaching is likely to occur, and, at 8°C weeks, widespread bleaching and mortality is expected. From 2013-2017, the coral reefs of the CNMI experienced multiple thermal stress events that greatly surpassed the 8°C week benchmark, resulting in unprecedented coral bleaching and mortality across the archipelago. Over this four-year period, most coral species were affected across all islands and reef zones, down to at least 20 meters depth.

While global scale reductions in carbon emissions are necessary to mitigate ocean warming, it is also important that the CNMI continues to work to improve the resilience of coral reef communities by reducing local-scale stressors, such as land-based pollution and overfishing.



Coral bleaching on the Saipan Forereef in 2017 was the most severe event on record. Photo: Lyza Johnston.

CLIMATE STRESS ON CORALS



Severe bleaching events were observed in 2013, 2014, 2016, and 2017. Data from NOAA Coral Reef Watch Program.

WHY A STATUS REPORT?

Effective coral reef conservation cannot be accomplished without an informed and engaged public. This status report is part of an ongoing series of documents to track the status and trends of coral reefs across the U.S. and its territories.

The Northern Mariana Islands coral status report is part of a larger effort to provide the public and decision-makers with information about managing and conserving coral reef ecosystems.

This status report provides a geographically specific assessment of the Northern Mariana Islands coral reef condition for the period 2012–2017. The Islands were divided into four sub-regions based on data resolution, geographical features, and impacts to the ecosystem. Data were collected by NOAA's National Coral Reef Monitoring Program. For more detailed information on methodologies, indicators, thresholds, and grading, visit <http://www.coris.noaa.gov> (keyword: status reports).

About this status report

This status report is a joint product of NOAA's Coral Reef Conservation Program (CRCP) and the University of Maryland Center for Environmental Science. Science communication, design, and layout by Alexandra Fries, Caroline Donovan, & Heath Kelsey, November 2018.

Working Group: Arielle Baker, David Benavente, Rusty Brainard, Rod Camacho, Fran Castro, Janice Castro, Jojo Cruz, Tray Dunn, Peter Edwards, Katie Giaciano, Lyza Johnston, Justine Kimball, Steve McKagan, Mallory Muna, Emily Northrup, Dana Okano, Rich Sales, Mike Tenorio, Mike Trianni, Bernardo Vargas-Angel, & Iver Williams.

Cover photo of Acropora at Wing Beach by Richard Shaul. Timeline photos: Headquarters of the government of the South Pacific Mandate in Saipan via Wikimedia Commons; WWII Memorial by Alexandra Fries; and Seal of Northern Mariana Islands via Wikimedia Commons.

For more information, visit coralreef.noaa.gov

Acknowledgements

The CRCP supports effective management and sound science to preserve, sustain, and restore valuable coral reef ecosystems for future generations.

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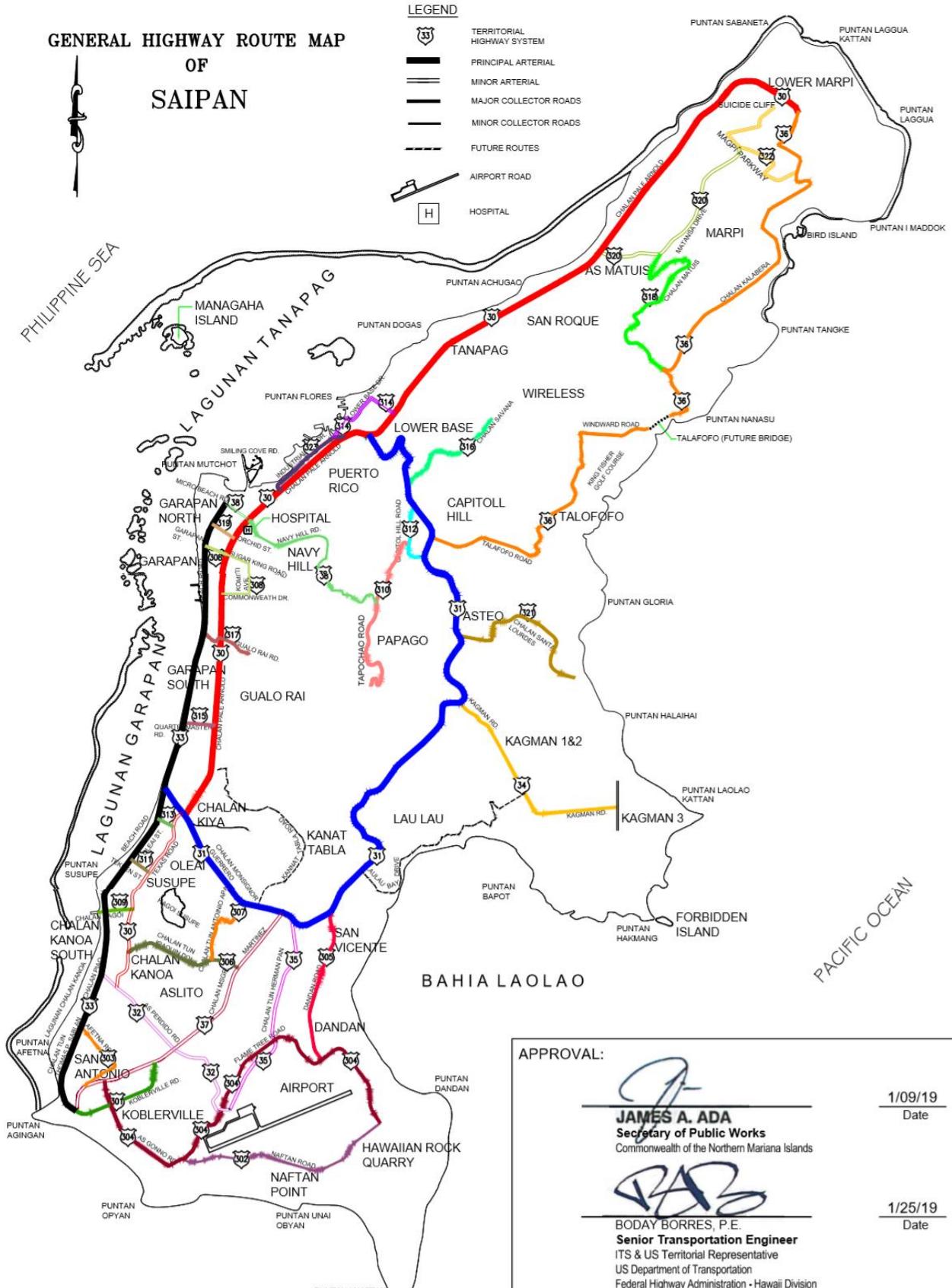
The status report working group during the workshop in Saipan, February 2017.



University of Maryland
CENTER FOR ENVIRONMENTAL SCIENCE

Appendix L – DPW Highway Maps, 2019

2019 Highway Maps of Saipan, Tinian, and Rota



APPROVAL:

[Signature]
JAMES A. ADA
 Secretary of Public Works
 Commonwealth of the Northern Mariana Islands
 1/09/19
 Date

[Signature]
BODAY BORRES, P.E.
 Senior Transportation Engineer
 ITS & US Territorial Representative
 US Department of Transportation
 Federal Highway Administration - Hawaii Division
 1/25/19
 Date

TOTAL LENGTH: 82.54 MILES

ROUTE NO.	LOCATION/DESCRIPTION	LENGTH/MILES	FROM	TO	ROUTE NO.	LOCATION/DESCRIPTION	LENGTH/MILES	FROM	TO
300	TEXAS ROAD	2.11	ASPERDIDO ROAD BY WSR ELEM SCHOOL	CHALAN MONSIGNOR GUERERO BY SM MART	306	CHALAN TUN JOAQUIN DOI	1.28	TEXAS ROAD	CHALAN MONSIGNOR MARTINES OR FORMER ASLITO ROAD
301	CHALAN PALE ARNOLD ROAD	11.32	CHALAN MONSIGNOR GUERERO BY SM MART	MARPI LANDFILL	307	CHALAN TUN ANTONIO APA	0.82	CHALAN TUN JOAQUIN DOI	CHALAN MONSIGNOR GUERRERO BY NMC
302	CHALAN MONSIGNOR GUERERO	2.05	BEACH ROAD MICROL TOYOTA	AIRPORT ROAD	308	GARAPAN STREET	0.25	BEACH ROAD BANK OF GUAM	CHALAN PALE ARNOLD BY HAPPY MARKET
303	ISA DRIVE (CROSS ISLAND ROAD)	7.82	AIRPORT ROAD	CHALAN PALE ARNOLD/DADOG TASI	309	SUGAR KING ROAD	0.41	CHALAN PALE ARNOLD	KOMITI AVENUE
304	AS PERDIDO ROAD	2.14	BEACH ROAD	FLAME TREE ROAD	310	COMMONWEALTH DRIVE	0.18	CHALAN PALE ARNOLD BY SUGAR KING PARK	KOMITI AVENUE
305	CHALAN TUN THOMAS P. SABLAN	1.80	CHALAN MONSIGNOR MARTINES	ASPERDIDO ROAD	311	KOMITI AVENUE	0.38	COMMONWEALTH DRIVE	SUGAR KING ROAD
306	BEACH ROAD	4.99	ASPERDIDO ROAD	MICROL BEACH ROAD	312	CHALAN HAGOI	0.29	SUGAR DOCK	TEXAS ROAD
307	KAGMAN ROAD	2.32	ISA DRIVE/CROSS ISLAND ROAD	KAGMAN HIGH SCHOOL	313	TAPOCHAO ROAD	2.12	PARKING AREA MT. TAPOCHAO	CAPITOL HILL ROAD
308	CHALAN TUN HERMAN PAN (AIRPORT ROAD)	2.37	FLAME TREE ROAD	CHALAN MONSIGNOR GUERERO ROAD	314	TEK'EN STREET (DPS CONNECTOR ROAD)	0.24	BEACH ROAD SUSUPE	TEXAS ROAD BY DETENTION FACILITY
309	WINDWARD ROAD CHALAN KALABERA	4.04	MAGPI PARKWAY	MARPI LANDFILL	315	CAPITOL HILL ROAD/LOOP	0.88	ISA DRIVE AT SOUTH	ISA DRIVE AT NORTH
310	TALAPOFO ROAD	2.88	ISA DRIVE/CROSS ISLAND ROAD	KINGFISHER GOLF COURSE	316	OLEAI STREET	0.18	BEACH ROAD	TEXAS ROAD
311	CHALAN KALABERA	1.73	KINGFISHER GOLF COURSE	MAGPI PARKWAY	317	LOWER BASE DRIVE	0.93	INDUSTRIAL DRIVE (Rte. 323)	CHALAN PALE ARNOLD
312	CHALAN MONSIGNOR MARTINEZ	3.23	CHALAN TUN THOMAS T. SABLAN	CHALAN MONSIGNOR GUERERO	318	QUARTER MASTER ROAD	0.32	BEACH ROAD	CHALAN PALE ARNOLD
313	MICROL BEACH ROAD	0.30	BEACH ROAD	CHALAN PALE ARNOLD	319	CHALAN SAVANA	2.18	ISA DRIVE/CROSS ISLAND	WIRELESS HILL
314	NAVY HILL ROAD	2.26	CHALAN PALE ARNOLD	MT. TAPOCHAO ROAD	320	GUALO RAI ROAD	0.59	BEACH ROAD	RIA DRIVE
315	KOBLER VILLE ROAD	1.14	CHALAN MONSIGNOR MARTINES OR MOBIL IN KOBLER VILLE	CHALAN MONSIGNOR MARTINES BY TOTO VILLE	321	CHALAN MATUIS	2.69	CHALAN KALABERA	MATANSA DRIVE (Rte. 320)
316	NAFTAN ROAD	2.35	AS GONNO ROAD OR BY THE AIRPORT RUNWAY	ROUTE 304 NEAR HAWAIIAN ROCK QUARRY	322	ORCHID STREET	0.28	BEACH ROAD BY GARAPAN ELEM SCHOOL	CHALAN PALE ARNOLD BY 99 CENTS MARKET
317	AFETNA ROAD	0.90	CHALAN MONSIGNOR MARTINES	BEACH ROAD	323	MATANSA DRIVE	2.17	CHALAN PALE ARNOLD	MAGPI PARKWAY (Rte. 322)
318	AS GONNO ROAD	2.07	CHALAN MONSIGNOR MARTINES	ASPERDIDO ROAD	324	CHALAN SANTA LOURDES	2.01	ISA DRIVE/CROSS ISLAND ROAD	PUNTAN HALAIHAI
319	FLAME TREE ROAD	2.70	ASPERDIDO ROAD	DANDAN ROAD	325	MAGPI PARKWAY	1.82	CHALAN KALABERA (Rte. 318)	SUICIDE CLIFF
320	DANDAN ROAD	1.84	FLAME TREE ROAD	ISA DRIVE/CROSS ISLAND ROAD AT ROUND HOUSE	326	INDUSTRIAL DRIVE/LOOP	0.95	CHALAN PALE ARNOLD AT SOUTH	CHALAN PALE ARNOLD AT NORTH

REVISED: JANUARY 2019

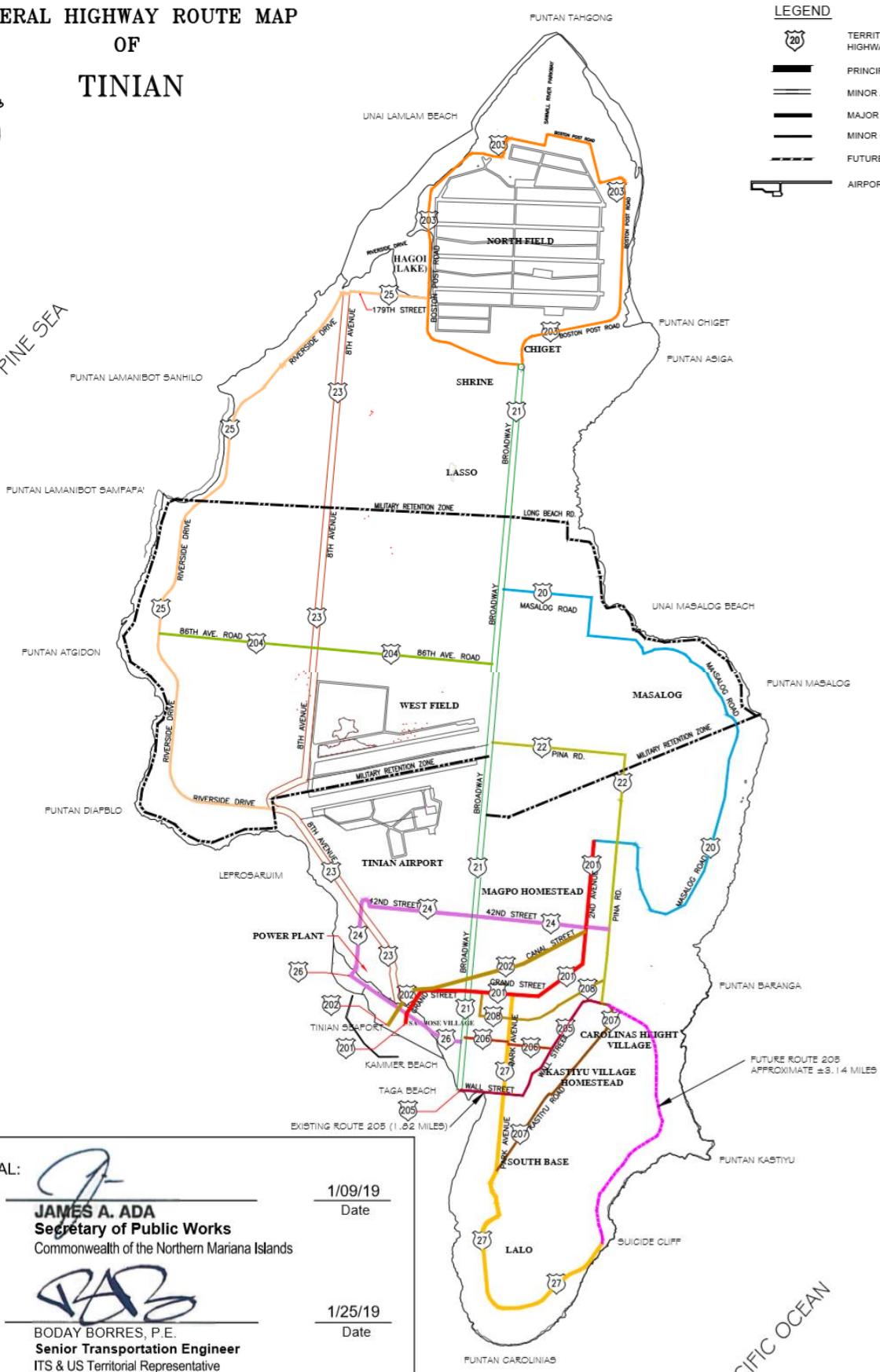
GENERAL HIGHWAY ROUTE MAP OF TINIAN

LEGEND

-  TERRITORIAL HIGHWAY SYSTEM
-  PRINCIPAL ARTERIAL
-  MINOR ARTERIAL
-  MAJOR COLLECTOR ROADS
-  MINOR COLLECTOR ROADS
-  FUTURE ROUTES
-  AIRPORT



PHILIPPINE SEA



PACIFIC OCEAN

APPROVAL:


JAMES A. ADA
 Secretary of Public Works
 Commonwealth of the Northern Mariana Islands

1/09/19
Date


BODAY BORRES, P.E.
 Senior Transportation Engineer
 ITS & US Territorial Representative
 US Department of Transportation
 Federal Highway Administration - Hawaii Division

1/25/19
Date

TOTAL LENGTH: 60.66 MILES

ROUTE NO.	LOCATION/DESCRIPTION	LENGTH/MILES	INTERSECTION		ROUTE NO.	LOCATION/DESCRIPTION	LENGTH/MILES	INTERSECTION	
			FROM	TO				FROM	TO
20	MASALOG ROAD	5.71	2nd AVENUE (Rte. 201)	BROADWAY AVE. (Rte. 21)	201	GRAND STREET	1.96	ROUTE 26	42ND STREET (Rte. 24)
21	BROADWAY	6.81	WALL STREET (Rte. 205)	BOSTON POST RD. (Rte. 203)	201	2ND AVENUE	1.16	42ND STREET (Rte. 24)	MASALOG ROAD (Rte. 20)
22	PINA ROAD	3.59	WALL STREET (Rte. 205)	BROADWAY AVE. (Rte. 21)	202	CANAL STREET	2.14	TINIAN SEA PORT	2nd AVENUE (Rte. 201)
23	8TH AVENUE	5.04	RIVER SIDE DRIVE (Rte. 25)	179th STREET (Rte. 25)	203	BOSTON POST ROAD LOOP	7.12	BROADWAY (Rte. 21)	BROADWAY (Rte. 21)
23	8TH AVENUE	2.26	SAN JOSE RD (Rte. 28)	RIVERSIDE (Rte. 25)	204	86TH. AVENUE ROAD	3.15	RIVER SIDE DRIVE (Rte. 25)	BROADWAY (Rte. 21)
24	42ND. STREET	3.08	SAN JOSE RD (Rte. 28)	2ND AVENUE (Rte. 201)	205	WALL STREET	1.82	BROADWAY (Rte. 21)	PINA ROAD (Rte. 22) KASTIYU ROAD (Rte. 207)
25	RIVERSIDE DRIVE	6.41	8TH AVENUE (Rte. 23)	8TH AVENUE (Rte. 23)	206	MARPO VALLEY 1 ROAD	0.40	BROADWAY (Rte. 21)	PARK AVENUE (Rte. 27)
25	179TH STREET	0.74	8TH AVENUE (Rte. 23)	BOSTON POST RD. (Rte. 203)	206	MARPO VALLEY 1 ROAD	0.42	PARK AVENUE (Rte. 27)	WALL STREET (Rte. 205)
26	SAN JOSE ROAD	1.23	POWER PLANT (Rte. 24)	BROADWAY (Rte. 21)	207	KASTIYU ROAD	1.86	PARK AVENUE (Rte. 27)	WALL STREET (Rte. 205) PINA ROAD (Rte. 22)
27	PARK AVENUE	4.28	SUICIDE CLIFF	GRAND STREET (Rte. 201)	208	MARPO VALLEY 2 ROAD	0.51	GRAND STREET (Rte. 201)	PARK AVENUE (Rte. 27)
					208	MARPO VALLEY 2 ROAD	0.97	PARK AVENUE (Rte. 27)	PINA ROAD (Rte. 22)

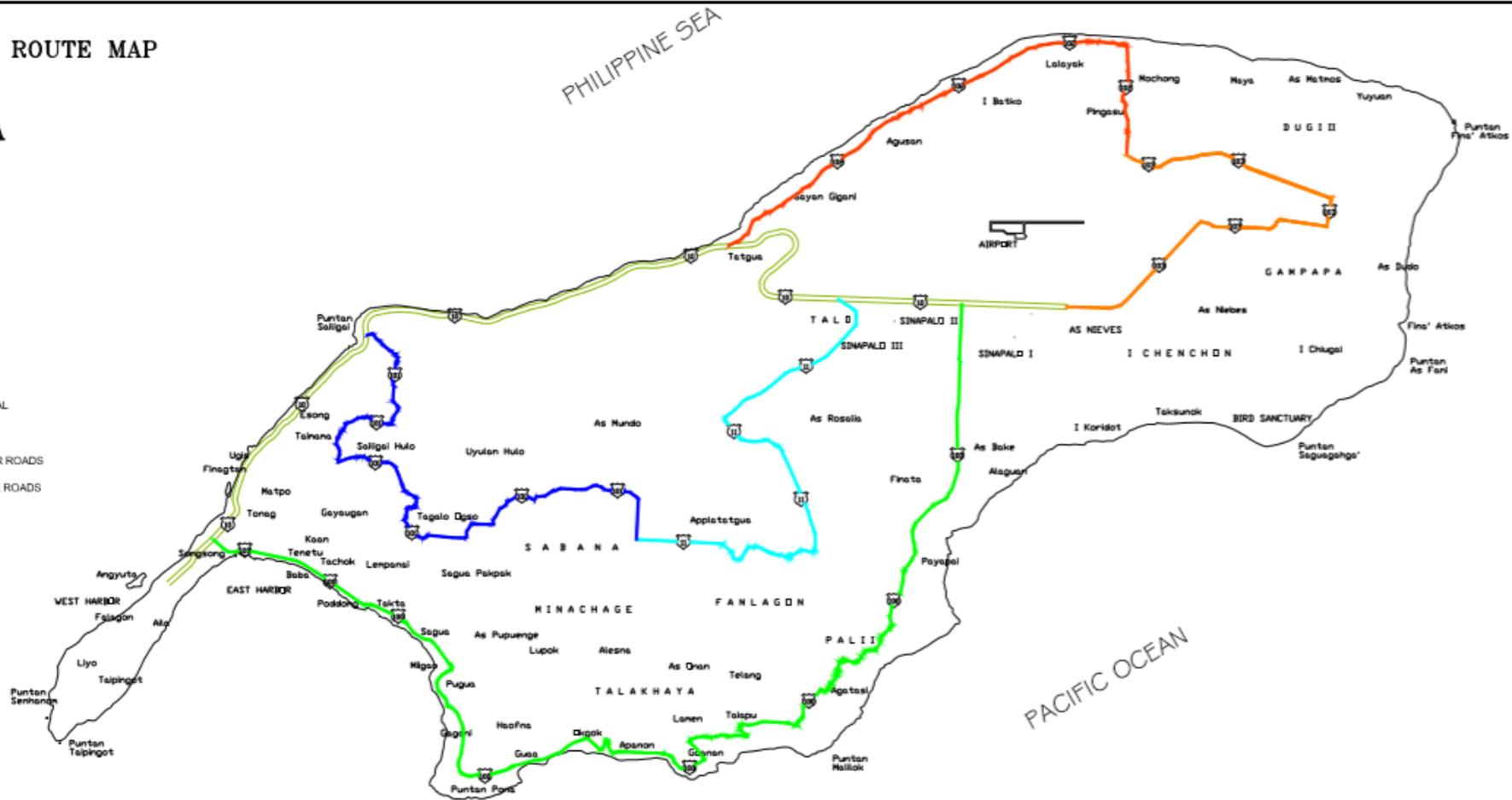
REVISED: JANUARY 2019

GENERAL HIGHWAY ROUTE MAP OF ROTA



LEGEND

-  TERRITORIAL HIGHWAY SYSTEM
-  PRINCIPAL ARTERIAL
-  MINOR ARTERIAL
-  MAJOR COLLECTOR ROADS
-  MINOR COLLECTOR ROADS
-  AIRPORT



TOTAL LENGTH: 39.30 MILES

ROUTE NO.	LOCATION/DESCRIPTION	LENGTH/MILES	INTERSECTION	
			FROM	TO
10	AIRPORT ROAD	9.4	ROTA WEST HARBOR AT SOUTH	ROUTE 103 NEAR AIRPORT TERMINAL ROAD
11	PAVED & CORAL ROAD	4.6	ROUTE 101 AT SABANA HILL	ROUTE 10 AT SINAPALO III
100	TALAKHAYA ROAD/EASTERN LOOP	10.9	ROUTE 10 AT SONGSONG VILLAGE	ROUTE 10 AT SINAPALO II
101	TATACHOG ROAD	5.3	ROUTE 10 NEAR PUNTAN SAILIGAL	ROUTE 11 AT SABANA
102	COCONUT VILLAGE ROAD	4.7	ROUTE 10 NEAR TATGUA	ROUTE 103 NEAR PINGASU
103	GAMPAPA ROAD	4.4	ROUTE 10 NEAR AIRPORT TERMINAL ROAD	ROUTE 102 NEAR PINGASU

APPROVAL:

JAMES A. ADA
Secretary of Public Works
Commonwealth of the Northern Mariana Islands

1/09/19
Date

BODAY BORRES, P.E.
Senior Transportation Engineer
ITS & US Territorial Representative
US Department of Transportation
Federal Highway Administration - Hawaii Division

1/25/19
Date

Appendix M - Tinian Harbor Master Plan

Excerpts including key recommendations and conclusions from CPA's [2018 Tinian Harbor Master Plan](#)

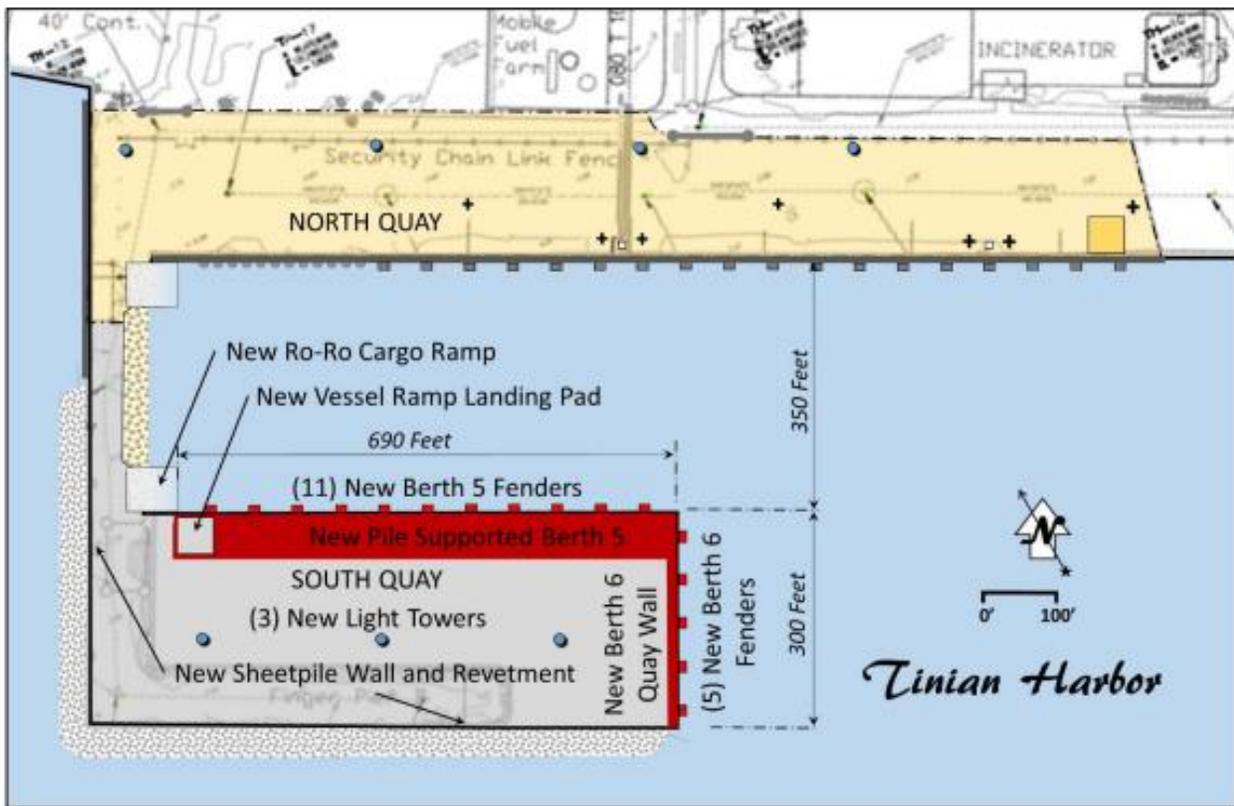
Executive Summary

INTRODUCTION AND BACKGROUND

The Commonwealth Ports Authority engaged Moffatt & Nichol (M&N) to develop a master plan for Tinian Harbor that would accommodate reasonable demand-driven growth and improve the island economy. The master plan includes provisions for commercial harbor operations, recreational boating and upland commercial development.

It is presented here as a comprehensive study of the port that includes short, medium, and long-term plans for repair, maintenance and development of the port and associated upland areas. It provides a framework to guide future port development that forms a cost-effective program to satisfy projected future demand, while considering potential environmental and socioeconomic impacts. Short term recommendations include improvements that are needed now and should be planned and initiated this year. Medium term improvements should be planned and funded now and constructed over the next five years to meet the needs of the island. Given the population and economic projections for Tinian, long term improvements will only be needed if a permanent U.S. Military presence on Tinian requires a dedicated berthing and operating area.

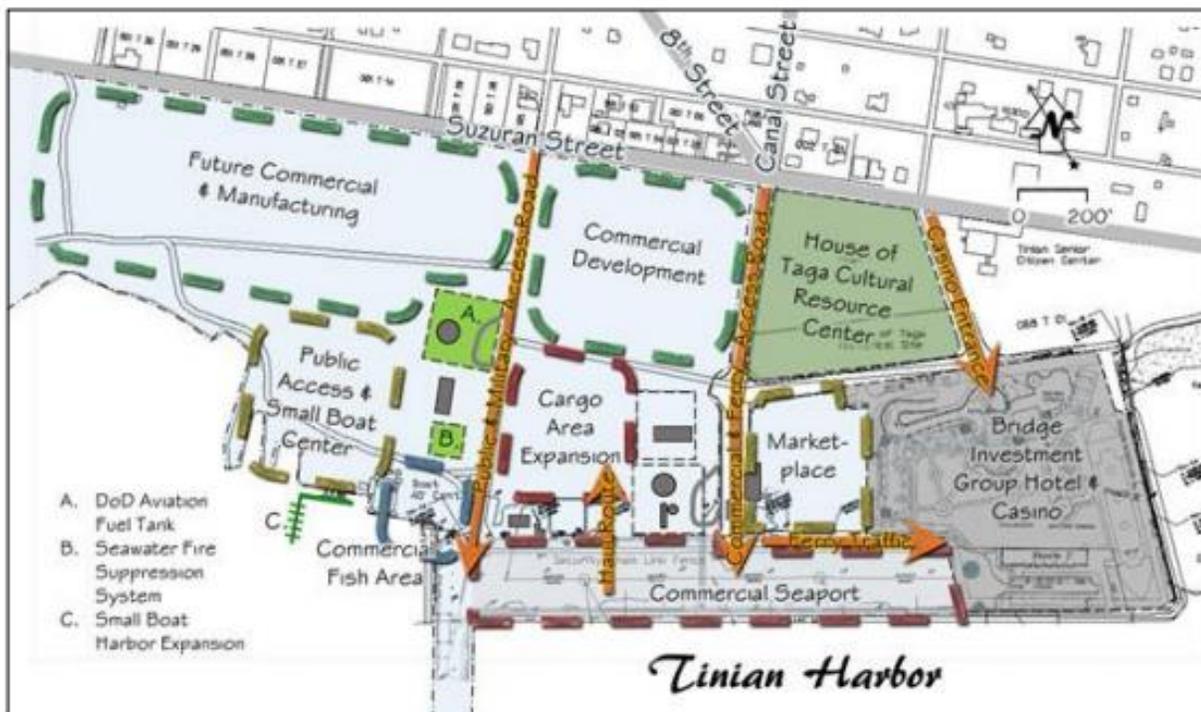
The harbor layout shown below was developed to accommodate all of the commercial traffic projected for the coming 20-year planning horizon as well as allow for future growth and increased military use of the harbor.



This harbor development plan is accompanied by a plan for upland, non-port activities on adjacent CPA parcels located farther from the commercial seaport. A shift in island demographic, on-dock and near-dock activities, and military uses, prompted the following recommended upland development needs:

- An open marketplace for Tinian small merchants that is within close walking distance from the new hotel and casino complex.
- A parcel dedicated to commercial retail, restaurant, and entertainment activities that is also accessible from the casino.
- Future cargo marshalling, storage and value-added laydown area adjacent to the commercial port.
- Relocation of non-waterfront dependent activities such as fuel storage and waste incineration away from the waterfront. This has the added benefit of placing such activities away from the hotel and casino complex.
- Reserve and development of public access small boat and recreational area that can also be used for fishing, diving and sight-seeing charters.

These development recommendations are illustrated in the following diagram:



The proposed improvements are estimated to cost \$111.2 M (2016 dollars) and could be phased in over 20 years as funds become available and needs emerge. The most significant cost - \$61M for the development of the South Quay - would be for a long-term military need and mission.

Together, the Tinian Harbor Master Plan represents a cost-effective and needs-driven program for port enhancement at the CPA facilities on Tinian.

6.0 Tinian Harbor Master Plan

6.1 Commercial Harbor

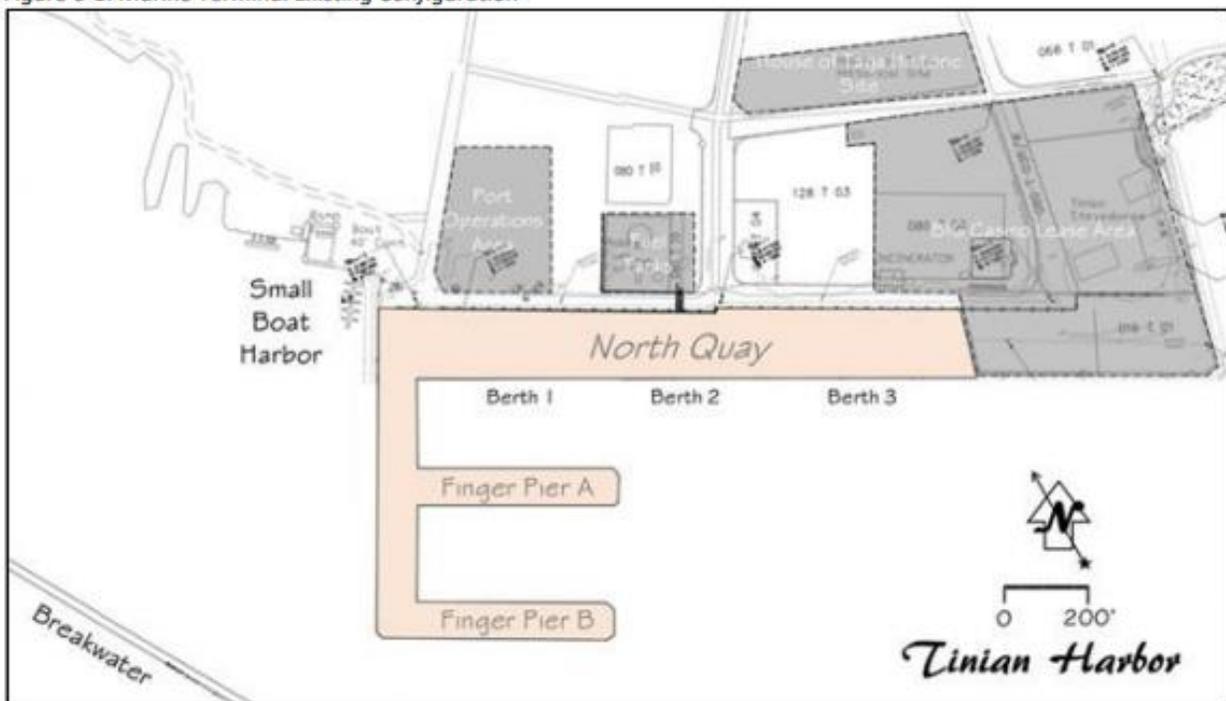
6.1.1 Harbor Layout Alternatives

Based on site observations, previous studies and stakeholder input, three alternative harbor plans were developed that would accommodate community, CPA, and DoD needs within the twenty year planning period. This alternative assessment considered the needs identified in the stakeholder interviews, the design vessel review and cargo projections.

Existing Harbor / No Change

The existing marine terminal has served Tinian since 1945. At 1,400 feet of contiguous wharf and five acres of cargo storage, the commercial marine terminal has enough physical capacity to serve the Island of Tinian for the foreseeable future. However, the existing berths must be reconstructed due to the structural deterioration, to allow deeper draft vessels, to ensure stability of the quay wall and to allow deeper draft vessels. In addition, improved ferry and Ro-Ro facilities are needed.

