2020
Commonwealth of the Northern Mariana Islands
305(b) and 303(d)
Water Quality Assessment Integrated Report

Photo: Scott Eck - Bird Island in Saipan's Northeastern Coastal waters

Bureau of Environmental and Coastal Quality
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CONTENTS

FIGURES and TABLES

LIST OF ACRONYMS/ABBREVIATIONS

ALUS	Aquatic Life Use Support
APC	Area of Particular Concern
ATTAINS	Assessment, TMDL Tracking, and Implementation System
BEACH	Beaches Environmental Assessment and Coastal Health (Act)
BECQ	Bureau of Environmental and Coastal Quality
BMP	Best Management Practice
CALM	Consolidated Assessment and Listing Methodology
CAP	Conservation Action Plan
CJMT	CNMI Joint Military Training
CNMI	Commonwealth of the Northern Mariana Islands
CUC	Commonwealth Utilities Corporation
CWA	Clean Water Act (Federal)
CW-1	CNMI-Only Transitional Worker visa
COT	Crown of Thorns (Starfish)
DEQ	Division of Environmental Quality
DCRM	Division of Coastal Resources Management
DFW	Division of Fish and Wildlife
DLNR	Department of Lands and Natural Resources
DO	Dissolved Oxygen
DoD	Department of Defense
DPL	Department of Public Lands
DPW	Department of Public Works
DU	Designated Use
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentive Program
FIB	Fecal Indicator Bacteria
GIS	Geographic Information System
GPS	Global Positioning System
IR	Integrated Report (CWA 305(d) and 303(d))

IWDS	Individual Wastewater Disposal System
IWMP	Integrated Watershed Management Plan
LiDAR	Light Detection and Ranging
MCL	Maximum Contaminant Level
MMT	Marine Monitoring Team
MPA	Marine Protected Area
MST	Microbial Source Tracking
MVA	Marianas Visitors Authority
NAD	North American Datum
NARS	National Aquatic Resource Surveys
NAWQA	National Water-Quality Assessment Program
NCCA	National Coastal Condition Assessment
NHD	National Hydrography Dataset
NOAA	National Oceanographic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
NRCS	Natural Resource Conservation Service
NWCA	National Wetland Condition Assessment
qPCR	quantitative Polymerase Chain Reaction
RAM	Rapid Assessment Method
SDW	Safe Drinking Water
SOC	Synthetic Organic Compound
STV	Statistical Threshold Value
SVAP	Stream Visual Assessment Protocol
TMDL	Total Maximum Daily Load
UoG	University of Guam
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	Volatile Organic Compound
WEEC	Wastewater, Earthmoving and Erosion Control

WERI	Water Environmental Research Institute
WQS	Water Quality Standard
WQS/NPS	Water Quality Surveillance/Nonpoint Source (Branch)
WTD	Wastewater Treatment Disposal
WWTP	Wastewater Treatment Plant

ACKNOWLEDGEMENTS

The 2020 Commonwealth of the Northern Mariana Islands (CNMI) 305(b) and 303(d), Water Quality Assessment Integrated Report (IR) was prepared by a number of Bureau of Environmental and Coastal Quality (BECQ) staff and other contributors. However, special recognition is given to the men and women who tirelessly collect marine and surface water samples, biological data, conduct field assessments, and bring water quality violators into compliance with BECQ regulations, whether sunny and mild, or during tropical storm events. They are (in alphabetical order): David Benavente, Richard Brooks, Rodney Camacho, Erin Derrington, John Iguel, Joseph Ito, Malcolm Johnson, Carlos Ketebengang, Shawn Masga, Kelsey McClellan, Emily Northrop, Denise Perez, John San Nicolas, Olivia Tenorio, and Kathy Yuknavage.

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EXECUTIVE SUMMARY

The 2020 Commonwealth of the Northern Mariana Islands' (CNMI) 305(b) and 303(d) Water Quality Assessment Integrated Report is based on pertinent research data provided by various government and non-government agencies, and biological criteria and water quality data collected during fiscal years 2018 through 2019 (October 1, 2017 through September 30, 2019). Of note, 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 stormwater Best Management Practices (BMPs), as well as a reduction in rainfall.

The abundant rains experienced at the beginning of the strong El Nino events in 2015 through 2016, were followed by a very dry post-Peak phase starting in June 2017 to present (NOAA website:https://www.climate.gov/news-features/blogs/beyond-data/hawaii-and-pacific-islands-2017-has-been-anything-normal).

Then beginning in Mid-September 2018 typhoon season formally began, as shown in Table 1., below.

TABLE I. Severe Weather Conditions Experienced this Reporting Cycle

Weather Condition	Name	Date	Closest Approach	Sustained Winds	Source
Typhoon	**Mangkhut**	Sept. 10-11, 2018	115 miles W of Rota, 155 miles W-SW of Tinian, and 165 miles W-SW of Saipan	100 mph on Rota	Joint Typhoon Warning Center
Super Typhoon	**Yutu**	Oct. 24-25, 2018	Eye of the Typhoon passed directly over Tinian and the southern part of Saipan	130 mph on Tinian	Joint Typhoon Warning Center
Typhoon	**Hagibis**	Oct. 7, 2019	Passed north of Saipan and south of Anatahan	Saipan 120 mph, Anatahan 160 mph	Joint Typhoon Warning Center
Tropical Storm	**Bualoi**	Oct. 22, 2019	Passed between Anatahan and Sarigan, 87 miles SE of Pagan	133 mph	Global Disaster Alert and Coordination System

September 10th, 2018 Typhoon Mangkhut passed nearest to the island of Rota, then Tinian and Saipan. This was followed by several tropical depressions, then Super Typhoon Yutu, and Typhoon Hagibis and Tropical Storm Bualoi in FY2019. The CNMI having not fully recovered from Super Typhoon Soudelor last reporting cycle, incurred further infrastructure damage, and devastated vegetation, shorelines, and coral reef ecosystems. These events have had both direct and indirect impacts to the CNMI's Water Quality.

<u>Commonwealth of the Northern Mariana Islands Coastal Waters</u>

There are 240.5 ocean shoreline miles in the CNMI as listed in Table I-a, in Appendix I. During this reporting cycle, 99.8 ocean miles (42%) 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 140.7 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.

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 stormwater 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 birds; 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.

However, it should be noted that some public beach advisories happen at sites unlikely to have true fecal contamination. These sites are often at remote coastlines with high surf, or drainages carrying soil-laden stormwater with naturally occurring Enterococci that is known to grow in tropical environments. In these instances, the exceedances would trigger a public beach advisory even though there is little chance of actual fecal contamination that could cause a potential human health risk.

To address these microbial beach advisories, in 2018, the EPA approved the, "*Total Maximum Daily Loads for Coastal Waters Impaired by Bacteria on Saipan*", hereafter cited as the 2018 TMDL. It has been shared with policy makers to make informed decisions on where best to use funding for water quality protection infrastructure projects. The 2018 TMDL is also being implemented by BECQ and other CNMI natural resource agencies in ongoing efforts to improve Saipan's water quality.

Table II., on the following page provides the Consolidated Assessment and Listing Methodology (CALM) Categories for each of Saipan's Waterbody Segments (Watersheds) and their total coastal miles.

TABLE II. Saipan and Mañagaha Coastal CALM Categories

Watershed	Seg ID	Category							Total Assessed
		1	2	3	4a	4b	4c	5	
Saipan Watershed Coastal (Miles)									
Kalabera	CN12							4.1	4.1
Talofofo	CN13							5.4	5.4
Kagman	CN14							6.7	6.7
Lao Lao	CN15							1.4	1.4
Dan Dan	CN16		6.3						6.3
Isley (West)	CN17A							1.7	1.7
Isley (East)	CN17B							4.2	4.2
Susupe (North)	CN18A							2.4	2.4
Susupe (South)	CN18B							2.8	2.8
W. Takpochao (North)	CN19A							1.0	1
W. Takpochao (Central)	CN19B							4.4	4.4
W. Takpochao (South)	CN19C							1.9	1.9
Achugao (North)	CN20A							1.9	1.9
Achugao (South)	CN20B							2.4	2.4
As Matuis	CN21							2.2	2.2
Banaderu	CN22							5.1	5.1
Total Saipan Category miles			**6.3**					**47.6**	**53.9**
Managaha Watershed Coastal (Miles)									
Managaha	CN23							0.6	0.6
Total Managaha Category miles								**0.6**	**0.6**
TOTAL SAIPAN AND MANAGAHA COASTAL MILES									**54.5**

Figures I., on the following page maps Saipan's watersheds CALM Categories and the various causes of coastal water impairment.