Figure 6-1: Marine Terminal Existing Configuration

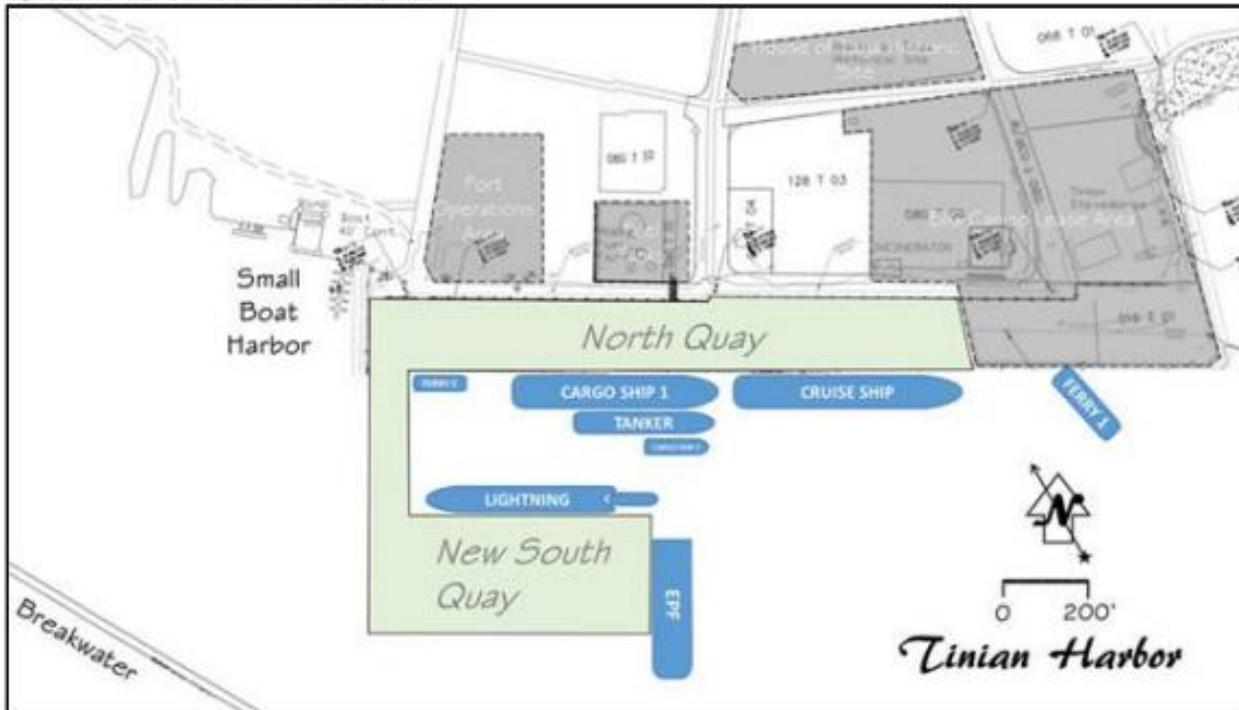


The existing facility could be renovated in phases, concentrating on replacement of the North Quay bulkhead and adding a Ro-Ro ramp to the Connecting Pier as needed. The finger piers have deteriorated to the point where they are no longer in service and could be fenced and abandoned in place. However, configuration of Finger Pier A constrains navigation and berthing at the existing Berths 1 and 2. Fill material and collapsed sheet piles could present a navigation hazard. Additionally, increased military presence on Tinian will occupy much of the available berth space when exercises are in progress.

Alternative 1

Prior studies have investigated several alternatives to develop additional terminal capacity for both military and civilian uses. Master Plan Alternative 1 is derived from the earlier considerations, specifically from the recommended plan¹⁶ developed in the 2015 condition assessment. This Alternative includes full reconstruction of the existing 1,400 feet of quay wall, demolition and removal of Finger Pier A, reinforcement of the Connecting Pier, and construction of a new South Quay berthing and cargo area.

Figure 6-2: Marine Terminal Alternative 1



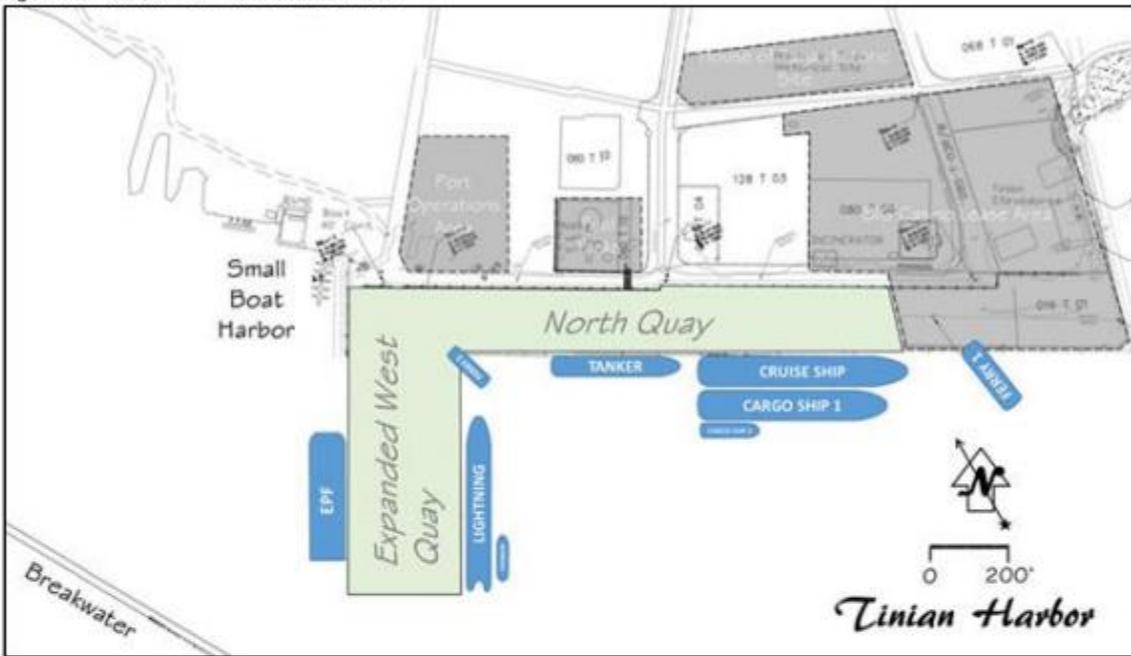
Alternative 1 has the advantage of maintaining all of the existing harbor activities in their existing configuration and adding an auxiliary terminal at the New South Quay for military or other specialized use. However, this alternative has a higher construction costs (than comparable Alternative 2 to follow) and development of the New South Quay must take place as a single project.

¹⁶ M&N; Assessment of Tinian Harbor; May 2015

Alternative 2

As a means of reducing construction cost, Alternative 2 expands the West Quay to develop the Connecting Pier as a new berthing and cargo handling area. Finger Pier A and Finger Pier B would be demolished to create a larger turning basin between the North Quay and the new facility.

Figure 6-3: Marine Terminal Alternative 2

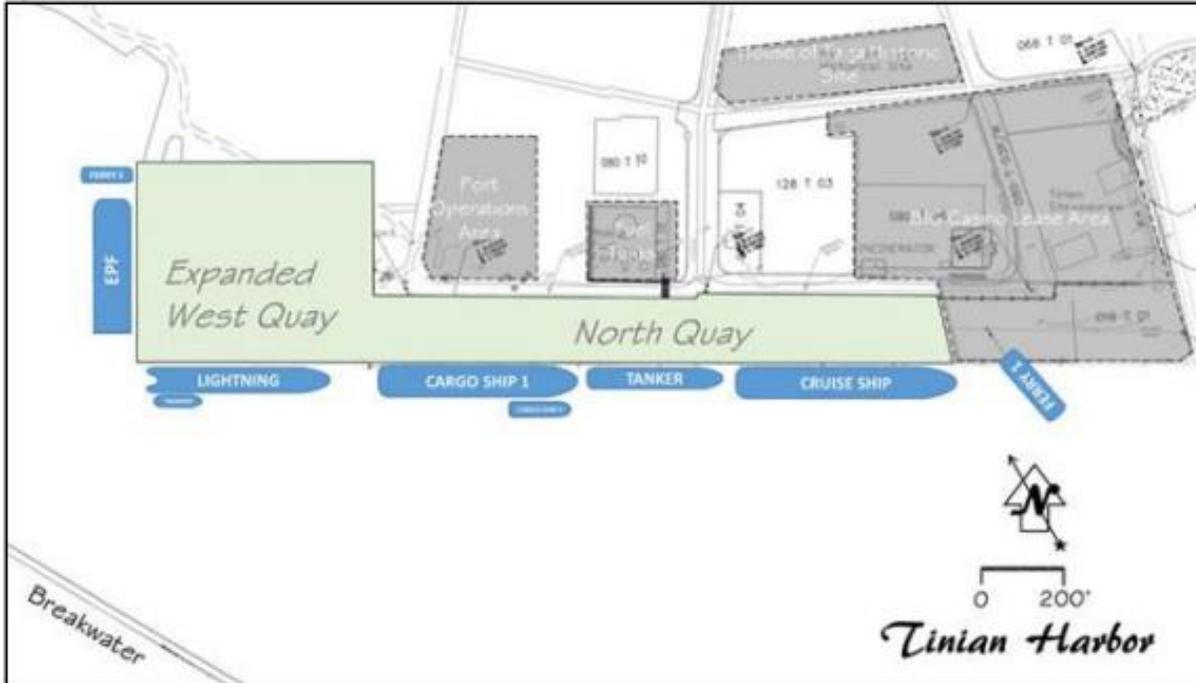


Aside from its lower cost compared to Alternative 1, Alternative 2 maintains many of the terminal uses in their current configuration. However, it displaces most of Berth 1. As with Alternative 1, expansion of the West Quay could not be accomplished in phases and must take place as a single project to be effective.

Alternative 3

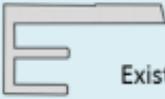
A continuous marginal quay wall is the most efficient configuration for modern container and bulk cargo handling. Therefore, an alternative was explored that expanded the existing configuration. Alternative 3 expands the West Quay to create a series of contiguous berths that would handle multiple commercial and DoD operations. This construction could be phased to track a growing need for berthing and cargo handling area.

Figure 6-4: Marine Terminal Alternative 3



While Alternative 3 allows the most flexibility for berthing and vessel operations it also is the most disruptive to the existing Small Boat Harbor and would require relocation and reconstruction of those facilities and other non-commercial uses. If the Northwest Breakwater is not reconstructed, Alternative 3 would also leave the marine terminal berthing area exposed to waves from that direction. Additionally, Alternative 3 would require extensive dredging and filling along the western shoreline and be the most environmentally impactful of the three Alternatives.

6.1.2. Alternatives Evaluation

Alternative	Advantages	Limitations
 <p>Existing</p>	<ul style="list-style-type: none"> • Lowest cost alternative • Sufficient berth length for current uses • Low environmental impacts 	<ul style="list-style-type: none"> • Will not support increased military uses • Finger piers will continue to degrade • Does not allow efficient use of Berth 1
 <p>Alt. 1</p>	<ul style="list-style-type: none"> • Provides detached military operating area • Could move ammunition and fuel transfer away from hotel and other users • Retains current commercial port configuration 	<ul style="list-style-type: none"> • Higher cost alternative • Expansion area difficult to construct in phases • Could constrain small boat harbor traffic
 <p>Alt. 2</p>	<ul style="list-style-type: none"> • Lower cost alternative than Alternative 1 that also includes expansion • Could move military and fuel transfer farther away from proposed hotel and other users • Simple configuration that allows more flexible use 	<ul style="list-style-type: none"> • Military uses could encroach on and conflict with small boat harbor • Eliminates much of Berth 1 • Requires demolition of both Finger Piers • Difficult to phase in conjunction with North Quay reconstruction.
 <p>Alt. 3</p>	<ul style="list-style-type: none"> • Provides most flexible configuration for alternative uses • Flexible construction phasing • Expansion to the west allows future use of vacant back lands • Ability to move commercial and military activities farther away from proposed hotel 	<ul style="list-style-type: none"> • Requires complete relocation of Small Boat Harbor and public use areas • Requires extensive fill and dredging • Requires complete demolition of Connecting Pier and Finger Piers • Exposes marine terminal to wave action from the northwest • Most environmentally impactful alternative

Regardless of the alternative chosen, the North Quay requires improvement and reconstruction. All of the alternatives considered the cost of rebuilding Berths 1, 2 and 3 as well as improvements to the back lands and associated CPA facilities. Navigation improvements associated with reconstruction of the North Quay could include deeper channels and berth area as well as repair of the Tinian Harbor breakwaters.

The Existing Alternative would not include rehabilitation or improvements to the Finger Piers or the Connecting Pier. With Finger Pier A obstructing Berth 1, full use of the North Quay could not be achieved. The Existing Alternative also does not accommodate increased military calls at Tinian Harbor without adversely affecting terminal operations. Therefore, this alternative is not recommended.

Alternative 3, with its contiguous marginal wharf, is attractive from an operational point of view and allows a sequential development from east to west that would preserve and upgrade the existing terminal facilities in advance of the expansion. However, the impacts to other, non-commercial uses, as well as the environmental impacts combine to make Alternative 3 less attractive. Therefore, this alternative is not recommended.

Alternative 1 and Alternative 2 both offer expanded terminal capacity and the possibility of a detached military operating area. Alternative 2 is the lower cost development, using much of the existing Connecting Pier and expanding east along Berth 1. However, it would be difficult to phase the development with the quay wall

reconstruction, and it does not have as much potential capacity as Alternative 1. Any early improvements at Berth 1 would be “buried” when the West Quay expansion took place. Therefore, Alternative 2 is not as attractive as Alternative 1.

From a commercial need perspective, only the existing North Quay berths are required to support the Tinian economy. Expansion such as Alternative 1 or Alternative 2 would not be needed unless increased military vessel calls and longer times in port displaced civilian uses. Therefore, Alternative 1 is recommended as the preferred development, as construction of the expansion area can be deferred until a specific need and funding source is identified. If only the North Quay is improved, Alternative 1 can also be the most cost-effective and allows CPA to phase its master plan development as needed and as funding is available.

6.2. Recommended Harbor Berthing Improvements

The recommended plan as shown in Figure 6-5 and Figure 6-6 features a new South Quay with new deep-water berths that can accommodate a variety of military and commercial vessels, as well as a smaller berth for the EPF type vessels. This plan includes two liquid fuel berths at the North Quay, a Ro-Ro ramp for ferry landing at Berth 1, and a second Ro-Ro ramp for military vessels at the South Quay. These features are described in more detail in the following sections.

Figure 6-5: Recommended Port Master Plan



Full build-out of the Master Plan for the Tinian Harbor waterfront facilities would include reconstruction and fendering of the entire length of the North Quay that includes the following features:

- Reconstruct the entire North Quay wall with sufficient pile depth and tie-back capacity to support a 600 psf working deck load with a 32 foot design berth depth.

- Foam filled fenders on all of Berth 2 and Berth 3, plus 200 feet of Berth 1.
- A 250 foot barge and ferry berthing area with vertical fenders at Berth 1 suitable for smaller vessels with varying freeboard and mooring requirements.
- A secondary tanker manifold at Berth 3 that includes adequate mooring bollards, safety equipment, and spill retention features.
- A Ro-Ro ramp for vehicle ferries, landing craft, and occasional military use at the North Quay.
- Repair and revetment of the existing Connecting Pier.
- A new 800 foot by 300 foot (5.5 acre) South Quay with one deep water berth for large military vessels and a smaller berth for lighters and shallow water vessels.
- A Ro-Ro ramp and vessel ramp landing pad designed for military vessels at the South Quay.

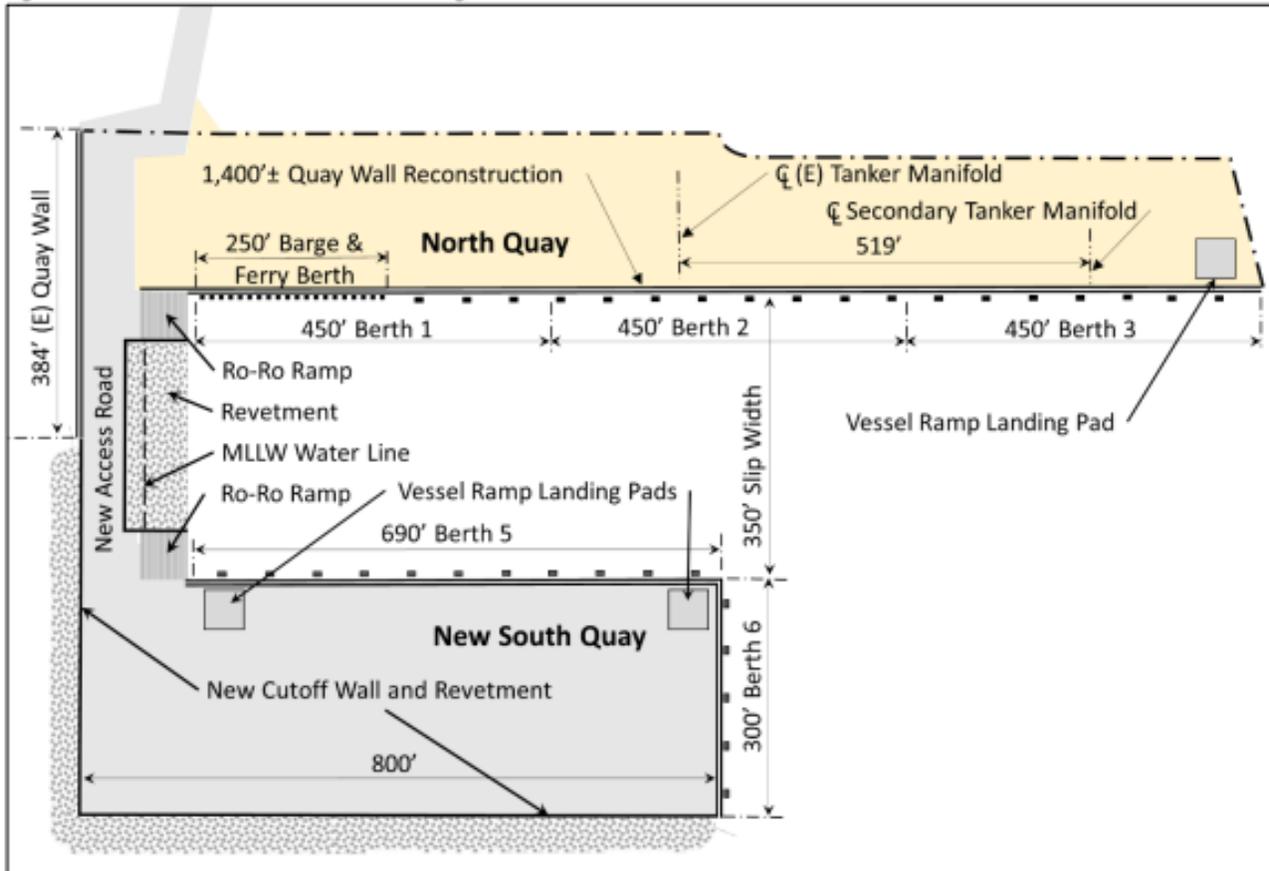
Figure 6-6 shows the general arrangement of these improvements. The concept is to create a flexible terminal layout that can be used for both military and commercial vessel calls. In practice, the new South Quay could be dedicated to military exercises when needed. Since it is isolated from the North Quay and the public hotel, casino and small vessel uses, the military could maintain a higher level of security at the South Quay.

Berth 1 is configured to take passenger and vehicle ferries, landing craft, and container barges. The fendering on Berth 1 will be oriented vertically to allow a variety of vessel sizes to call. Berth 1 can also be used by military transport vessels with bow or stern Ro-Ro ramps.

Berth 3 of the North Quay will have a secondary liquid fuel manifold for use when Berth 2 is not available. It will also have a reinforced landing pad for a Ro-Ro vessel quartering stern ramp that can be used when Berth 5 is not available.

Berth 5 of the South Quay is designed as a pile supported platform that can be dredged to a greater depth than a sheet pile quay wall.

Figure 6-6: Port Master Plan General Arrangement



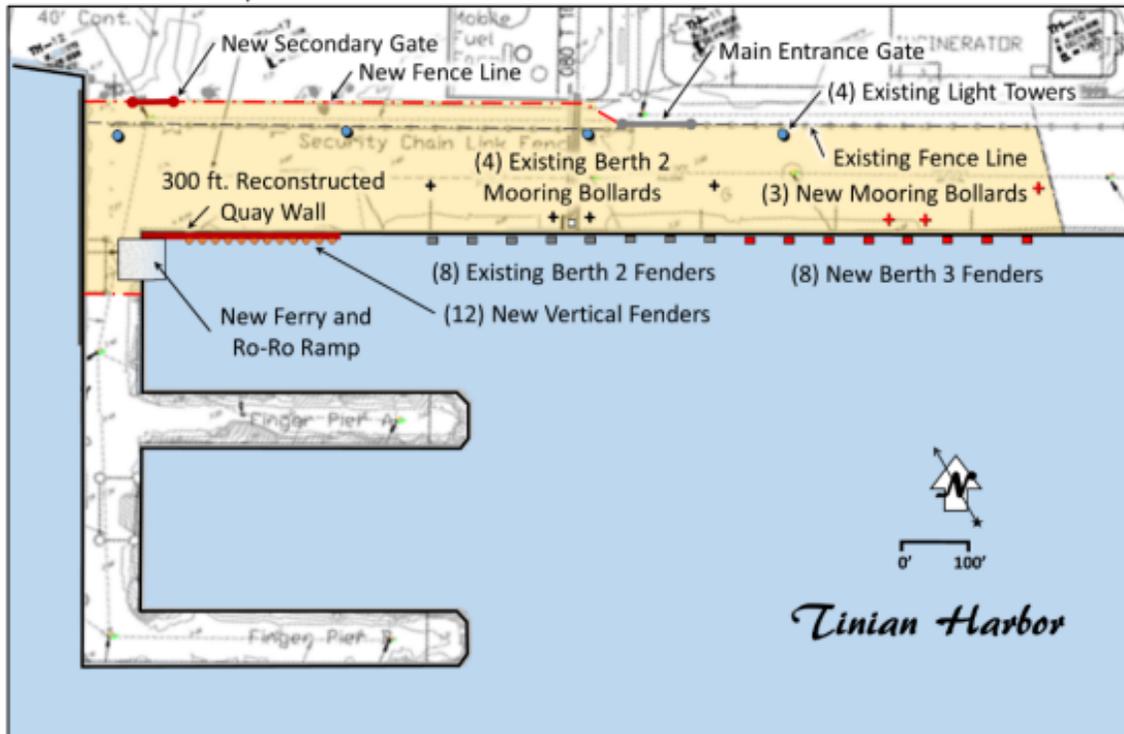
6.2.1. Phasing Plan

Phase 1

Phase 1 as illustrated in Figure 6-7 represents the initial port improvements that should be made as soon as possible. These improvements will increase the utility of the Tinian Harbor commercial port and prepare the port for the projected calls by larger vessels. On the water side, the most important improvement will be adding fenders and mooring bollards at Berth 3 so that cargo can be unloaded from larger ships while Berth 2 is in use by tankers delivering fuel. Eight new foam-filled fenders will create a total of 1,000 feet of berthing along Berth 2 and 3. Three new bollards will be installed at Berth 3 in a similar pattern to those at Berth 2 to create a secondary cargo and tanker berth.

The initial phase of quay wall reconstruction will take place at Berth 1, with 300 feet of new sheet pile wall and concrete cap installed starting at the connecting pier. The design depth of the initial Berth 1 wall does not have to be more than the existing -28 feet MLLW, as it is intended for shallow draft vessels. However, the cap and paved area must have at least a 600 pound/square foot bearing capacity to support the port's mobile crane. In conjunction with the wall construction, a new Ro-Ro ramp will be built to extend from the Connecting Pier along Berth 1.

Figure 6-7: Phase 1 Berth Improvements



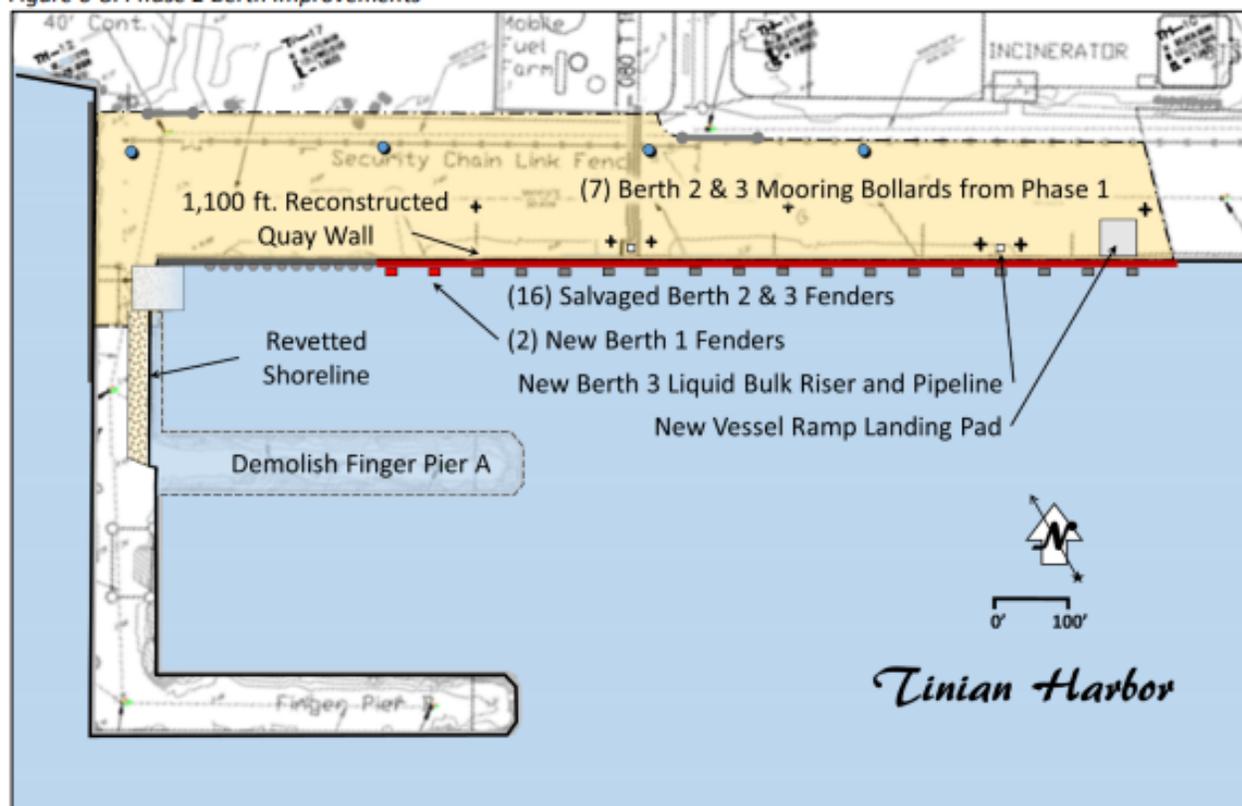
With the Ro-Ro ramp available at Berth 1, the remainder of the Connecting Pier along with both Finger Piers would be closed to further use. In addition, the upland area is cleared of non-essential fencing and damaged portions of the Berth 1 pavement will be razed and repaved. Soil and vegetation is cleared from operations areas along the wharf, and high-mast lighting is repaired to allow night operations.

As part of Phase 1, the northwest fence line is moved approximately 40 feet north to enclose the road that currently connects Canal Street with the public marina area. This will allow the new tree-snake confinement area to become part of the secure marine terminal and will connect the new Port Administration Center with the terminal. In the future, more of the CPA owned backlands in this area can be developed for port uses. Future expansion and circulation recommendations are described in Section 6.4, *Port Authority Upland Development*.

Phase 2

Phase 2 of the Tinian Harbor development is shown in Figure 6-8. This phase is focused on replacement of the existing sheet pile quay wall. When harbor dredging is performed to deepen the berths, a new quay wall will be needed to support the increased span between the concrete cap and the lower line of embedment in the harbor bottom. The recent condition assessment revealed extensive corrosion along the underwater portions of the wall, as can be expected of a 70+ year-old structure. Repairs to the concrete cap at Berth 2 and Berth 3 have significantly extended the life of this structure, but ongoing decay of the underlying foundation will eventually compromise the integrity of the North Quay.

Figure 6-8: Phase 2 Berth Improvements



The initial stage of reconstruction would begin at Berth 3. The tanker mooring at Berth 2 and the cargo/ferry operation at Berth 1 would remain in use to sustain the cargo needs of the island. As part of the reconstruction of Berth 3, a secondary tanker fuel manifold and buried pipeline would be installed, similar to that at Berth 2. This will allow tanker calls at Tinian Harbor Berth 3 while Berth 2 is under reconstruction, and later when larger vessels are blocking access to the Berth 2 fuel manifold. The deck pavement at Berth 3 will be replaced behind the wharf after repair of the quay wall, and a spill retention system will be installed around the new riser. Along with new deck pavement, Berth 3 will require a hardened landing pad for the stern-ramp of a military EPF ship.

Following completion of Berth 3 reconstruction, the Berth 2 quay wall and approximately 150 feet of Berth 1 will be rebuilt. The existing foam-filled cylindrical fenders at Berth 2 and Berth 3 can be salvaged and re-installed on the new quay wall face. Two new fenders at Berth 1 will complete the project, yielding 1,100 feet of contiguous marginal wharf for dry cargo, liquid bulk, cruise ships, and military use.

To achieve full utilization of Berth 1 and Berth 2, the remaining portions of Finger Pier A must be removed and fugitive fill material removed from the berthing area. Much or all of this work can be carried out from the land using a clamshell excavator and a vibratory pile extractor. Extraction of the steel sheet piles will be necessary to ensure this area can be dredged in Phase 3.

With Finger Pier A removed, approximately 250 feet of the Connecting Pier eastern wall will also need improvement. As this will never be used as berthing face, the deteriorated sheet pile can be cut off at the water line, and sloping revetment constructed to prevent further collapse of the filled structure. A 2:1 slope from +9.0 to -28.0 would leave approximately 50 feet of roadway at the top of the connecting pier, more than enough for two wide traffic lanes, a pedestrian way, and utilities.

Phase 3

For the 20-year duration of the planning period, the Phase 2 improvements will provide all of the commercial harbor needs for Tinian. Coupled with upland improvements and public waterfront development, the CPA properties have a potential to support almost any reasonable commercial activity on the island.

However, the U.S. Department of Defense is expected to expand use of its 14,000+ acres of military reservation on Tinian. This will likely result in an increased frequency of military vessel calls and perhaps a need for larger vessels with greater depth requirements than can be currently accommodated at the North Quay commercial berths.

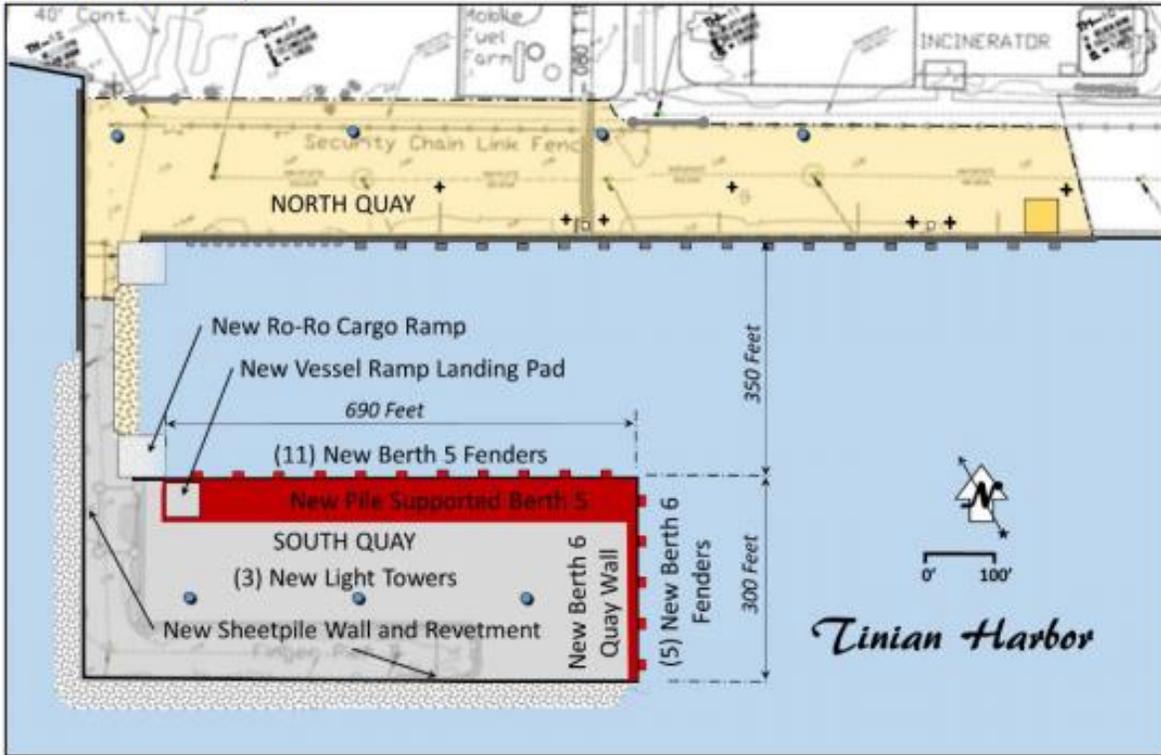
Phase 3, as illustrated in Figure 6-9 embeds the existing Finger Pier B and a portion of the Connecting Pier into a 5.5 acre island, or South Quay. The new reclamation will be 800 feet long and 300 feet wide, including the area of the existing piers, but the land area will not extend south or west significantly farther than the present line of sheet pile. The west and south sides of the South Quay will consist of a short curtain wall with revetment at the foot to prevent scour.

The primary mooring area will be a new, 690 foot Berth 5 constructed along the north side of the reclamation area. This berth will be constructed as a 50 foot wide, pile supported platform that would be engineered to stand a future dredged depth of up to -42 feet MLLW. In addition, a new 300 foot Berth 6 will be constructed on the east end of the South Quay to accommodate smaller vessels and lighters. If the bow of the EPF is allowed to hang beyond the end of Berth 6, then it too could berth there.

The South Quay will have its own Ro-Ro ramp for bow-loading vessels such as the Lightning, and a vessel ramp landing pad for the EPF class vessels. At 42 feet of depth, Berth 5 could accommodate most of the medium sized MSC Ro-Ro and cargo vessels currently in use. However, simultaneous calls by two large vessels would require use of one of the North Quay commercial berths.

The South Quay will require three illumination towers as well as site utilities. A small operations building will also be needed to provide support for the terminal labor.

Figure 6-9: Phase 3 Berth Improvements



6.2.2. Structural Repair Recommendation

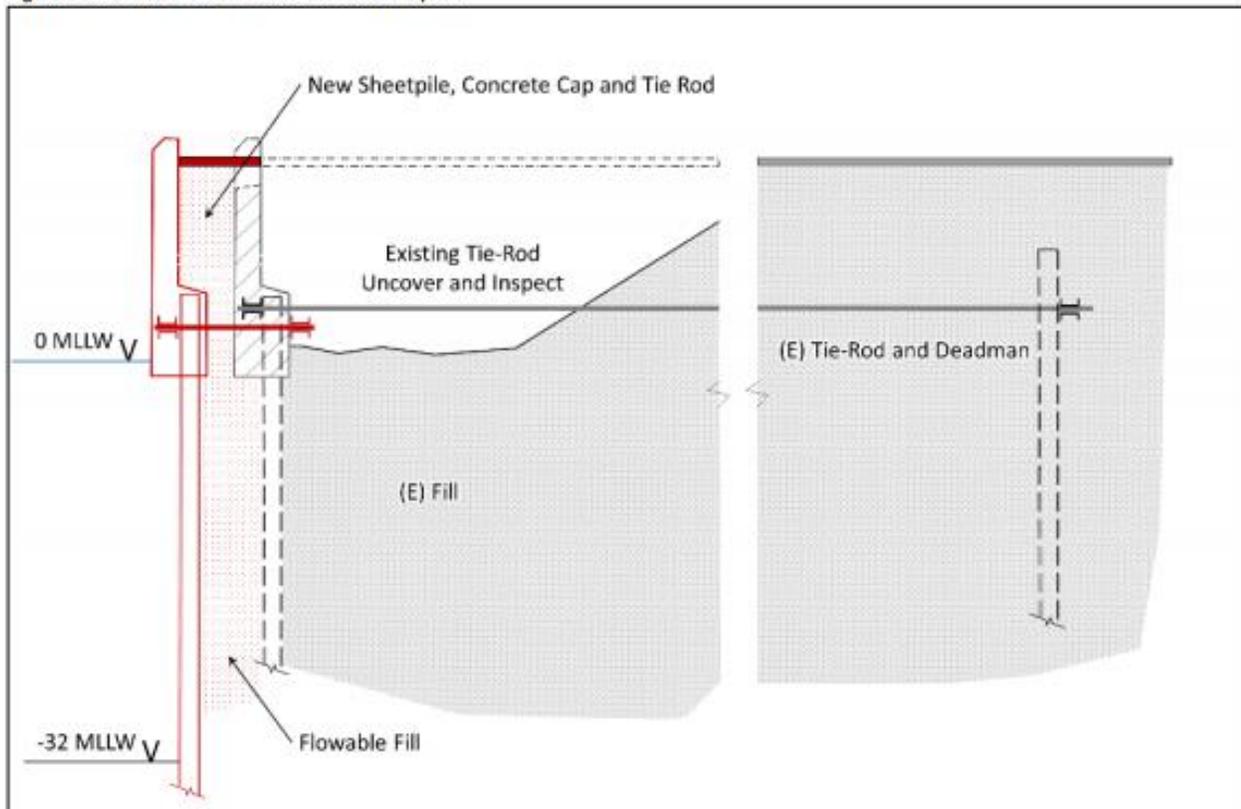
Much of the sheetpile bulkhead making up Tinian Harbor has markedly deteriorated since its construction in 1945. The Finger Piers and the BIG Casino portions of North Quay Berth 4 and the East Quay are beyond repair. Berths 1 through 3 show more moderate deterioration and may be reinforced to extend their service life.

A new sheetpile bulkhead in front of the existing one, joined by a tie-rod, is probably the most cost-effective repair. This bulkhead replacement method can be employed if the existing bulkhead is only moderately deteriorated, and the structure is still stable. Deterioration of the existing Tinian North Quay bulkhead was evaluated in 2015¹⁷. It was determined that the sheets have lost approximately 25% of their section in most places and that the structure, while stable, was no longer able to support the design loads. It was also determined that the North Quay berths were vulnerable to failure during a seismic event.

Although the sheetpiles below the concrete cap and above the mud-line showed section loss, the buried tie-rods and anchor wall are expected to be in good condition. This is due to the soil embedment and anoxic conditions normally found behind a filled structure. If this is found to be the case by a structural investigation prior to detailed design, the new bulkhead could be attached to the existing waler and tie-backs without replacing the entire structure. Should additional tie-rods be necessary to address deteriorated existing tie-rods of the bulkhead, they can be installed by drilling from the water-side and using grouted anchors at each tie rod. Figure 6-10 shows the schematic section for the proposed repair.

¹⁷ M&N; Assessment of Tinian Harbor; May 2015

Figure 6-10: Recommended Bulkhead Repair



6.2.3. Phased Construction Costs

A rough order of magnitude (ROM) construction cost estimate has been prepared for the waterfront construction and minor landside improvements. This ROM estimate is based on similar projects in Guam and Hawaii, as well as costs derived from previous studies. For this master plan level of design, only the elements described in the phasing plan were included in this ROM estimate. Figure 6-11 shows graphically the relative cost breakdown by major construction elements.

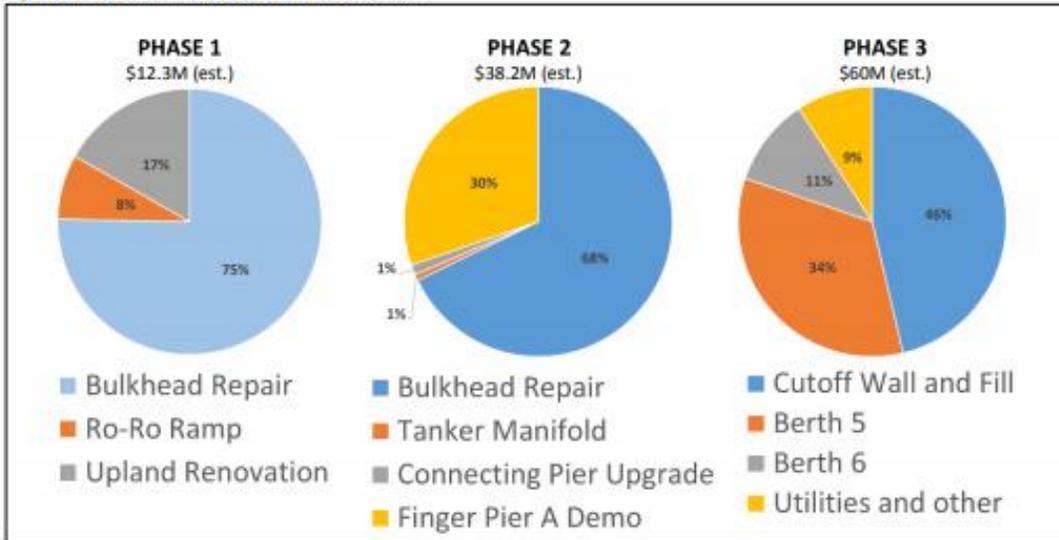
Breakwater and dredging estimates were taken directly from the 2015 *Tinian Harbor Condition Assessment and Breakwater Alternatives Evaluation*. The breakwater preliminary cost estimate is \$82.5 million. Of this, as much as \$21 million could be the CPA's local contribution. Upland improvements and improvements to the Small Boat Marina are advisory and discretionary only. Therefore, it is not possible to develop a cost estimate or to determine where these projects would occur in an overall phasing plan.

Phase 1 – The majority of construction cost in Phase 1 comes from renovating Berth 1 and providing a Ro-Ro ferry and cargo landing point on the Connecting Pier. The total ROM estimate including overhead, mobilization, contingency, environmental mitigation, and permitting is U.S. \$12.3 million (all ROM estimates provided in 2016 U.S. dollars).

Phase 2 – Phase 2 consists mostly of bulkhead reconstruction at Berths 2 and 3. It also includes removal of Finger Pier A, but does not include maintenance, or new dredging in Tinian Harbor. The total estimated cost for Phase 2 is U.S. \$38.2 million.

Phase 3 – If Phase 3 is needed in the future, the overall design and layout will likely change to suit the need at that time. However, a rough estimate was prepared for comparison and planning purposes. In Phase 3, almost half of the cost is in reclamation and wharf construction to create the South Quay. A third of the cost is in the pile-supported Berth 5. This cost could be reduced if a tied-back quay-wall were constructed. However, the quay-wall could not be dredged as deep as the pile supported wharf. In its current conceptual form the ROM cost of Phase 3 is estimated at U.S. \$60.6 million.

Figure 6-11: Construction Cost Breakdown



6.3. Dredging, Breakwater, and Navigation Improvements

6.3.1. Future Dredging Requirements

The initial harbor design dredge depth for the 1945 construction was 28 feet within the harbor and 35 feet in the approach channel. The most recent design depth for Tinian Harbor is reported to be 26 feet in the basin and 30 feet in the channel. Currently, the U.S. Army Corps of Engineers is considering new dredging at Tinian Harbor in conjunction with reconstruction of the breakwater. Dredge depths under consideration for this project, recommended by the 1997 Tinian Harbor Master Plan are 30 feet *MSL* inside the harbor, and 33 feet *MSL* in the entrance channel. This corresponds to approximately 29 feet *MLLW* and 32 feet *MLLW*, respectively¹⁸.

Vessels approaching Berth 4 have grounded in the past and larger vessels such as the Mobil tankers, arrive light-loaded to maintain adequate underkeel clearance (usually about 3 feet). Shoaling within the harbor has been found to occur primarily along the deteriorated quay walls and likely consists of lost fill material rather than current driven sediment. Therefore, the primary area in need of dredging is the North Quay Berth 4, where removal of as much as 30 feet of material may be required to restore the design dredged depth. The south margin of the turning basin and southwest margin of the inner entrance channel also have some shoaling that should be dredged. According to the latest Corps estimates, the computed maintenance dredge quantity is 33,784 cubic yards to achieve the 1997 recommended depths.

Fully-laden draft for many of the design vessels presently calling at Tinian Harbor is 25 feet to 26 feet. Since this is near the current depth in many parts of the harbor, these ships arrive light in order to maintain at least a

¹⁸ See Section 3.3.2 for discussion of tidal datum elevations

three-foot underkeel clearance. Therefore, 29 feet below mean lower low water is the minimum depth that should be considered for inner harbor dredging. This applies particularly to cruise ships that do not have the option of sailing under “light” loading conditions.

In addition, the Department of Defense has requested that the Corps investigate channel alternatives up to -42 feet MLLW in order to accommodate future fuel tankers and large military supply vessels. It should be noted that the current North Quay was designed for a -28 foot depth and in its current condition, may not support any maintenance dredging below -26 feet.

Since efficient future use of Tinian Harbor will depend on having deeper water at the berth and mooring areas, this Master Plan recommends that future dredging be designed to no less than -29 feet MLLW. Further, it recommends that structural improvements at the North Quay be designed to support no less than -32 feet MLLW in the berth area to accommodate future deeper vessels and to allow 3.0 feet of overdredging. If the U.S. military requires deeper berth depth, then the new South Quay can be designed as a pile supported wharf at Berth 5 that will provide the -42 feet of depth the DoD may desire for its vessels.

6.3.2. Breakwater Reconstruction¹⁹

The existing Tinian Harbor breakwater is severely degraded and beyond repair leaving the inner harbor exposed to the approach of large deepwater ocean swell and severe typhoon storm waves. If Tinian Harbor is to remain usable for commercial and military vessels, the breakwater must be reconstructed before further degradation results in damage to port facilities.

The replacement breakwater should be designed for the 50-year return period wave event coupled with a nearshore water level rise associated with the nearby passage of a typhoon. As steel sheetpile has a limited lifespan in salt water, a conventional rubble mound breakwater structure is recommended, with the existing sheet pile caisson remnants being incorporated into the core of the new breakwater.

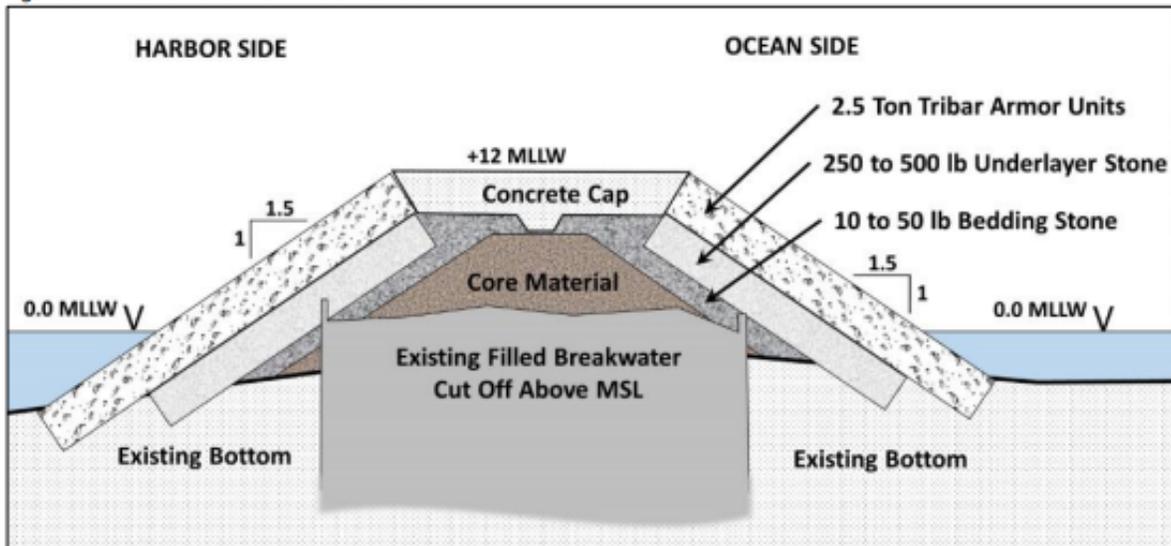
Concrete armor units are recommended for the Tinian breakwater, as adequate armor stone may not be available on-island. These precast concrete units have the ability to withstand wave attack and can be smaller than the required stone size for a given wave height. Tribar concrete armor units have been used with considerable success for projects with design conditions similar to Tinian Harbor, and are recommended as an alternative to stone armor.

A breakwater crest elevation of +12 feet would prevent overtopping during typically-occurring non-typhoon wave events. Over-topping of the breakwater during typhoon conditions could be allowed, provided the structure is designed to withstand overtopping forces. This requires tribar armor on the inner side of the breakwater as well as the sea-facing side. Ocean-going vessels would need to leave a harbor in the event of a typhoon and ride out the storm at sea if overtopping occurs. Smaller vessels, such as tugs, ferries, and fishing boats would have to find a harbor of refuge on Saipan or Guam.

Rubble mound structures are composed of a compacted fill material core, covered by a bedding layer, an under layer of stone, and an armor layer. The new breakwater would follow the alignment of the existing breakwater, and would utilize the remnants of the existing breakwater as a portion of the core. Remnants extending above +3 feet would be removed so as to not protrude into the new breakwater stone layers. Figure 6-12 is a schematic of such a breakwater.

¹⁹ U.S. Army Corps of Engineers; *Tinian Harbor Condition Assessment and Breakwater Alternatives Evaluation*; July 2015

Figure 6-12: Schematic Breakwater Section



Data Source: Corps of Engineers, Drawing M&N

6.3.3. Other Navigation Improvements

When the Corps replaces the Tinian Harbor breakwater, local users have asked that a new small boat harbor entrance and navigation channel be included through the northwest portion of the new breakwater. This channel would improve water circulation within the enclosed harbor and allow small boat traffic to bypass the commercial harbor.

Furthermore, Marine Corps supply ships presently arriving in Tinian are chartered vessels which do not require a security zone. However, military vessels often require a security radius and sensitive military ships may call in the future. It has been reported that military ships at Tinian Harbor have restricted small boat access in the past so a bypass would enable small boats to avoid military harbor activities.

In conjunction with dredging and breakwater repair, the outer and inner reach of the entrance channel should be provided with on-shore radar-reflective range markers to allow vessel approach and departure during times of reduced visibility. In addition, the U.S. Coast Guard should review all illumination plans for the nearby BIG casino and hotel development to ensure that it does not interfere with nighttime vessel movement. The master plan also recommends that the CPA consider a full-time tug at the harbor for vessel-assist if justified by frequent calls from larger vessels and to evacuate the harbor under typhoon conditions since a tug from Saipan may not be available under such circumstances.

6.3.4. Breakwater Construction and Dredging Costs

The U.S. Army Corps of Engineers is evaluating several alternatives for breakwater repair at Tinian Harbor. At this time, their recommendation is for a rubble-mound structure to replace the existing deteriorated sheet piles. The Corps' recommended plan is to replace both the Main Breakwater and the Northwest Breakwater in one project. This would allow the constructor to drive on the breakwater and do much of the work from the dry. The following construction and dredging costs were developed in the Corps' July 2015 *Tinian Harbor Condition Assessment and Breakwater Alternatives Evaluation*. As this work is expected to be funded by the U.S. government, these costs are not included in the rough order of magnitude (ROM) cost estimates for berth and upland developments and therefore, financial analysis.

- The estimated ROM cost to rebuild the entire 3,500 linear feet of main breakwater, plus the 1,100 feet of Northwest Breakwater is \$82.5 million.
- Maintenance dredging of the existing channel to -32 feet MLLW and the harbor turning basin to -29 feet MLLW is estimated to require removal of 33,800 cubic yards of material at a cost of \$4.8 million.
- Additional dredging to provide a new 1-lane northwest channel to the small boat harbor is estimated to cost \$4.9 million, and a 2-lane channel is \$7.0 million.

These ROM estimates represent construction cost only. They do not include real estate cost, plans and specifications development, contract administration, engineering during construction, construction administration, mitigation/ environmental permits, escalation or contingency.

6.4. Ports Authority Upland Development

6.4.1. Key Drivers

Commonwealth Ports Authority controls approximately 73 acres of land that were ceded to the CNMI and not leased back to the U.S. Government. This land includes the harbor area and working berths, the breakwater, and a large parcel of land south of the San Jose municipality. Control of this land has largely prevented encroachment by commercial and residential uses. However, a five-acre parcel was recently leased to BIG for hotel and casino development within the marine terminal operating area. Additionally, a seawater pumping station, and an Air Force fuel depot have been proposed directly adjacent to the North Quay. Therefore, a comprehensive plan for future upland development is crucial to preventing future constriction of port operations. The following key drivers of upland development are recommended:

1. **Water Dependent Use** – Any land directly adjacent to the marine terminal must be reserved for uses that are related to cargo handling or other uses that require waterfront access. Warehousing, tankage, maintenance and other functions that can take place near the port but away from the water must be located farther inland.
2. **Public Access and Circulation** – Tinian residents need a safe and effective facility for recreation, subsistence fishing and small boat storage. Such uses are water dependent, but cannot limit the marine terminal activities.
3. **Passenger Access and Port Security** – Ferries and cruise ships will generate passenger traffic that must be separated from the port operations area for reasons of security and safety.
4. **Expandability and Flexibility** – Upland areas must include reserve land for future expansion and any use proposed near the port must be flexible to accommodate changing market demand and port needs.

6.4.2. Prioritized Land Use

Excluding the BIG Casino leased area, smaller parcels leased to Mobil, Saipan Stevedore Company, Inc., and other enterprises, CPA controls about 57 acres of wharf and backlands. Of that, approximately 45 acres remain for development as near-dock, off-dock and commercial or public uses. Allocating these parcels must follow a priority or level of importance to the CPA.

1. **Highest Priority** – Land that is essential for the current *or future* operations and circulation of the marine terminal.
2. **High Priority** – Land needed for port related commercial and public activities that do not have to be on the marine terminal.
3. **Medium Priority** – Land that can be used to enhance the tourism and other commercial potential of Tinian or can otherwise generate economic growth for the island.

4. **Low Priority** – Land that is too far from the terminal to be used for direct port activities.

Figure 6-13: Land Priority Allocation



Figure 6-13 illustrates a recommended land priority allocation for the CPA properties at Tinian Harbor. The Highest Priority areas are those with possible direct access to the commercial berths and with uses that are already part of port operations. The land just west of the seaport is given a High Priority designation as it has an established water dependent use for recreation and commercial fishing. The parcel immediately adjacent to the hotel and casino lease would normally be High Priority for port development. However, proximity to the public facilities at Taga Park and the future public use at the casino complex reduces this land’s value for port uses.

6.4.3. Recommended Land Use Plan

Based on the premise that the CPA should use its land for efficient and safe transfer of cargo and for the economic benefit of Tinian Island residents, a Land Use Plan was developed for all of the CPA properties. While it is not necessary or desirable to develop all of the parcels, this plan provides the necessary expandability and flexibility to allow a variety of future uses.

Figure 6-14 illustrates the recommended upland uses combining projects that are currently under consideration, near term needs identified by stakeholders and residents, along with longer term possible uses that are compatible with the CPA properties. In general order of priority, these upland developments include:

- Combining the new port offices and the brown tree snake interdiction area with the current seaport fenced terminal. This will allow direct access for terminal labor, port management, customs and inspection officials and others with port authorization. It will also open an area to the north of the commercial seaport for future refrigerated warehousing and other value-added cargo activities.
- Constructing the proposed DoD aviation fuel tanks and transfer facility to a site that is farther away from the wharf and farther from the hotel and casino complex. This creates the opportunity in the near term (post-2020) to relocate the Mobil fuel storage facility to the same location and open additional waterfront land to port uses. Should the incineration station be rebuilt, it should be in this same area.

- A seawater fire protection system is needed to support increased tanker calls at Tinian Harbor. This is presently considered for a location near the current Mobil fuel storage tanks. However, by locating it farther to the northwest, it is still near a water source, but does not impede other uses that need to be closer to the port.
- A commercial fish receiving area is needed near the small boat harbor. This should be located near the reconfigured small boat marina as described in Section 6.5 (Figure 6-15, Item "C").
- Public access enhancements can be located near the existing launch ramp, as well as expansion and improvement of the small boat marina.
- An open marketplace west of the Bridge Investment Group Hotel and Casino would provide a buffer between commercial port activities and the guest accommodations at the hotel. It would also create an opportunity for local small business to sell directly to island visitors.
- A future commercial development area west of the House of Taga Cultural Resource Center would be within a short walk of the hotel and casino complex, providing an opportunity to develop high-end retail outlets and restaurants.
- Finally, expanded commercial or retail needs on Tinian could be developed south of Suzuran Street on the CPA property located in the low and medium priority property.
- A leasing policy should be developed that outlines the above to guide CPA administrative decisions. Lease uses, duration, compensation, and public disclosure policies and procedures will ensure consistent and transparent property decisions.

Figure 6-14: Recommended Upland Development Plan



6.5. Public and Recreational Uses

6.5.1. Public Use Areas

The existing public launch ramp and marina provide a very popular and important resource at Tinian Harbor. However, the overall facility lacks basic amenities such as restrooms, picnic areas, fish-cleaning areas and other necessary infrastructure. For this area to properly support local fishing and recreational boating, it should have the following improvements:

- **Public Restrooms** – Restroom would make this facility more attractive for families and recreational boaters. They would also minimize the discharge of untreated sewage into the harbor and/or nearshore waters (Figure 6-15, Item “F”).
- **Picnic and Recreation Area** – The existing shelter should be augmented with tables, benches and grills located near the boat ramp. In addition, a fish cleaning station would be located adjacent to the boat ramp (Figure 6-15, Item “E”).
- **Trailer Parking and Boat Wash-Down** – 25 to 30 paved parking stalls for vehicles, vehicles with trailers, and for boat wash-down is needed near the launch ramp (Figure 6-15, Item “B”).
- **Boat Storage** – A paved and secured area for small boat storage and minor repair could be constructed north of the public use area. This storage facility should be let as a commercial concession to ensure that it is maintained and secured (Figure 6-15, Item “A”).
- **Vehicle Parking** – Paved parking for passenger vehicles and buses is needed near the proposed marginal loading dock. A sufficient number of stalls would be provided to accommodate passengers using the interisland ferry service; charter dive and fishing operations. A limited number of long-term parking stalls could be provided for people living on Saipan and working on Tinian, and people living on Tinian and working on Saipan.

6.5.2. Concession Area

A one acre portion of the public area could be let on concession to an operator that would own and run a convenience store for bait, boat parts, picnic supplies and ice (Figure 6-15, Item “C”). The concession operator could also:

- Oversee and maintain the marina and floating docks
- Maintain and operate the restrooms and the pump-out station
- Secure and maintain a boat and trailer storage facility that includes a wash-down area and repair shop
- Have general responsibility for use and condition of the site, including managing parking
- Operate as a fish-buyer and processor distributing to Tinian and local CNMI markets

6.5.3. Small Boat Harbor

Tinian Harbor includes the only small craft facilities on the island providing access for commercial and recreational vessels. The existing small craft facilities include a floating dock held in place with steel pipe piles; a single lane concrete boat ramp; a barge ramp; paved and unpaved parking for vehicles and vehicles towing trailers; and a floating marginal loading dock held in place with stiff-arm anchorage. These facilities provide mooring for up to 18 small craft vessels; support commercial, recreational and subsistence fishing; and provide a landing for informal trade with Saipan. Improvement of the Small Boat Harbor will not have a lasting benefit until the breakwater can be repaired and seasonal storms do not continue to damage the facilities. Maintenance dredging of the harbor bottom is also needed to maintain access for medium sized fishing vessels and calling

yachts. A separate entrance channel to the small craft facility is currently under consideration by the Corps and would greatly enhance the usability of the harbor. (See Section 6.3.3 Other Navigation Improvements).

Based on the public information meeting held on October 27, 2016, literature research and review of similar facilities, the following improvements (See Figure 6-15) are proposed to enhance the public marina facilities:

- The existing floating dock would be repaired and relocated to provide clearance for vessels mooring on the proposed marginal loading dock. It would be anchored in place with an elastic mooring system instead of the existing steel pipe piles. The floating marginal dock would be expanded to the west to connect with the relocated slips (Figure 6-15, Item "b").
- A new launch ramp boarding float would be installed adjacent to the existing concrete launch ramp. It will be used to expedite the launching and retrieval process, and to make is safer and more convenient to load and unload passengers (Figure 6-15, Item "a").
- A new small craft float / multi-use dock would be located alongside the West Quay to provide temporary mooring for boats using the vessel sewage pump-out and/or fish hoist. It could also be used for vessels to be fueled directly from a fuel truck. The existing concrete bulkhead would be repaired and covered with plastic fendering (Figure 6-15, Items "c" and "e").
- Vessel pump-out on the utility dock will be used by vessels moored in the harbor or by visiting vessels to minimize the discharge of untreated sewage into the harbor and/or nearshore waters.
- A public fish hoist and scale on the utility dock will be used by vessels moored in the harbor or visiting vessels to off load large fish and to weigh fish. It could also be used to off load cargo, boat engines and parts (Figure 6-15, Item "d").

Figure 6-15: Small Boat Harbor



Source: M&N

10.0 Conclusions

Tinian Harbor is the primary lifeline for the residents of Tinian. However, its facilities were constructed over 70 years ago and are now in need of renovation and reconfiguration. Additionally, increased use by the U.S. DoD and the development of hotel and gaming on Tinian have put additional stress on the port's aging infrastructure and capacity.

The immediate risk to the harbor is the potential for near-term failure of the existing quay wharf structure, which could result in significant disruption to the delivery of fuel and supplies to the island. However, another challenge is the encroachment and constraint of the terminal by multiple small projects that seek to be located immediately adjacent to the existing facility.

Therefore, the CPA must follow a plan that will ensure the continued functionality of the North Quay through a phased approach that addresses immediate needs first, but not in a way that precludes mid-term and long term development of the port.

The principal recommendations of this Master Plan include:

1. Develop a second tanker berth at Berth 3 that can be used when Berth 2 is occupied by cargo vessels. This is particularly important before the breakwater is repaired, as Berth 3 may experience too much wave action for lifting cargo by crane.
2. Repair the existing terminal lighting and other facilities so that when a vessel arrives, it can be serviced expeditiously.
3. Establish near-dock uses that only include water-dependent activities that must be within the terminal fence line. Take a strong stance against locating new facilities where they could impede future development.
4. Develop a functioning ferry berth under the control of CPA. This will ensure that cargo and passengers have access to the island regardless of conditions at other proposed ferry berths.
5. Renovate the existing North Quay as soon as financially feasible in order to avoid a much costlier catastrophic collapse of the structure.
6. Provide improved facilities for recreation and small boat use off of the terminal. Ensure that a concessionaire is on-site to administer the facility.
7. Construct seawater fire suppression system at the port to allow tanker operations without calling a firetruck from the airport.

In addition, the CPA will need to work with the U.S. Army Corps of Engineers to develop an affordable plan for replacing the harbor breakwater and performing maintenance dredging. Although the Corps will dredge the entrance channel and turning basin, it will be the CPA's responsibility to dredge the berthing areas.

If only Phase 2 of the Master Plan is constructed, and if a new breakwater is built by the Corps, then Tinian will have one of the finest harbor facilities in the Western Pacific. With the Phase 3 South Quay development, and additional harbor dredging, Tinian could host a broad spectrum of future DoD missions including DoD disaster relief pre-positioning, Marine Corps training exercises and other future uses in support of Western Pacific operations.

Appendix N - Rota Harbor Master Plan

Excerpts including key recommendations and conclusions from CPA's [2018 Rota Harbor Master Plan](#)

Executive Summary

Introduction

The Commonwealth Ports Authority engaged Moffatt & Nichol to develop a master plan for Rota West Harbor that would accommodate reasonable demand-driven growth and improve the island economy. The master plan includes provision for commercial harbor operations, recreational boating and upland commercial development. It is presented here as a comprehensive study of the port that includes short, medium, and long-term plans for repair, maintenance and development of the port and associated upland areas. Short term recommendations include improvements that should be planned and initiated this year as they are needed now. Medium term improvements should be planned and funded now and constructed over the next five years to meet the needs of the island.



Given the population and economic projections for Rota, long term improvements to Berth 1 will be needed later if cargo growth materializes. A harbor layout was developed as shown below that will accommodate all of the commercial traffic in the coming 20-year planning horizon as well as allow for future growth and increased use of the harbor. Key to the development plans is the approval and construction of a new breakwater and current training wall by the U.S. Army Corps of Engineers.

The West Rota harbor development plan accommodates future upland, non-port activities on CPA and non- CPA parcels located farther from the harbor. The shift in island demographic, on-dock and near-dock activities generates the following recommended upland development needs:

1. Breakwater and training wall to allow safe harbor entry and to reduce harbor wave agitation.
2. Expansion of Berth 2 with improved/repaired or replaced fender units and mooring bollards.

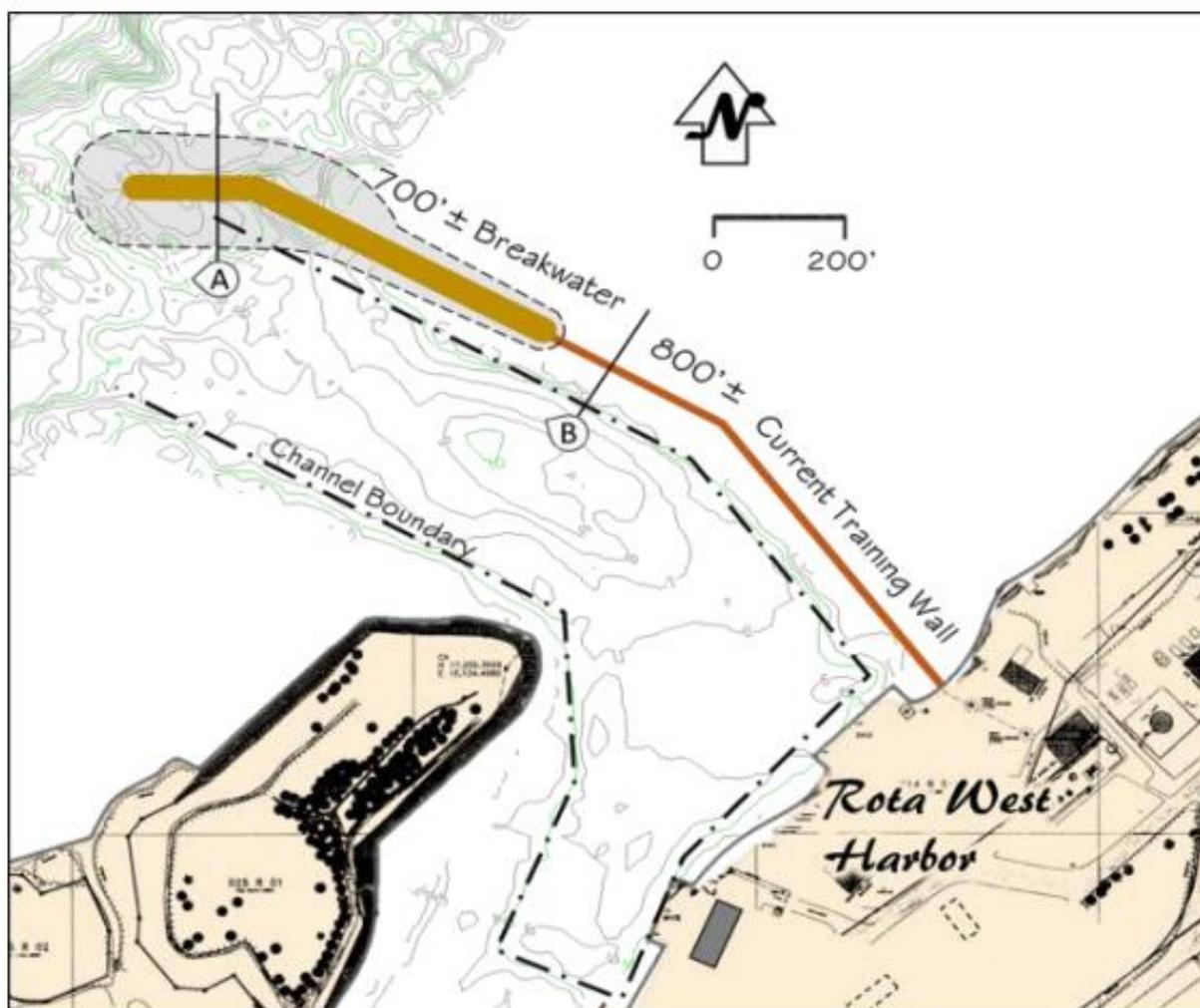
3. New commercial float with cargo storage and transfer facilities.
4. Expanded public marina facilities with upland amenities that include a boat ramp, parking, comfort station, and fish cleaning stations.
5. Designated public access and commercial recreational areas.

These recommended improvements are illustrated in the following diagram:



West Harbor operations are conducted within a relatively sheltered basin that is protected on the west by a small barrier island and further protected on the north by a fringing reef. An entrance channel through the fringing reef leads to a small turning and berthing area. Prior to 1983, cargo was handled at Berth 1 that faces the turning basin. Normal wave action can enter the channel and make this location difficult to use. Following significant typhoon damage in 1976 and a seven-year reconstruction effort, a new wharf Berth 2 was constructed behind the barrier island. At the same time, the turning basin was enlarged to accommodate this new facility. Despite the shelter provided by the fringing reef and the island, deep ocean waves can enter the harbor at times and cause excessive vessel movement at the wharf.

During these periods navigation and use of the harbor are seriously hindered. Consequently, this master plan recommends design and construction of a breakwater and current training wall as conceptually depicted in the figure below:



Onshore improvements are proposed to be phased over 20 years as funds become available and demand dictates. Total construction costs for Phases 1, 2, & 3 are estimated at \$29.2 (2016 dollars). The largest single cost is the expected local cost share (\$20M) for the breakwater.

This Master Plan provides a framework to guide future port development that forms a cost-effective program to satisfy projected future demand, while considering potential environmental and socioeconomic impacts.

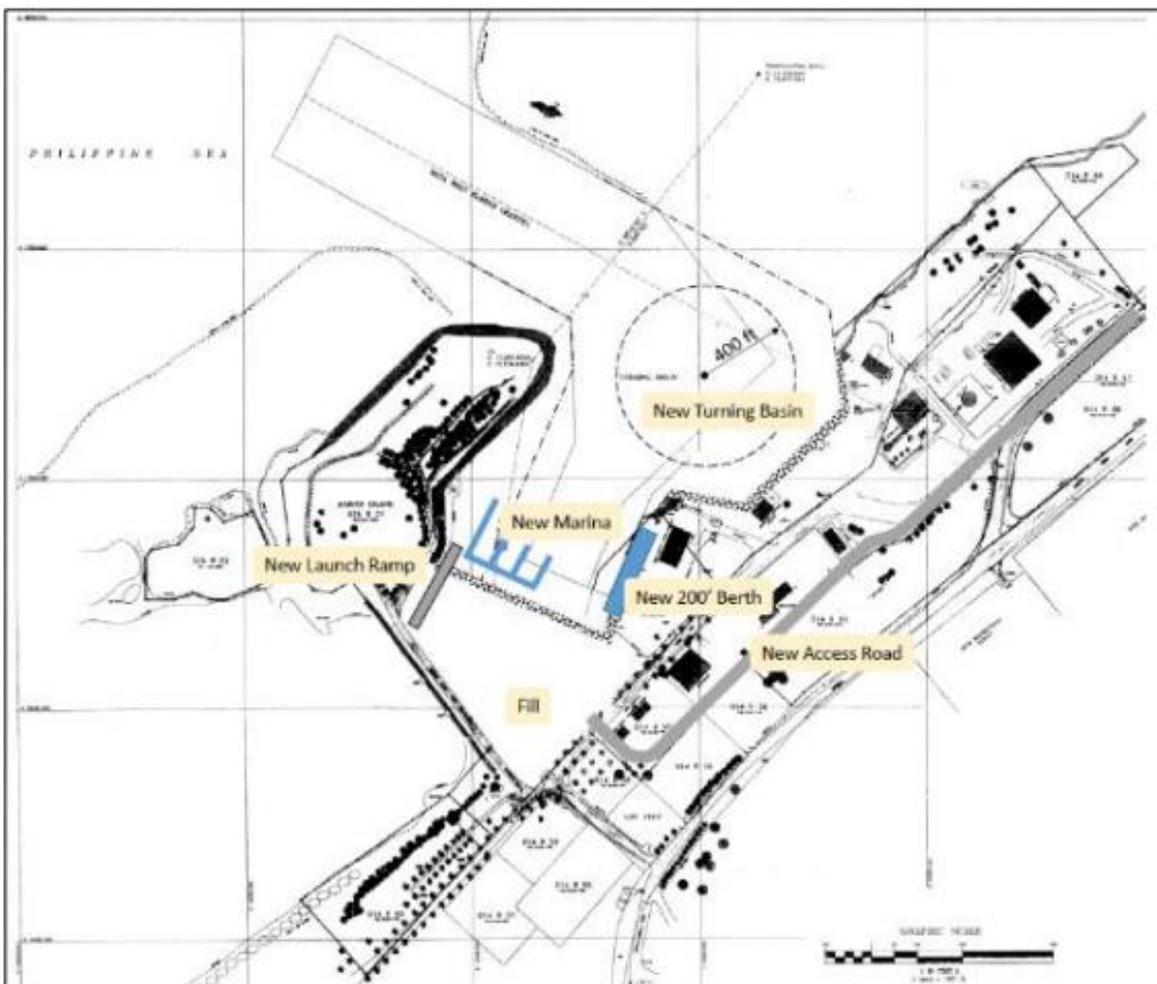
6.0 Rota West Harbor Master Plan

6.1 Commercial Harbor

6.1.1 Harbor Layout Alternatives

For this Master Plan, an initial concept was developed based on preliminary site observations and on previous master plan recommendations. This concept enlarged the turning basin to allow vessels to enter under speed and stop when they were within shelter of the island. It also increased port area by fill within the basin to develop additional operational area.

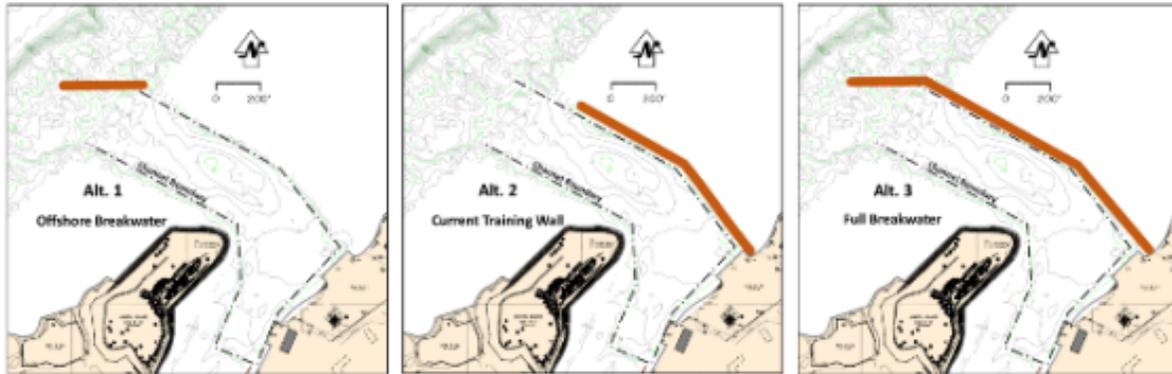
Figure 6-1: Initial Concept (Not Recommended)



This configuration was abandoned due to environmental permitting issues, cost, and terminal needs. Subsequent coastal engineering analysis of wave and current monitoring data showed that an enlarged turning basin would not improve vessel navigation. Cargo forecasts also showed that additional backland terminal area would not be needed to support the commercial port operation at Rota West Harbor.

Based on current vessel forecasts and additional coastal engineering, the Rota West Harbor Master Plan team determined that a breakwater structure would be necessary to improve navigability, precluding the need for an enlarged turning basin. Therefore, three additional alternatives were developed to explore wave protection options, as shown in Figure 6-2.

Figure 6-2: Breakwater Alternatives



1. Breakwater Alternative 1 consists of an isolated offshore breakwater to deflect waves entering the channel. This reduces the instances of breaking waves, but does not limit the current. Some concern was raised that current eddies at the end of the breakwater could make the channel entrance difficult.
2. Breakwater Alternative 2 is a current training wall constructed on top of the existing shallow lagoon bottom. It would deflect currents running off the backreef. Alternative 2 would not reduce wave action in the channel, and potentially strong eddies could develop at the seaward end of the wall.
3. Breakwater Alternative 3 combines the two concepts to fully enclose the north edge of the channel. This would be the costliest alternative, but is expected to relieve channel safety problems.

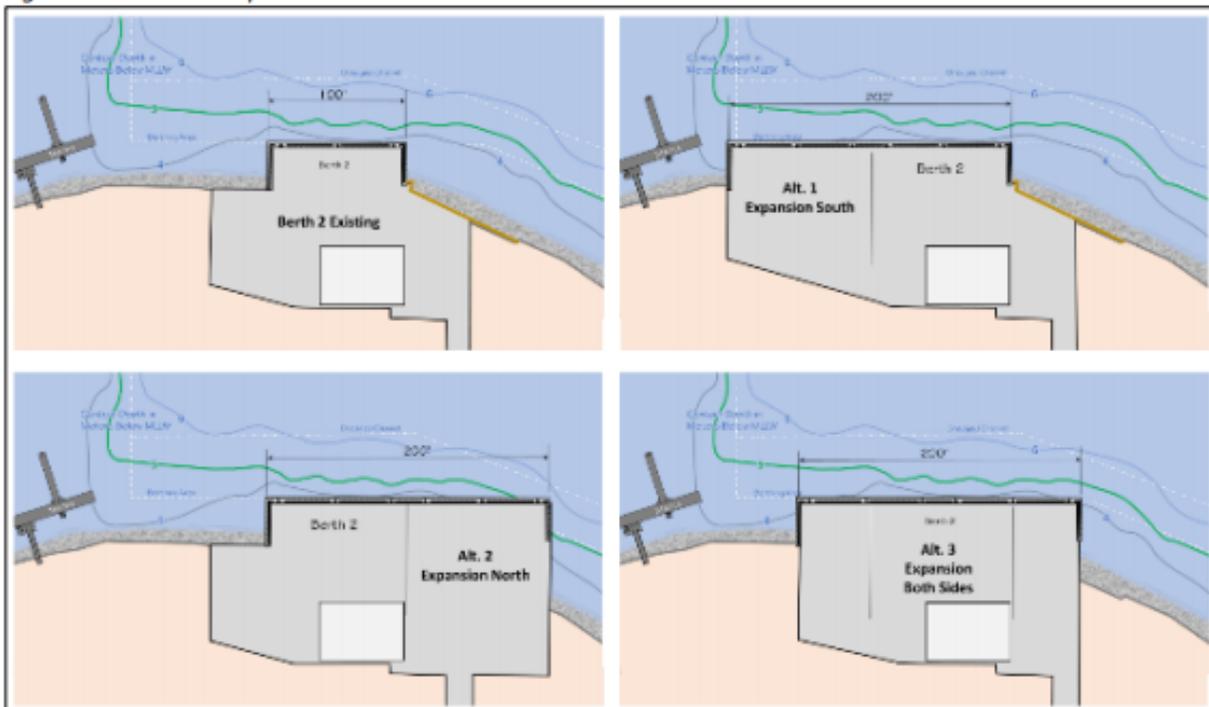
With sufficient additional wave protection to allow safe navigation, there will likely be reduced wave agitation within the mooring basin, particularly at Berth 2. Therefore, a significant reconfiguration of the harbor, including dredging, will not be necessary if the breakwater is constructed.