FIGURE I. Saipan Coastal CALM Categories and Causes of Impairment

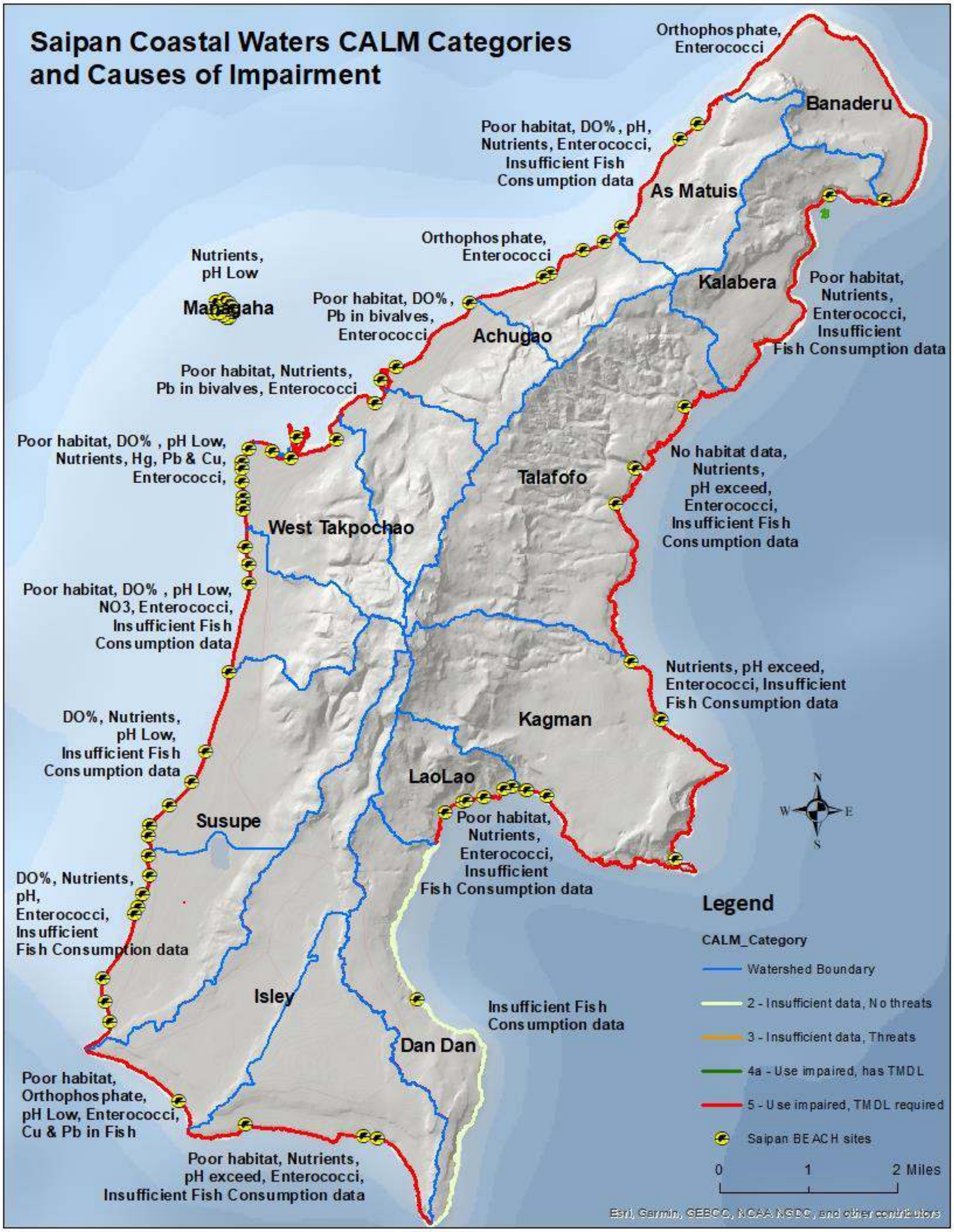


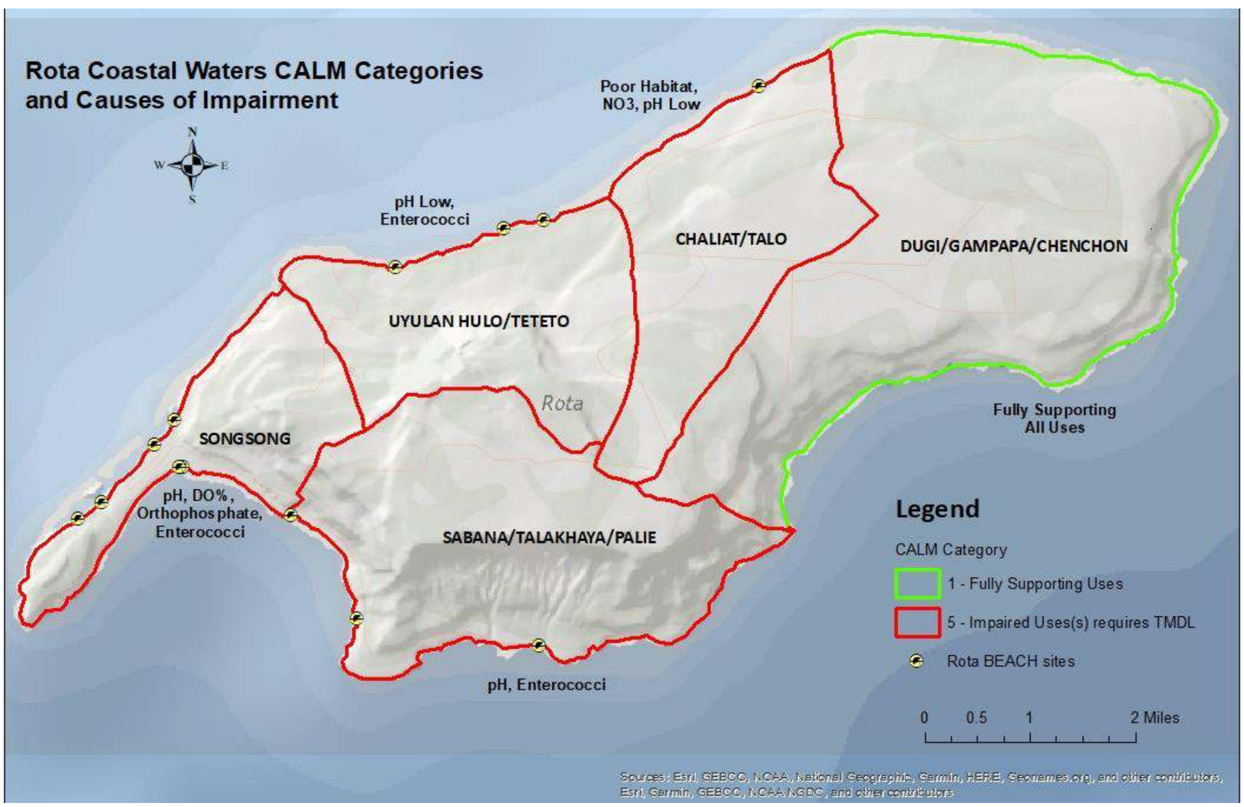
Table III., below provides the CALM Categories for each of Rota's watersheds and their coastal miles.

TABLE III. Rota's Coastal CALM Categories

Watershed	Seg ID	Category 1	2	3	4a	4b	4c	5	Total Assessed
Rota Watershed Coastal (Miles)									
Dugi/Gampapa/Chenchon	**CN1**	11.1							11.1
Sabana/Talakhaya/Palie	**CN2**							7.3	7.3
Songsong	**CN3**							7.9	7.9
Uyulanhulo/Teteto	**CN4**							3.5	3.5
Chaliat/Talo	**CN5**							2.6	2.6
Total Rota Category miles		**11.1**						**21.3**	**32.4**
TOTAL ROTA COASTAL MILES									**32.4**

Figure II., maps Rota watersheds' CALM Categories and the various causes of water impairment.