At 100 feet in length, Berth 2 is not adequate for the size of barge and ship traffic calling at Rota West Harbor. Although a full reconfiguration of the harbor may not be necessary, near term improvements and expansion of Berth 2 will increase the speed and safety of cargo transfer. Three alternatives considered for this expansion are shown in Figure 6-3.

1. Berth Expansion Alternative 1 expands the berth face to the south end of the dredged harbor basin. This alternative has the advantage of moving the center of operation somewhat farther from the turning basin. It also uses the existing level area within the port limits. Alternative 1 is likely to be the lowest cost construction of the three alternatives, as it uses the least sheet pile and results in the least fill. However, it encroaches on the public marina and shallow water areas.

2. Berth Expansion Alternative 2 expands north toward Berth 1 and provides an opportunity to create a consolidated Berth 1-2 operations area. However, Alternative 2 would require the most fill and would likely be the highest cost option.
3. Berth Expansion Alternative 3 expands both ends of Berth 2. It keeps the shed centered in the operations area and maintains adequate spacing with the existing marina to allow development of a new commercial small craft float.

Figure 6-3: Berth 2 Expansion Alternatives



6.1.2. Alternatives Evaluation

Channel Improvement Alternatives

The three breakwater alternatives were analyzed using field data collected by the three wave and current monitoring devices recovered in March of 2017, as well as modeling results released by the Corps in July 2017. This evaluation revealed that a complex current regime can occur within the channel when the nearshore significant wave heights reach four feet or more. At the channel entrance, rapid outflow encounters incident waves resulting in chaotic wave patterns as reported by local vessel operators. Additionally, a strong eddy was modeled within the channel that could be hazardous to vessels having reduced maneuverability. Evaluation of the alternatives resulted in the following recommendations:

1. Breakwater Alternative 1 does not attenuate the strong currents entering the channel from the northern back-reef lagoon. It also could cause additional chaotic wave conditions due to a strong nearshore current trending from the northeast.
2. Breakwater Alternative 2 would block current flow off the lagoon, but would not attenuate waves entering the channel from the northwest. Additionally, strong currents and eddies could develop at the shallow-water, western termination of the training wall.

3. Breakwater Alternative 3 combines wave attenuation with control of the currents. Flow off the back-reef lagoon would be trained away from the harbor entrance. However, Alternative 3 is the costliest of the options.

Based on this evaluation, Breakwater Alternative 1 could improve wave conditions within the harbor but would not attenuate cross-currents in the channel. Breakwater Alternative 2 would control currents, but would leave the channel vulnerable to offshore wave action. Therefore, the highest cost Breakwater Alternative 3 is likely to be the most effective of the three options explored in this report.

A non-structural alternative would be to serve Rota West Harbor with a vessel capable of entering the harbor under conditions that the current tug and barge are not designed to handle. However, recent business failure of the *MV Luta* suggests that a dedicated vessel may not be economically viable given the level of cargo demand on Rota and the competing service from other carriers.

Berthing Expansion Alternatives

The three alternative berthing improvements focused on Berth 2 as it is the newest berth, in the best location. Berth 2 can also be improved and would be beneficial even prior to implementation of the breakwater improvements. Expanding the wharf face to a full 200 feet, allows a more distributed load on the fendering and better positioning of the mooring lines. This will better stabilize the vessel, and will reduce damage to the fenders or the vessel rail if wave action increases while a ship is at port. A longer wharf face will also allow crane positioning to reach more containers without moving the barge or the ship.

1. Berth Expansion Alternative 1 was considered the most attractive from a cost standpoint. Only one wing-wall is needed and it ties back a short distance to the shore. Alternative 1 also uses existing port container storage areas without additional grading. However, it prevents development of a small commercial float without significant disruption of the existing marina. It also puts larger vessel very close to the dredged channel limits, risking grounding or propulsion damage to nearby small craft.
2. Berth Expansion Alternative 2 is likely to be the most expensive to construct and mitigate. Beyond its proximity to the Berth 1 storage areas, Alternative 2 offers few advantages and was not considered further.
3. Berth Expansion Alternative 3 splits the expansion, north and south. This keeps the transit shed centered on the wharf and 'squares-up' the open paved storage. It also retains sufficient clearance on the south side to allow construction of a dedicated commercial float for small vessels arriving from Guam.

Berth Expansion Alternative 3 is recommended for further development as it provides the best operational configuration and it allows construction of a small vessel float adjacent to the existing marina.

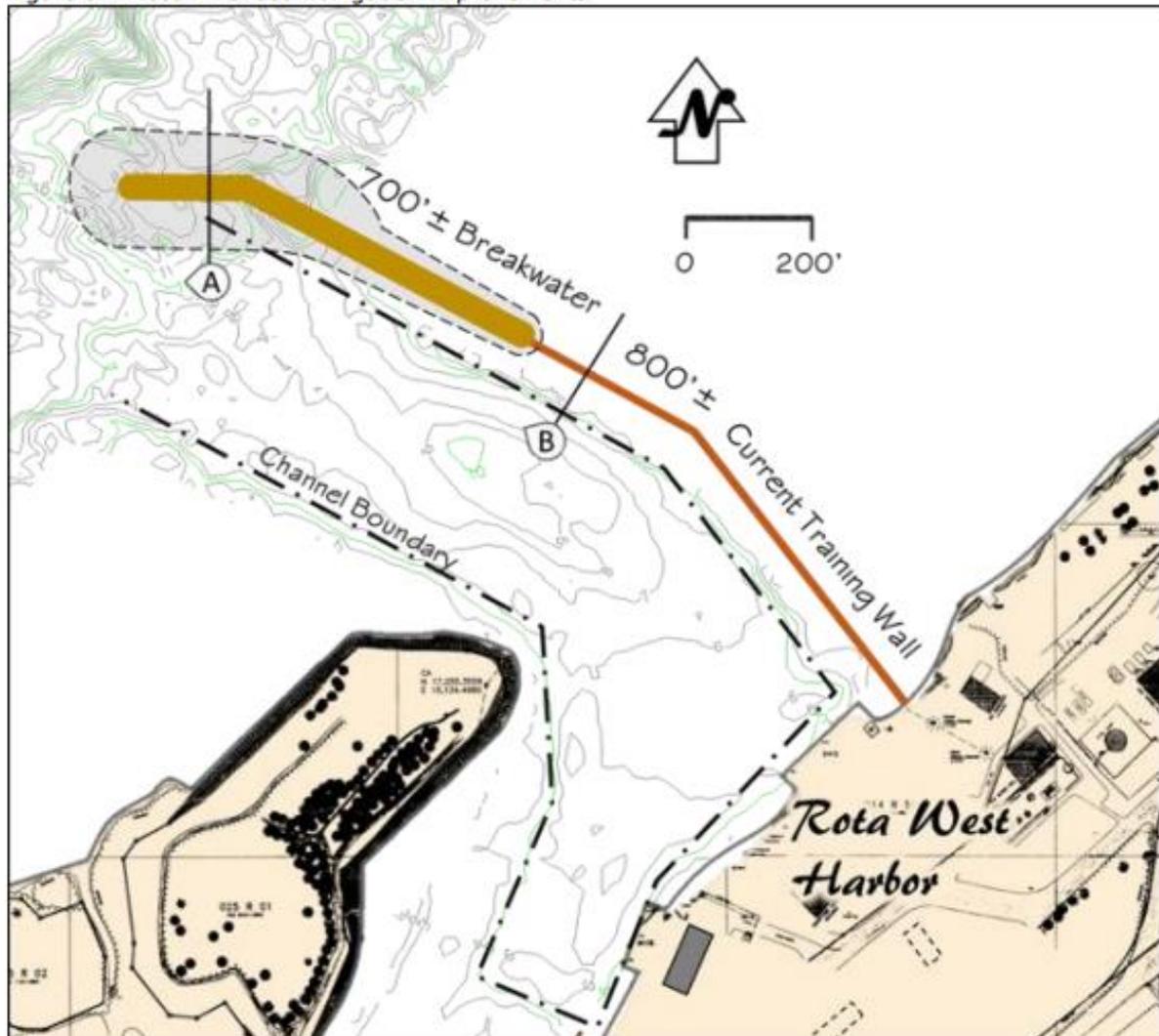
6.2. Breakwater, Training Wall, and Navigation Improvements

Wave, current, and weather conditions were investigated at the West Harbor, and analysis of primary data was performed for harbor entrance conditions. This analysis is summarized in Section 3 and shown in more detail in Appendix B. Based on this analysis, and on the experience of local mariners using the West Harbor, prevailing ocean conditions prevent safe use of the entrance channel for as much as three months out of the year.

Therefore, an offshore breakwater will be necessary if regular marine traffic is to call at Rota West Harbor. Additionally, currents originating from the back-reef lagoon, north of the West Harbor channel, should be attenuated by a “training wall” along the north edge of the channel. These improvements are shown in schematic form in Figure 6-4.

Breakwater design will require a detailed survey of the site and additional coastal engineering modeling to confirm the size and configuration of the structure. It must have substantial armor to prevent typhoon damage and it must be located so as to minimize impact to the local coral reef system.

Figure 6-4: Recommended Navigation Improvements



6.2.1. Breakwater and Training Wall Concept

Considerable additional engineering, surveying and environmental research will be needed to develop a construction plan for the breakwater and training wall. Aside from preliminary survey information, detailed bottom condition and geotechnical data has not been developed. Therefore, a rough, theoretical

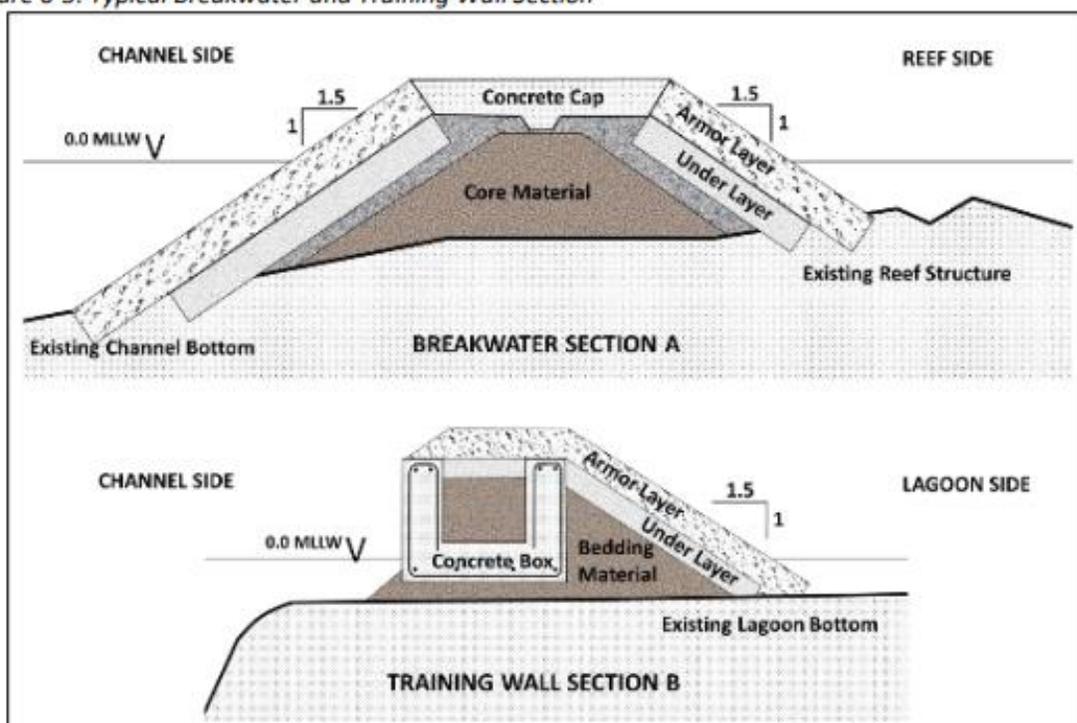
breakwater and training wall concept was created for discussion purposes. This concept will be subject to considerable change once more information has been collected on the site.

The primary wave protection for Rota Harbor is the barrier island. This island has been over-washed several times during previous typhoon events, notably Typhoon Pamela and Typhoon Chaba. Therefore, the West Harbor cannot be used as a harbor of refuge, and vessels would leave prior to a typhoon's arrival.

Figure 6-5 illustrates the working concept used for evaluating this project. Since the West Harbor is not a harbor of refuge, breakwaters can be sized to allow overtopping in extreme weather events. Therefore, a lower structure profile can be used as long as the cap and armoring is sufficient to protect it from typhoon conditions.

As the training wall is set well behind the fringing reef, it will not encounter wave conditions expected at the channel entrance. In addition, the lagoon bottom supporting the training wall is very shallow and often exposed at low water.

Figure 6-5: Typical Breakwater and Training Wall Section



6.2.2. Construction Sequence

Figure 6-6 shows the back-reef lagoon at a low tide level and calm conditions. Much of the bottom is exposed with small coral heads visible at the channel's edge. This condition allows construction to begin from the shore. Initially, coarse bedding material consisting of quarry-run coral rock would be staged near Berth 1 and used to build a temporary causeway along the channel edge. This would allow heavy equipment to move directly on to the breakwater site for the construction. The general construction sequence could be similar to this:

1. Stockpile coral rock and other material behind Berth 1
2. Build a causeway of bedding material approximately 16 feet wide for the length of the training wall
3. Begin to stockpile armor material at Berth 1
4. Build a temporary staging and turning area at the head of the causeway
5. Continue building the breakwater from the staging area using heavy equipment to set the armor
6. Stockpile precast concrete box caisson units at Berth 1
7. Finish the breakwater by pouring or setting the cap
8. Remove staging area material and begin setting the training wall box units from the outer end
9. Work back toward shore, setting box units, filling and armoring.

Figure 6-6: Lagoon Conditions



Several variations on the concepts illustrated in Figure 6-5 are possible including tribar armor units on the breakwater face, stone or armor on the breakwater cap, a conventional core and stone section for the training wall, or a combination of alternatives. Construction would have to be timed to correspond with the calmer summer months and a substantial contingency built into the schedule for typhoon weather events. Many details such as water circulation and environmental mitigation measures remain unresolved.

6.2.3. Other Alternatives

The breakwater and training wall structures present significant financial, engineering, and regulatory challenges. In the Western Pacific, typhoon conditions, remote construction sites, and sensitive

environments can substantially increase project costs. Therefore, alternatives to the recommended breakwater structure should be considered.

Reduced Project – A smaller project may be possible that would improve access to Rota Harbor, if not yield all the benefits of the recommended plan.

Vessel Subsidy – A long-term minimum cargo commitment by the CPA could be developed to ensure that a self-propelled vessel with bow-thrusters was maintained in the Rota service.

Warehousing Logistics – A logistics center could be developed to maintain a 60-day supply of sustenance goods during periods of bad shipping conditions, or in the event of typhoon damage to the Port.

6.2.4. Navigation Improvements

Rota West Harbor entrance channel is well marked with lighted range markers located behind Berth 1. When the breakwater is constructed, a lighted marker will be needed at the head to guide vessels into the channel. With a breakwater and training wall in place, the 20-foot channel depth and 300-foot width will be sufficient to serve the design vessels under one-way traffic conditions.

Prevailing wind and waves are such a significant factor in governing harbor entrance conditions that addition of an anemometer to the roof of the transit shed and harbor operations building would help the vessel operator decide when to enter and when to bypass Rota harbor. Similarly, a video camera could be mounted on one of the range towers to monitor channel conditions in advance of vessel arrival.

6.3. Upland Development

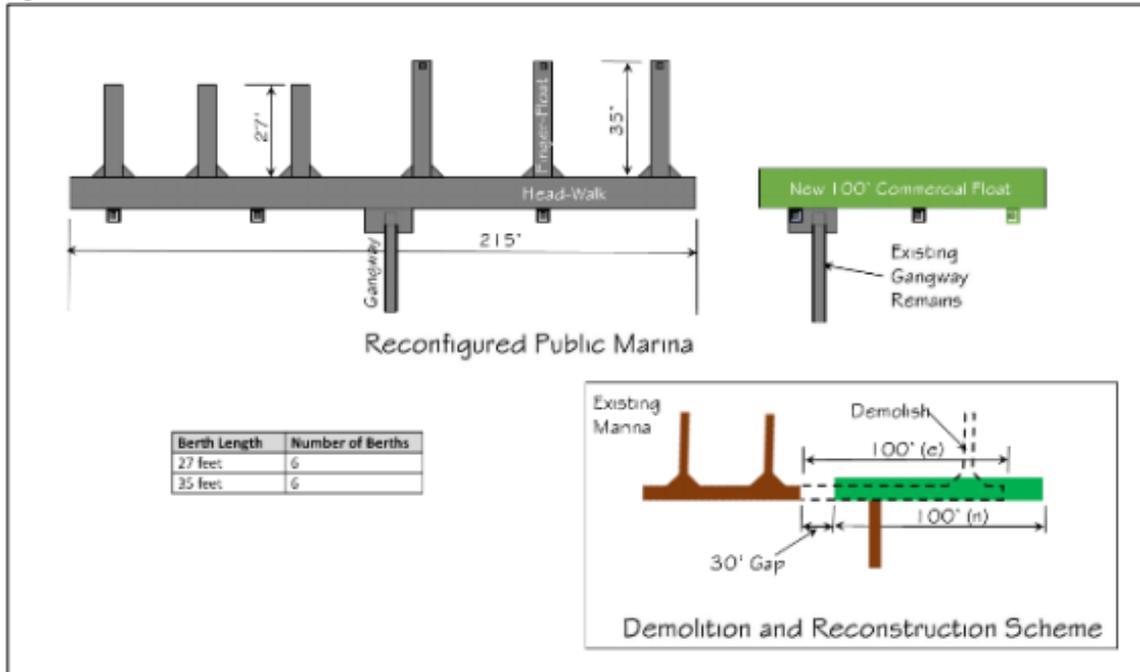
6.3.1. Key Drivers

Upland development of CPA Rota West Harbor property is primarily driven by the community need for waterfront access and marina facilities. Rota holds several sport fishing events that contribute to the tourism sector of their economy. Rota also has excellent snorkel and scuba diving sites that draw visitors to the island.

To accommodate small commercial vessel traffic, the CPA seaport needs a heavy commercial float that is within the Port secured boundaries. Figure 6-7 illustrates how a portion of the existing marina would be converted for commercial use by replacing approximately 100 feet of marina head-walk with a heavy duty commercial small boat landing⁹. This development would eliminate the remaining 48-foot finger pier and so reduce available berthing in the marina. Since this facility was constructed under a memorandum with the DLNR, a revised agreement will be necessary to modify the public marina head-walk to construct the commercial float.

⁹ A site visit on 3/15/18 found that the gangway at this location has been removed. Replacement of the gangway would be necessary as part of the commercial small boat landing.

Figure 6-7: Commercial Float

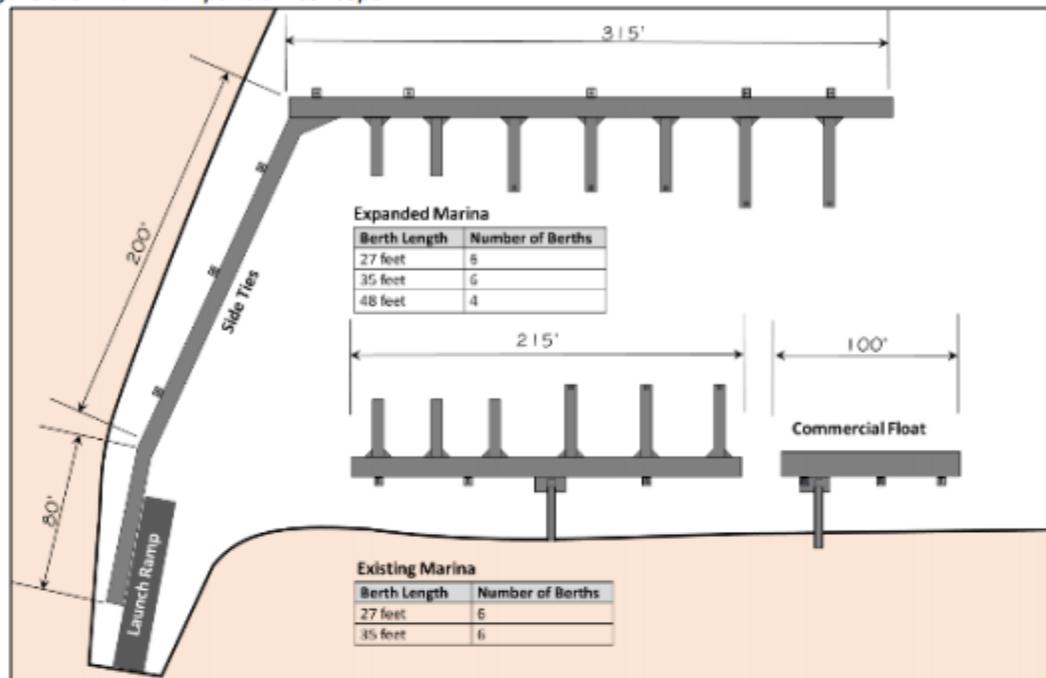


6.3.2. Small Boat Harbor

Accommodations for smaller commercial vessels are needed at the seaport and will displace the larger slips in the existing marina. Therefore, an expanded marina should be constructed to replace the lost berthing capacity and to accommodate more boats during seasonal events. Access to the marina expansion would be via a new, 80-foot boarding float at the existing launch ramp. The float should be designed with a non-slip walking surface, and at low water, should not reach an angle steeper than that of the marina gangways.

Figure 6-8 illustrates one concept for small boat marina expansion that would fill the need for additional slips and temporary mooring (side ties) for visiting boats. As bottom conditions within the West Harbor vary considerably, additional evaluation will be needed to design the guide piles and to survey the harbor depth. Marina expansion should not take place until a breakwater is installed along the harbor channel entrance to control harbor wave agitation.

Figure 6-8: Marina Expansion Concept



6.3.3. Public Access

A portion of the existing public area at Rota West Harbor will revert to CPA control when the commercial float is constructed since it will have to be incorporated into the secured terminal area, within the security fence. However, this area is generally underutilized and is primarily vehicle parking that could be located elsewhere. Future development of the CPA property south and east of the commercial harbor should include improved public access and waterfront amenities such as comfort station and fish cleaning stations.

Figure 6-9 illustrates a very general concept for improving public access at West Harbor. This concept is primarily for discussion of area needs and spatial arrangement. Specific elements should be developed as need arises and funding becomes available.

Since typhoon storm surge can periodically inundate the port area, public improvements and commercial recreational developments in this area should be designed to withstand flooding of the lower levels. Lower value structures such as picnic shelters should be roofed with thatch or other natural materials that can be sacrificed in typhoon events and replaced at a relatively low cost.

Figure 6-9: Public Access



The CPA controls additional land south of the Manglona Park island causeway, as well as land surrounding the historical sugar mill site. This property could also be improved for commercial or public recreational uses if needed.

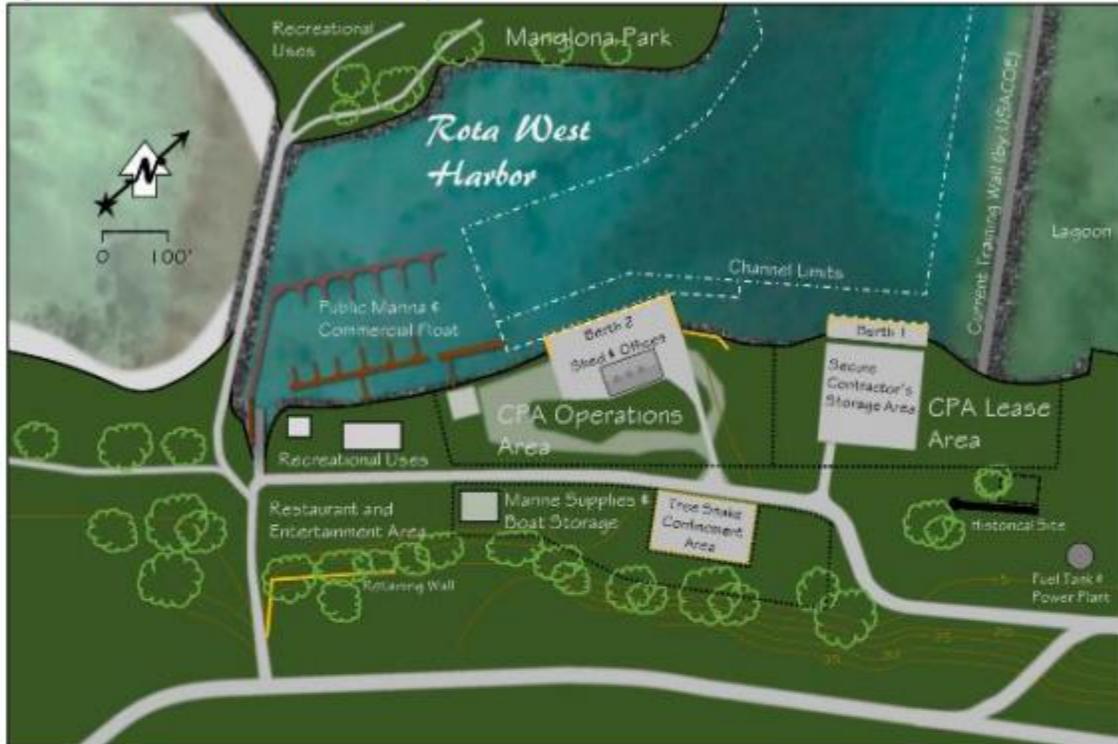
6.4. Recommended Harbor Improvements

The needs assessment and interviews show that Rota West Harbor has sufficient land and transit shed space to accommodate all forecast cargo through 2030. Therefore, upland expansion should be done on an incremental basis as needed by specific future cargo developments. A small expansion south of Berth 2 will be necessary to incorporate the commercial float into the secured terminal area.

On the water side, Berth 2 requires fender repair and expansion to safely accommodate the 200-foot design vessel, whether a barge or a small ship such as the MV Luta. Expansion of Berth 2 will entail some fill in the harbor that will require environmental mitigation. Figure 6-10 illustrates the primary features of the recommended master plan harbor improvements:

1. Breakwater and training wall to allow safe harbor entry and to reduce harbor wave agitation.
2. Expansion of Berth 2 with improved/repaired or replaced fender units and mooring bollards.
3. New commercial float with cargo storage and transfer facilities.
4. Expanded public marina facilities with upland amenities that include comfort station and fish cleaning stations.
5. Designated public access and commercial recreational areas

Figure 6-10: Master Plan Harbor Development



6.5. Phasing Plan

Development of Rota West Harbor is needed in the near-term to address the immediate needs of Rota residents for reliable ocean cargo service. As population and economic growth are seen to be modest over the next 20 years, the renovated port will have sufficient capacity to serve local needs in that time period. Therefore, an accelerated phasing plan is proposed to answer the island's need in the near term.

Phase I (see 6.5.1) is designed to stabilize the wharf structure and to improve berth and cargo handling operations as much as possible without new harbor wave and current improvements. Phase I could start in 2018 when funds are allocated and would continue for two years of permitting, bidding, and construction.

Phase II (see 6.5.2) is intended to complement construction of a new breakwater and current training well. However, the Berth 2 improvements should be implemented whether a breakwater is complete or not. Phase II could begin in 2020 when the funds are allocated and would take place over two to three years for permitting, bidding and construction. As it will take considerably longer to fund, permit and construct, Phase II is assumed to extend until 2025 when reduced harbor wave agitation allows expansion of the public marina.

Phase III (see 6.5.3) is considered a post-breakwater phase, although Berth 1 improvements may take place earlier to facilitate breakwater construction. Timing of Phase III will be determined mostly by

demand and funding availability. For this analysis, it is assumed that Phase III funding will be committed in 2025.

6.5.1. Phase I Improvements

New fenders on Berth 2 – The existing wharf face at Berth 2 is fendered with equipment tires hung from the bull rail. These tires have little energy absorption capability and result in damage to the rail, the wharf and the calling vessel. New trapezoidal rubber fenders, at least three feet long, are needed on the wharf face.

Demolish 100' of marina dock and piles and construct new commercial float – Small vessels in the 100-foot range call at the West Harbor delivering consumer goods in an informal trade with Guam and the other islands. This trade should take place from a suitably heavy float, within the harbor secure area. A loading and storage area will be needed as well as an extended security fenced area.

Material handling equipment – The Grove TM875 crane currently in use is under-sized for the reach requirements of barges calling Rota West Harbor. A newer and larger crane delivered to Rota was estimated at about \$1.8 million in 2013. The new equipment would require less vessel repositioning and could lift heavier containers, resulting in lower shipment costs to Rota (since containers can be more fully loaded) and faster vessel service times.

6.5.2. Phase II Improvements

Extensions of Berth 2 – The 100-foot Berth 2 is inadequate for mooring the 200-foot vessels that call Rota West Harbor. One of the reasons the original fender system failed was that too much load was placed against a short berthing area. By extending Berth 2, the fendered surface can be designed to be compatible with the vessel class using the port. It will also allow a better mooring pattern to be used and will allow full access to the vessel by the port's cargo crane.

New Public Marina Floats and Launch Ramp Boarding Float – The existing public marina is said to be too small for seasonal fishing events, guest yachts and fishing vessels. Additionally, the existing launch ramp lacks a boarding float and loading area. Additional slips in Phase II will replace those lost to development of the commercial float and increase overall berthing capacity. Access to the new marina would be via a proposed launch ramp float.

Breakwater and Training Wall – At this time, the Corps is completing their study of the Rota West Harbor channel and breakwater improvements. With environmental review, permitting, mitigation, and funding, it is possible that the breakwater could be constructed during the Phase II time-frame.

6.5.3. Phase III Improvements

Berth 1 Rehabilitation and Secure Contractor's Storage Area – On completion of the USACE breakwater and training wall, Berth 1 could be repaired and fitted with new fenders for use by local contractors importing bulk materials and construction equipment. The existing wharf should be retro-fitted with a removable bull-rail section to allow transfer of Ro-Ro cargo from landing craft and other inter-island vessels. In the backland area, approximately 0.5 acres would be leveled and paved with crushed coral

stone for contractor's equipment storage. (Note: Partial Berth 1 rehabilitation may be required beforehand to facilitate construction of the breakwater and training wall).

Boat Repair and Storage with Marine Supplies and Charters – When visitor traffic to Rota grows to the point that dive charters and excursion boat operators use the West Harbor, there will be a need for upland storage, boat and engine repair, as well as fishing supplies and charter booking support.

Picnic Areas with Shelter and Comfort Station – Expanded public use of the West Harbor marina will require comfort station amenities as well as family-use facilities. All construction near the harbor will have to be resistant to typhoon flooding and winds, or easily repaired.

Restaurants and Entertainment – If sufficient commercial demand for waterfront entertainment develops, the area east of the Port Access Road and Manglona Park island causeway could be developed as a site for informal dining and evening entertainment. Any such development must consider that Manglona Park island will over-wash in a typhoon and low-level improvements are subject to flooding.

Figure 6-11: Phased Development Plan



6.5.4. Phase I Repair Recommendations

Berth 1 – The tire fenders should be removed to prevent further erosion of the bull-rail and wharf face. If Berth 1 is needed, temporary fenders can be deployed by the arriving vessel operator. A passive cathodic protection system should be installed for Berth 1 at the same time it is installed for Berth 2.

Berth 2 – The tire fenders should be replaced with an engineered fender system. Concrete spalls should be patched and repaired where reinforcing steel is exposed, or where rebar “bleeding” is evident. Damaged steel sheet piles should be repaired and a passive cathodic protection system should be installed. Berth 2 should be swept for in-water debris when the steel sheet piles are being repaired.

Public Marina – General maintenance on the broken deck boards, cleats, and fenders should be performed as part of the Phase I commercial float construction project.

Storage – The transit shed door track should be removed and replaced. All area lighting should be maintained to allow evening cargo operations.

6.5.5. Phase II Repair Recommendations

Berth 2 – In conjunction with the Berth expansion, subsided Berth 2 deck areas should be filled and repaved.

6.5.6. Phase III Repair Recommendations

Berth 1 – The damaged concrete cap should be re-faced to extend the service life of the berth. Remaining concrete spalls should be patched and repaired where reinforcing steel is exposed, or where rebar “bleeding” is evident. Damaged steel sheet piles should be repaired and rip-rap repaired or replaced at both ends of the berth. Stone and debris build-up near the wharf face should be surveyed and removed. Subsided deck areas should be filled and repaved. (Note: Berth 1 reconstruction may be required earlier than Phase III to support the U.S. Army Corps of Engineers’ breakwater and training wall project. If so, the USACE contractor could be required to make these improvements as a condition of using Berth 1.)

6.5.7. Phased Cost Estimates

For Phase I, approximately \$2.93 million should be allocated in 2018 to fund the repair and improvements of Berth 2. Of this allocation, approximately \$2.0 million will be for the container handling crane. As purchase of a new crane will not be necessary until after berth upgrades have been completed, it can be deferred until later in the Phase I cycle. However, Rota should purchase a second crane for the terminal by 2020.

Item	Phase I	Cost
1	Berth 2 Upgrades	\$195,000
2	New Commercial Float	\$465,000
3	Storage Yard Improvements	\$170,000
4	Miscellaneous Repairs and Improvements	\$99,000
5	Container Handling Crane	\$2,000,000
	TOTAL	\$2,929,000

The Phase II allocation of \$24.1 million includes the Commonwealth contribution to breakwater and training wall costs. As the cost of construction is relatively high in the CNMI, and as significant mitigation costs are anticipated, a very conservative \$20 million is allocated for breakwater construction. That amounts to 20 percent of the \$100 million rough cost estimate given by USACE and assumes an 80-20 federal-local costs share split.

This estimated contribution is deliberately conservative and could be as much as two times the amount required. Therefore, budgeting for Phase II will hinge on the final recommendation of the Corps' current evaluation. Additionally, the CNMI contribution may not be required until several years after the Phase II funding allocation date of 2020.

Item	Phase II	Cost
1	Berth 2 Upgrades	\$2,248,000
2	Marina and Boarding Float	\$1,804,000
3	Breakwater and Training Wall (CPA estimated contribution to federal project)	\$20,000,000
	TOTAL	\$24,052,000

Construction costs for Phase III are a rough estimate that can be used for future planning, but may occur almost any time during the 20-year planning horizon. Berth 1 upgrades and repairs may be needed as part of the breakwater construction project, and should not be delayed later than 2025.

Item	Phase III	Cost
1	Berth 1 Upgrades	\$966,000
2	Upland Improvements	\$3,208,000
	TOTAL	\$4,174,000

10.0 Conclusions

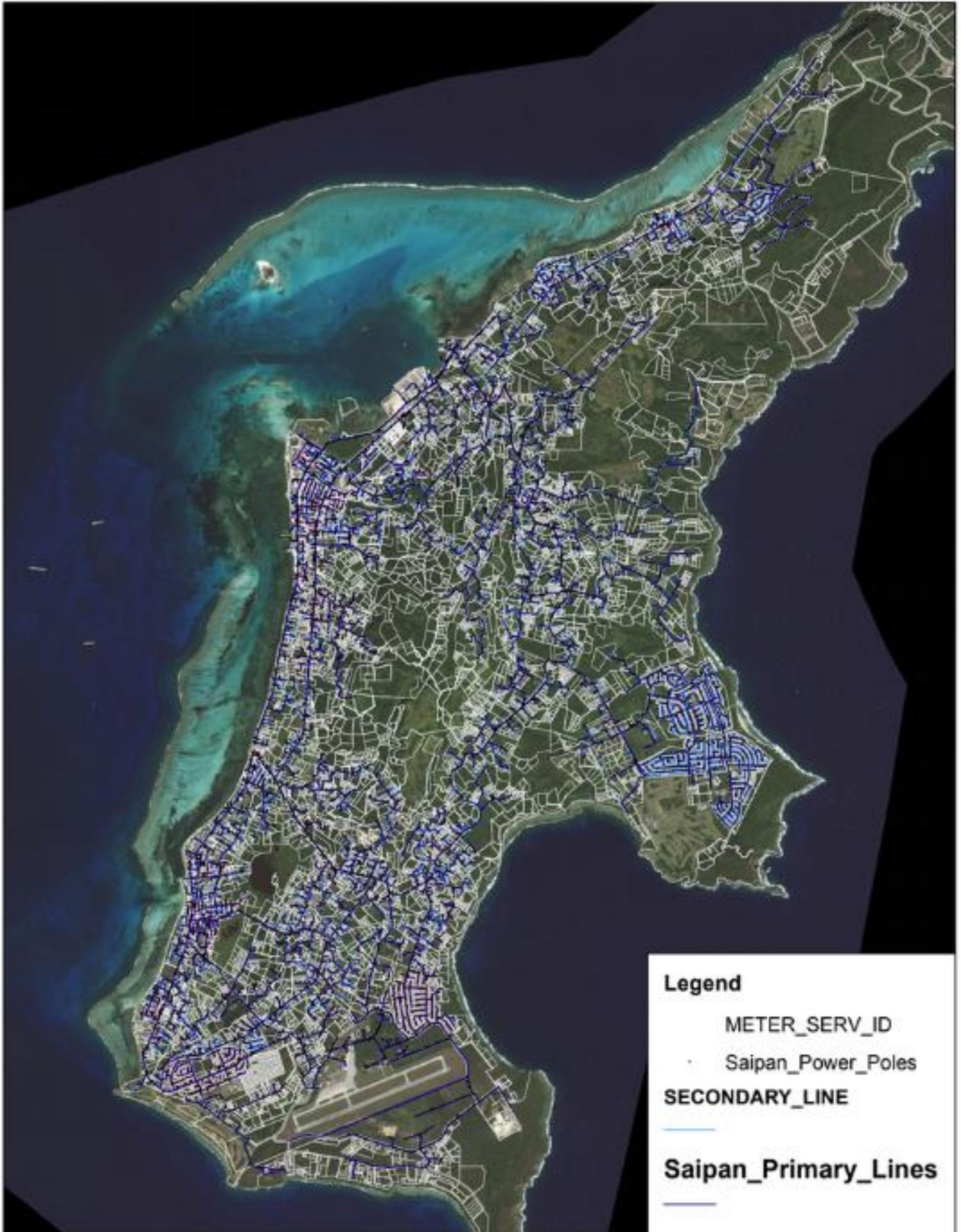
The current and forecasted level of cargo volume at Rota West Harbor has not been sufficient in recent years to justify operation of a small container ship. Therefore, almost all cargo arrives by barge. By their nature, barges do not have the maneuverability of a ship and have difficulty entering the Rota West Harbor channel under wave conditions of about four feet or more.

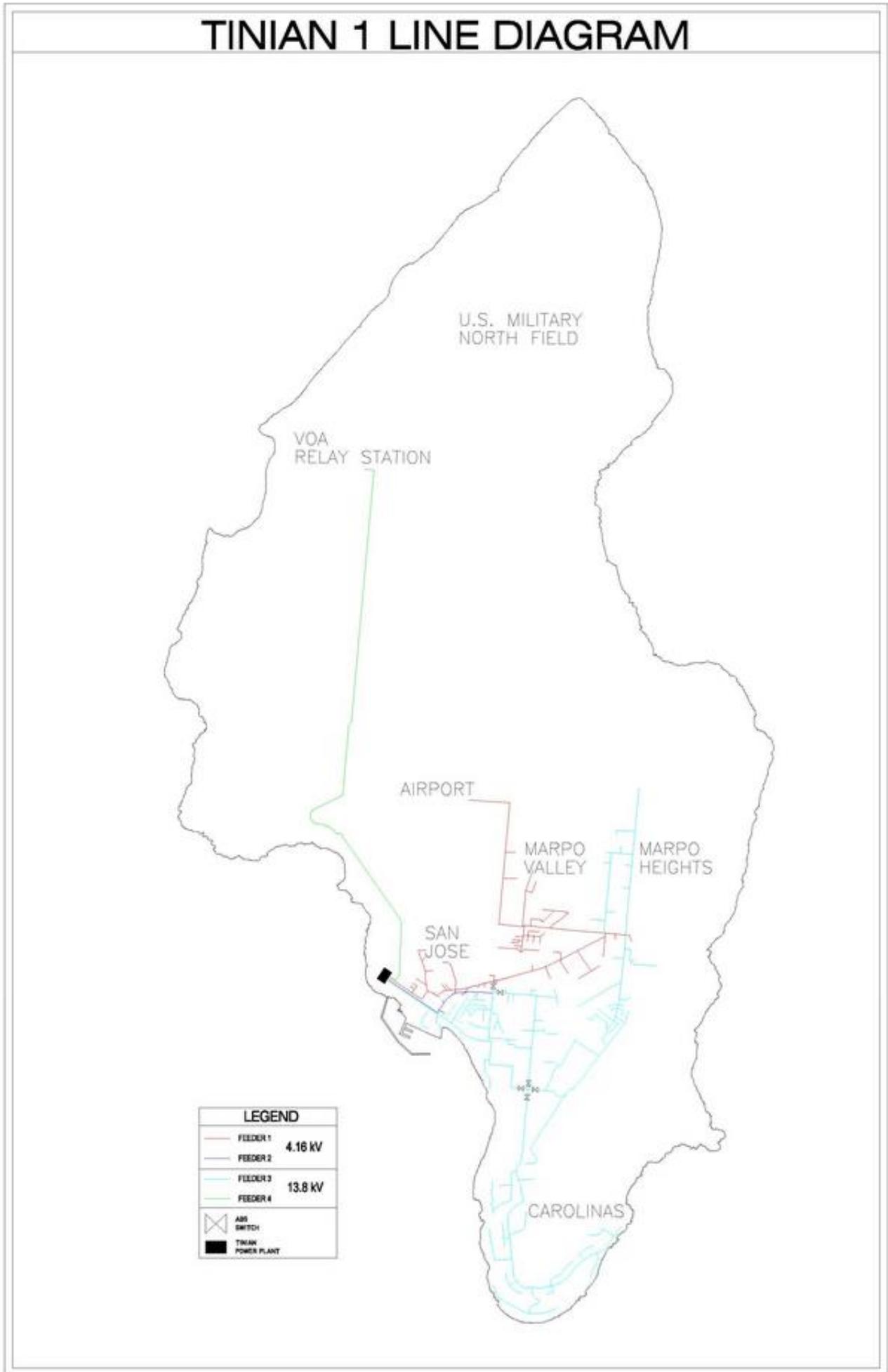
Rota Island requires a channel and harbor that is flexible for a variety of calling vessels and is safe for entry and cargo handling under most local sea conditions. Therefore, this report strongly recommends a combination breakwater and current training wall as has been described by the U.S. Army Corps of Engineers and in Master Plan Section 6. For the purposes of planning only, a conservative figure of \$20 million was budgeted for the CNMI share of the Corps project.

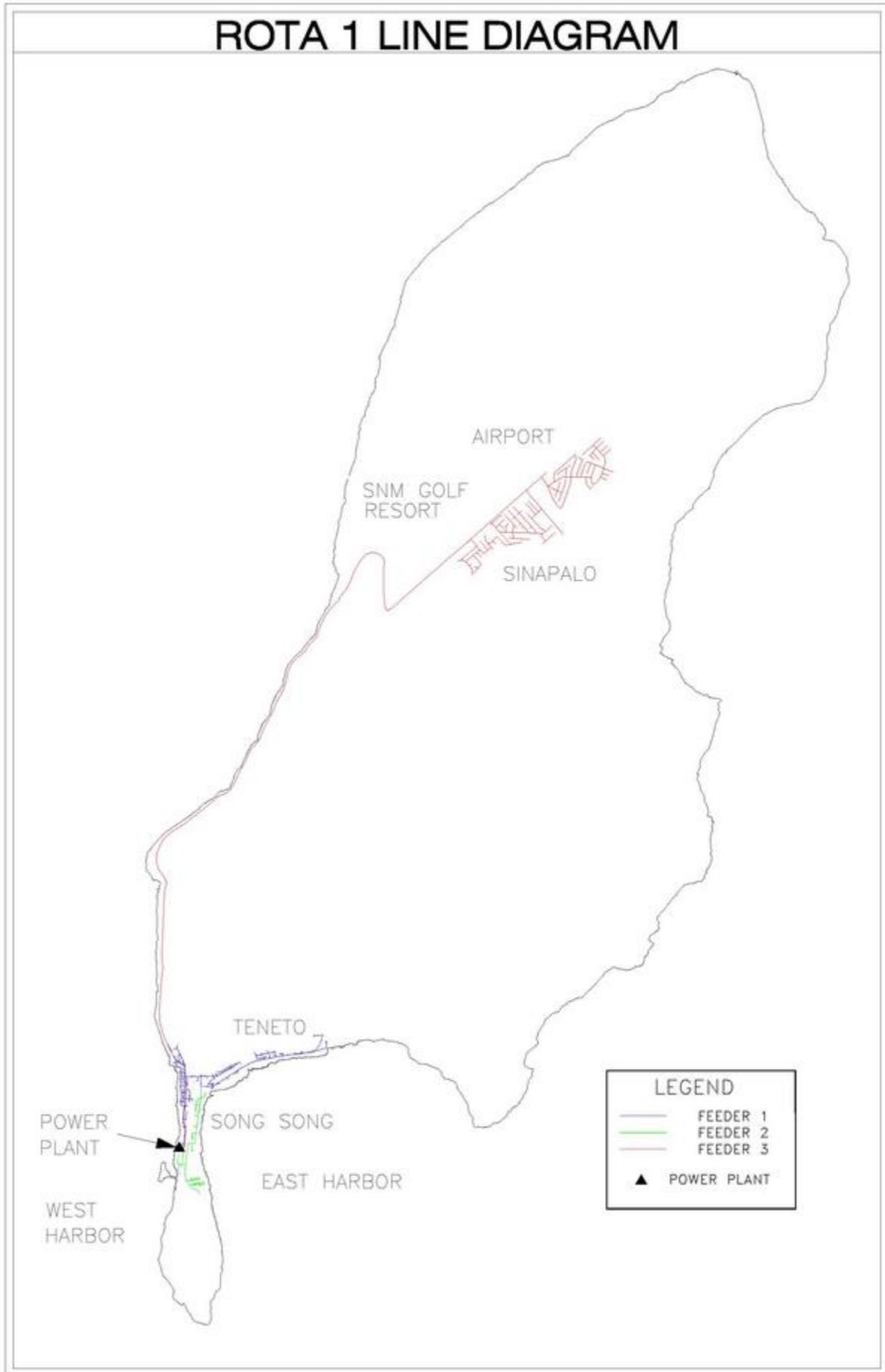
This report also recognizes that Berth 2 is too small to adequately moor the calling vessels, whether barge or ship. Therefore, expansion of the berth will be needed to improve mooring safety and vessel service at the wharf. In addition, small craft improvements are needed to accommodate visiting boats as well as small commercial vessels.

Economic evaluation of the project costs and the CPA bonding capacity shows that the Rota West Harbor improvement projects Phase I and Phase II may be feasible. However, the large amount budgeted for breakwater construction will likely require federal or other outside funding sources. Therefore, this report recommends that initial steps be taken to authorize the projects and initiate the Phase I construction, while seeking assistance with harbor navigation improvements.

CUC Distribution and Meters







Appendix P - CUC Utility Rates, July 2019

The latest electric power service rate schedule was effective July 01, 2019.

Current and past rates are posted at CUC's website here: <http://www.cucgov.org/rates/>

		RESIDENTIAL	COMMERCIAL	GOVERNMENT	MP*		
COMMONWEALTH UTILITIES CORPORATION SCHEDULE OF ELECTRIC CHARGES AND RATES							
By order of the Commonwealth Public Utilities Commission, CUC is authorized to adjust the Fuel Adjustment Charge, previously known as Levelized Energy Adjustment Clause or LEAC, depending on the price of oil. Adjustments are made when the "Mean of Platts Singapore" monthly pricing equals or exceeds a 4.5% differential of the average per gallon cost of fuel used in the calculation of the Fuel Adjustment Charge. Due to a decrease in the average fuel prices, CUC will adjust the fuel and lube oil element by 6.39%. Accordingly, the Fuel Adjustment Charge has decreased from \$0.20087 per kWh to \$0.18803 per kWh effective July 1, 2019 .							
1	Monthly Customer Charge	\$ 7.00	\$ 10.00	\$ 10.00	\$ 9.06		
2	Base Rates Per kWh:						
	KWH LEVELS						
	1) 1 to 350	\$ 0.0210	\$ 0.1130	\$ 0.1240	\$ 0.1070		
	2) 351 to 1,200	\$ 0.0970	\$ 0.1130	\$ 0.1240	\$ 0.1070		
	3) 1,201 and over	\$ 0.1580	\$ 0.1130	\$ 0.1240	\$ 0.1070		
*Municipal Pumping							
FUEL ADJUSTMENT CHARGE or FAC(Previously known as Levelized Energy Adjustment Clause or LEAC)							
		RESIDENTIAL	COMMERCIAL	GOVERNMENT	MP*		
	Current FAC (Effective 07/01/19)	\$ 0.18803	\$ 0.18803	\$ 0.18803	\$ 0.18803		
	Previous FAC (04/01/19 - 06/30/19)	\$ 0.20087	\$ 0.20087	\$ 0.20087	\$ 0.20087		
*Municipal Pumping							
PUBLIC STREETLIGHTING AND PRIVATE AREA LIGHTING TARIFF							
Availability: Applicable to public outdoor streetlighting service and private area lighting where CUC owns, maintains and operates such facilities.							
Fixture Charge: See below.							
Energy Charge: The Energy Charge is the kWh multiplied by the sum of the applicable Electric Base Rate and the Fuel Adjustment Charge.							
Total Streetlight Charge: The Total Streetlight Charge is the sum of the applicable Fixture Charge and the applicable Energy Charge.							
Monthly Charge							
FIXTURE TYPE	WATTS	KWH	FIXTURE CHARGE	RES - ENERGY CHARGE	RES - TOTAL S.LIGHT CHARGE	COM - ENERGY CHARGE	COM - TOTAL S.LIGHT CHARGE
1 Long Arm	250	101	\$ 11.67	\$ 21.11	\$ 32.78	\$ 30.40	\$ 42.07
2 Short Arm	175	71	\$ 8.33	\$ 14.84	\$ 23.17	\$ 21.37	\$ 29.70
3 LED	140	57	\$ 10.83	\$ 11.91	\$ 22.74	\$ 17.16	\$ 27.99
			(a)	(b)	(a+b)	(c)	(a+c)
RES = Residential		COM = Commercial		S.LIGHT = Streetlight			
ELECTRIC NON-RATE FEES							
1	Late Charge (monthly)					1% of Past Due	
2	NSF Check / Returned Check Charge					\$ 40.00	
3	Convenience Fee (for pay-by-phone and online payments) - Temporarily Suspended					\$ 1.50	
4	Unauthorized Connection					\$ 550.00	
5	Reconnection at the Pole					\$ 200.00	
6	Investigation (no charge for first two investigations)					\$ 210.00	
7	Disconnection Notice - Temporarily Suspended					\$ 15.00	
8	Meter Change Out					\$ 95.00	
9	New Service - Single Phase					\$ 135.00	
10	Inspection of Service (no charge for first two inspections)					\$ 90.00	
11	Meter Test - Single Phase					\$ 75.00	
12	Meter Test - Three Phase					\$ 110.00	
13	Disconnection at the Meter					\$ 45.00	
14	Reconnection at the Meter					\$ 60.00	

Jul-19

Appendix Q - Water Production Wells and Distribution Maps





TINIAN

WOP-059-05
KV-20
WOP-059-06
WOP-059-07



Legend

- Drinking
- Irrigation
- ◉ Monitoring
- Exploratory
- Industrial





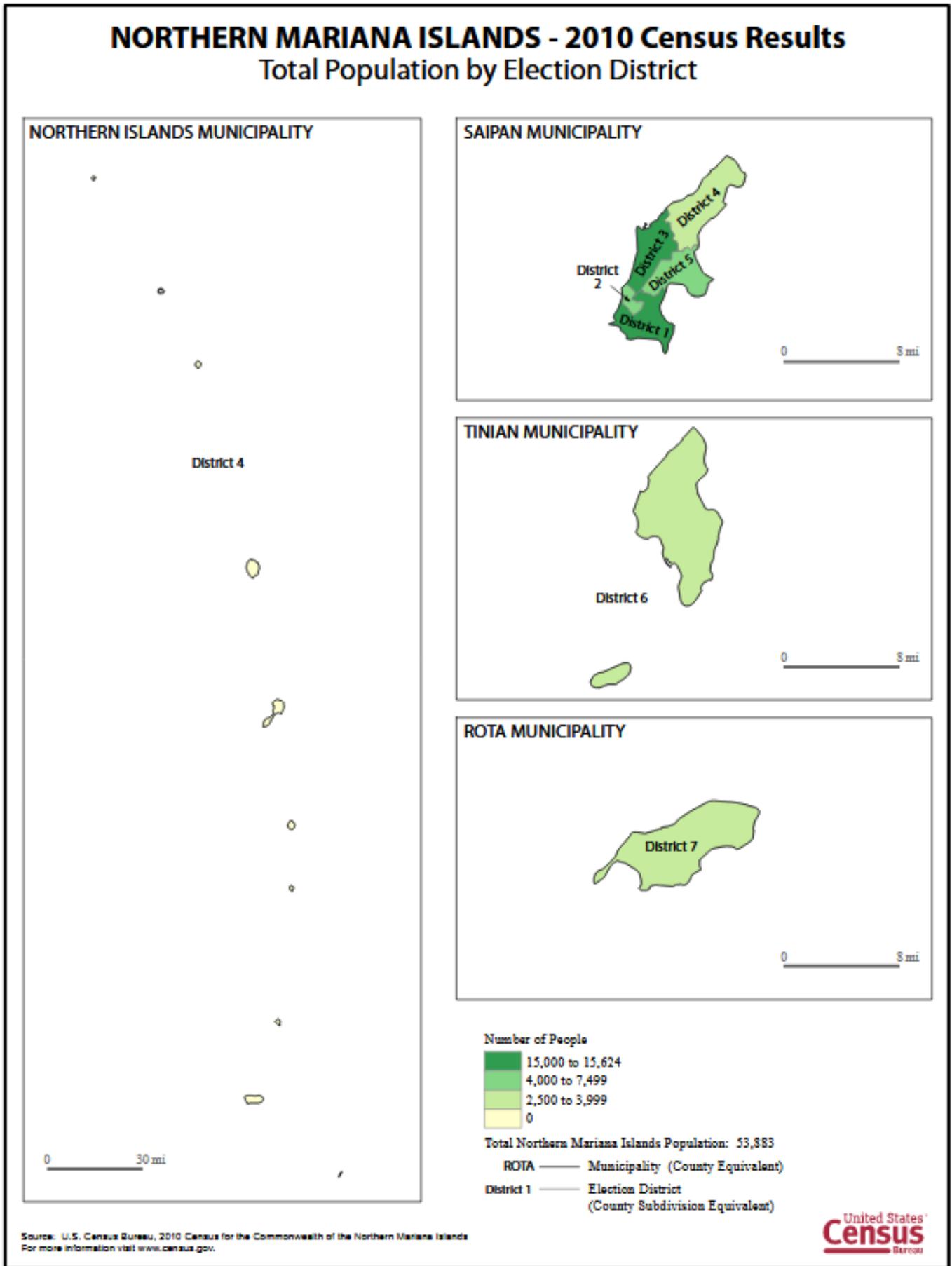
ROTA

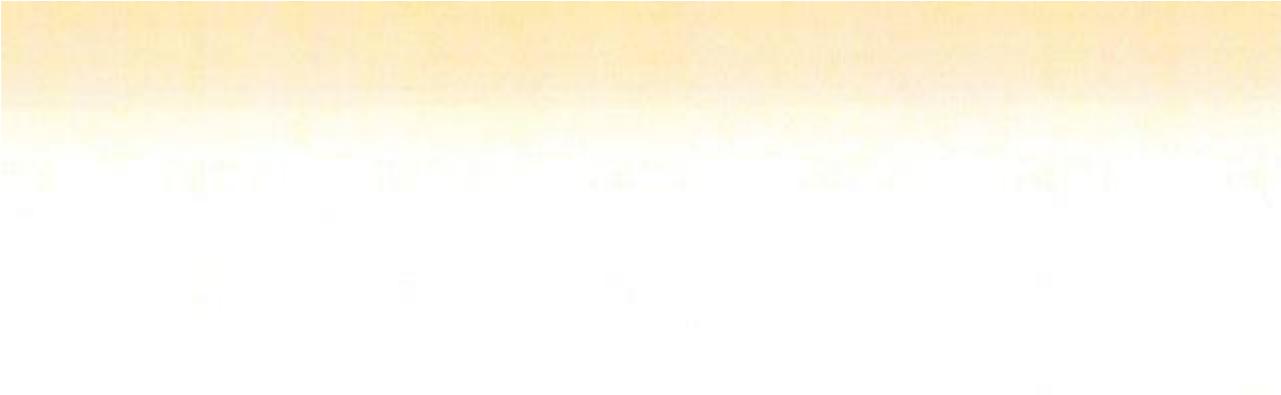


Legend

- Drinking
- Irrigation
- Monitoring
- Exploratory
- Industrial

Appendix R – 2010 Census Results – Population by Election District





Preservation CNMI
Caring for the Past in an Uncertain Future

Commonwealth of the Northern Mariana Islands
Historic Preservation Plan
2011-2015

Office of Historic Preservation
Department of Community and Cultural Affairs



Contents

Message from the Historic Preservation Officer	iv
Introduction	1
The Physical and Cultural Environments	1
The Northern Mariana Islands and its People	1
An Overview History of the Northern Mariana Islands	5
Recent Developments in the CNMI	14
The Framework for Historic Preservation in the CNMI	16
Survey	16
Registration	16
Land-Use Reviews	17
Public Education	17
Cultural Preservation	17
The CNMI's Historic Resources	20
Prehistoric (ca. 2000 BC - AD 1668)	20
Spanish Period (1668-1899)	20
German Period (1899-1914)	20
Japanese Period (1914-1941)	21
World War II (1941-1945)	21
Post-War Period (1945-present)	21
A Vision for Historic Preservation in the CNMI	24
In Quest of the Vision: A Discussion of Challenges and Opportunities	24
Adequate Funding for Historic Preservation	24
Tourism/Economic Development	25
Land-Use Conflicts	25
Public Participation	26
Survey, Inventory, Registration	26
Federal Agency Cooperation	27
Public Education	28
Cultural Preservation	28
Planning Process and Implementation	29
Caring for the Past: How You Can Help	30
Individuals	30
Businesses	30
Public/Private Schools	30
Commonwealth/Federal Agencies	31
Bibliography	32

Message from the Historic Preservation Officer



Dear Reader,

The Marianas were settled over 4000 years ago. Our ancestors developed a unique culture in the islands. The remains of prehistoric villages with standing architectural features can be found throughout the islands. European and Asian cultures have left their imprint on our islands over the past 400 years. Events that took place here in the mid-20th century changed the course of history.

Our islands are well known for the tropical climate, friendly people, variety of international and local cuisine, scuba diving and other recreational opportunities. We also have a variety of historic and prehistoric properties that can provide information about our history, important events, and the influences that shaped our culture.

This document, *Preservation CNMI: Caring for the Past in an Uncertain Future*, is appropriately titled. Recent events and inevitable changes challenge us to find ways to make our vision for historic preservation become a reality. *Preservation CNMI* states our goals and objectives for realizing that vision. If we are to attain our goals, we will need the participation of our local and federal agencies, educators, businesses, and the public. *Preservation CNMI* provides suggestions about how you or your organization can help.

If you are reading *Preservation CNMI*, then you have an interest in our cultural history. Whether you are a preservation professional, teacher, student, businessman, resident or visitor, there are actions you can take to assist HPO in the identification, interpretation, and preservation of our important cultural resources.

This Plan addresses some of the challenges we anticipate facing in the coming years. HPO consists of a small staff of dedicated preservation professionals. Time and funding are limited. The success of our efforts depends on the support of the community. I ask you to read through the Plan and think of ways you can become involved. Thank you for your interest in preserving and promoting our cultural heritage.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Melvin L. O. Faisao'. The signature is stylized and includes a large flourish.

MELVIN L. O. FAISAO
Secretary, Department of Community and Cultural Affairs
CNMI State Historic Preservation Officer

Introduction

Preservation CNMI: Caring for the Past in an Uncertain Future will guide historic preservation efforts in the Commonwealth of the Northern Mariana Islands (CNMI) for a five-year period. Its aim is to effectively integrate historic preservation into the broader planning and decision-making arenas and to make historic preservation necessary and relevant within the context of social, cultural, and economic realities in the CNMI.

It is the latest in a series of statewide historic preservation plans developed for the CNMI over the past decade. The first covered the period 1999 to 2003, and the second 2004 to 2008. The second plan was extended through the end of fiscal year 2010 to consider the changing preservation environment in the CNMI. The current plan will guide preservation activities from 2011 to 2015.

When developing this plan, the CNMI Historic Preservation Office (HPO) sought input from a wide variety of stakeholders in the Commonwealth. Public comment reinforced the fact that historic preservation has played and will continue to play an extremely important role in the CNMI. Historic resources are important links with the islands' past and possess the potential to significantly expand our understanding of and appreciation for the rich history and cultures of the islands. They are also resources with considerable economic potential particularly with respect to the CNMI's visitor industry.

This plan will help to ensure that these historic resources are protected and utilized to their fullest potential for the benefit of all the people of the CNMI.

The Physical and Cultural Environments

The Northern Mariana Islands and its People

The Commonwealth of the Northern Mariana Islands (CNMI) comprises fourteen separate islands arranged in two gently curving arcs between 13 and 21 degrees north latitude and approximately 145 degrees east longitude. The CNMI is roughly 2,400 kilometers east of the Philippines and 2,500 kilometers southeast of Japan, and is the northernmost group in a region of the Pacific commonly referred to as Micronesia. Although the island of Guam is the southernmost island in the Mariana archipelago, it is politically separate from the CNMI and administered as an unincorporated territory of the United States.

The CNMI's climate is marine tropical with distinct dry and wet seasons. Located in the primary storm track of the western Pacific, the archipelago is routinely affected by tropical storms and typhoons, the most powerful of which are capable of generating winds of over 250 kilometers an hour. Large storms generate high winds and storm surge that knock down vegetation, destroy buildings and structures, and reconfigure coastal environments.

The CNMI's population is concentrated on the main southern islands of Saipan, Tinian and Rota. Saipan is by far the most populous (estimated 60,608 in 2005) and developed. It also possesses the bulk of the infrastructure that supports the tourism industry, the mainstay of the CNMI's economy. Saipan also serves as the seat of the Commonwealth government.

Tinian, lying only five kilometers south of Saipan, has a much smaller population (estimated 2,829 in 2005) which resides in the southern one-third of the island. The northern two-thirds of the island are leased by the U.S. government

and used for military training. Permanent military facilities are expected to be constructed on Tinian as a part of the transfer of U.S. forces from Okinawa. With the exception of a casino and hotel, which opened in 1998, Tinian possesses little tourist infrastructure.

Rota, the southernmost island in the CNMI, also possesses a small population (estimated 2,490 in 2005). Physically, Rota is the most pristine of the main southern islands with substantial stands of undisturbed limestone forest and well-preserved prehistoric archaeological sites. Rota has one golf resort that attracts a modest number of visitors, primarily from Guam and Japan. There is interest to boost economic activity and casino gambling was formally approved for the island in 2007. No casino development has been started, however.

The other islands of the southern arc are the small, cliff fringed island of Aguiguan, five kilometers south of Tinian, and tiny Farallon de Medinilla, located 65 kilometers north of Saipan. Both islands are uninhabited. Aguiguan is visited from time to time by subsistence hunters and fishermen. Access to Aguiguan is controlled by the municipality of Tinian. Medinilla is leased to the military and serves as a target for aerial bombardment training. It is off-limits to the general public due to the dangers of unexploded ordnance.

To the north of Medinilla are nine islands commonly referred to as the "Northern Islands." These islands are geologically more recent than the islands of the southern arc and volcanic in origin. Several possess active volcanoes. In general, they are small, rugged, and lack beaches, flat land, developed reef systems and protected anchorages. Currently, only two of these islands are occupied – Agrigan (estimated 9 persons in 2005) and Alamagan (estimated 7 persons in 2005). Two islands, Pagan and Anatahan have been declared off-limits for settlement due to recent volcanic eruptions. Although the government has plans to open homesteads in the northern islands, logistics, volcanic activity and a lack of funding will probably combine to postpone this program for the foreseeable future.

In January 2009, President Bush signed an executive order creating the Marianas Trench Marine National Monument. A component of this monument, the "Islands Unit," includes the waters and submerged lands of the three northernmost islands (Uracas, Maug and Asuncion). The Secretary of the Commerce, through the National Oceanic and Atmospheric Administration, has primary management responsibility for fishery-related activities in the waters of the Islands Unit. The CNMI government maintains exclusive authority for managing the three islands above the mean low water line.

The indigenous residents of the CNMI, the Chamorros, are the descendants of the original settlers who successfully colonized the archipelago approximately 4,000 ago. A second indigenous population, established in the mid-1800s, comprises the descendants of immigrants from the small atolls and islands of the Central Carolines located to the south of the Marianas between Chuuk and Yap. Due to rapid economic development and the resulting demand for outside labor, indigenous residents are a minority population in the CNMI (representing roughly 35% of the 2005 population). Reflecting the multi-cultural makeup of the islands, the CNMI Constitution establishes three official languages: Chamorro, Carolinian and English.

Although the CNMI is tiny in terms of population and land area when compared to U.S. mainland jurisdictions, it is both culturally diverse and physically spread out over thousands of square kilometers of ocean.



Map of the Commonwealth of the Northern Mariana Islands.

Data on the Northern Mariana Islands

Island	Area (Square Kilometers)	Peak Elevation (meters)
Rota	85.20	485
Aguiguan	7.17	178
Tinian	101.76	177
Saipan	122.92	473
Medinilla	.90	81
Anataban	32.32	787
Sariguan	4.99	548
Guguan	4.16	301
Alamagan	11.26	744
Pagan	48.30	569
Agrigan	47.37	964
Asuncion	7.30	890
Maug	2.09	227
Uracas	2.04	319

An Overview History of the Northern Mariana Islands

Human settlement in the Northern Mariana Islands began over 4,000 years ago with the arrival of seafaring explorers from Island Southeast Asia. These immigrants are the ancient ancestors of the modern day Chamorros, the indigenous residents of the Mariana Islands. Ancient Chamorros were skillful horticulturalists, mariners and fishers who adapted to an environment made challenging by periodic droughts and powerful tropical storms.

Reflecting their maritime orientation, these early settlers built their first villages along sandy shorelines offering protected fishing grounds and nearby sources of fresh water. Early settlement sites have been found on Tinian and Saipan, suggesting that the large islands of the southern arc were settled first and at roughly the same time. Currently, there is no archaeological evidence suggesting that the small, rugged volcanic islands of the northern arc were settled at this time although it is likely that they were visited periodically for resource exploitation by foraging parties from the southern islands.

Very little is known about the early settlement period. It may be assumed that the initial colonists brought sophisticated ceramic and canoe technologies and the basic tropical cultigens such as banana, taro, sugarcane, breadfruit and coconuts. Rice, which played an important role in Chamorro society late in the prehistoric sequence, apparently was not brought with the initial colonists. Also apparently absent were domesticated animals such as dogs, chickens and pigs.

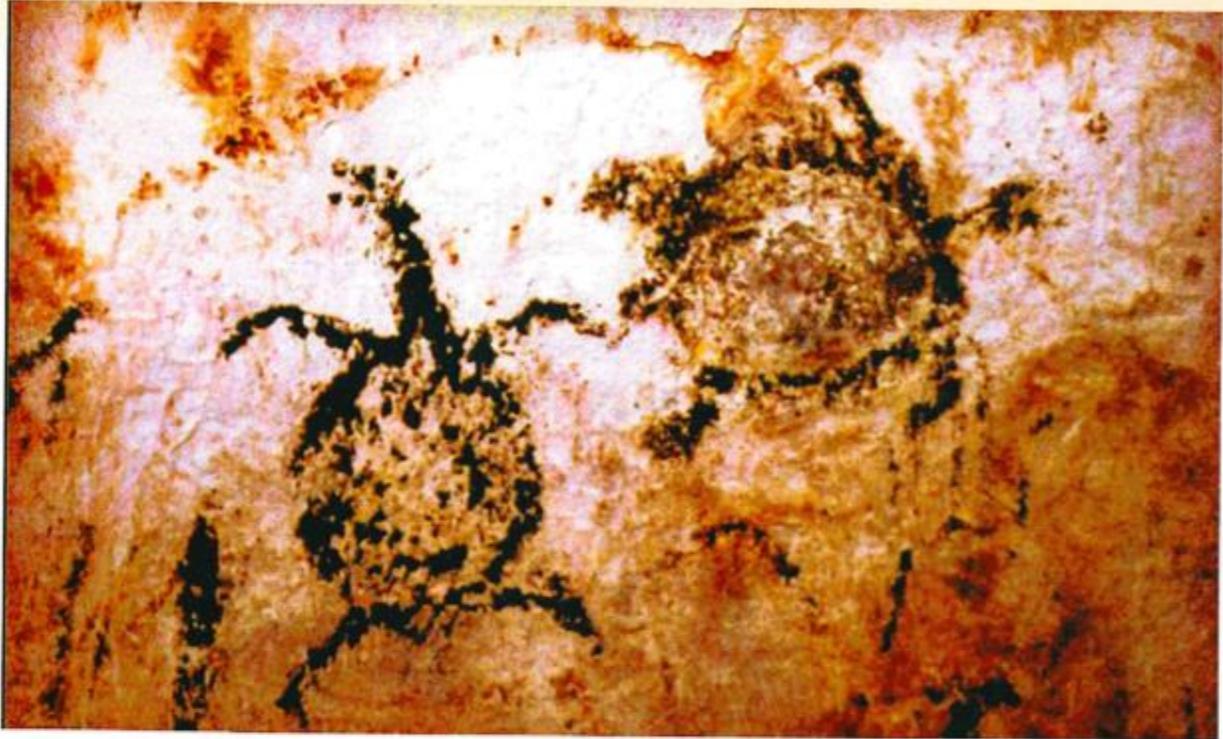
For the first roughly 3,000 years, Chamorro communities lived exclusively in villages in coastal areas of the large islands of the southern arc. By 1000 AD, however, there is archaeological evidence documenting a dramatic expansion of settlements into previously unoccupied interior regions of Rota, Tinian and Saipan. The tiny beach-less island of Agui-guan south of Tinian and the rugged volcanic islands of the northern arc also were settled at this time.



Sherds of incised redware pottery which are diagnostic of early settlement sites in the Mariana Islands.

The expansion into previously unsettled areas coincided with the appearance of a new architectural form consisting of paired, two-piece foundation stones known as *latte*. *Latte* foundations supported Chamorro residences and perhaps other specialized structures including canoe houses. Villages containing multiple *latte* structures were situated in both coastal and inland locations. Large basalt grinding stones are commonly found in association with *latte* houses.

This settlement expansion has been credited to a significant increase in population and, possibly, to major social and economic transformations within Chamorro society. The causes behind this expansion, however, have not been conclusively determined. They may have resulted from the adoption of new subsistence practices, possibly the introduction of rice cultivation around 1000 AD. While archaeological and historical evidence confirms that rice was being cultivated in the Mariana Islands prior to and at European contact, the timing of its initial introduction in the archipelago remains unclear.



Sea turtle pictographs from a site on Rota.

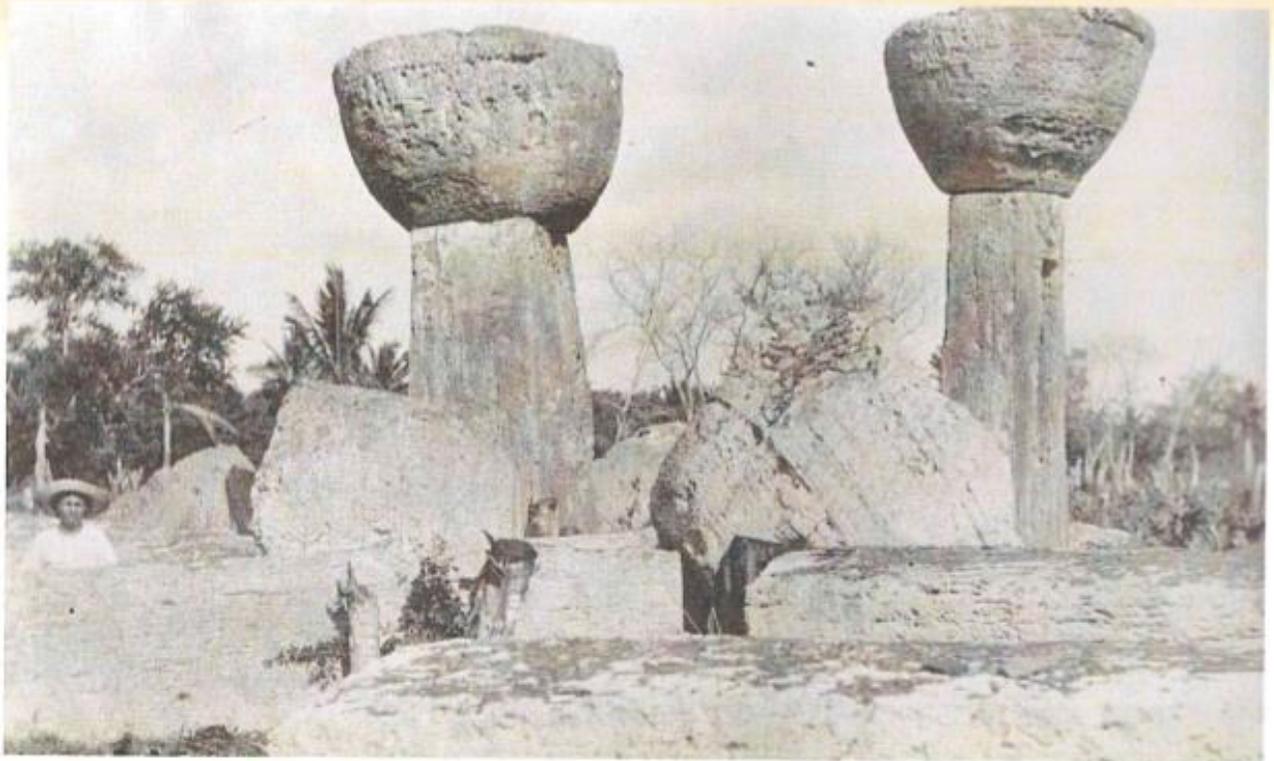
Shifting rice cultivation techniques for high yields of rice would explain the relatively rapid and widespread settlement of previously unoccupied interior regions. Similarly, *latte* architecture and the large grinding stones found in association with late period settlement sites might represent components of a technology package that accompanied rice from Island Southeast Asia. Small amounts of iron may have been introduced at this same time.

On the eve of European contact, Chamorros were living on virtually all of the islands in the archipelago. Villages were organized into ranked matrilineal clans with residents of coastal villages enjoying higher status than residents of inland settlements. High status individuals received special treatment in the form of respectful behavior, choice seating and special foods at gatherings, and assistance with manual tasks. Work was divided along gender lines. Men fished, undertook major construction work and served as warriors during times of conflict. Women tended gardens, produced woven products and exercised control over family life, property, and inheritance.

Subsistence was based on the cultivation of tree and root crops and fishing. In addition to the normal suite of tropical cultigens, Chamorros also cultivated rice before European contact. Rice was an important ritual food served at ceremonial events and also used as an article of trade by residents of interior villages who sought fish from residents of coastal settlements. Chamorros also distinguished themselves by capturing large pelagic fish such as marlin from their swift and well-made outrigger sailing canoes.

An important aspect of Chamorro society was ancestor worship. The skulls of deceased relatives were used to communicate with the ancestral spirits for insuring the success of important activities such as fishing and warfare. Communications with the spirit world were facilitated by shaman who were consulted to cure illnesses, foresee future events, and to ensure success of important activities.

Ancient Chamorros built and sailed graceful outrigger canoes, but they are best known for the distinctive stone pillars



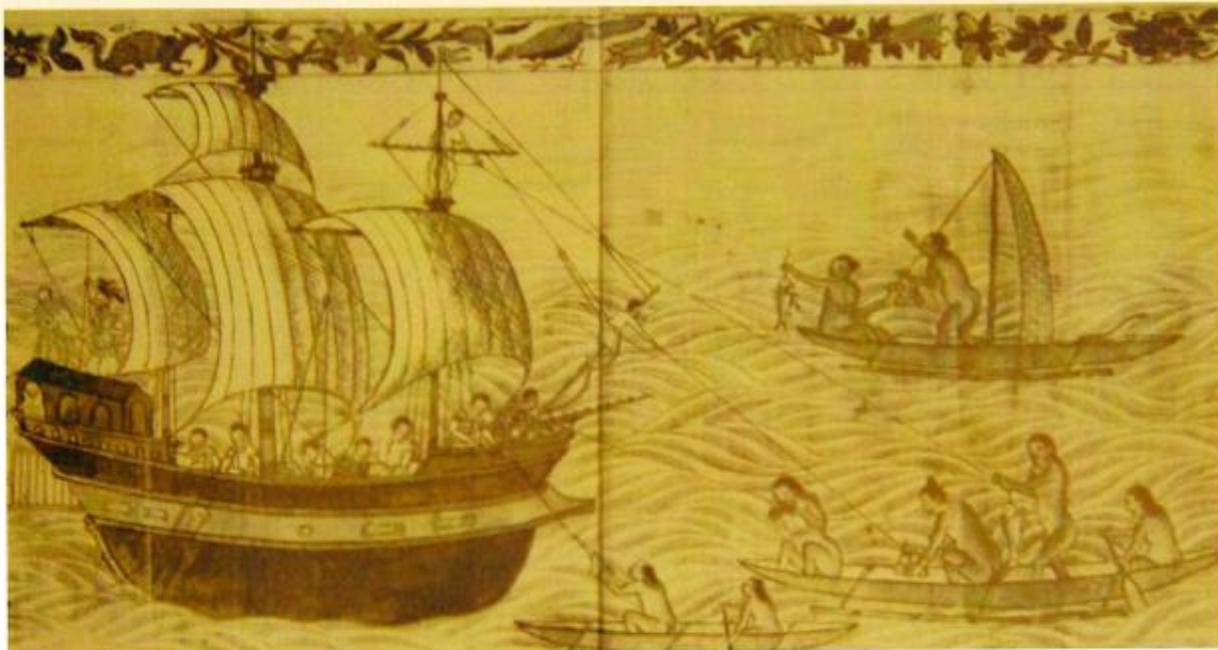
The House of Taga on Tinian pictured in the 1920s. It is the largest erected latte structure in the Mariana Islands.

that supported their residences. *Latte* is the Chamorro term for two parallel rows of stone shafts which were surmounted by cup-shaped capstones. The most spectacular example of a *latte* house is the House of Taga on Tinian. The *latte* is now an important cultural symbol for modern Chamorros. Its importance is reflected in its depiction on both the Commonwealth flag and the NMI commemorative quarter dollar recently produced by the U.S. Treasury Department.