FIGURE II. Rota Coastal CALM Categories and Causes of Impairment



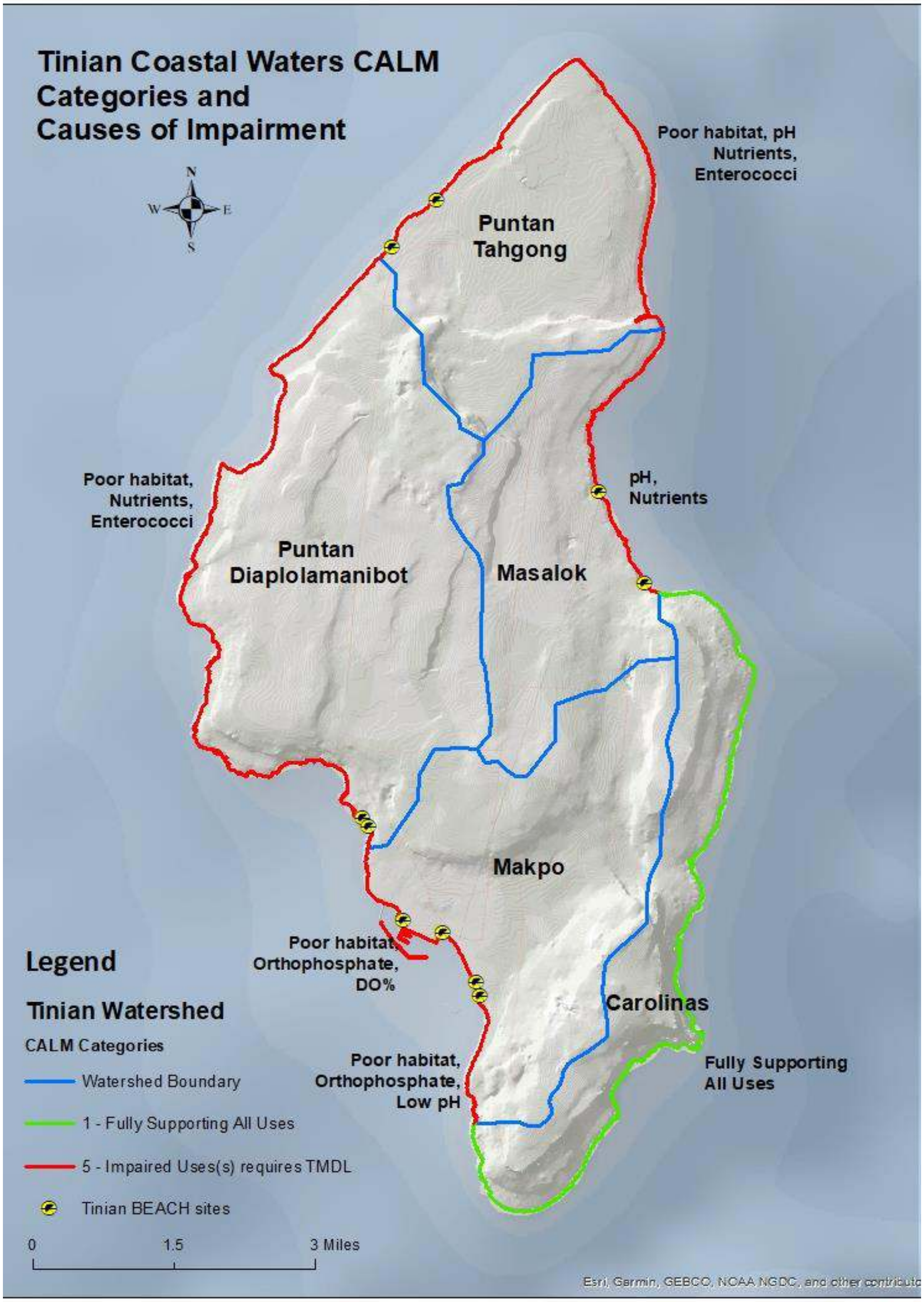
Rota and Tinian's reduction in percent of violations of the WQS for the Fecal Indicator Bacteria (FIB) Enterococci are also associated with reduced rainfall in 2017, as well as a substantive decrease in the islands' populations and wastewater production during last, and this reporting cycle. The reduction is associated with a downturn in the economy, decreased tourism, and a decrease in number of foreign workers allowed to remain in the CNMI by the Federal government. Table IV., below provides the CALM Categories for each of Tinian's watersheds and their coastal miles.

TABLE IV. Aguigan and Tinian's Coastal CALM Categories

Watershed	Seg ID	Category							Total Assessed
		1	2	3	4a	4b	4c	5	
Aguigan Watershed Coastal (Miles)									
Aguigan	**CN6**			8.2					8.2
Total Aguigan Category miles				**8.2**					**8.2**
Tinian Watershed Coastal (Miles)									
Masalok	**CN7**							3.5	3.5
Carolinas	**CN8**	10.4							10.4
Makpo	**CN9**							3.0	3.0
Makpo Harbor	**CN9H**							1.5	1.5
Puntan Daiplolaanibot	**CN10**							9.9	9.9
Puntan Tahgong	**CN11**							6.4	6.4
Total Tinian Category miles		**10.4**						**24.3**	**34.7**
TOTAL AGUIGAN AND TINIAN COASTAL MILES									**42.9**

Figures III., on the following page maps Tinian watersheds' CALM Categories and the various causes of coastal water impairment.

FIGURE III. Tinian Coastal CALM Categories and Causes of Impaired Designated Uses



As to the other DUs, only *Aesthetic Enjoyment* is supported by almost all CNMI coastal waters, except for Farallon de Medinilla (FDM) that is used as a live bombing range by the US military.

Table V., below provides the CALM Categories for each of Northern Islands and their coastal miles, as these islands have not had watershed boundaries established at the time of this writing.

TABLE V. Northern Islands' Coastal CALM Categories

Watershed	Seg ID	Category 1	2	3	4a	4b	4c	5	Total Assessed
***Northern Islands Coastal (Miles)**									
Farallon de Medinilla	**CN24**							4.2	4.2
Anatahan	**CN25**	17.3							17.3
Sarigan	**CN26**	6.0							6.0
Guguan	**CN27**	5.6							5.6
Alamagan	**CN28**	9.4							9.4
Pagan	**CN29**			28.2					28.2
Agrihan	**CN30**	19.3							19.3
Asuncion	**CN31**	7.0							7.0
Maug	**CN32**	9.5							9.5
Farallon de Pajaros	**CN33**	4.2							4.2
Total Northern Islands Category miles		**78.3**		**28.2**				**4.2**	**110.7**
				TOTAL NORTHERN ISLANDS COASTAL MILES					**110.7**

The causes and sources of each island's impairments will be discussed at length in Section C.3.8., in the latter half of this IR.

<u>CNMI Stream Systems</u>

There has been a significant amount of ground-truthing and GPS mapping of streams systems on Saipan and Rota. However, stream visual assessments using the new protocol have just begun this reporting cycle, beginning with the South Achugao watershed. Tinian, Aguigan, Mañagaha and FDM islands do not have existing stream systems.

Additionally, the CNMI received the updated National Hydrography Dataset (NHD) from the US Geological Survey (USGS) in 2017. USGS created the NHD at a resolution of 1:24,000. The Wetland and Streams Geographical Information System (GIS) data layer for Saipan was also updated last reporting cycle by the DCRM GIS specialist. These data provide more accurate delineation of intermittent (flowing in response to rainfall), and ephemeral (normally dry most of the year) streams, wetlands, and Susupe Lake. It is now estimated that 100.5 stream miles are in existence within the CNMI, with 50.3 stream miles failing to support at least one DU, the most common of which is the *Recreational* DU.

Most streams lack sufficient water quality data to assess all DUs. Of those streams that could be assessed, the most frequent causes for 303(d) listing were exceedances of the WQS for Enterococci, Orthophosphate (PO_4), Nitrate as Nitrogen (NO_3-N), and Dissolved Oxygen (DO%). Table VI., provides the CALM Categories and stream miles for each of CNMI's watersheds.

TABLE VI. CNMI's Streams' CALM Categories

Watershed	Seg ID	Category							Total Assessed
		1	2	3	4a	4b	4c	5	
Saipan Watershed Stream (miles)									
Kalabera	**12STR**		X						
Talofofo	**13STR**							X	
Kagman	**14STR**			X					
Lao Lao	**15STR**			X					
Dan Dan	**16STR**		X						
Isley (West)	**17STRA**			X					
Isley (East)	**17STRB**			X					
Susupe (North)	**18STRA**		X						
Susupe (South)	**18STRB**			X					
W. Takpochao (North)	**19STRA**		X						
W. Takpochao (Central)	**196STRB**							X	
W. Takpochao (South)	**19STRC**			X					
Achugao (North)	**20STRA**		X						
Achugao (South)	**20STRB**							X	
As Matuis	**21STR**		X						
Total Saipan Category (miles)			**24.8**	**25.4**				**44.2**	**94.4**
Rota Watershed Stream (miles)									
Sabana/Talakhaya/Palie	**2STR**							X	
Total Rota Category (miles)								**6.1**	**6.1**
Northern Islands Watershed Stream (miles)									
Anatahan	**25STR**			X					
Sarigan	**26STR**	X							
Guguan	**27STR**	X							
Alamagan	**28STR**	X							
Pagan	**29STR**			X					
Agrihan	**30STR**	X							
Asuncion	**31STR**	X							
Maug	**32STR**	X							
Farallonde Pajaros	**33STR**	X							
Total N.I. Category (miles)		**?**		**?**					**?**
								TOTAL CNMI STREAM (miles)	**100.5**

* Northern Islands streams have not been delineated to determine their miles.

It is unsurprising that most stream water microbial violations are from: 1) Wet weather NPS discharges such as those from deteriorating sewer lines and manhole cover overflows; 2) poorly constructed or aging homes, businesses, or apartments with failing on-site wastewater collection systems; 3) stormwater drainages near heavily populated areas; 4) collection sites near subsistence farms that lack BMPs to capture waste from free roaming domestic or feral livestock; or 5) waste from free roaming feral dogs and cats.