Europeans first arrived in the Marianas in 1521 when Ferdinand Magellan touched at Guam during his historic voyage to establish a western route to the valuable Spice Islands. Forty-four years later the islands were officially claimed by Spain, but with the exception of annual provisioning stops by galleons plying the Manila-Acapulco trade route, the Spanish had little contact with the Chamorro people. This was to change in 1668 following the establishment of a Jesuit mission on Guam. The priests, supported by a small but determined garrison of troops, commenced an aggressive campaign to convert the islanders to Catholicism. Their initial efforts met with some success, but by the early 1670s Chamorro communities on Guam, Rota, Tinian, and Saipan were actively resisting mission activities.

Initially, the Spanish missionaries and troops were largely limited to Guam, but in 1684 they launched a major campaign to subjugate and convert Chamorro communities on the islands to the north. By the late 1690s, worn down by a quarter century of conflict and decimated by exotic diseases against which they had no natural resistance, surviving Chamorros in what is now the Commonwealth of the Northern Mariana Islands capitulated. Many islanders were resettled into mission villages on Guam where they quietly converted to the Catholic faith under the watchful eyes of the Spanish priests.

Along with the Catholic religion, Chamorros also adopted a number of other foreign customs including a patrilineal family organization, western dress, private land ownership, and food preferences influenced by Spanish and Mexican cuisines. In spite of these major changes, Chamorros continued to speak their indigenous language and maintained many aspects of traditional culture that they successfully blended with European and New World elements to form a hybrid culture now referred to by modern Chamorros as "*Kustumbren Chamorro*" (Chamorro culture).



A late sixteenth century sketch of a trading session between Europeans and Chamorros.

For much of the eighteenth and nineteenth centuries, Chamorros lived quiet lives, interrupted only occasionally by visiting ships. Life centered on the family, farm, and the ecclesiastical calendar of the Catholic Church. In the early decades of the nineteenth century, Carolinian immigrants escaping storm-ravaged islands and atolls of the Central Carolines to the south were allowed to settle on Saipan thus establishing the archipelago's second indigenous population.

Carolinians were expert canoe builders and open ocean voyagers who made the 500 mile trip between their home islands and the Marianas using navigational knowledge passed down in chants. In return for permission to settle in the Marianas, the Carolinians agreed to transport people and cargo among the islands on behalf of the Spanish administration. Although they became Christians, Carolinians who settled in the Marianas retained their language and their traditional culture.

Normal life was interrupted in 1898 when American troops landed on Guam at the outset of the Spanish-American War. Following the Treaty of Paris, Guam was retained as an American territory and the remainder of the archipelago was purchased by Germany.

Germany took formal possession of the Northern Mariana Islands in November 1899. The tiny German administration focused its efforts on economic development, particularly expanding copra production, and constructing much-needed infrastructure. Attention was also directed to improving public health and education, and effecting cultural change in local society to encourage the acceptance of European values that stressed punctuality, discipline and the accumulation of wealth.

In an effort to expand the small population, the German administration attracted Chamorro settlers from Guam by providing homestead lands to those who agreed to establish a permanent residence on Saipan. They also forcefully resettled Carolinian islanders on Saipan after their home islands and atolls in the Central Carolines were struck by typhoons. The standard of living rose during the German period, a cash economy was established, and a handful of Chamorros and Carolinians were given the opportunity to pursue trades training in Germany, China and Yap.

German rule was brought to an abrupt end by a Japanese naval squadron that seized the Northern Marianas and the rest of German Micronesia in October 1914. Japan, an ally of England, had long desired to expand into Micronesia, and the outbreak of World War I provided a convenient opportunity. Following its bloodless conquest, Japanese naval authorities repatriated the small contingent of German colonial administrators, planters, and priests.

With the end of the war, Japan laid formal claim to its newly acquired territories in Micronesia. These efforts were prompted by both economic and military considerations, particularly the latter. In 1921, the League of Nations formally recognized Japan's control of Micronesia, including the Northern Mariana Islands, under the provisions of a League Mandate.

The Japanese focused their energies on commercial development and by the early 1930s, large sugar cane plantations and refining mills were operating on Saipan, Tinian and Rota. At the height of operations, the Northern Marianas produced thousands of tons of processed sugar, alcohol, and other products that were shipped to markets in Japan. In pursuing their development priorities, the Japanese brought in tens of thousands of Japanese and Okinawan agricultural and factory workers to meet the growing labor demands. By the late 1930s, the foreign population in the Northern Marianas numbered more than 40,000, roughly ten times the size of the indigenous population.

Under the Japanese administration, the Northern Mariana Islands were transformed into small but prosperous cogs in Japan's overseas empire. The sugar industry brought with it an improved standard of living, modern townships, electricity, running water, and quality health care. Many local residents earned substantial cash incomes from land leases with Japanese businessmen and used this income to purchase a range of consumer goods offered in Japanese stores. In return, local residents were expected to learn the Japanese language and culture and to be loyal subjects of the Japanese Emperor.

This prosperous period came to an end in December 1941 with the outbreak of the Pacific War. Airfields on Saipan were used during the Japanese attack on America-held Guam but it wasn't until late 1943 that the Japanese military began to fortify the islands in anticipation of amphibious landings by American forces. By early 1944, the Marianas had become a front line position as a part of Japan's Absolute National Defensive Sphere. The Japanese realized that the defense of the Marianas was critical to the overall war effort. On Saipan, the lynchpin of the archipelago's defense, 30,000 Japanese troops were prepared to fight to the death in an effort to keep the island out of American hands.

American war plans called for the capture of Saipan, Tinian, and Guam to serve as airbases for the newly developed B-29 *Superfortress*, the world's first strategic bomber. Possessing a range of nearly 3,000 miles, a bomb capacity of four tons, and heavily armed, the *Superfortress* was a formidable weapon and one that the U.S. wished to unleash against the Japanese home islands at the earliest possible date.

The American invasion of the Marianas, code named *Forager*, was carried out by an assault force consisting of over 105,000 combat troops. *Forager* began with the amphibious assault against Saipan on 15 June 1944. Following three weeks of bloody fighting, U.S. Marines and soldiers succeeded in wresting the island from its determined Japanese defenders. The fighting was costly for both sides. American casualties included 3,100 killed and over 11,000 wounded, while the Japanese suffered more than 28,000 battle deaths.

Also killed in the crossfire were thousands of Japanese, Okinawan, and Korean civilians, and more than 900 Chamorros and Carolinians, roughly one fifth of the indigenous population. With the island in ruins, surviving civilians were placed in internment camps where they were provided with emergency food, medical treatment, and shelter. With Saipan secure, the U.S. turned its attention to Tinian and Guam. Both were captured after short but fierce battles. Rota and the islands north of Saipan were isolated but not invaded.

Airfield construction commenced immediately. By early 1945, five B-29 bomb wings were operating out of fields on

Guam, Tinian, and Saipan. From November 1944 until early August 1945, Japan was subjected to an unrelenting campaign of aerial bombardment. The full potential of the Marianas airbases was realized in August 1945 when Tinian-based B-29s dropped atomic bombs on the Japanese cities of Hiroshima and Nagasaki. Shortly thereafter, Japan sued for peace, thus ending the Second World War.

Following the war, the islands were administered by the Department of the Navy under a Trusteeship agreement created by the United Nations. The Trust Territory of the Pacific Islands (TTPI), as this governmental organization was named, was unique in that it was the only "strategic" trusteeship created by the United Nations. As a strategic trust territory, the TTPI did not fall within the purview of the General Assembly as did the other trust territories, but rather the Security Council in which the United States exercised veto power.

In the 1950s and early 1960s, Saipan was used as a secret training base for Nationalist Chinese and Tibetan guerrillas, an operation reportedly directed by the Central Intelligence Agency. The islands were generally off-limits to all but the local population and military personnel, and travel by non-residents required prior approval by Navy officials in Washington, D.C. In these years, there was little private economic activity and local residents were forced to return to their farms to augment what wage labor they were able to secure from the military government. In 1962, military control ended and administrative responsibilities passed to the Department of the Interior. Saipan became the capital of the Trust Territory of the Pacific Islands. Security requirements were lifted and increasingly larger budgets were made available to the TTPI helping to increase the standard of living.

Later in the 1960s, Chamorros and Carolinians made their desires known regarding their future political status. Many people sought reunification with Guam believing that this was the best option to acquire U.S. citizenship and regain a standard of living that they had enjoyed during the Japanese administration. A referendum on reunification was held in 1969. Although reunification was supported by a majority of the Northern Marianas voters, Guam voters rejected it. Not wishing to remain a part of Micronesia, and desiring close political association with the United States, a Marianas political delegation began direct negotiations with the U.S. government. These negotiations were undertaken to separate the Northern Marianas from the Trust Territory government and to establish a permanent political union with the United States.

After several years of bilateral negotiations, a Covenant to establish the Commonwealth of the Northern Mariana Islands was approved by the Marianas District Legislature in 1975. This document was also approved by both houses of the U.S. Congress and signed into law by President Gerald Ford on March 24, 1976. The Covenant created the Commonwealth of the Northern Mariana Islands and provided residents with self-government and U.S. citizenship. Under this agreement, the CNMI is entitled to participate in a wide variety of federal programs, including the Historic Preservation Fund program administered by the National Park Service.

Soon after attaining Commonwealth status, Saipan became the focus of tourist-related development. Beginning in the mid-1980s, outside developers, initially from Japan, but also from Korea and China, leased thousands of hectares of public and private lands and constructed tourist-related facilities including resort hotels, golf courses, shops and restaurants.

At about this same time, the garment industry was established under a provision of the Covenant that authorized duty-free access to U.S. markets for items manufactured in the CNMI. Over the next decade dozens of foreign-owned factories were built in the CNMI, staffed by thousands of guest workers from Asia, primarily China. The garment industry led to a marked expansion in air cargo and shipping service to the CNMI and to a substantial rise in government revenues. It also had negative social and environmental impacts arising from the large increase in the foreign population and led to friction with certain sectors of the U.S. government.

This economic boom period in the CNMI was to last for roughly 15 years – 1986 to 2000. Over the next five years,

several international events combined to negatively affect the CNMI. The first was the collapse of the Japanese “bubble economy” that fueled much of the tourist development in the CNMI. Japanese investment funding all but disappeared and Japanese firms, including Japan Airlines, began to divest themselves of their holdings in the CNMI. Then came the 9/11 attacks and the SARS outbreak. These developments resulted in a decline in tourist arrivals, most dramatically from Japan which had historically been the principal market for the tourism industry.

Recent Developments in the CNMI

Economic and political developments over the past five years have continued in a negative direction. The lifting of World Trade Organization restrictions on Chinese imports to the United States and the increase in CNMI minimum wage combined to extinguish the local garment industry. The last factory closed in 2009.

The loss of this industry has greatly affected the level of economic activity in the CNMI. The value of garment exports dropped from \$650 million in 2005 to slightly over \$3 million in 2009, and the volume of imports to the CNMI decreased from 605,000 tons in 2005 to 220,880 over that same period. The collapse of this industry is also evident in the dramatic drop in Business Gross Receipts Tax which declined from slightly over 2 billion dollars in 2005 to 1.5 billion in 2009.

Another negative economic development has been the steady decline in tourist arrivals, most notably from Japan. Although partially off-set by visitors from Russia, China and Korea, the loss of Japanese tourists has been a troubling development. Hotel occupancy, which ran at 70% in 2005, dropped to an anemic 58% in 2009. The government has focused considerable effort on the tourism sector over the past five years but little significant progress has been made to reverse this trend.

Adding to this difficult situation was the passage of U.S. Public Law 110-2209 which ended CNMI control over immigration in late 2009. As a result of this action, the CNMI no longer has unlimited access to foreign labor, a situation that has caused considerable confusion and concern in the local business community. Concern has also been raised that this legislation will threaten indigenous control of local government due to the possible granting of permanent residence status to long-time guest workers.

A by-product of the economic meltdown has been a sizable reduction in the size of the CNMI population. The termination of the garment industry resulted in the repatriation of thousands of foreign guest workers, primarily from China. Significant numbers of guest workers from the visitor and service industries have also returned to their countries of origin due to widespread business closures and downsizings.

In addition to guest workers, a substantial number of local residents (indigenous and non-indigenous U.S. citizens) have also left the CNMI to find better economic opportunities in Guam, Hawaii and the U.S. mainland. Although actual population figures will not be known until the results of the 2010 census are made known, unofficial estimates suggest that the CNMI has lost more than 10,000 people over the past five years.

The economic recession has led to a government budget crisis. Government work hours have been reduced and the threat of payless paydays, mass layoffs, and the loss of essential public services remain very real possibilities. The only positive economic news has come from the federal government in the form of categorical grants, funding for capital improvement projects, emergency ARRA projects, and the expansion of military facilities and operations on Tinian. While the federal funding is important, it cannot offset the dramatic drop in locally-generated revenues.

It may be anticipated that barring a major improvement in local economic situation, historic preservation will be com-

peting for ever-shrinking public resources and fending off attempts to reduce its regulatory control over land-use projects. These circumstances present both challenges and opportunities for historic preservation over the next five years.

Visitor Arrivals in the CNMI for Selected Years 1990-2009

Year	Visitor Arrivals
1990	417,146
1992	488,330
1994	583,557
1996	736,508
1998	526,298
2000	526,111
2003	458,932
2005	491,701
2009	353,956

Population Data for the CNMI, 1973-2005

Year	Population	% indigenous	% increase/decrease
1973	14,333	80.0	—
1980	16,780	77.8	(+)17%
1990	43,345	39.6	(+)158%
1995	59,913	33.6	(+) 38%
2000	69,221	34.5	(+)15%
2005	65,927	35.5	(-) 5%

The Framework for Historic Preservation in the CNMI

The historic and cultural resources left behind by nearly 4,000 years of human occupation are found throughout the CNMI. In recognition of the scientific, cultural and economic importance of these tangible links with the islands' past, the CNMI Legislature passed the Historic Preservation Act of 1982 (Public Law 3-39). This law created the Historic Preservation Office (HPO) and protects important historic, archaeological, architectural and cultural resources on public and private lands throughout the Commonwealth. In addition to Public Law 3-39, significant sites are also afforded protection under federal laws and regulations, primarily Section 106 of the National Historic Preservation Act of 1966, as amended, and associated 36 CFR Part 800.

The HPO maintains its central office on Saipan that is headed by the Historic Preservation Officer, and branch offices on the islands of Rota and Tinian. Branch offices are headed by Coordinators who report to the Historic Preservation Officer. The program receives annual grant assistance from the National Park Service under the Historic Preservation Fund program and annual appropriations from the CNMI legislature. Other funding is secured from a variety of grant sources, primarily to support specific preservation projects. The program receives essential advice and guidance from the Historic Preservation Review Board appointed by the Governor.

Historic preservation activities are supported by a number of local, regional and international organizations. Locally, they include the CNMI Museum of History and Culture, the CNMI Public School System, the Northern Marianas College, the CNMI Council for Arts and Culture, the Joeten-Kiyu Public Library, the NMI Council for the Humanities, the CNMI Division of Environmental Quality, and the Coastal Resources Management Office. Regional organizations include the Micronesian Endowment for Historic Preservation, the Micronesian Area Research Center, the Micronesian Seminar, the Guam Preservation Trust, and the University of Hawaii. International partners include a wide variety of preservation professionals including archaeologists and historians, and universities in the United States, Japan, and Australia.

Major historic preservation activities fall within several general program areas including survey, registration, project review, public education and cultural preservation.

Survey

As mandated under federal and local laws, the HPO is responsible for completing a comprehensive survey to locate and document all significant archaeological, historic, architectural and cultural resources in the CNMI. Surveys are undertaken in-house by HPO staff and under contracts with professional archaeologists. Surveys are also undertaken in advance of land-use projects. Large areas of Saipan, Tinian and Rota have been subjected to systematic archaeological surveys. By contrast, with the notable exception of Pagan, the rugged Northern Islands have received virtually no survey coverage.

Registration

Historic resources identified by archaeological, architectural and historic surveys are fully documented and site information is added to the HPO's site inventory listing. This listing contains thousands of sites and associated features. Efforts are underway to computerize the HPO's site inventory. In addition to the inventory listing, significant resources are also listed on the U.S. National Register of Historic Places. The National Register is a formal listing of the nation's most significant sites and is maintained by the National Park Service. Currently, 35 sites in the CNMI are listed on the National

Register. Of these, twelve are ancient Chamorro sites, two are traditional Carolinian sites, twelve date to the Japanese period, and nine are associated with World War II. Finally, nationally significant sites may be designated National Historic Landmarks, a program also administered by the National Park Service. Two National Historic Landmarks have been designated in the CNMI, both following the theme of the War in the Pacific.

Land-Use Reviews

The HPO reviews land-use projects in conjunction with two principal permitting agencies. Large-scale projects or those that will be undertaken within sensitive environmental areas are reviewed under the Coastal Resource Management (CRM) program. In most cases, these project areas are subjected to professional-level surveys and potential adverse effects to important historic resources are identified and mitigated through specific requirements incorporated into CRM permits. Mitigation measures may include one or more of the following: in-place preservation; relocation; data recovery, back-filling; intensive recordation; interpretive development; and monitoring. Smaller-scale projects are reviewed under the Division of Environmental Quality Earthmoving permit process. Typically, such project areas are surveyed by staff of the HPO. Needed mitigation measures as previously discussed are then made a part of the earthmoving permit. Federal undertakings are reviewed under the Section 106 review process. This process requires federal agencies to consider potential effects their undertakings may have on properties on or eligible to be on the U.S. National Register of Historic Places. Areas to be impacted by federally-assisted projects are normally subjected to professional-level archaeological surveys and any required mitigation actions are stipulated in formal agreement documents.

Public Education

An important component of historic preservation is the dissemination of archaeological and historic research conducted in the CNMI. The HPO maintains two publication series: the *Micronesian Archaeological Survey* report series, established in 1981, presents the results of important archaeological investigations. Historical research is published through the HPO's *Occasional Historical Papers* series. The HPO conducts lectures on local history, archaeology and historic preservation and sponsors guided tours to significant sites. It has also initiated an interpretive project that involves placing multi-language signs at significant historical sites. It also recently completed work to develop a self-guided tour of underwater sites in the Saipan Lagoon. Publications on other topics, including culture, are produced by other agencies and organizations including the NMI Council for the Humanities.

Cultural Preservation

In light of rapid changes ushered in by economic development, the HPO has sponsored projects to strengthen indigenous cultural systems, practices and knowledge. Referred to as cultural preservation, this program area is undertaken in coordination with other agencies in the CNMI including the NMI Council for the Humanities, the Commonwealth Council for the Arts and Culture, the Language Commission, the Office of Indigenous Affairs and the Carolinian Language Commission. Cultural preservation projects are varied and have included oral histories, traditional sailing canoe reconstructions, workshops to provide training in local medicinal practices, celestial navigation, and fishing, and the documentation of other traditional skills and crafts that are important to the indigenous cultures.

The CNMI's Historic Resources

Nearly 4,000 years of human occupation has left a rich patchwork of sites throughout the CNMI. Due to the small size of individual islands and their intensive utilization during both the prehistoric and historic periods, it is rare to find areas which do not contain historic resources. For management and research purposes, the HPO assigns historic resources to one of several temporal periods. These include: Prehistoric; Spanish Period; German Period; Japanese Period; World War II; and Post-War Period.

Prehistoric (ca. 2000 BC to AD 1668)

Prehistoric sites are the physical manifestations of human activities which occurred prior to the arrival of the first Europeans. The earliest sites, those associated with the initial settlement of the archipelago at roughly 2000 BC, primarily consist of buried cultural deposits whose artifact assemblages are dominated by a distinctive ceramic type known as Early Calcareous Ware (ECW). Early period sites are rare and due to natural and man-induced disturbances, they are usually poorly preserved. These sites are found almost exclusively in coastal beach environments but are also present in rock shelters and caves often located well inland from the sea. Late in prehistoric times, around 1,000 years ago, major changes took place in Chamorro society. These included changes in settlement patterning, subsistence adaptations, and the introduction of the *latte* architectural form found in both coastal and inland locations. *Latte* sites commonly possess large basalt grinding stones, surface artifact scatters, and stratified subsurface cultural deposits which include human burials. Other sites associated with late prehistoric life are *latte* quarries, water wells, tool-making loci, rock shelters and caves, and rock art sites.

Spanish Period (1668-1899)

Although the Marianas were first visited by Magellan in 1521 and formally claimed for the Spanish crown in 1565, Europeans had little impact on traditional Chamorro life until the establishment of the Jesuit mission on Guam in 1668. As a consequence, Chamorro sites from the early Spanish period are nearly indistinguishable from sites from the pre-contact period. Spanish colonial occupation of the Marianas was the longest in duration but many of the sites associated with this occupation are found on the island of Guam which served as the headquarters for the Spanish colonial administration. Sites associated with the Spanish period are rare in the CNMI and consist of archaeological sites associated with post-conquest mission villages, a few buildings, mostly in ruins, and buried artifacts. Also present are two shipwrecks; *Concepcion* and *Santa Margarita*. Both were Acapulco-bound galleons that wrecked off Saipan and Rota respectively in the early decades of the seventeenth century. There is evidence to suggest that additional Spanish-period shipwrecks may be present within CNMI waters.

German Period (1899-1914)

Germany administered the islands for 15 years and concentrated its efforts on economic development, mostly copra production, and infrastructure projects such as roads and docks. Indigenous residents lived in two villages on Saipan and a single village on Rota. Tinian was unoccupied. Residential structures, for the most part, were built of wood and thatch. There were a handful of more substantial homes built of stone. Few sites dating to the German occupation survived the intensive agricultural development implemented by their successors, the Japanese, or the massive land disturbance which occurred during World War II. The few sites which have been identified are limited to structural remnants and buried cultural deposits.

Japanese Period (1914-1941)

Sites associated with Japan's rule of the islands are both numerous and diverse. Particularly prevalent are sites associated with Japan's economic development of the islands which peaked in the late 1930s. These include the ruins of farmsteads, factories, railroad lines, mill towns, and mining sites. Also present are concrete remnants of residences, hospitals, stores, administrative offices, and water cisterns. Shrines associated with the *Shinto* religion are found throughout the islands. Buried cultural deposits, primarily in the form of refuse dumps, are also a common site type from this period. The remnants of Japanese agricultural activities are also found in the rugged Northern Islands, particularly on the island of Pagan which supported a sizable pre-war civilian population. Sites associated with the agricultural exploitation of tiny Aguiguan Island have also been documented.

World War II Period (1941-1945)

Sites associated with World War II in the Pacific make up the largest percentage of sites in the CNMI. These sites are assigned to one of two sub-periods: Japanese and American. Sites associated with Japan's defense of the islands include airfields and associated infrastructure, reinforced concrete gun positions, troop barracks, anti-aircraft and coastal defense guns, man-made tunnels and improved caves, and extensive surface scatters of equipment, armaments and ordnance. Also present are individual and mass graves of Japanese troops and civilians killed in the battle. Offshore in shallow coastal waters are the remains of military aircraft, patrol boats, and merchant ships. Sites associated with the American invasion of the islands and the post-invasion use of Saipan and Tinian consist of airfields, paved roads, hospitals, ammunition storage areas, and scores of Quonset Hut foundations used for a wide variety of operational and administrative functions. Also present are equipment dumps, artifact scatters, and buried ordnance.

Post-War Period (1945-present)

With the passage of time, more attention has focused on documenting sites created after World War II. Sites from this period include early post-war churches, commercial buildings and residences. Also constructed during this period is a substantial complex of concrete buildings located on Capitol Hill reportedly constructed by the CIA to serve as headquarters for a top secret training facility that operated from the early 1950s through 1962. This complex, which is an important resource from the Cold War, then became the headquarters of the Trust Territory government and, later, for the CNMI. Other buildings from this period include the remnants of the Congress of Micronesia, the Marianas District legislature, and municipal office buildings.

A Vision for Historic Preservation in the CNMI

In the future, historic preservation will play a key role in improving the quality of life for all residents of the CNMI.

Historic and cultural resources will be considered by CNMI residents as irreplaceable links to our past whose preservation and study will add to our understanding of the archipelago's unique cultures and history.

Educators will take full advantage of historic preservation by ensuring that important historical and cultural data generated by archaeological and historical research is integrated into school curricula. Students will take inspiration from the past and use it as a compass to navigate an uncertain and challenging future.

The legislature will recognize the importance of historic preservation and will appropriate adequate levels of funding to ensure that historic and cultural resources are identified, protected, studied and interpreted. The legislature will also enact stronger laws which will provide preservationists and others with the tools necessary to ensure that important resources are respectfully considered and afforded appropriate treatment.

Historic Preservation will be integrated fully into economic development and historic resources will be viewed by developers as assets rather than liabilities. Preservationists and developers will recognize common ground, thus avoiding adversarial relationships.

Visitors to the CNMI will be provided opportunities to learn about the history and cultures of the Northern Mariana Islands and residents will take rightful pride in the many accomplishments of their ancestors. Cultural tourism will be embraced and will serve as an important drawing attraction for visitors from around the world.

In Quest of the Vision: A Discussion of Challenges and Opportunities

Eight issues have been identified that affect or have the potential to affect historic preservation in the CNMI and which must be addressed to realize the vision previously outlined. These have been listed in a descending order of importance. For each issue, an associated goal has been developed. Individual goals will be addressed by completing associated objectives. These are as follows:

Issue 1. Adequate Funding for Historic Preservation

Due to the serious economic recession in the CNMI, annual appropriations from the CNMI Legislature to support historic preservation have been reduced, and further reductions are anticipated. It is also possible that annual grant assistance from the NPS may also be reduced in coming years. Such reductions pose serious challenges to the continued viability of historic preservation in the CNMI.

Goal 1. Secure adequate funding to support core historic preservation activities and projects.

Objective (1) 1. Ensure timely and complete submissions for annual Historic Preservation Fund grants from the National Park Service.

Objective (1) 2. Support annual requests to the CNMI Legislature that are adequate to carry out preservation activities.

Objective (1) 3. Seek grant funding from regional and international organizations.

Objective (1) 4. Establish cooperative agreements with appropriate agencies and organizations to carry out historic preservation activities.

Objective(1) 5. Identify and obtain potential private sector funding in the CNMI.

Issue 2. Tourism/Economic Development

Tourism is the main industry in the CNMI and currently serves as the sole pillar of the local economy. Excellent opportunities exist to utilize historic resources to increase the quality of the visitor experience, to ensure an accurate portrayal of local history and cultures, and to serve as additional attractions for the visitor industry.

Goal 2. Integrate historic preservation into the visitor industry in the CNMI.

Objective (2). 1. Develop a tourism marketing strategy for historic and cultural resources.

Objective (2) 2. Support the development of cultural tourism in the CNMI.

Objective (2) 3. Improve the accuracy of information disseminated about historic and cultural sites through training programs for tour guides and other means.

Objective (2) 4. Strengthen the preservation and interpretation of historic and cultural sites on private development projects.

Objective (2) 5. Produce and distribute accurate information (books, brochures, maps, websites, etc.) on historic sites for use by visitors to the CNMI.

Issue 3. Land-Use Conflicts

Land is an extremely important cultural and economic resource in the CNMI. Its importance in relation to local culture is reflected in Article XII of the CNMI Constitution which limits acquisition of real property to persons of Northern Marianas Descent. Under the provisions of Public Law 3-39, the HPO reviews land-use activities on both public and private lands. While these reviews are essential to the protection of significant historic resources, they are also a source of public opposition to historic preservation. Local landowners are concerned that preservation requirements will unduly limit their ability to put their land to its fullest use or might prevent them from securing lucrative leases with outside developers. For their part, developers sometimes object to incurring expenses for archaeological surveys and needed mitigation work. These concerns have been magnified by the poor economic situation that has plagued the CNMI for the past decade.

Goal 3. Incorporate considerations of historic and cultural resource preservation as a routine part of all environmental, land-use and public policy activities.

Objective (3) 1. Increase public awareness about the value of preserving significant historic resources.

Objective (3) 2. Develop and distribute multi-lingual materials describing historic preservation requirements and procedures in the CNMI.

Objective (3) 3. Conduct workshops to explain historic preservation requirements relating to land-use activities.

Objective (3) 4. Identify, document, evaluate, and, to the extent feasible, protect historic and cultural resources located within development projects.

Objective (3) 5. Develop and maintain a publicly accessible database to track individual land-use project reviews.

Objective (3) 6. Improve the effectiveness of the project-review process through evaluating and updating current procedures and other means.

Objective (3) 7. Develop disaster preparedness and recovery plans for historic properties.

Objective (3) 8. Expand the use of government land exchanges that protect significant historic resources.

Objective (3) 9. Establish incentives for preserving and developing historic resources in the CNMI.

Issue 4. Public Participation

In light of its technical nature and the professional requirements normally associated with grant-assisted activities, many in the community view historic preservation as a discipline for outside archaeologists, historians and architects. This has limited local participation which, in turn, has affected overall public support for the program. Public support for the historic preservation is particularly important at a time when government services are forced to compete for ever-shrinking public and private funding.

Goal 4. Increase opportunities for the general public to participate in historic preservation projects and events.

Objective (4) 1. Provide opportunities for residents to pursue degrees in archaeology, history, historic preservation and related fields.

Objective (4) 2. Maximize the use of local expertise and volunteers in planning and executing preservation projects in the CNMI.

Objective (4) 3. Provide historic preservation-related training to members of the public.

Objective (4) 4. Hire Workforce Investment Act (WIA) employees to support historic preservation activities.

Objective (4) 5. Seek and consider public input on historic preservation projects and activities undertaken in the CNMI.

Objective (4) 6. Ensure that information about historic preservation projects and activities is disseminated to the public in a variety of formats.

Issue 5. Survey, Inventory and Registration

Substantial areas on Saipan, Tinian, Rota and Aguiguan have been subjected to professional-level surveys and thousands of sites and associated features have been located, documented and assessed. Unfortunately, survey and site data are stored in paper format and are not easily available to scholars and to the general public, thus reducing the value of this

data set. Further, the Northern Islands have received no systematic survey coverage and little is known about the sites they contain. Underwater sites and those dating to the post-World War II period also have not received systematic coverage. These gaps in survey coverage and current antiquated inventory system affect the effective stewardship of historic resources in the CNMI.

Goal 5. Identify, document, evaluate and designate all significant historic resources in the CNMI.

Objective (5) 1. Review all existing site records and revise as necessary to ensure completeness and accuracy.

Objective (5) 2. Develop and maintain a computerized site inventory system.

Objective (5) 3. Identify, record and evaluate sites in Northern Islands.

Objective (5) 4. Identify, evaluate and record sites dating to the Post-World War II Period.

Objective (5) 5. Identify, evaluate and record underwater sites.

Objective (5) 6. Nominate significant sites to the U.S. National Register of Historic Places.

Objective (5) 7. Strengthen and utilize local capabilities to effectively manage cultural resources.

Objective (5) 8. Update the synthesis of archaeological research conducted in the CNMI.

Issue 6. Federal Agency Cooperation

Federally-funded projects are critical to the CNMI particularly during difficult economic times. Currently, such projects make up the bulk of construction work in the islands. This trend, bolstered by the Department of Defense's plans to develop Tinian as a training base, is likely to continue for the foreseeable future. While many federal agencies diligently comply with federal and local historic preservation requirements, others are less cooperative. This lack of cooperation threatens significant archaeological, historic and cultural resources in the CNMI. It also threatens much needed federal funding that might be lost due to the failure to comply with historic preservation laws and regulations.

Goal 6. Improve federal agency compliance with federal and local historic preservation laws, regulations and policies.

Objective (6) 1. Establish procedures for the effective and timely review federal undertakings.

Objective (6) 2. Provide guidance and technical information to federal agencies as they plan and carry out specific undertakings in the CNMI.

Objective (6) 3. Negotiate and execute memoranda of agreement and programmatic agreements as needed for specific federal undertakings.

Objective (6) 4. Hold and participate in workshops on Section 106 and NEPA workshops for both local and federal participants.

Objective (6) 5. Strengthen open lines of communication with all stakeholders during Section 106 consultations.

Issue 7. Public Education

A large body of historical, archaeological and cultural information has been generated over the past 25 years by historic preservation projects. There is a continuing need to make this valuable information available to the general public in a variety of formats.

Goal 7. Expand the public's understanding of and appreciation for the history and cultures of the Northern Mariana Islands.

Objective (7) 1. Integrate historical, archaeological and cultural information into curricula of public and private schools (junior high through college).

Objective (7) 2. Disseminate the results of archaeological and historical research in a variety of formats (publications, videos, websites, digital files, etc.) for both lay and academic audiences.

Objective (7) 3. Conduct field trips to archaeological and historic sites for elementary, junior high and high school students.

Objective (7) 4. Conduct lectures and presentations on historic preservation, archaeology, history, and cultures in school classrooms and public venues throughout the CNMI.

Objective (7) 5. Expand public involvement in historic preservation planning and decision-making throughout the CNMI.

Objective (7) 6. Develop programs that educate the public about historic preservation.

Objective (7) 7. Publicize historic preservation activities and projects using a variety of media.

Issue 8. Cultural Preservation

The rapid development of the CNMI has affected the social fabric of the islands including the loss of many indigenous cultural practices. This situation has been exacerbated by the influx of guest workers which has reduced indigenous residents to a minority population in the CNMI. In times of rapid social change, it is important to maintain a strong cultural identity to deal with the many challenges of modern life. Cultural preservation also has the potential to make a contribution to economic development by establishing an authentic sense of place.

Goal 8. Identify, preserve and sustain indigenous cultural heritage in the CNMI.

Objective (8) 1. Develop and implement an oral history master plan aimed at collecting important historical and cultural data from a local perspective.

Objective (8) 2. Document and provide opportunities to perpetuate important indigenous skills and practices.

Objective (8) 3. Identify, document and protect traditional cultural properties in advance of land-use development.

Objective (8) 4. Disseminate accurate information relating to indigenous cultures and cultural practices in a variety of formats.

Objective (8) 5. Strengthen and enhance the capabilities of the NMI Museum of History and Culture.

Planning Process and Implementation

Preservation CNMI was developed to provide guidance to groups, organizations, businesses and individuals interested in identifying, protecting, enhancing and promoting the Commonwealth's historic and cultural resources. It is based on the idea that historic preservation is a valuable but underutilized community and economic development strategy that should be an integral part of the CNMI's educational and economic development efforts.

When preparing this plan, the HPO sought input from a wide variety of stakeholders in the Commonwealth. Comments from the general public were solicited at a series of public hearings held on Saipan, Tinian and Rota facilitated by HPO staff. These public meetings were intended to collect grassroots input from the indigenous communities. Public hearings were supplemented by meetings with key government and private-sector officials. The views of preservation professionals representing the disciplines of archaeology, history and historic preservation were also solicited.

It is anticipated that this plan will be the focal point for collaboration and effort with respect to historic preservation throughout the CNMI. Our established historic preservation partners should find it useful to consult with the vision, goals and objectives to determine how they can best help achieve the plan's intent. Others might wish to review the background information to become familiar with the resources and the issues confronting preservation in the CNMI.

The CNMI HPO will prepare annual implementation plans for the next five years to organize and carry out its work on an annual basis. Progress on plan implementation will be monitored and reported on an annual basis with the assistance of the CNMI Historic Preservation Review Board.

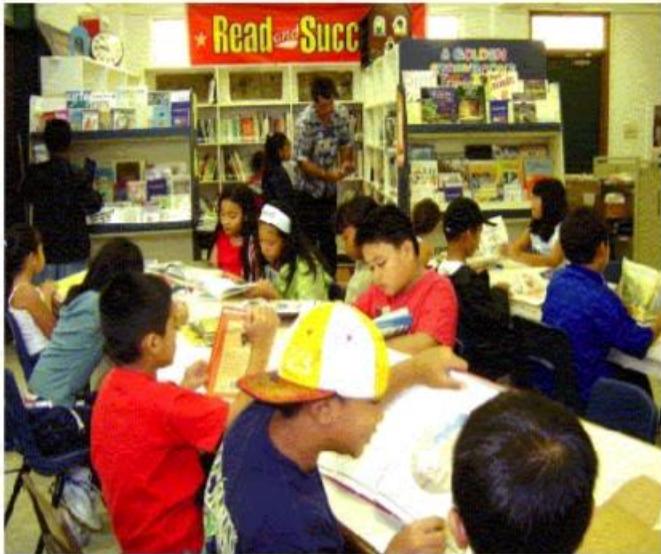
Preservation CNMI is intended to be a flexible document that will be reviewed on an annual basis and revised as needed. A new plan will be adopted in 2016.



Preserving the past for future generations.

Appendix T – PSS 2017 Readiness

**Visit your school library
on Saturdays for all
your reading needs!**



*The more you read,
the more you know
The more you know,
the smarter you'll grow!*

**Curriculum, Instruction &
Assessment**
P. O. Box 501370
Saipan, MP 96950
Tel. No. (670) 237-3011
Fax: (670) 664-3796
E-mail: cabrerap@pss.cnmi.mp

Developed by the CNMI Public School System under a grant from the U.S. Department of Education

CNMI Public School System

Report Card

**SCHOOL YEAR
2006-2007**



2006 EDITION



Funded under grant from the U.S. Dept. of Education

CNMI Public School System Statewide Enrollment By Grade & Gender

Gender	K	1st	2nd	3rd	4th	5th	6th	Total Elem.
Male	365	498	493	476	483	460	427	3,202
Female	361	442	417	428	408	405	397	2,858
Total	726	940	910	904	891	865	824	6,060

Gender	7th	8th	9th	10th	11th	12th	Total Secon.	Total Elem. & Secon.
Male	449	504	519	431	326	361	2,590	5,792
Female	390	435	461	418	318	357	2,379	5,237
Total	839	939	980	849	644	718	4,969	11,029

OTHER SERVICES:	Enroll.	PSS Total
Headstart	579	11,693
Early Intervention Services	56	
Advance Development Institute (ADI)	29	

	No	%
CNMI PSS Special Needs Students	680	6%

PSS School Personnel By Category

Administration		Teaching Staff	
Principal	20	Classroom Teachers:	487
Vice-Principal	18	* Other C. R. Teachers	54
Counselor (s):	24	Total C. R. Teachers:	541
Support Staff:	141	** Teacher Aides:	216
Total:	203	Total: Teaching Staff	757

* Other C.R. Tchrs: SPED, JROTC, Pdg. Res., Tech. & BI.
 ** Include 30 HeadStart Teacher Aides.