CNMI Wetlands

CNMI wetlands have not been fully delineated or valuated using the CNMI Wetland RAM. This is due to logistical issues and accessibility, especially to the Northern Islands. Table VII., below provides the CALM Categories for each of CNMI Watersheds' Wetlands and their total acreage.

TABLE VII. CNMI's Wetlands' CALM Categories

Watershed	Seg ID	Category							Total Assessed
		1	2	3	4a	4b	4c	5	
Saipan Watershed Wetland (acres)									
Talofofo	**13WET**						2.6		
Kagman	**14WET**	5.1							
Dan Dan	**16WET**						2.8		
Isley (West)	**17WETA**			26.4					
Isley (East)	**17WETB**						2		
Susupe (North)	**18WETA**						197.3		
Susupe (South)	**18WETB**						292.4		
W. Takpochao (North)	**19WETA**						20.2		
W. Takpochao (Central)	**19WETB**						20.5		
Achugao (North)	**20WETA**						12.9		
Achugao (South)	**20WETB**						25.1		
Total Saipan Category (miles)		**5.1**		**26.4**			**575.8**		**607.3**
Tinian Watershed Wetland (acres)									
Masalok	**7WET**		1.6						
Makpo	**9WET**						28.4		
Puntan Diaplolamanibot	**10WET**	12.9							
Puntan Tahgong	**11WET**	40.6							
Total Rota Category (miles)		**53.5**	**1.6**				**28.4**		**83.5**
Northern Islands Watershed Wetland (acres)									
Pagan	**29WET**			27					
Total N.I. Category (miles)				**27**					**27**
								TOTAL CNMI WETLAND (acres)	**717.8**

N.I. – Northern Islands

There are 717.8 wetland acres, not including lakes, on the islands of Saipan, Tinian, Rota and Pagan. This acreage was determined using the most recent delineations, the 2017 NHD and Wetland and Streams GIS data layer, and a 2015 survey of Tinian. The Tinian survey was conducted for the Pacific Naval Facilities Engineering Command as part of the CNMI Joint Military Training (CJMT) Environmental Impact Statement (EIS).

There is insufficient data available to fully assess CNMI wetlands. Therefore, most impairments are from hydrological changes due to fill, introduced non-native species, and flow regime changes, which are not considered pollutants. CNMI's Wetlands' causes and sources of impairment, are discussed in detail in Section C.3.3., under the heading of ALL CNMI WETLANDS, of this IR.

CNMI Lakes

There are now five lakes in the CNMI archipelago. Susupe Lake on Saipan is considered the most impaired. The remaining four lakes are on the Northern Islands; two on Anatahan, and two on Pagan. A second lake on Anatahan emerged after the 2003 eruption, which produced an open water body on the western coast. To date this lake has not been delineated to provide the acreage the lake covers. Table VIII., below provides the CALM Categories for each of CNMI's Lakes and their total acreage.

TABLE VIII. CNMI's Lakes' CALM Categories

Watershed	Seg ID	Category							Total Assessed (Acres)
		1	2	3	4a	4b	4c	5	
Saipan Watershed Lake (Acres)									
Susupe (South)	**CN18LAKB**							57.4	57.4
Total Saipan Lake Category acres								**57.4**	**57.4**
Northern Islands' Lake (Acres)									
Anatahan (Hagoi Haya)	**CN25LAKA**			149.0					149.0
Anatahan (Hagoi Lagu)	**CN25LAKB**		?						?
Pagan (Lagona Sanhiyong	**CN29LAKA**			34.0					34.0
Pagan (Sanhalom)	**CN29LAKB**			27.0					27.0
Total N.I. Lake Category acres			**?**						**210.0**
						TOTAL CNMI LAKES (ACRES)			**267.4**

In general, the Northern Islands' lakes have far less new anthropogenic stressors, than Saipan. However, Pagan's and Anatahan's lakes' sediment and/or biota may have been contaminated with heavy metals and other toxins from legacy military debris and munitions left over from WWII activities. This is based on the many toxicity studies conducted around military dumps sites on and around Saipan by Dr. Gary Denton, of the University of Guam's (UoG) Water Environmental Research Institute (WERI). See Section B.4.4., of this report for further details.

During this reporting cycle, there were 17 people living on the Northern Islands: seven on Alamagan; four on Pagan; and six on Agrihan. Some individuals do not live there permanently, but return to the more populated southern islands for supplies, or to attend to medical conditions, (personal communication Northern Islands Mayor, Vicente “Ben” Santos, December 5th, 2019).

In regards to the *Potable Water Supply* DU, no surface waters within the CNMI are used as a potable source, only ground water. In general, the quality of ground water used for Public Water Systems (PWS) meets EPA Primary Drinking Water Standards. Although there are isolated incidents of ground water contamination from underground or aboveground storage tanks. The CNMI Commonwealth Utility Corporation (CUC) minimizes the threat of these pollutants from entering the general PWS by employing a large number of production wells. These wells are spread extensively over the islands’ entire land surface. CUC pumps wells at relatively low flow rates to diminish infiltration. With that said, salt water intrusion, although not an EPA Primary Drinking Water concern, remains a significant issue on Saipan due to general unpalatability. CNMI’s Lakes’ causes and sources of impairment are discussed in detail in Section C.3.4., 314 (Clean Lakes Program) of this IR.

Recommendations for Improving CNMI Water Quality

Key recommendations for addressing identified point, and NPS water quality impairments in the CNMI, is for the Bureau of Environmental and Coastal Quality (BECQ) to continue collaborating with local and federal agencies and watershed communities to implement restoration activities contained within community vetted Conservation Action Plans (CAP), Integrated Watershed Management Plans (IWMP), and the 2018 TMDL.

In addition, BECQ has expedited the manner in which potential point sources of sewage discharges and stormwater contaminants are brought to the attention of the CUC field crew using tablets, Global Positioning Systems (GPS), and GIS mapping. CUC is now alerted immediately whenever “spikes” in Enterococci levels occur, or whenever overflows, sewage odors, or failing lift stations are observed during routine water quality sampling. In this way, corrective measures are put into place as quickly as possible resulting in more timely resolution of pollution events.

BECQ also provides training to the Department of Public Works (DPW) and the Mayors’ Offices on proper road grading and maintenance techniques to minimize NPS of contamination. BECQ assists with planning roadway improvements, such as sedimentation basins, swales, rain gardens, stormwater catchments, and other BMPs.

The BECQ Water Quality Surveillance and NPS (WQS/NPS) Program continues to conduct sanitary field surveys in impaired watersheds to identify other possible NPSs of contamination. WQS/NPS staff collaborate with watershed stakeholders and farmers to avail information and funding to improve watershed health. A primary partner is the United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) through their Environmental Quality Incentive Program (EQIP). This program continues to provide essential financial assistance for farmers to build dry litter piggeries, erect solar voltaic fencing to prevent cattle from free-range grazing, and to construct proper animal wastewater treatment systems.

Aside from these efforts, BECQ stresses to the public, business community, and political leadership that more focus and funding is needed to prevent water pollution. This includes funding to expand sewer infrastructure, provide regular maintenance of these facilities and stormwater drainages, *and* to dedicate public land for BMPs. Lack of dedicated funding has been the primary obstacle in making major improvements to CNMI water quality.

A summary of CNMI waterbody assessment methodology, and assessment results (causes and sources of impairment) are discussed in Section C.2., and C.3., of this report respectively. Subsequently, further detail is provided about each waterbody segment (watershed) in the three inhabited islands, and in the Northern Islands in Section C.4 that follows. Readers wishing to learn more about the health of watersheds in which they live or work are directed to the table of contents to navigate directly to the pages of interest.

PART A. INTRODUCTION

BECQ was established by Executive Order No. 2013-24, by the Late Governor of the CNMI, Eloy Inos. The Bureau under the Executive Branch is made up of the Division of Environmental Quality (DEQ) and the Division of Coastal Resources Management (DCRM). BECQ is responsible for monitoring, assessing, and protecting water quality within the CNMI, as well as managing land, air, water, and coastal quality. Both Commonwealth and U.S. Federal laws and regulations mandate this responsibility. Table B-1., contains the total size of CNMI water bodies.

TABLE B-1. Size of CNMI Surface Waters Assigned to Reporting Categories

Topic	Value	Source
CNMI Population	53,883	2010 US Census (April 2015)
Total Miles of Streams	100.5	2017 NHD Wetland and Stream GIS data Layer
- Non-perennial Streams	96.41	
- Miles of ditches or canals	4.1	
Number of Publically Owned Lakes	5	2016 Imagery, 2017 NHD
Acres of Publicly Owned Lakes	267.4	2016 Imagery, 2017 NHD
Square Miles of harbors and bays	6.6	2016 Imagery, 2017 NHD
Miles of Ocean Coast	240.5	2016 Imagery
Acres of Wetlands	717.8	2017 NHD GIS data Layer
Acres of Tidal Mangrove Wetlands	61.4	2017 NHD GIS data Layer

1 Stream length does not include Northern Islands' streams

2 Acreage include Susupe on Saipan, two lakes on Pagan, and two on Anatahan (Hagoi Lagu has not been delineated.

The WQS/NPS branch within DEQ was formed in 2012, prior to the merger of BECQ. This Branch is principally responsible for the BEACH monitoring Program, which includes collecting water quality samples, analyzing physical and chemical water quality criteria in the field, and assisting the BECQ Marine Monitoring Team (MMT) in collecting biological monitoring data. In addition, the WQS/NPS branch uses visual field assessments and remote GPS sensing to: conduct watershed surveys; identify causes of contamination; and map the potential sources of contamination. WQS/NPS then collaborates with other BECQ branches and CUC to prevent further contamination and subsequently, remediate or restore waterbodies as much as possible to their natural state.

The CNMI waterbody DUs are defined in detail within the CNMI Water Quality Standards (WQS), and Section C.2.2., of this 305(b) and 303(d) Water Quality Assessment Integrated Report (henceforth referred to as the "IR"). In short DUs include: *Support of Aquatic Life and Coral Reef Conservation; Fishing and the Consumption of Fish and Shellfish; Recreation in and on the Water; and Aesthetic Enjoyment*. Surface waters have one additional DU, their availability as a *Potable Water Supply*.

These findings are compiled into the EPA ATTAINs national database, which is used to calculate the total miles of CNMI shoreline, streams, and acres of wetlands and lakes impaired. The identified impaired waters are then included in the 303(d) list in Section C.3.2., of this report, thus satisfying the requirements of Sections 303(d), 305(b), 314, and 319 of the CWA.

In this IR, water quality and biological monitoring data collected from October 1, 2017 through September 30, 2019 were collected for all responsible agencies, analyzed, and compared to previous fiscal years to assess each waterbody's health. A waterbody is "healthy" when all monitoring sites within the waterbody is found to be fully supporting all of its DUs.

In addition, observed trends are also assessed and assigned one of the five (5) US EPA recommended CALM Categories. These range from CALM Category 1 where all DUs are supported, to Category 5 where at least one DU is not being supported. Category 5 requires that a TMDL be established for each pollutant in the waterbody. The TMDL is used to focus natural resource management and restoration efforts to minimize the source(s) of impairment.

This IR is the principal means by which the CNMI BECQ, Congress, and the public evaluate whether CNMI waters are meeting WQS, thus ensuring that all DUs are supported, and CNMI waters are "fishable and swimmable".

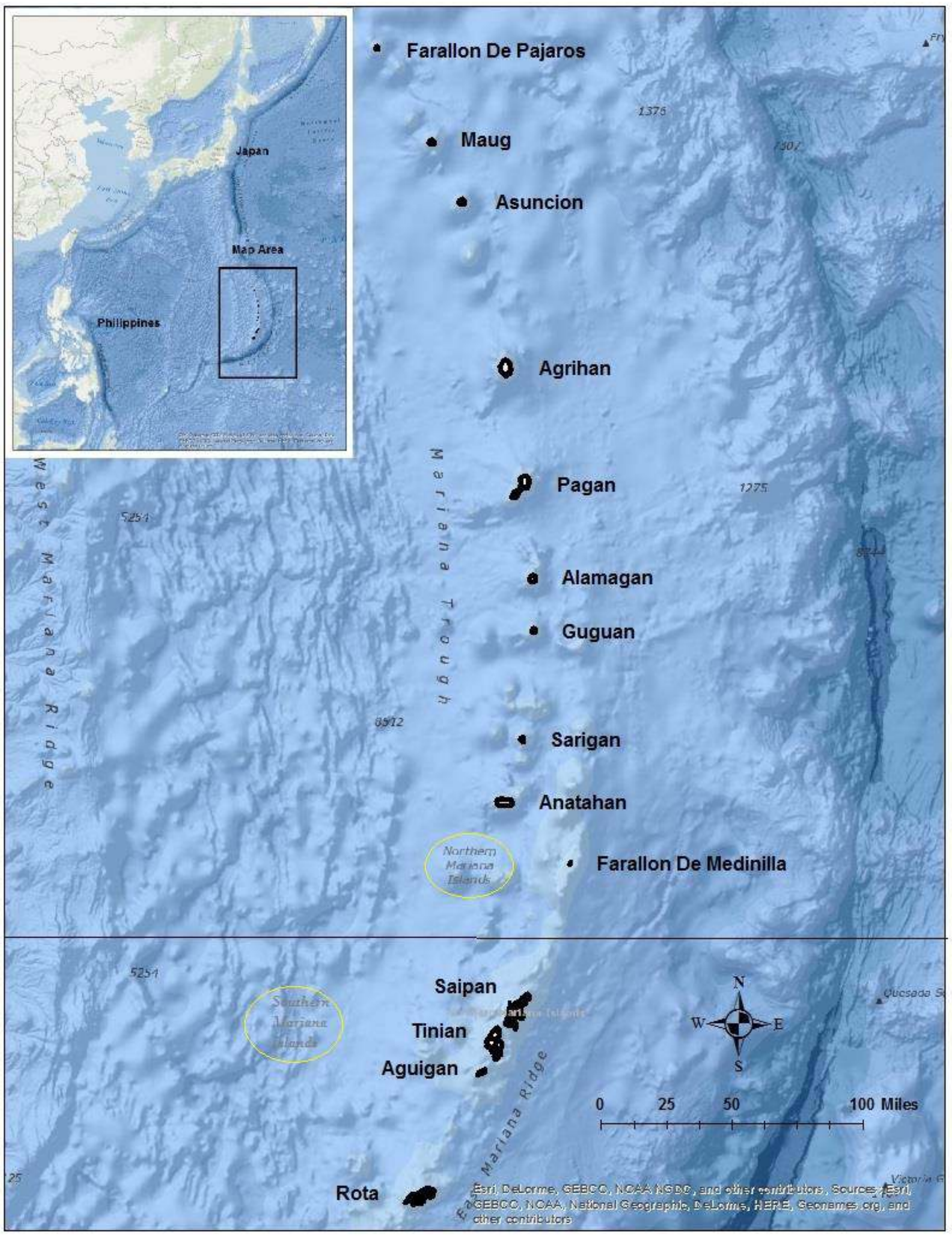
PART B. BACKGROUND INFORMATION

B.1. ALL CNMI SURFACE WATERS

The CNMI consists of two geologically distinct island chains located at 145° E latitude, and between 14° – 21° N longitude (Figure B-1., on the following page). Archaeological findings by Carson in 2016, validate the earliest human cultural presence on the islands as being "slightly older than 1500 B.C. (2017, Carson, M.T., and Hung, H).

The four *southern* Mariana Islands are around 41 million years old and were initially formed by volcanic activity, which permanently ceased around 10 million years ago. Trusdell, Frank A., reports in the 2009, "Marianas, Geology", article that, "…the southern Mariana Islands are now raised volcanic islands with caps of limestone. The limestone grew either as coral growth kept pace with the subsidence rate or during higher stands of the sea.", (Gillespie, Rosemary G., And David A. Clague, Eds., 2009, Encyclopedia of Islands. University of California Press. www.jstor.org/stable/10.1525/j.ctt1pn90r.).

FIGURE B-1. The Commonwealth of the Northern Marianas Islands



The Northern Islands lie to the northwest, residing on the still volcanically active Mariana Ridge, and "overlie an active subduction zone where the Pacific Plate, moving northwest at about 11 cm/year, passes beneath the Philippine Plate, moving west-northwest at 8.6 cm/year.", (2009. Trusdell, F.A.). The present composition and terraced appearance of the southern Marianas is the result of limestone reef deposition, geologic uplifting, and shifting sea levels.

This IR contains information primarily about the three southernmost islands of Saipan (including "Mañagaha", a small sand cay in Saipan's lagoon), and Tinian, and Rota. The vast majority (89 %) of the CNMI population lives and recreates on Saipan (2010, CNMI census data). Information is also provided on the Northern Islands, as Pagan has been targeted for homestead development, and most recently, military training exercises by the US Department of Defense (DoD). In addition, the marine waters surrounding the three northern most Islands of the archipelago, Farallon de Pajaros ("Uracas"), Maug, and Asuncion, were selected for further protection by US presidential proclamation through the establishment of the Marianas Trench Marine National Monument in 2009.

B.1.1. Monitoring Water Quality of Saipan and Mañagaha

Saipan is the capital of CNMI and is the largest and most populated of the islands, with 48,220 inhabitants (CNMI Census, 2010). Saipan has five Marine Protected Areas including: Mañagaha Marine Conservation Area (Waterbody Segment #23); Bird Island Marine Sanctuary (Kalabera, Segment #12); Forbidden Island Marine Sanctuary (Kagman, Segment #14); Lau Lau Bay Sea Cucumber Sanctuary (LaoLao, Segment #15); and the Lighthouse Reef Trochus Sanctuary (Susupe North, Segment #18A).