PSS Elementary Classroom Teacher By Grade Level

K	1st	2nd	3rd	4th	5th	6th	Others	Total
21	43	43	41	41	40	31	28	288

PSS Elementary Classroom Teacher By Gender

Male	Female	Total
61	227	288

PSS Secondary Classroom Teacher By Gender

Male	Female	Total
140	113	253

Total PSS Elementary & Secondary Classroom Teacher By Gender

Male	Female	Total
201	340	541

Source: Report from the Schools

Commissioner of Education's Leadership Team

David M. Borja, DBA - Commissioner of Education

Leadership:

Jackie A. Quitugua - Associate Commissioner for Inst. Services

Vacant - Associate Commissioner for Administration

Richard Waldo - Finance Director

Charley Kenty - Human Resource Officer

Tim Thornburgh - Federal Programs Officer

Eric Evangelista - Elementary Principal Representative

Vince Delacruz - Secondary Principal Representative



Ten CNMI State Board of Education

Ramon C. Benavente, Chairman	Saipan
Dino M. Jones, Vice Chairman	Saipan
Marja Lee Taitano, Secretary/Treasurer	Rota
Lucia L. Blanco-Maratita, Member	Tinian
Herman T. Guerrero, Member	Saipan
Scott Norman	Non-Public School Rep.
Ambrose Benett	Teacher Rep.
Louvelle Borja	Student Rep.



STUDENT - CLASSROOM TEACHER RATIO SY: 2006-2007

PUBLIC SCHOOL	STUDENT ENROLLMENT	TOTAL NO. OF TEACHERS	STUDENT-TEACHER RATIO
G.T. Camacho Elem.	220	13	17 : 1
Tanapag Elem.	236	12	20 : 1
Garapan Elem.	881	37	24 : 1
Oleai Elem.	476	22	22 : 1
San Vicente Elem.	807	34	24 : 1
Kagman Elem.	724	30	24 : 1
Dandan Elem.	485	20	24 : 1
W. S. Reyes Elem.	684	29	24 : 1
San Antonio Elem.	333	15	22 : 1
Koblerville Elem.	449	19	24 : 1
Tinian Elem.	320	15	21 : 1
Sinapalo Elem./Rota	261	14	19 : 1
Tinian Jr. & High	337	17	20 : 1
Rota Jr. High	153	8	19 : 1
Rota High	189	12	16 : 1
Hopwood Jr. High	1184	46	26 : 1
Chacha OV Jr. High	513	22	23 : 1
Marianas High	1,225	62	20 : 1
Kagman High	802	28	29 : 1
SPN South High	750	32	23 : 1
Total	11,029	487	23 : 1

*Note: Classroom Teachers for SPED, JROTC, Reading Res. & Bil. are not reflected in this figure.

Source: Report from the Schools
Data Baseline: As of August 24, 2006

Increase/Decrease Rate of Student Ethnicity

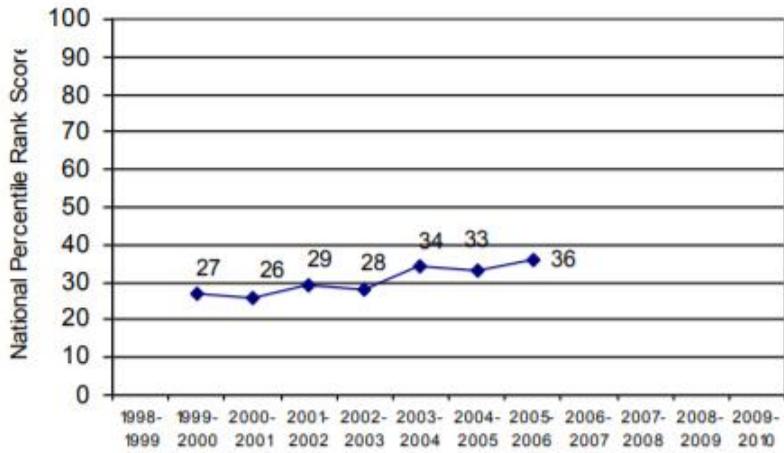
ETHNIC GROUP	Beg. 2005-2006	Beg. 2006-2007	% Change
Chamorro	4,880	4,925	1%
Carolinian	1,301	1,157	-11%
Chamorro/Carolinian	202	180	-11%
Chuukese	529	499	-6%
Filipino	2,588	2,813	9%
Palauan	548	506	-8%
Pohnpeian	263	206	-22%
Marshallese	63	36	-43%
Yapese	86	74	-14%
Korean	181	231	28%
Caucasian	49	53	8%
African/American	7	5	-29%
Chinese	96	114	19%
Japanese	45	47	4%
Other Pac. Isl.	81	35	-57%
Others	143	148	3%
Total:	11,062	11,029	0%

Source: Report from the Schools
Data Baseline: As of August 24, 2006

**TERM OF ACCREDITATION
UPDATE AS OF SPRING 2006**

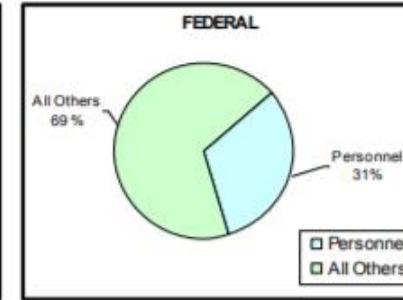
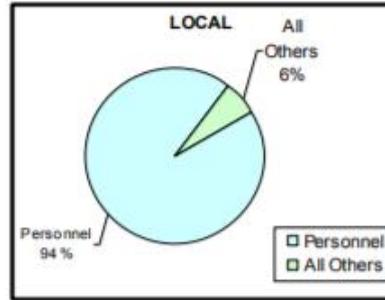
PUBLIC SCHOOL	TERM
G.T.Camacho Elem.	6 Years
Tanapag Elem.	6 Years
Garapan Elem.	6 Years
Oleai Elem.	6 Years
San Vicente Elem.	6 Years
Kagman Elem.	6 Years
Dandan Elem.	3 Years
W.S.Reyes Elem.	6 Years
San Antonio Elem.	6 Years
Koblerville Elem.	6 Years
Tinian Elem.	3 Years
Sinapalo Elem./Rota	6 Years
Tinian Jr. & High	3 Years
Rota Jr. High	6 Years
Rota High	3 Years
Hopwood Jr. High	3 Years
Chacha OV Jr. High	3 Years
Marianas High	6 Years
Kagman High	3 Years
SPN South High	6 Years

**Stanford Achievement Test 9th and 10th Edition CNMI PSS
Overall Grade 11 Complete Battery Trends**



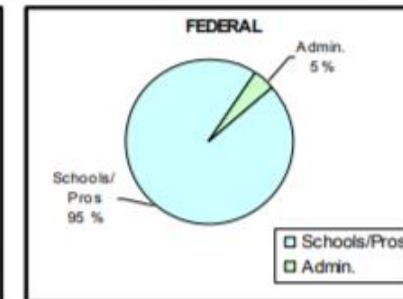
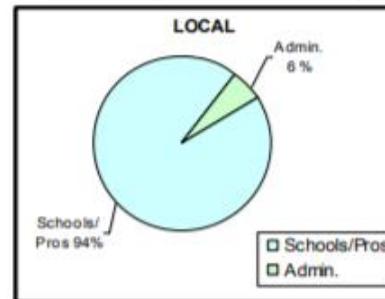
PSS Budget Allocation FY 2006-2007

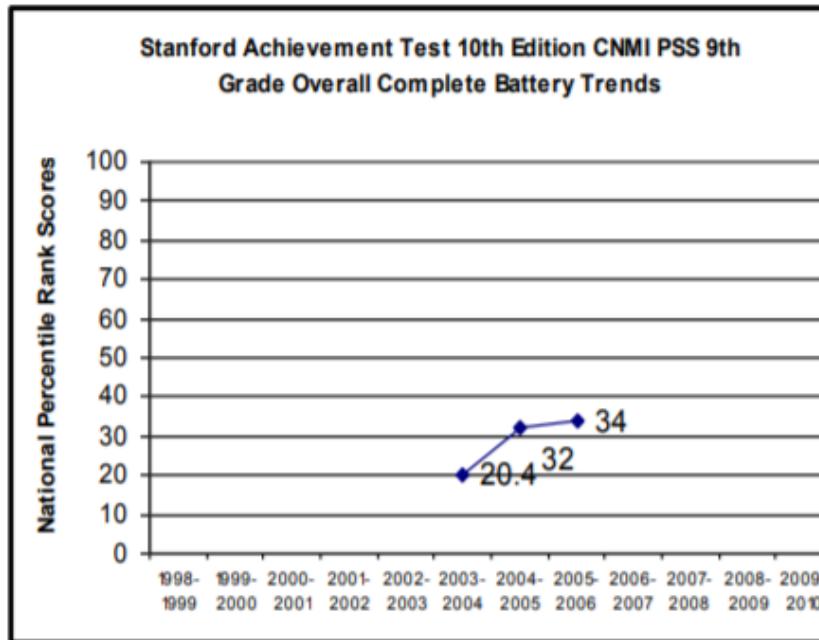
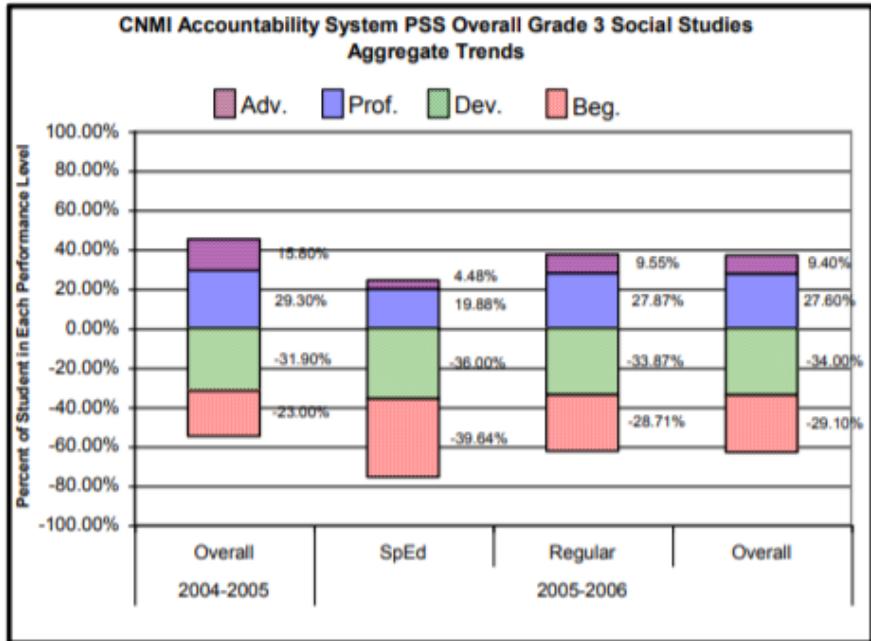
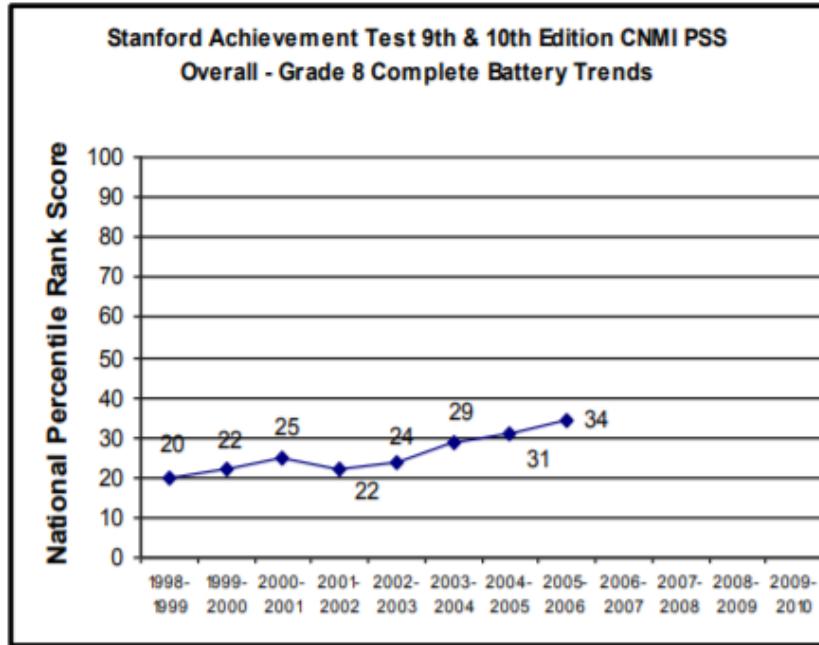
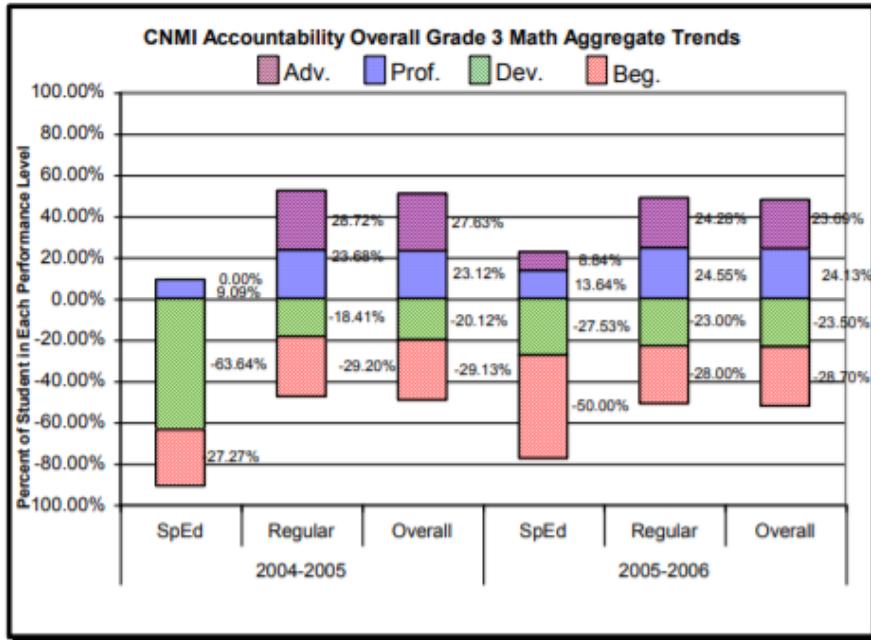
	Personnel	All Others	TOTAL
LOCAL	\$34,999,822.00	\$2,225,106.00	\$37,224,928.00
FEDERAL	\$10,311,370.00	\$22,457,759.00	\$32,769,129.00

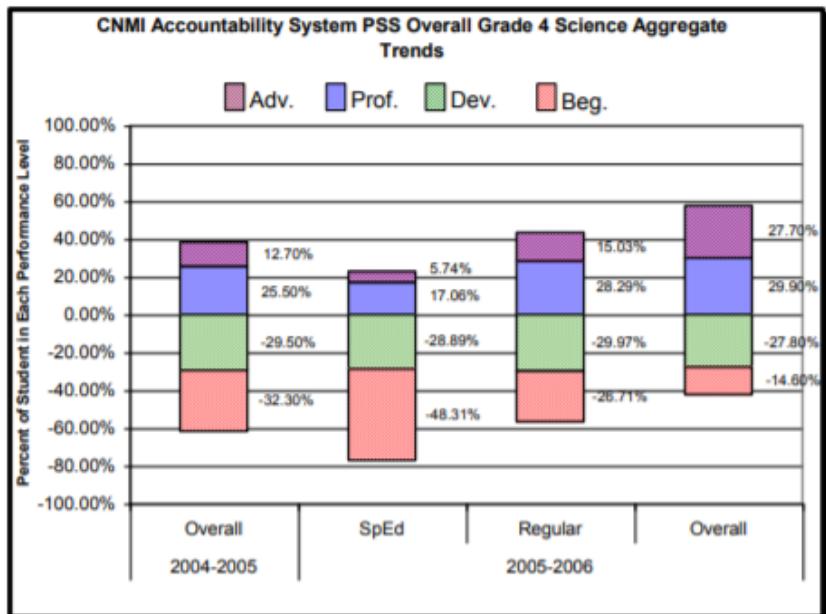
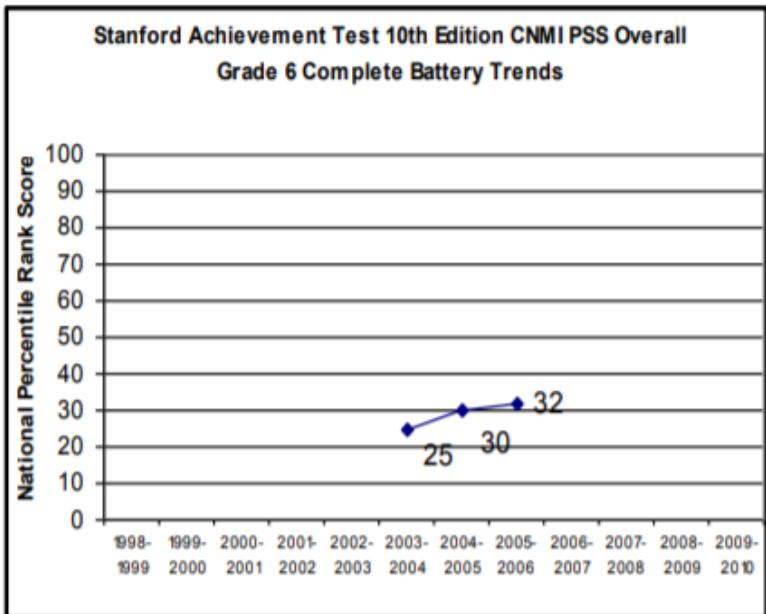
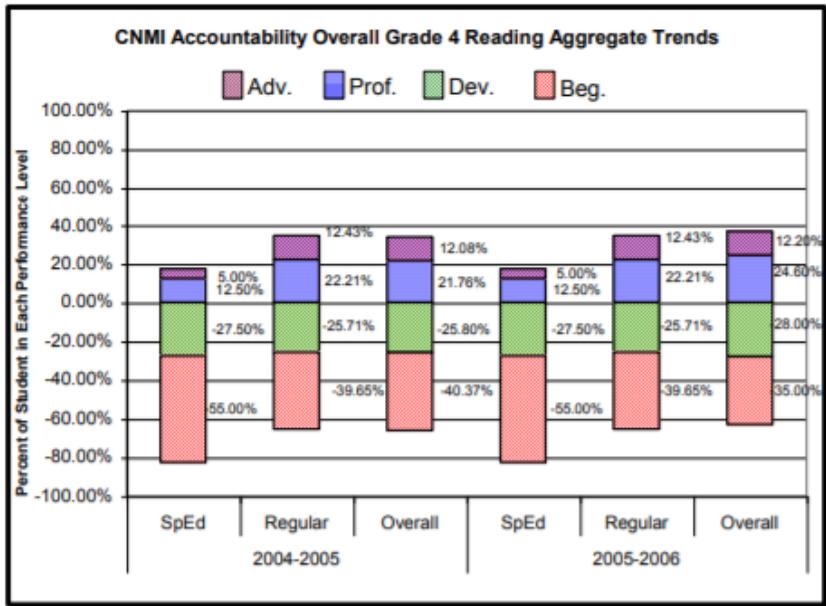
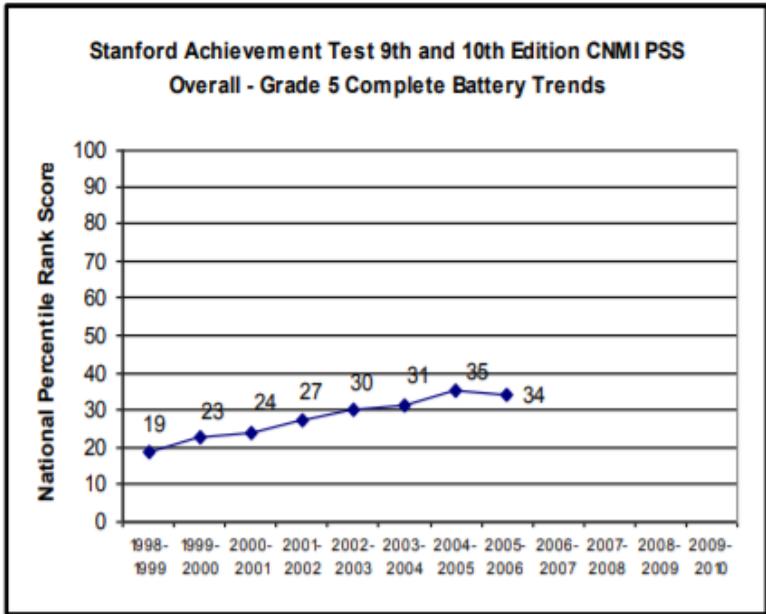


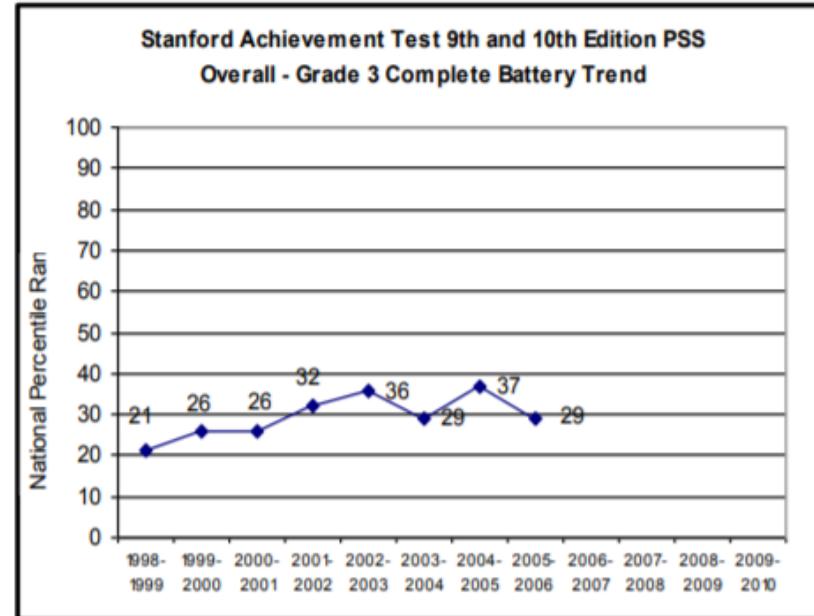
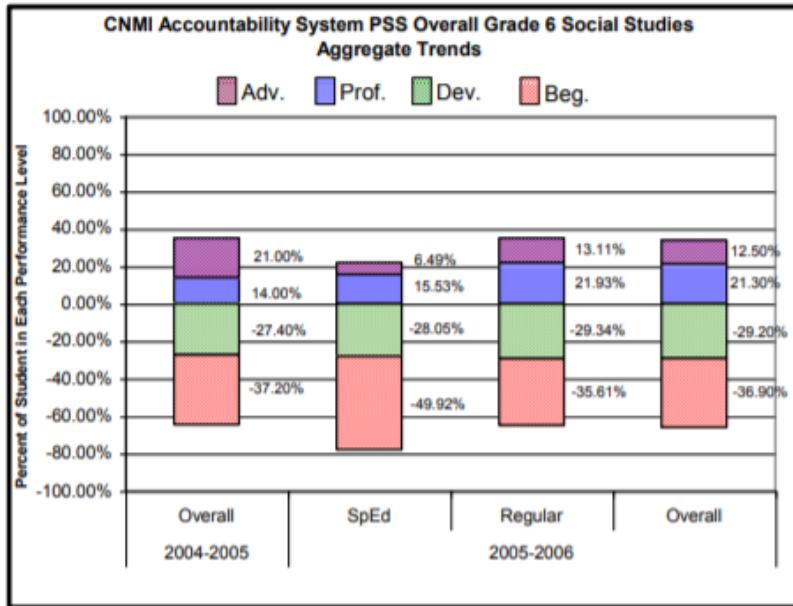
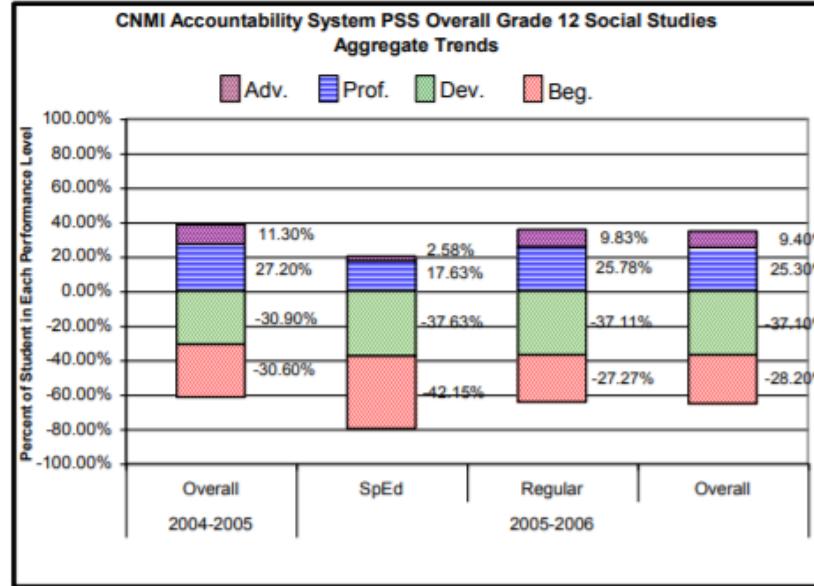
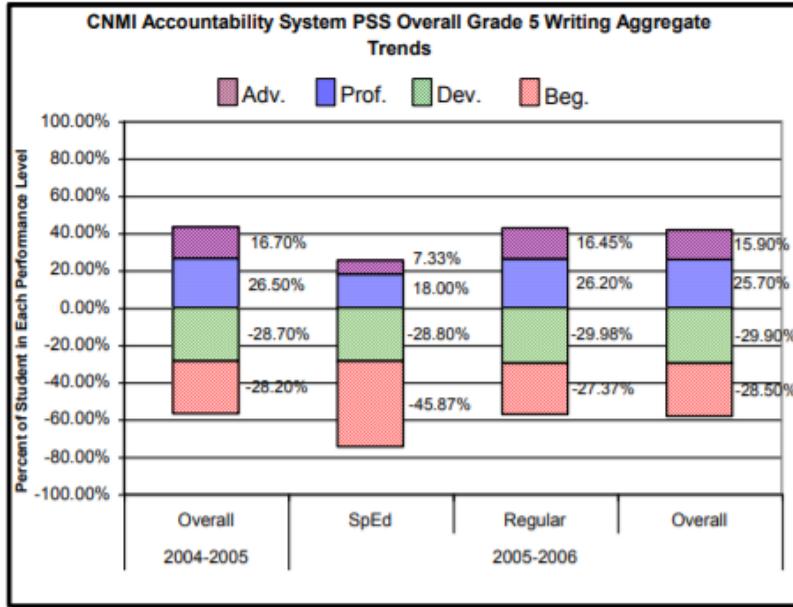
PSS Expenditures FY 2005-2006

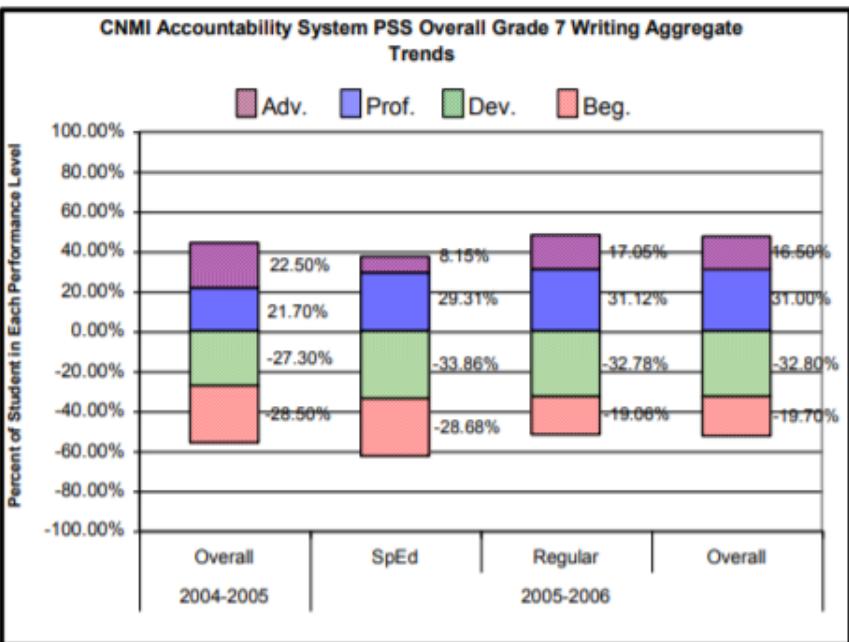
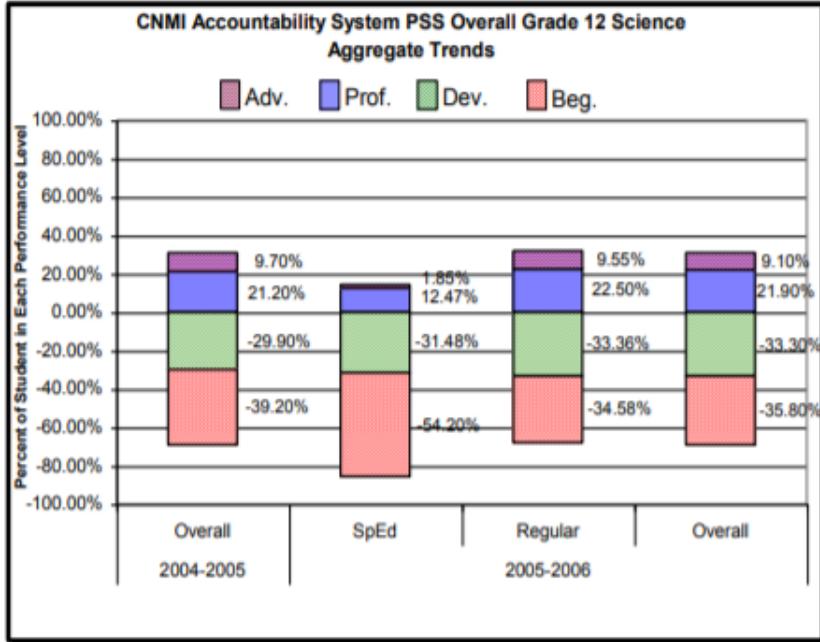
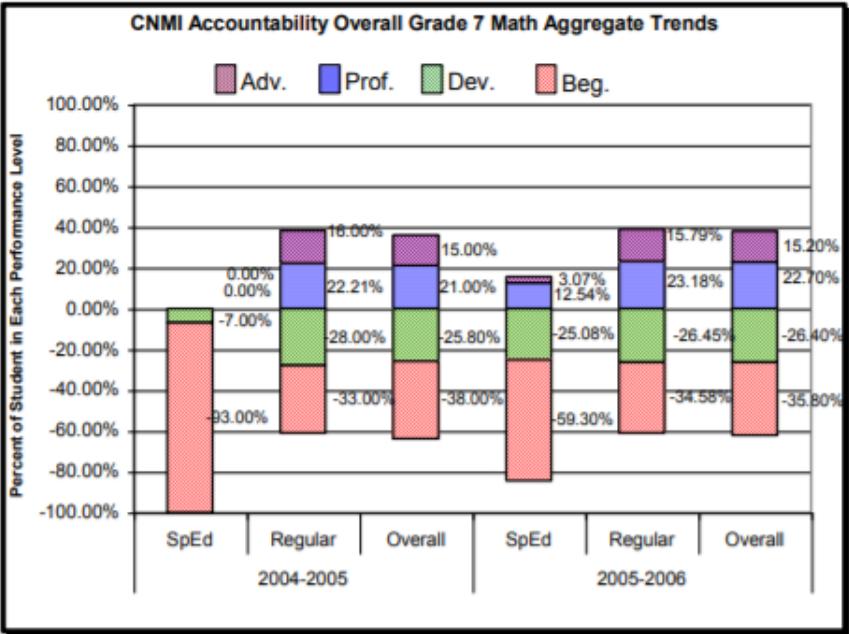
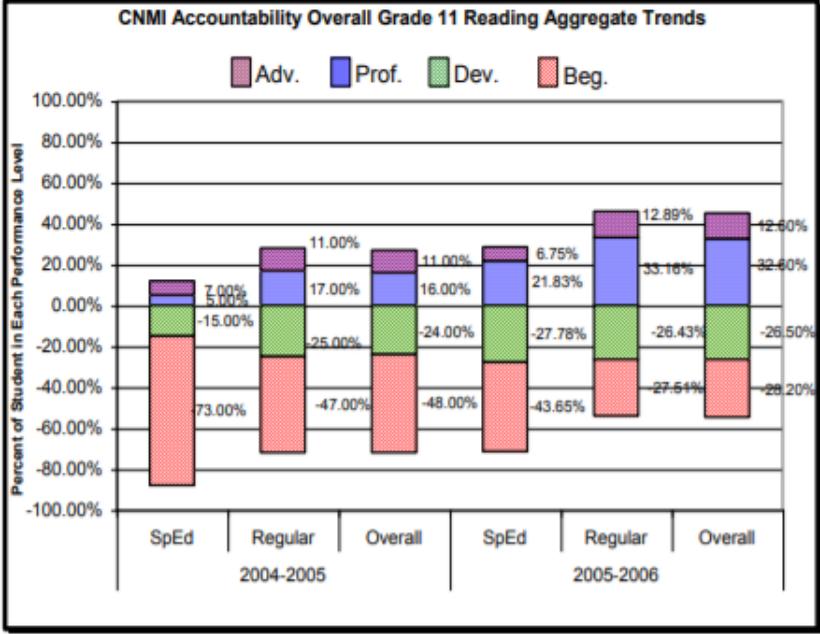
	Schools/Pros	Admin.	TOTAL
LOCAL	\$33,885,396.00	\$2,208,533.00	\$36,093,929.00
FEDERAL	\$25,934,615.00	\$1,449,993.00	\$27,384,608.00

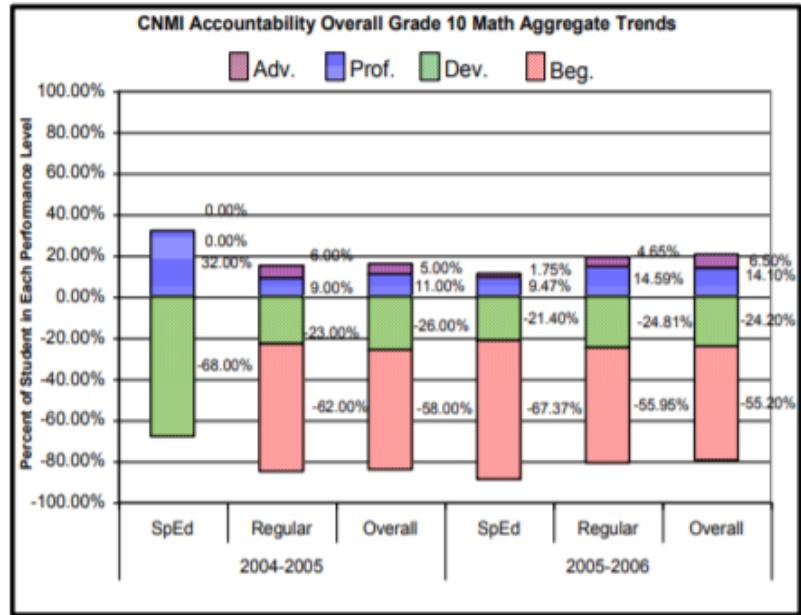
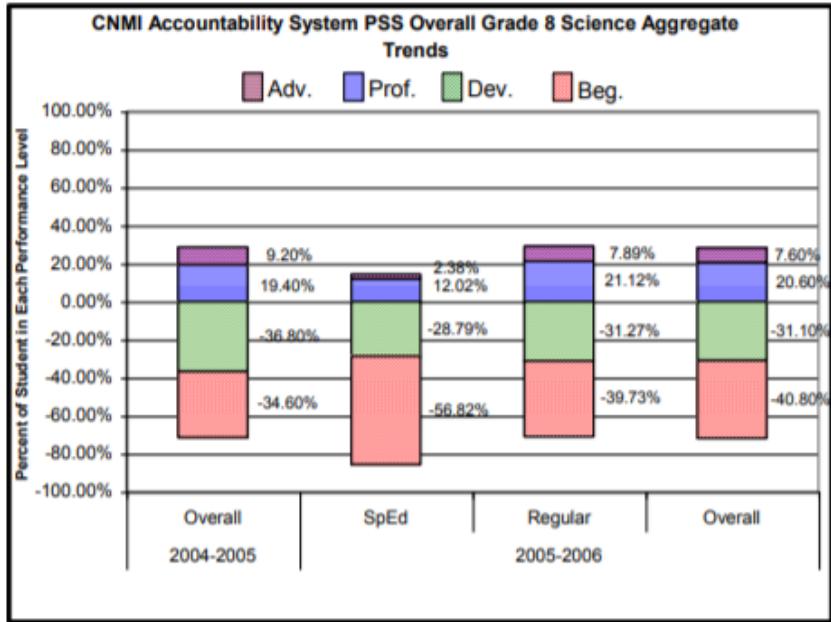
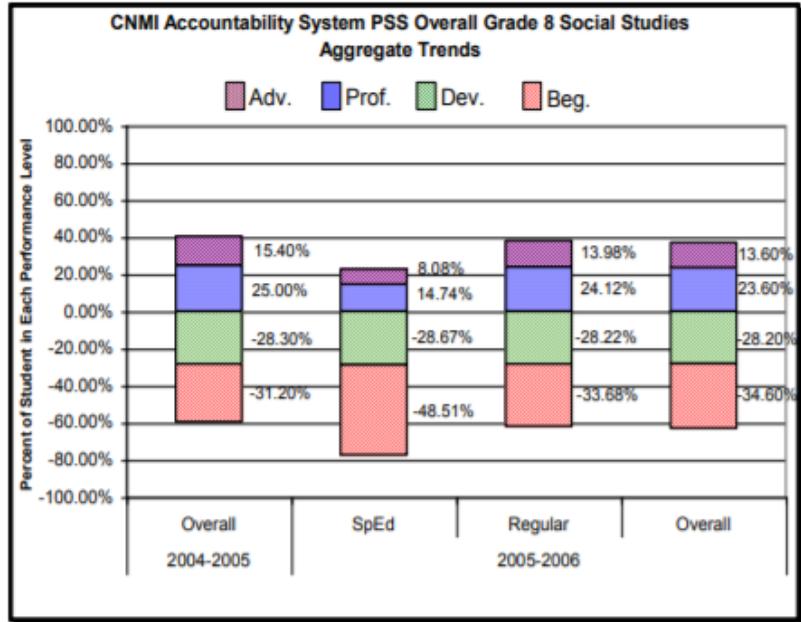
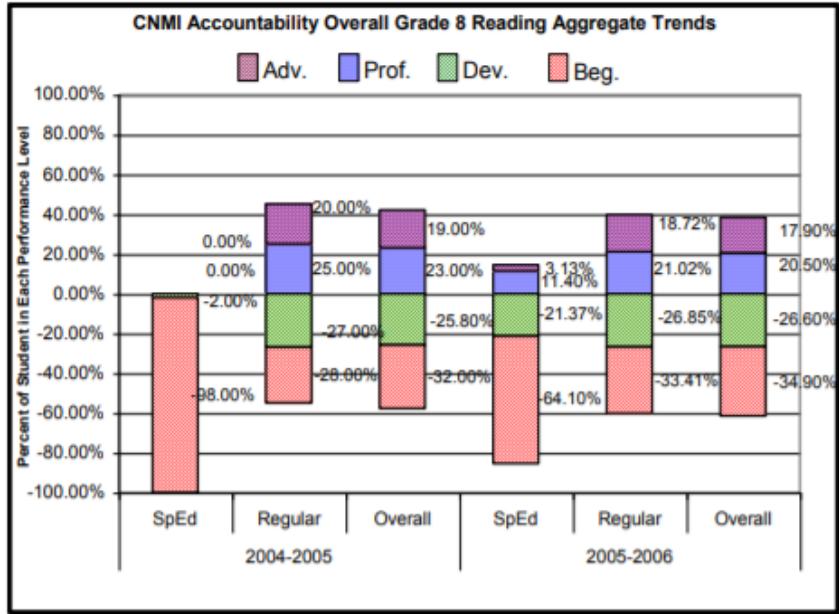