Due to the size of Saipan's population, its annual visitor numbers, and the ongoing rapid development on island since 2015, anthropogenic threats to Saipan's MPAs' water quality are considered greater than that to Rota, Tinian, or the Northern Islands.

This and the fact that BECQ has only a few staff dedicated to marine and surface water quality monitoring has resulted in more resources being dedicated to analyzing waterbodies on Saipan, and primarily on Saipan's west coast which has the largest number of visitors daily. Saipan's east beaches and Mañagaha are monitored less often. They are monitored on a rotational eight (8) week schedule to ensure that contaminants and other data are collected on at least a quarterly basis to capture seasonal changes.

B.1.2. Monitoring Water Quality of Rota and Tinian

Like Saipan's east beaches and Mañagaha, the less densely populated islands of Rota and Tinian, are monitored on a rotational eight (8) week sampling schedule. Rota has one designated MPA, the Sasanhaya Bay Fish Reserve (Sabana/Talakhaya/Palie Watershed, Segment #2). Tinian also has one MPA, the Tinian Marine Reserve (Makpo, Segment #9).

B.1.3. Monitoring Water Quality of Northern Islands

The 10 other northernmost islands (see Figure B-1., on page 11), commonly referred to as the "Northern Islands", are not routinely monitored, and rarely visited by BECQ staff.

Only the islands of Agrihan, Pagan, and Alamagan are occasionally inhabited by a few families. As was mentioned above, the marine waters surrounding the three most Northern Islands, Uracas (Segment #33), Maug (Segment #32) and Ascuncion (Segment #31), were designated as the *Marianas Trench National Marine Monument* in January 2009, by then President George W. Bush. "The Monument consists of three units: The Islands, Trench, and Volcanic Units covering 96,714 square miles of submerged lands cooperatively managed by the US Secretary of Commerce (NOAA), and Secretary of the Interior (US Fish and Wildlife Service) in coordination with the DoD and the CNMI government." (www.fpir.noaalgov/MNM/mnm_marians-trench.html).

The 2020 CNMI IR evaluation of the Northern Islands is based on marine water quality, and biological criteria monitoring data, but based on considerably less data than is available for the southern islands. Data collected in 2014 by the multi-agency "Bottomfish Research Cruise", which was conducted in June through July aboard the NOAA R/V Oscar Elton Sette, deemed that all of the Northern Islands were fully supportive of all their DUs. Subsequent visits by NOAA vessels in 2015 (NOAA R/V Oscar Elton Sette), and 2016 (NOAA R/V Okeanos Explorer) also found these to be high quality islands with outstanding and valuable resources for the CNMI. This is reinforced by the fact that the islands are remote and lack major developments, making new anthropogenic sources of pollutants highly unlikely if they were left in their present state, with the exception of FDM due to ongoing live fire military bombing exercises. Therefore, like waters of other National Parks, marine sanctuaries, and wildlife refuges, the waters of the Northern Islands have exceptional recreational and ecological significance.

However, it should be noted that past military impacts and ongoing exercises have left their legacy of unexploded ordnance and other debris, especially on the islands of Pagan, Anatahan, and FDM; the extent to which is yet to be fully assessed.

B.1.4. CNMI Classification of Marine Coastal Water Uses

The CNMI also has two Classes of marine waters designated in the WQS as Class AA (highest quality) and Class A waters (waters surrounding ports or marinas, surrounding FDM, or industrial areas).

B.1.4.1. Class AA Coastal Waterbodies

The majority of CNMI waters are Class AA meaning that, "…these waters remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-related source or actions." (2014. CNMI WQS). Waterbodies in industrial or harbor areas, and those surrounding FDM are Class A, which are known to have anthropogenic stressors. "It is the objective of this class of waters that their use for recreational purposes and aesthetic enjoyment be protected."

The DUs protected in both classes of waters are: *the support and propagation of marine life; conservation of coral reefs and wilderness areas; oceanographic research; aesthetic enjoyment and compatible recreation, inclusive of whole body contact (e.g. swimming and snorkeling); and other related activities* in keeping with the intent of the CWA to maintain these waters as "fishable and Swimmable".

In addition, the CNMI WQS adopted an anti-degradation policy that provides for three tiers of protection for waterbodies based on their attributes as specified in the "*2012 EPA Recreational Water Quality Criteria*". Tier 3 are high quality waters, which constitute an outstanding CNMI resource, where lowered water quality is *prohibited*. Tier 3 waters are within Class AA waters. This is followed by Tier 2 where the waters' quality exceeds the levels necessary to support propagation of fish, shellfish, and wildlife, and recreation in and on the water, but whose quality may be lowered if necessary, to accommodate important economic or social development. Tier 2 waters are also within Class AA waters, but with significantly more daily users. Finally, Tier 1 includes all waters where the existing level of quality routinely falls below or just above the applicable water quality criteria for DUs, which requires a minimum level of water quality necessary to protect its existing uses. Tier 1 waters include ports, marinas, harbors, and receiving waters for WWTPs outfalls with EPA National Pollutant Discharge Elimination System (NPDES) permitted mixing zones and are within Class A waters.

As seen in Table B-2., on the following page, all of the Northern Islands' coastal waters have been designated as Tier 3. This is important to note as the present frequency of inhabitants on the Islands and their population density could change in the future should homesteads be built, the US expand military training exercises there, or the CNMI tourism industry increase visitor travel to these islands. This poses an emerging anthropogenic threat to the islands' current pristine status. Therefore, further study is required to establish water quality baselines for each island and to regularly monitor and maintain these waterbodies as required by the CNMI WQS and the CWA.

Mañagaha, Aguigan, Tinian and Rota beaches (outside of their harbor areas), are also designated as Tier 3. They have exceptional resource value due to their relatively pristine state, and the small population having limited potential for causing anthropogenic stresses therein.

In comparison, Saipan's recreational beaches on the western shore are more densely used by residents and tourists. This underscores their value, making them an extremely important economic and environmental resource for the CNMI, upon which tourism greatly depends.

The more remote beaches in the far north and on the eastern shore of Saipan have exceptional resource value. For this reason, Saipan's Kalabera, Talofofo, LaoLao, DanDan and Banaderu watersheds are also designated as Tier 3. However, the remaining beaches on Saipan's west coast are more easily accessed and have had more impairments from WWII, and anthropogenic stressors from development and poor land use practices, and for this reason they are designated as Tier 2. Table B-2., on the following page provides the reason for these designations.

TABLE B-2. Classification of Coastal Water Uses and Waterbody Tier Designations

Island	Water Body	Segment	Class	Tier	Reason for Designation
Saipan	Puerto Rico Industrial Area	19A	A	1	Commercial port / Municipal wastewater outfall
	Agingan Point	17A, 18B	A	1	Municipal wastewater outfall
	Kalabera	12	AA	3	High quality / Outstanding resource
	Talofofo	13	AA	3	High quality / Outstanding resource
	Kagman	14	AA	2	Support propagation of fish, recreation
	LaoLao	15	AA	3	High quality / Outstanding resource
	DanDan	16	AA	3	High quality / Outstanding resource
	Isley	17A&B	AA	2	Support propagation of fish, recreation
	Susupe	18A&B	AA	2	Support propagation of fish, recreation
	W.Takpochao	19A,B&C	AA	2	Support propagation of fish, recreation
	Achugao	20A&B	AA	2	Support propagation of fish, recreation
	As Matuis	21	AA	2	Support propagation of fish, recreation
	Banaderu	22	AA	3	High quality / Outstanding resource
Managaha	All beaches	23	AA	3	High quality / Outstanding resource
Rota	East Harbor	3	A	1	Commercial port
	West Harbor	3	A	1	Commercial port
	All others	1-2, 4-5	AA	3	High quality / Outstanding resource
Tinian	San Jose Harbor	9H	A	1	Commercial port
	Aguigan "Goat Island"	6	AA	3	High quality / Outstanding resource
	All others	7 - 11	AA	3	High quality / Outstanding resource
Northern Islands	Farallon de Pajaros "Uracas"	33	AA	3	Marine National Monument
	Maug	32	AA	3	Marine National Monument
	Asuncion	31	AA	3	Marine National Monument
	Agrihan	30	AA	3	High quality / Outstanding resource
	Pagan	29	AA	3	High quality / Outstanding resource
	Alamagan	28	AA	3	High quality / Outstanding resource
	Guguan	27	AA	3	High quality / Outstanding resource
	Sarigan	26	AA	3	High quality / Outstanding resource
	Anatahan	25	AA	3	High quality / Outstanding resource
	Farallon de Medinilla	24	A	3	High quality / Outstanding resource / but ongoing military bombing exercises

B.1.4.2. Class A Coastal Waterbodies

Class A waters in the CNMI are limited to Saipan's Puerto Rico "Industrial" area, which includes the area 3000 feet from the shore and contains the seaport, marinas, and Sadog Tasi municipal Wastewater Treatment Plant (WWTP) outfall, located in Lower Base. Class A waters also include a 1,000 foot radius surrounding the Agingan Point municipal WWTP outfall on the southern tip of Saipan in the Isley Watershed. The only Class A waters in the Northern Islands are the waters surrounding FDM, due to ongoing military bombing exercises.

FIGURE B-2. Class A Waters within 3000 ft of Puerto Rico Industrial Area, Saipan

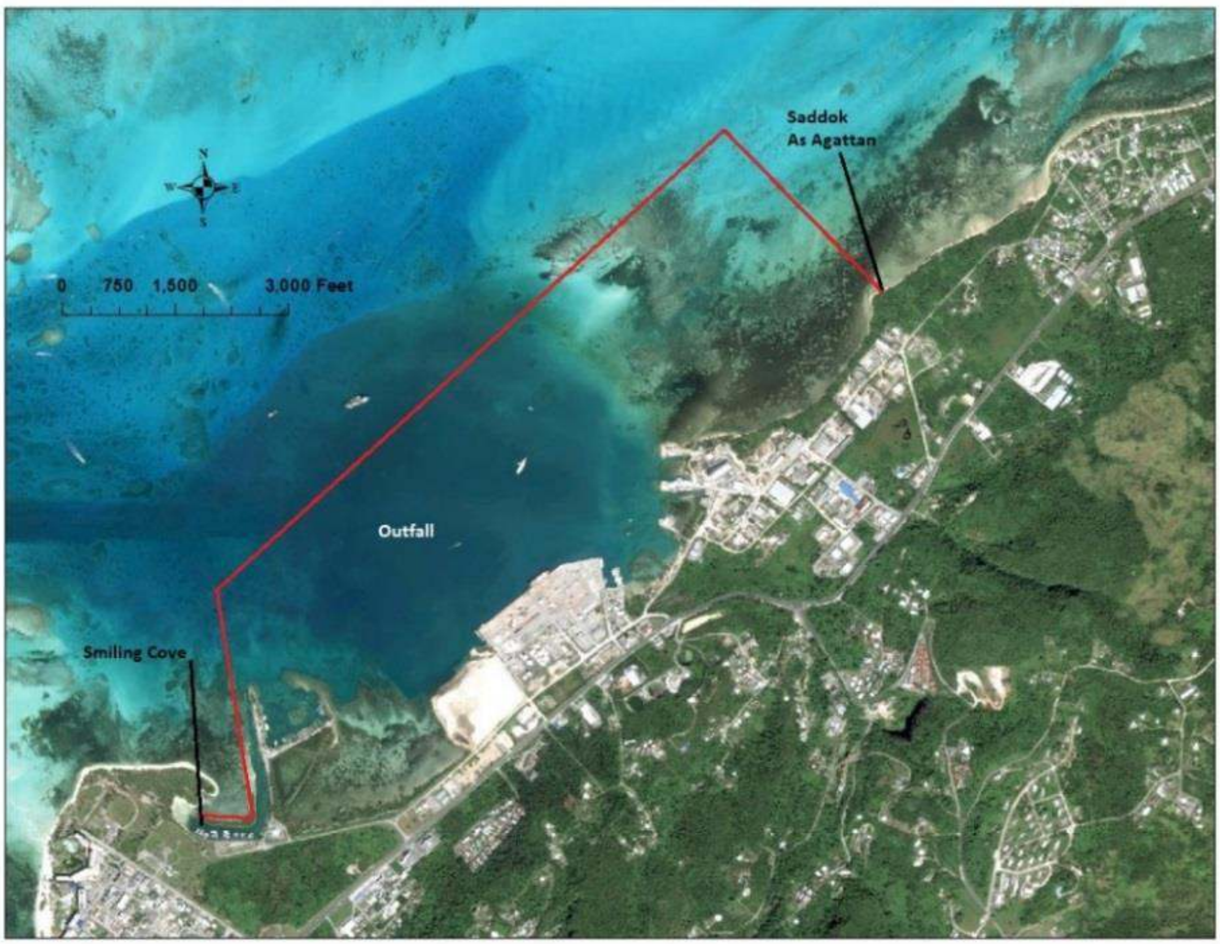
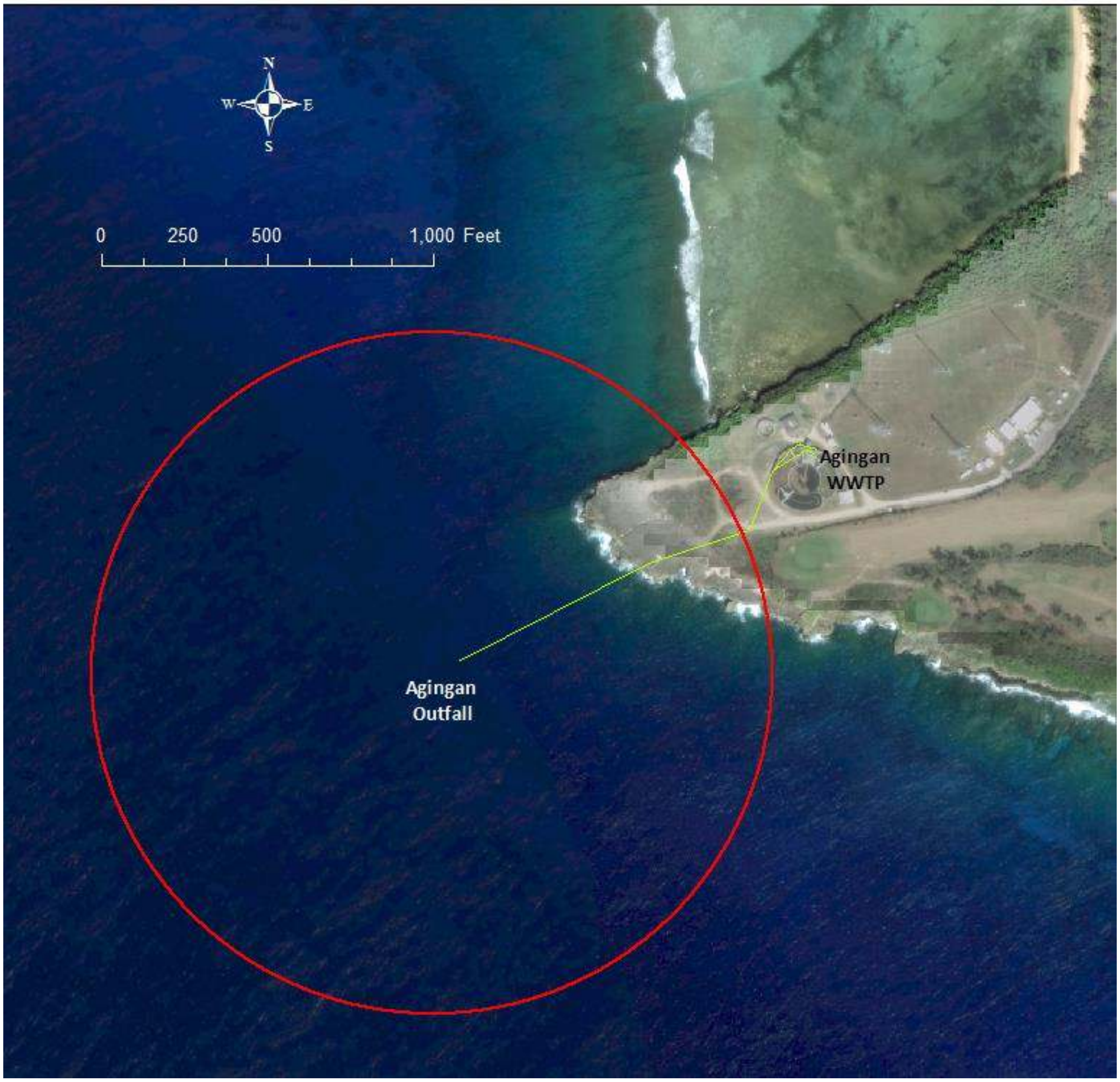


FIGURE B-3. Class A Waters within 1000 ft of Agingan Outfall (15°7' 7.9 N, 145°41'18.3 E), Saipan



The other Class A waters are limited to the existing harbors on Tinian and Rota.

FIGURE B-4. Class A Waters of San Jose Harbor, Tinian

FIGURE B-5. Class A Waters of East and West Harbor, Rota

Class A waters are protected for their *Recreational* and *Aesthetic Enjoyment* DUs. The WQS allow for other uses as long as those uses support the *protection and propagation of fish and shellfish*, and wildlife, and *recreation in and on the water with limited body contact.* In other words, the DUs recommended in the CWA.