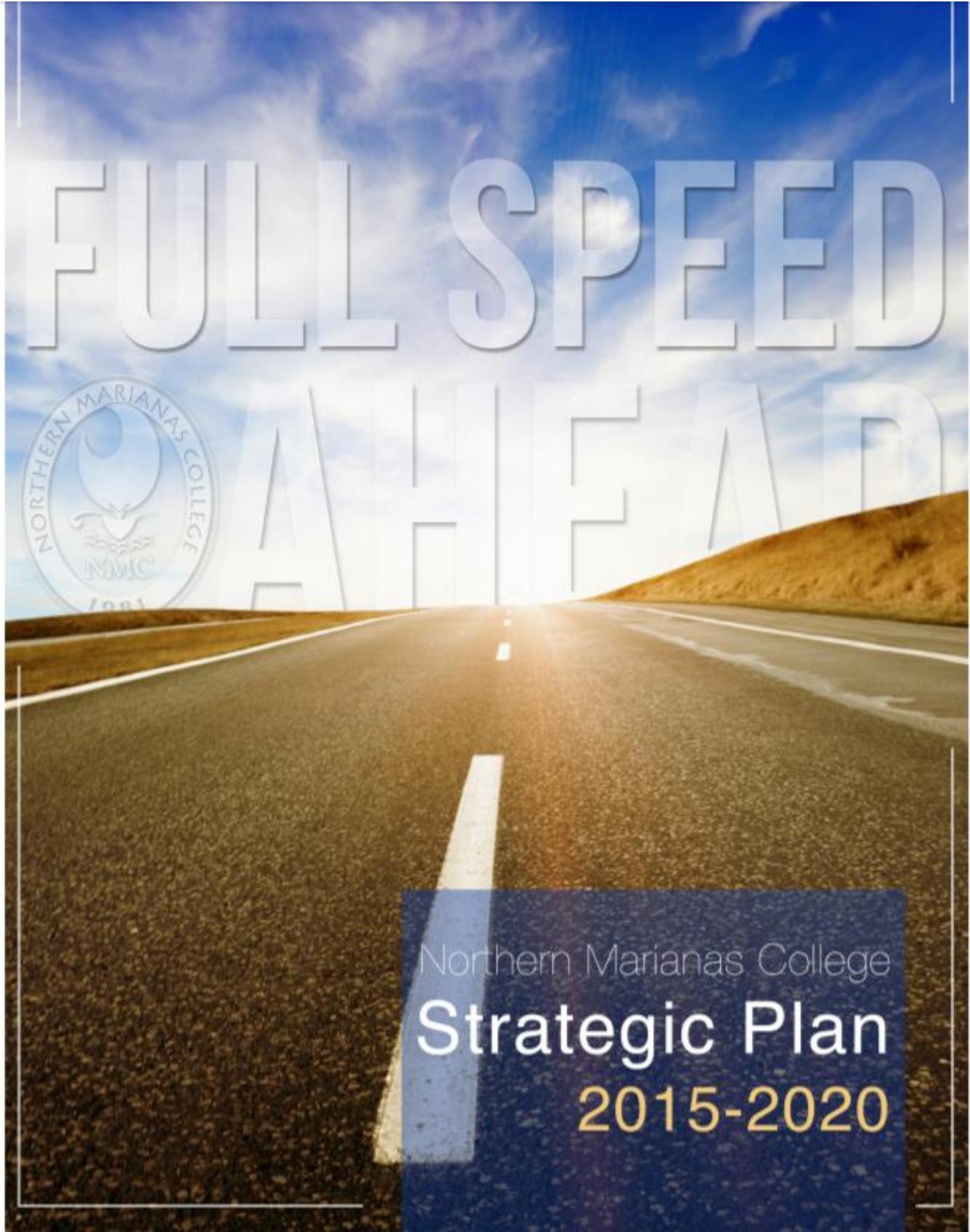


TABLE OF CONTENTS

Contents

Letter from the President & Board Chair _____	1
Northern Marianas College Administration & History _____	2-3
Development of the Strategic Plan _____	4
Complete College America _____	10
The Game Changers _____	13
Establishing Benchmarks For Targets and Success _____	15
Imperative One: Increase Relevance to CNMI Workforce _____	16
Imperative Two: Ensure Continued Accreditation _____	18
Imperative Three: Accelerate Time to Completion _____	20
Imperative Four: Improve Student Success and Support _____	22
Imperative Five: Strengthen Operations and Resource Development _____	24

LETTER FROM THE PRESIDENT & BOARD CHAIR

Letter from the President & Board Chair

Dear Stakeholders,

Our new college motto, ***“Full Speed Ahead”*** was unveiled on Friday, February 7, 2014 just as we received the exciting news that the College had been reaffirmed by the Accrediting Commission of Community and Junior Colleges. But for any organization to move forward, or steam ahead, it must have a clearly defined path of where it is, where it wants to go, and how it plans to get there.

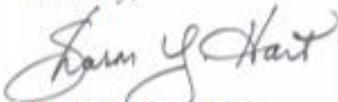
The *Northern Marianas College Five Year Strategic Plan 2015-2020—Full Speed Ahead* paves the road we will travel and clearly defines every step we will need to take along the way. It starts with our new mission and vision statements, which were both approved by the Board of Regents in September, 2013. The new mission, ***“Northern Marianas College, through its commitment to student learning, provides high quality, affordable and accessible educational programs and services for the individual and people of the Commonwealth”***, clearly defines our purposes for existing. It defines to our stakeholders what they should be expecting from NMC. Everything that the College does is reflected back to and supported by this mission statement. And, it is NMC’s new vision statement, ***“Northern Marianas College will serve as the engine to drive the economic growth and the social and cultural vitality of the Commonwealth,”*** that provides us with a picture of our future— defining what we want to achieve. It is an inspiration and is reflected throughout the strategic plan.

We encourage all stakeholders to read this plan in detail and to embrace our new mission statement, and reflect on our new vision statement. We know you will be as excited as we are once you have the chance to examine our five strategic imperatives. These become our roadmap for the future, which is outlined in the pages to follow. Each year the College will then develop an Operational Plan that will further outline specific responsible parties, needed resources, and a timeline for implementation

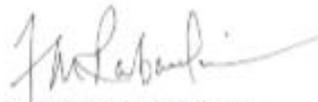
Yes, this is a very demanding yet achievable set of strategic imperative, aimed at fulfilling the collective vision of our many stakeholders. When fully implemented, the strategic imperatives will allow the College to continue to meet its stated mission for its students and the Commonwealth and to maintain a strong accreditation position for the benefit of all.

With this plan, we will now proceed ***“Full Speed Ahead”!*** Jump on board this Proa and join us!

Sincerely,



Sharon Y. Hart, PhD.
President



Frank M. Rabauliman
Chairperson, Board of Regents

Northern Marianas College

Board of Regents

Frank M. Rabauliman, Chairperson
Elaine Hocog Orilla, Vice Chairperson
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Michaela U. Sanchez, Regent
Dr. Elizabeth D. Rechebei, Regent

President

Dr. Sharon Y. Hart

Management Team

David J. Attao, Dean of Administration and Resource Development
Jacqueline Che, Director of Institutional Effectiveness
Ni Deleon Guerrero, Faculty Senate President
Frankie Eliptico, Director of External Relations
Tracy Guerrero, Chief Financial Officer
Ross Manglona, Dean/Director of CREES
Floyd Masga, Staff Senate President
Barbara Merfalen, Dean of Academic Programs and Services
Leo Pangelinan, Dean of Student Services
Chenglong "Alex" Shen, Student ASNMC President
Christopher Timmons, Director of Human Resources/Legal Counsel
Jonathan Liwag, Director of Information Technology
(Note: Management Team Reports to President Hart)

History of NMC

Northern Marianas College was established in May 1981 when Governor Carlos S. Camacho created the College as an official governmental entity through Executive Order #25. The Executive Order established the College as one of the divisions within the Commonwealth Department of Education. By mid-summer of 1981 the College was offering training programs for government employees and teachers of the public school system.

In January 1983 Public law 3-43 established NMC as a public, nonprofit corporation having the Board of Education as its governing board. In March of 1985 the passage of CNMI Public Law 4-34 made NMC a public corporation under the general governance of its own Board of Regents, and granted it autonomy in both fiscal and personnel matters. This law stipulated the mission of the college and designated NMC to serve as the land-grant college for the Commonwealth.

In November of 1985 the Second Constitutional Convention in the CNMI adopted a series of proposed amendments to the CNMI Constitution. Among them was Amendment 38 concerning education in the Commonwealth. Article 15, Section 2 of that proposed amendment provided for the establishment of Northern Marianas College, and stipulated that the College's Board of Regents should have autonomy in conducting its affairs. This amendment restated the mission of the college and guaranteed annual funding. Amendment 38, among others, was adopted by the people of the Commonwealth in a special election held in January of 1986.

In June 1985 the college received its initial accreditation from the Accrediting Commission for Community and Junior Colleges (ACCJC) of the Western Association of Schools and Colleges (WASC). The accreditation was reaffirmed in 1990, 1996, 2001, and 2009. In March 2001, the Accrediting Commission for Senior Colleges & Universities of WASC granted NMC initial accreditation for offering a Bachelor of Science degree in Elementary Education. This marked the first time in history of WASC that a two-year community college offered a four-year degree.

Since its beginning, NMC has focused on meeting the higher education and vocational training needs of the CNMI. From the times of its first program in teacher education, NMC has developed a comprehensive set of academic programs and services to meet the social, cultural, occupational and economic development needs of its island communities. Today, students are enrolled in various educational programs of study leading to Certificates of Completion, Associate Degrees, and Bachelor of Science in Elementary Education. In addition, there are hundreds of students enrolled in credit and non-credit, continuing adult education courses.

Throughout the years, more than 20,000 people have enrolled in regular NMC degree and certificate courses, over 3000 persons have been awarded certificates and/or degrees in programs offered or coordinated by NMC; and more than 12,000 individuals have been served in our community through such programs as the Adult Basic Education, Continuing Education, and the Cooperative, Research, Extensions, and Education Service.

And also through the years, the institution has been engaged in significant strategic planning efforts. The most recent long-term strategic plan, "PROA Strategic Plan 2008-2012", which identified four strategic goals, established a number of priority initiatives that extended beyond 2012 and continued until the adoption of this new Strategic Plan 2015-2020.

Development of the Plan

*An Overview of the
Strategic Planning Process*

"Northern Marianas College, as a result of our recent accreditation reaffirmation, is now in a better position to become the institution which the CNMI needs and expects as the engine for economic growth and development. The future of the CNMI is partly in our hands. Trusting us with this responsibility is predicated on our success to deliver on our five strategic imperatives. Working together as a team at NMC, I know we can deliver!"

*Dr. Sharon Y. Hart, President
Northern Marianas College*

DEVELOPMENT OF THE PLAN

Development of the Plan

An Overview of the Strategic Planning Process

The *Northern Marianas College Five Year Strategic Plan 2015-2020—Full Speed Ahead* provides the overall direction for prioritizing future key initiatives, which will ultimately link to the allocation of resources. This Plan will assist NMC in focusing its efforts to cost-effectively provide the best services and learning opportunities for students across the Northern Mariana Islands of Rota, Saipan, and Tinian.

Initiation and Agreement on the Five-Year Strategic Planning Process

Setting the direction was the starting point for the Strategic Planning Task Force, in conjunction with the president. In early 2012 an initial agreement on how the strategic planning process would develop was created. It was decided the best option would be to seek a national expert to assist the institution with data gathering, community input, and suggestions for strategic priorities. The development of the final plan would best be developed by an internal group of decision-makers—the Management Team—who would synthesize the information gathered by the consultant into the final version, which would then be disseminated to all employees and governance bodies for input.

Funding for this project was provided through a grant received from the U.S. Department of Interior – Office of Insular Affairs.

Assessing the External and Internal Environments

An effective long-term strategic plan must include an assessment of the environment and input to the College. What are the strengths and weaknesses of the College? What are the opportunities and threats it may encounter in the (near) future? Often an external environmental scan will include many elements that are beyond the College's ability to control or change (e.g. pending departure of CNMI contract workers). Yet, these elements must be reviewed in the context of their impact on the institution.

Beginning in the fall of 2012, a broadly based and representative group of private sector and community leaders, elected officials, the NMC Board of Regents, NMC president, and selected members of the NMC Management Team gathered in a strategic planning

DEVELOPMENT OF THE PLAN

roundtable. The roundtable was organized to gather input from stakeholders who would help to outline the future direction of the institution. It was facilitated by Dennis Jones, president of the National Center for Higher Education Management Systems (NCHEMS). This organization has received widespread acclaim for developing practical responses to the strategic issues facing public and private leaders, including higher education institutions across the nation such as Hawaii, North Dakota, Pennsylvania, and Indiana. An Environmental Scan was provided to the roundtable participants as a starting point for group discussion. Stakeholders were specifically asked the following questions:

- What important factors were missed in the Environmental Scan?
- What are the important takeaways?
- What are the implications for
 - NMC?
 - The government?
 - The private sector?

At the end of the roundtable, next steps were identified for these three constituent groups—NMC, government, and the private sector. Thus, NMC was provided a significant number of suggestions to prioritize within its strategic planning efforts.

Additionally, Mr. Jones held a daylong strategic planning retreat with all NMC employees to share the results of the roundtable, gather additional input from internal stakeholders, and then to provide the institution with a set of strategic priorities, which would be further reviewed in the development of the NMC 2015-2020 Strategic Plan.

In mid-October, Mr. Jones provided NMC with a final report, outlining his observations and suggestions.

Development of NMC's Mission, Vision and Values

From the observations and suggestions provided by Mr. Jones, the College was next challenged to develop both mission and vision statements. A solid mission statement clarifies the purpose of the College, how it operates, and who it serves, while a vision statement addresses the direction the institution wants to go. Values are those drivers that guide how the employees of the College will work and operate together.

DEVELOPMENT OF THE PLAN

From the information collected, a series of mini-retreats were held which culminated in the development of a new mission and vision statement.

Mission Statement

Northern Marianas College, through its commitment to student learning, provides high quality, affordable and accessible educational programs and services for the individual and people of the Commonwealth.

Adopted by the Board of Regents, September 26, 2013

Vision Statement

Northern Marianas College will serve as the engine to drive the economic growth and the social and cultural vitality of the Commonwealth.

Adopted by the Board of Regents, September 26, 2013

Development of Strategic Initiatives to Address the Strategic Issues

After the Board of Regents approved the new mission and vision statements, the College's Management Team began to assemble all information from stakeholders in order to develop the *Northern Marianas College Five Year Strategic Plan 2015-2020 – Full Speed Ahead*. It began by using an alignment approach, which took the critical issues identified by Dennis Jones and determined the significance of each of these in order to develop the final strategic initiatives. Basically it is similar to a car. All four wheels must be in perfect alignment in order to properly function. Thus, the strategic initiatives must all work together and be properly aligned in order for the College to be in complete balance.

Questions had to be asked. Are these new strategic initiatives the most relevant ones for the College? Are these addressing the right needs of the College's stakeholders and the CNMI community? How are these matched up against key national priorities for higher education? Does the institution have the required resources available in order to implement these?

After months of deliberation and review at the Management Team level, added review and input by internal stakeholders and members of the College Council, the *Northern Marianas College Five Year Strategic Plan 2015-2020 – Full Speed Ahead* was submitted to the President for

DEVELOPMENT OF THE PLAN

final review and input. It was then provided to the Board of Regents for review, discussion and consideration for formal adoption.

Implementation

After Board of Regents' approval of the *Northern Marianas College Five Year Strategic Plan 2015-2020—Full Speed Ahead* is secured, it then becomes the responsibility of the president to implement. As such, the president will work to develop an effective implementation process for the actions that the College will be taking over the next five years. All required actions will be identified and outlined within an Annual Operational Plan. This yearly plan will include expected outcomes, specific action steps, timelines, means of assessment, success criteria, resources needed, and the persons responsible. Additionally, it will be submitted to the Board of Regents no later than September of each year for its review and approval.

The strategic plan must always be kept up to date and a monitoring system by the Board of Regents will be established at an early stage to ensure that the plan is implemented according to its stipulated strategy, vision, mission, and values.

Evaluation

An evaluation of the Annual Operational Plan will be conducted at the end of each fiscal year. At the same time, as the Board will be monitoring the progress of this Plan as part of its key role and responsibility, it will in fact be fully aware of the progress and/or of any obstacles the College is encountering.

The evaluation process is meant to strengthen and reinforce the strategic plan. The need for a reassessment of the plan, and a decision as to whether it should be modified or not, can in fact happen. The Board can choose, in consultation with the president, to modify the plan should new factors arise—either inside or outside of the institution. For example, a change to the plan can occur if the leadership of the college changes, new national reforms or legislation are pending, needs have changed, or the internal or external environment (stakeholders) provide new and important relevant input.

THE FIVE-YEAR STRATEGIC PLACE REVIEW PROCESS

The Five-Year Strategic Place Review Process

The entire strategic planning process, from start to finish, is outlined below.



Recognizing Complete College America *as the Game Changer*

As the one and only publicly funded higher education institution in the CNMI, is Northern Marianas College working with local government and other leaders to implement the best reforms to produce more college graduates?

"I am pleased the College is developing innovative solutions to address the most pressing and key challenges facing higher education today--both at the national and local levels. When it comes to college completion, the CNMI can't afford to wait any longer. The challenge to dramatically increase the number of completion rates in our degrees and certifications is a national imperative. Therefore, NMC must tighten its focus and add more clarity to help ensure the success of all students who enter the doors of this College."

Frank M. Rabauliman
Chairperson, NMC Board of Regents

Complete College America

33 States, 1 Mission

With a dynamic alliance, our country is poised to significantly boost college completion and close attainment gaps.

Four years ago, Complete College America reached out to governors throughout the country and asked them to join our Alliance of States — a network that would make challenging commitments to substantially boost college completion and increase student success. Seventeen governors immediately accepted this call to action, and since that time, the Complete College America Alliance of States has doubled in size.

Over the course of our work, we have conducted detailed research, compiled and evaluated extensive volumes of data, and sought out best practices from around the nation. Overall, public awareness has expanded dramatically around the straightforward and staggering fact that America faces a college completion crisis.

In our groundbreaking reports *Time is the Enemy* and *Remediation: Higher Education's Bridge to Nowhere*, we have outlined some of the most pressing challenges facing today's students and pointed to the structural deficiencies that perpetuate abysmal graduation rates and persistent attainment gaps. Our joint statement on the principles for transforming remediation with the Charles A. Dana Center, Education Commission of the States, and Jobs for the Future has inspired transformative state policy and legislation at scale, making clear that these are solvable problems.

Taken together, this important work has shed light on the consequences of inaction and spurred movement from many states and higher education leaders who are getting serious about college completion. But to maintain our economic recovery and ensure the future financial strength of our states and country, we must tighten our focus and add more clarity to our advocacy, pushing harder to quicken the pace and broaden the scale of reform.

Admittedly, our mission is difficult — requiring an analysis of every facet of higher education structure and delivery. More important, success demands the sober recognition that, at the most basic level, what we are intending to accomplish is a reinvention of centuries-old institutions that now must change to help ensure the success of students who have rarely succeeded in the past.

While immense challenges lie before us, proven strategies that lead to real and lasting results are available — methods that not only create the conditions for success but also provide a pathway for how we get there. When it comes to college completion, our nation can't afford to wait any longer. Now is the time for Game Changers.

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Complete College America

Governors Who Get It

The progress we have made thus far, as well as our future success, is possible because of the dynamic and growing Alliance of States, the governors who get it, the higher education leaders who recognize the urgency of this work, and the impatient reformers who know this is about the future of this country.

- Governor Mike Beebe (Arkansas)
- Governor John Hickenlooper (Colorado)
- Governor Dan Malloy (Connecticut)
- Governor Rick Scott (Florida)
- Governor Nathan Deal (Georgia)
- Governor Neil Abercrombie (Hawaii)
- Governor Butch Otter (Idaho)
- Governor Pat Quinn (Illinois)
- Governor Mike Pence (Indiana)
- Governor Steve Beshear (Kentucky)
- Governor Bobby Jindal (Louisiana)
- Governor Paul LePage (Maine)
- Governor Martin O'Malley (Maryland)
- Governor Deval Patrick (Massachusetts)
- Governor Mark Dayton (Minnesota)
- Governor Phil Bryant (Mississippi)
- Governor Jay Nixon (Missouri)
- Governor Steve Bullock (Montana)
- Governor Brian Sandoval (Nevada)
- Governor Susana Martinez (New Mexico)
- Governor John Kasich (Ohio)
- Governor Mary Fallin (Oklahoma)
- Governor John Kitzhaber (Oregon)
- Governor Tom Corbett (Pennsylvania)
- Governor Lincoln Chafee (Rhode Island)
- Governor Dennis Daugaard (South Dakota)
- Governor Bill Haslam (Tennessee)
- Governor Rick Perry (Texas)
- Governor Gary Herbert (Utah)
- Governor Peter Shumlin (Vermont)
- Governor Earl Ray Tomblin (West Virginia)
- Governor Scott Walker (Wisconsin)
- Governor Matt Mead (Wyoming)

The Game Changers

Performance Funding

Pay for performance, not just enrollment. Use the Complete College America and National Governors Association metrics to tie state funding to student progression through programs and completion of degrees and certificates. Include financial incentives to encourage the success of low-income students and the production of graduates in high-demand fields.

Corequisite Remediation

Default many more unprepared students into college-level gateway courses with mandatory, just-in-time instructional support. Combine reading and writing instruction. Align mathematics to programs of study, matching the curriculum to real-world career needs. For many more unprepared students, provide remedial help parallel to highly structured coursework.

Full-Time is 15

Incentivize students to attend full-time and ensure that full-time means 15 credits per semester. Use banded tuition so 15 credits per semester cost students no more than 12 credits. Cap degree credit requirements (120 for bachelor's and 60 for associate) to ensure degrees can be completed on time. Ensure college credits can be transferred.

Structured Schedules

Help working students balance jobs and school by using structured scheduling of classes to add predictability to their busy lives — doing so enables many more students to attend college full-time, shortening their time to completion.

Guided Pathways to Success

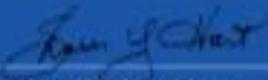
Enabled by technology, default all students into highly structured degree plans, not individual courses. Start students in a limited number of “meta majors,” which narrow into majors. Map out every semester of study for the entire program, and guarantee that milestone courses will be available when needed. Use built-in early warning systems to alert advisers when students fall behind to ensure efficient intervention.

Accepting the College Completion Challenge

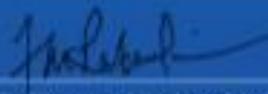
A Call to Action

In recognition of the central role that Northern Marianas College has in meeting the educational and training needs in our community and, more broadly, in contributing to an educated U.S. citizenry and a competitive workforce, we pledge to do our part to increase in the number of Americans with high quality postsecondary degrees and certifications to fulfill critical local, state, and national goals. With the "completion agenda" as a national imperative, Northern Marianas College has an obligation to meet the challenge while holding firmly to traditional values of access, opportunity, and quality.

- We believe the student success and completion agenda is the future of Northern Marianas College.
- We believe that completion matters and that every student counts.
- We believe in every student's potential and responsibility to succeed—and that an engaged student is more likely to persist in college.
- We believe the "open door" must not be a "revolving door," and that Northern Marianas College must take responsibility for student success.
- We believe that community colleges are the gateways to the middle class and beyond for millions of Americans.
- We believe that community colleges are an invaluable economic engine driving the nation toward renewed and sustained economic prosperity.
- We believe that talented and committed people working "heart and soul" at Northern Marianas College are ready to take on leadership roles to increase student success and college completion.
- We believe to change an institutional culture, from emphasis on access-only to emphasis on access and success.
- We commit to courageous conversations about diversity, equity, and evidence reflecting student success and institutional performance.
- We commit, while increasing success rates for all students, to eliminating the attainment gaps that separate student groups on the basis of race, ethnicity and family income.
- We commit to acting on facts to make positive changes in the interest of student success and college completion.
- We commit to promoting faculty and staff development focused on evidence based educational practice.
- We commit to providing development opportunities, for college administrators, trustees, faculty, staff, and students to build and sustain leadership for student success.
- We ask every regent, administrator, faculty member, counselor, advisor, financial aid officer, staff member, and student organization to examine current practices, to identify ways to help students understand the added value of degrees and certifications, and to help them progress toward their goals.
- We ask every student to help one other student succeed.
- We ask community members to support and work with us to help more students succeed.
- We ask elected officials to create the policy conditions that enable, support, and reward our work to strengthen student success.
- We ask other community colleges to join us by signing and sharing this commitment and call to action.



President, Northern Marianas College



Chair, Board of Regents, Northern Marianas College

February 21, 2014

Date



ESTABLISHING BENCHMARKS FOR TARGETS AND SUCCESS

Establishing Benchmarks For Targets and Success

The following measures will outline a culture of student and institutional success at NMC. How will the College know that it has been successful as it undertakes the work necessary to complete the *Northern Marianas College Five Year Strategic Plan 2015-2020 – Full Speed Ahead*. Because establishing benchmarks and target goals—and appropriately comparing the College's performance against national or regional standards—will help the institution to gauge overall success.

1. Student Access – Total Enrollment and by Student Type
 - Percentage of PSS graduates entering NMC (FY11-FY20)
 - Percentage of PSS graduates requiring remediation (FY11-FY20)
 - Percentage of Student Population over 25 (FY11-FY20)
 - Percentage of International Students (FY11-FY20)
 - Enrollment by Total Credit Unduplicated Headcount (FY11 – FY20)
 - Enrollment by ABE (FY11-FY20)
 - Enrollment by CREES (FY11-FY20)
 - Enrollment by Community Development Institute (FY11-FY20)
2. Percent of Transfer Degree Completers who transfer to a four-year institution within two years of completing an AA, AS, AAS. (FY11-FY20)
3. Percent of Entering Remedial Students (FY11-FY20)
4. Percent of Remedial Students who Complete a Degree (FY11-FY20)
5. Number of ABE and ELI students who advance to College-level courses (FY11-FY20)
6. Link NMC credit programs to CNMI industry needs
7. Link NMC non-credit programs to CNMI industry needs
8. Completion Within Two / Three / Four Years of Associate Degree Programs (FY11-FY20)
9. Completion Within Four / Six / Eight Years for Bachelor's Programs (FY11-FY20)
10. Credit Retention From Fall to Fall Semesters (FY11-FY20)
11. Percent who Transfer (FY11-FY20)
12. Full time student success rates vs. part-time success rates (FY11-FY20)
13. Number of dual credit (FY11-FY20)
14. Increase articulation agreements with two and four-year institutions (FY11-FY20)
15. Number of Internships/Work Experiences (FY11-FY20)
16. Percentage of Job Placement by Program (FY11-FY20)
17. Earnings of Graduates by Program (FY11-FY20)
18. Net Instructional Cost per FTE (FY11-FY20)
19. Percent of unrestricted fund balance to total expenses (FY11-FY20)
20. Increase the amount of money awarded through grants and revenue generating programs (FY11-FY20)
21. Increase retention of all employees by type: faculty, staff, administration (FY11-FY20)
22. Increase educational attainment level of CNMI residents
23. Cost per Completion of Two-Year Programs
24. Cost per Completion of Four-Year Programs

Imperative One
Increase Relevance to CNMI
Workforce and Community Needs

"Our vision is for the CNMI to become a globally recognized workforce that is well educated, trained, and skilled with the character and work ethics needed to foster and sustain a demand driven and robust economy. An educated citizenry and work-ready community is essential to the CNMI's long-term economic strength that will bring increased revenues from business growth/expansion for the generation of more employment opportunities with comparable wages based on education and training."

*Edith Deleon Guerrero
CNMI Secretary of Labor*

IMPERATIVE ONE

Imperative One

Increase Relevance to CNMI Workforce and Community Needs

In order to ensure the relevance of its programs and courses, Northern Marianas College will assure the alignment of its offerings in these specific areas:

- a. Strengthen the link of the Public School Systems' (PSS) curriculum to Northern Marianas Colleges' curriculum.
 - Work with Public School System to align the English and Math curricula and utilize assessment tools so students can easily transition to NMC while reducing the need for developmental courses.
 - Provide alignment of PSS's career programs to offerings within NMC.
 - Initiate dual-enrollment opportunities and expand other early admission initiatives for high school students.
 - Ensure NMC is preparing teachers competent in international standards or the Common Core State K-12 Standards to ensure student achievement.
- b. Ensure the relevance of developmental curriculum to a student's chosen academic program of study.
- c. Ensure the relevance of NMC's remediation program curricula to the College's credit curriculum.
 - Improve the rigor of remedial program offerings to align with college level offerings.
- d. Ensure program offerings match the employment needs of the CNMI.
 - Build local workforce capacity to include preparing for the loss of working non-US citizens.
 - Expand a broad array of post-secondary programs and services to address CNMI workforce needs.
 - Utilize research-based strategies to assist in the development of sustainable CNMI industries.
 - Align program curricula with the needs of CNMI employers in key industries leading to economic growth and economic value to graduates.
 - Integrate entrepreneurship, work ethic, and life skills across all curriculums.
 - Create stronger relationships with local employers to improve curriculum, engage students in internships or related work experiences, and enhance job placement upon graduation.
- e. Ensure that NMC's courses designed for transfer are closely aligned with WICHE and other regional institutions.
 - Strengthen existing articulation agreements and partner to secure more agreements with specific WICHE institutions that support a high CNMI enrollment possibility.
 - Ensure students transfer in a manner that maximizes their credit enrollments and minimize their financial investment.

Imperative Two
Ensure Continued Accreditation

"I would like to once more recognize Northern Marianas College on its efforts to maintain accreditation. This is important as only students attending accredited colleges and universities are eligible for Title IV funding. In addition, it is a key factor in helping students to transfer to other two or four-year institutions. As governor, I will continue to support NMC and to ensure its "sustainability" for the residents of the CNMI."

Hon. Eloy S. Inos
Governor, CNMI

IMPERATIVE TWO

Imperative Two **Ensure Continued Accreditation**

The College will commit to ensuring continued institutional accreditation and explore, where appropriate, program accreditation. To do this effectively, it will embrace the culture of accreditation using the standards and criteria for review and demonstrate effective performance by focusing efforts to follow accreditation standards.

- A. Define clear institutional purposes and ensure educational objectives.
- B. Achieve educational objectives through core functions.
- C. Develop and apply resources and organizational structures to ensure quality and sustainability.
- D. Create an organization committed to quality, assurance, institutional learning and improvement.
- E. Maintain ongoing institutional accreditation practices that include program level accreditation.

Imperative Three
Accelerate Time to Completion

"It is great that Northern Marianas College is committed to making the necessary changes to enable more graduates to get out of college sooner and to enter the labor market or to successfully transfer on to other four-year colleges or universities. We need these graduates to sustain or to help grow our many businesses."

Jerry Tan
CEO, Tan Holdings Corporation

IMPERATIVE THREE

Imperative Three **Accelerate Time to Completion**

The College understands that time can be an enemy to students. To ensure students complete on time and do not fall through the cracks, the institution will target time in the following key strategic areas:

- A. Reduce the time between a student's entry into Northern Marianas College and his or her enrollment in a program of study.
 - Improve advising support to get students on a planned pathway of success.
- B. Reduce time-to-degree and increase the number of students completing a two-year or a four-year degree on time.
 - Explore strategic scheduling and other pathways to reduce drop/stop-outs.
 - Align credits required to graduate with national standards.
 - Implement a guided pathway that guarantees courses.
 - Establish 15 credits as full time.
- C. Reduce time and accelerate success for a student to complete remediation for transition into college credit.
 - Ensure a complete set of gateway courses for a program of study.
 - Ensure the content of required gateway courses align with a student's academic program of study.
 - Ensure enrollment in a gateway college-level courses is the default placement for many more students.
 - Provide additional academic and student support.
 - Initiate co-requisites (enrolling students in remedial and college-level courses simultaneously).
 - Provide accelerated routes into programs of study.
 - Provide multiple measures to provide guidance in the placement of students.
 - Ensure all remedial students enter a program of study in their first year at NMC.

Imperative Four
**Improve Student Success
and Support**

"Hats off to Northern Marianas College for focusing on student access and support services. These strategies will help to produce positive outcomes for all students who choose to enroll at the College. NMC is definitely developing a system that will support students who must often balance work and family with their coursework. I am glad I chose to study at NMC and for those students enrolling over the next five years, remember that our College is constantly committed to your overall success."

*Chenglong "Alex" Shen
President, Associated Students of NMC*

IMPERATIVE FOUR

Imperative Four **Improve Student Success and Support**

To ensure more students are successfully entering and completing their education at NMC, the College will focus on improving student access and in providing the necessary student support services. This will require a student-focused and data-driven environment within the institution. To do this effectively, the College will:

- A. Implement strategies to enhance recruitment and retention rates
 - Expand first year experience and other retention activities like the Learning in Communities (LinC) program to ensure strengthened student retention
 - Develop and expand programs and services that are geared toward adult learners, including veterans and other military personnel
 - Launch a sustainable prior learning assessment program that recognizes knowledge and competency acquired through informal lifelong learning
- B. Work with local government leaders to establish educational attainment and completion goals on those jobs requiring post-secondary education to more closely align with federal benchmarks.
- C. Provide data in a format that will improve and lead the institution to student success.
 - Expand access to important data for all faculty and front-line staff.
 - Identify students at academic risk early to provide effective interventions.
 - Create reports around key performance indicators.
- D. Understand students by obtaining more information about them and their educational goals.
- E. Provide innovative and high quality support services that enable students to successfully navigate their pathway to achieving their educational goals.

Imperative Five
**Strengthen Operations and
Resource Development**

"NMC cannot be that 'engine of economic growth' for the CNMI if its engine is not fully charged with the resources required for it to steam ahead! For NMC to fully implement a plan that will strengthen the overall economic vitality of the CNMI will require an infusion of resources. This needs to come from the private sector, the government, the NMC Foundation, and other key entities."

*Dr. Alan Markoff,
Owner, Toothworks Dental Clinic, NMC Foundation*

Imperative Five **Strengthen Operations and Resource Development**

All strategies described throughout this Plan require a strong level of operations along with adequate human, financial, and technical resources. Without these elements, NMC will not be equipped to focus on performance goals and key strategies. Thus, to ensure effective and efficient operations, the College must achieve the following through a culture fostering organizational entrepreneurship.

- A. Implement NMC's facility master plan to support the student learning environment.
- B. Enhance NMC's institutional image.
 - Execute an integrated marketing plan to position NMC as a world-class institution.
- C. Sustain a skilled and productive workforce by improving human resource practices.
 - Ensure continued professional development and efficient succession planning.
 - Ensure salaries of ALL employees are competitive and benchmarked to at least 85% of the average of peer institutions.
- D. Maximize funding opportunities through appropriations, grants, NMC Foundation, and other sources to align with institutional priorities.
- E. Improve information data systems and other technology resources to support student learning.
 - Increase capacity of internet services.
 - Improve inter-island communications through appropriate technologies.
 - Implement online registration
- F. Enhance financial monitoring and institutional accountability.



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Appendix V – Reviewed Regulations

Regulations and relevant enabling legislation reviewed for this report includes but is not limited to the following:

Executive Orders

Public Laws

- Public Law 20-20, *"To Establish the Office of Planning and Development" (OPD)*
- Public Law 15-67, *"Public Lands Act of 2006"*
- Public Law 15-2, *"Amendment and Clarification of P.L. 15-2" (DPL)*
- Public Law 10-57, *"Public Lands and Natural Resources Administration Act" (DLNR-P&R)*
- Public Law 8-23, *"To impose a tax on new development in the Commonwealth to help pay for infrastructure"*
- Public Law 6-30, *"Commonwealth Solid Waste Management Act"*
- Public Law 5-33, *"Public Purpose Land Exchange Authorization Act" (DPL)*
- Public Law 4-47, *"Commonwealth Utilities Corporation Act"*
- Public Law 3-47, *"Coastal Resources Management Act"*
- Public Law 3-23, *"Commonwealth Environmental Protection Act"*
- Public Law 2-13, *"Homestead Waiver Act of 1981"*
- Public Law 1-8, *"Executive Branch Organization"*
- Public Law 6-32, *"Saipan Zoning Law"*

Regulations

- 1 CMC §§ 2651-2691, 2 CMC §§ 5101 - 5109, 5235, & 5324 (DLNR-DFW)
- 1 CMC §§ 2801-2808, *Administrative Hearing Procedure Rules and Regulations*
- 1 CMC §§ 2081-2082, 2 CMC §§1501-1543 (BECQ-DCRM)
- 1 CMC §§ 2646-2649, 2 CMC §§ 3101-3134 (BECQ-DEQ)
- 1 CMC §§ 2653, 2654, 2705 (DLNR)
- 1 CMC § 2404; 2 CMC § 4134 (Public Right of Ways and Facilities)
- 2 CMC §§ 3511-3521 (DPW- Solid Waste)
- 2 CMC §§ 4321-4328; 2 CMC §§ 4741-4751 (DPL)
- 4 CMC §§ 8111-8158 (CUC)
- 10 CMC §§ 3511 et sec (Saipan Zoning Law)