B.1.5. CNMI Classification of Fresh Surface Waterbodies (Streams, Wetlands and Lakes) Uses

The CNMI WQS also define two classes of fresh surface water uses, Class 1 and 2. The uses to be protected in Class 1 waters, "…are for domestic water supplies, food processing, the support and propagation of aquatic life, groundwater recharge, compatible recreation and aesthetic enjoyment including water contact recreation with risk of water ingestion by either children or adults.", (2018. CNMI WQS). Class 2 water uses to be protected, "…are all uses compatible with the protection and propagation of fish and other aquatic life, groundwater recharge, and with recreation in and on these waters. Compatible recreation shall include limited body contact activities. Such waters shall not act as receiving waters for any discharge which has not received the best degree of treatment or control practical under technological and economic conditions and compatible with the standards established for this class. A zone of mixing is permissible in these waters." However, there are no Class 2 waters in the CNMI. Therefore, all CNMI surface waters are to remain in a pristine state with an absolute minimum of pollution or alteration of water quality from any human-related source or actions in order to meet their Class 1 DUs.

In addition, a Tier 3 status has been designated for those surface waters of high quality where lowered quality is prohibited. They constitute an outstanding resource and are listed in Table B-3., on the following page.

Streams occur mostly in limited areas where less permeable volcanic materials have been exposed. The raised limestone bedrock of the southern Mariana Islands is extremely permeable and highly erodible. Therefore, most rainfall that does not directly run off into the ocean percolates readily into the ground. The majority of CNMI streams are not tested for water quality on a regular basis due to lack of flow. A few sections of streams are wet most of the year, but none of which have measurable flow volumes through their entire length. Most of the islands' seasonally dry streambeds are used for hiking, and training by recreational and professional athletes, which demonstrates their aesthetic value. Freshwater shrimp and eels have been found in some of the more frequently flowing streams that contain perennial surface pools on Saipan and Rota. Although, BECQ has increasingly been able to identify riparian and aquatic organisms in and around streams, DLNR DFW has been solicited to take part in future stream assessments to better capture this data for more informed valuations of streams, and to prioritize restoration activities therein.

To date, only limited water quality data and visual field assessments have been completed on streams beginning with those in high priority watersheds of Saipan and Rota. As more water quality data becomes available and assessments and valuations are completed, streams of high value will be designated as Tier 3 waters due to their important hydrological function, and as sites providing essential native aquatic and wildlife habitat. Therefore, all wetlands are designated as Class 1 and Tier 3 waters, as shown in Table B-3., below.

TABLE B-3. Classification of Surface Water Uses and Waterbody Tier Designation

Island	Watershed Name	Segment	Type	Class	Tier	Reason for Designation
Saipan	Talofofo	13WET	Wetland	1	3	Hydrological Function/Aquatic and Wildlife Habitat/Outstanding Resource
	Kagman	14WET		1	3	Hydrological Function/Aquatic and Wildlife Habitat/Outstanding Resource
	DanDan	16WET		1	3	Hydrological Function/Aquatic and Wildlife Habitat/Outstanding Resource
	Isley	17WET		1	3	Hydrological Function/Aquatic and Wildlife Habitat/Outstanding Resource
	Susupe	18WETB		1	3	Hydrological Function/Aquatic and Wildlife Habitat/Outstanding Resource
	West Takpochau	19WET		1	3	Hydrological Function/Aquatic and Wildlife Habitat/Outstanding Resource
	Achugao	20WET		1	3	Hydrological Function/Aquatic and Wildlife Habitat/Outstanding Resource
	Kalabera	12STR	Stream	1	TBD	
	Talofofo	13STR		1	TBD	
	Kagman	14STR		1	TBD	
	Lao Lao	15STR		1	TBD	
	Isley (West)	17STRA		1	TBD	
	Isley (East)	17STRB		1	TBD	
	Susupe (North)	18STRA		1	TBD	
	Susupe (South)	18STRB		1	TBD	
	West Takpochau (North)	19STRA		1	TBD	
	West Takpochau (Central)	19STRB		1	TBD	
	West Takpochau (South)	19STRC		1	TBD	
	Achugao (Achugao)	20STRA		1	2	Hydrological Function/Aquatic and Wildlife Habitat/Outstanding Resource
	Achugao (Dogas)	20STRB		1	2	Hydrological Function/Aquatic and Wildlife Habitat/Outstanding Resource
	Achugao (Agatan)	20STRC		1	TBD	
	As Matuis	21STR		1	TBD	
	Susupe (South)	18LAKB	Lake	1	TBD	
Rota	Sabana/Talakhaya/Palie	2STR	Stream	1	3	High Quality/Hydrological Function /Outstanding Resource
Tinian	Masalok	7WET	Wetland	1	3	Hydrological Function/Aquatic and Wildlife Habitat/Outstanding Resource
	Makpo	9WET		1	3	Hydrological Function/Aquatic and Wildlife Habitat/Outstanding Resource
	Puntan Diaplolamanibot	10WET		1	3	Hydrological Function/Aquatic and Wildlife Habitat/Outstanding Resource
	Puntan Tahgong	11WET		1	3	High Quality/Aquatic and Wildlife Habitat/Hydrological Function /Outstanding Resource
Northern Islands	Pagan	29WET	Wetland	1	3	High Quality/Aquatic and Wildlife Habitat/Hydrological Function /Outstanding Resource
	Anatahan (Hagoi Haya)	25LAKA	Lake	1	TBD	
	Anatahan (Hagoi Lagu)	25LAKB		1	TBD	Newly formed
	Pagan (Lagona Sanhiyong)	29LAKA		1	3	High Quality/Aquatic and Wildlife Habitat/Hydrological Function /Outstanding Resource
	Pagan (Sanhalom)	29LAKB		1	3	High Quality/High Hydrological Function / Outstanding Resource

TBD – To be determined

There are a low abundance of wetlands, streams, and lakes in the CNMI. Wetlands occur primarily at low elevations where the water table intersects with the land's surface. Wetlands and streams together comprise less than 5% of the land (based on the 2017 NHD and Wetland and Streams GIS data layers). Wetlands alone cover less than 2% of the CNMI, the majority of which are patchily distributed around the islands of Saipan, Tinian, and Pagan. The importance of wetlands as the primary treatment for polluted surface water runoff, and for their hydrological function, wildlife habitat, and marine nurseries, establishes them as high quality waters, which constitute exceptional CNMI resources.

There are only five lakes within the CNMI, one on Saipan and the rest in the Northern Islands, two are on Anatahan and two on Pagan. They will be discussed in more detail in Section C.3.4. Section 314 (Clean Lakes Program) of this report.

The ground water resources of the southern islands, require careful management. Some ground water resources on Tinian and Rota are under the influence of surface waters, but are still used as sources for potable water. However, none of Saipan's surface waters are used in such a manner.

B.2. WATER POLLUTION CONTROL PROGRAM

BECQ's Water Pollution Control Program is comprised of several branches working in coordination, but with different mandates and responsibilities

B.2.1. Water Quality Surveillance/Nonpoint Source Program

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The WQS/NPS program's primary responsibilities are to enforce the CNMI WQS, monitor the quality of marine and surface waters (lakes, wetlands and streams), and notify the public when waters exceed the WQS. The program is also responsible for administering the Section 401 Water Quality Certification Program. These duties ensure that CNMI waters remain fishable and swimmable.

Each year the WQS/NPS Program receives approximately $1.2 million in funding from the: Beaches Environmental Assessment and Coastal Health (BEACH) Act; and CWA Sections 106 and 319. These funds also support the BECQ's Environmental Surveillance Laboratory, NPS demonstration projects, and other education and outreach activities.

B.2.1.1. CNMI Water Quality Standards

A triennial review of the CNMI WQS was completed in 2018. Revisions included the adoption of EPAs national criteria fresh and marine waters for ammonia, cadmium (Cd), selenium (Se) and the human health criteria updates for 94 pollutants, in order to protect both human health and aquatic life. This revision also included deletion of fecal coliform as a FIB.

The frequency with which water samples exceed the WQS in conjunction with biological marine monitoring data, and information gathered from visual field assessments, are used to identify impaired waterbodies (those not supportive of at least one DU). The WQS/NPS branch compiles this information into the CNMI biennial IR, which contains the 303(d) list of impaired waters.

The 303(d) list steers policy decisions, prioritizes waterbodies, and determines: 1) Where TMDLs are required; and 2) Which watersheds are in most need of remediation and restoration efforts. In the past Conservation Action Plans (CAP) were established for these areas. At the time of this writing, these CAPs are being revised and updated into Integrated Watershed Management Plans (IWMP). Currently, four IWMPs are being developed for Achugao, Garapan, and LaoLao on Saipan; and Talakhaya on Rota. They will be developed locally through a collaborative process, utilizing the best available science and stakeholder input. This makes the best use of limited financial and available human resources.

B.2.1.2. Water Quality Monitoring and Notification

The WQS/NPS staff collect weekly marine water samples from long-term BEACH monitoring sites discussed in detail in Section C.1.1. In addition, they collaborate with the MMT to conduct biological assessments of benthic, coral reefs, and seagrass habitats. Coastal marine waters, lakes, and streams are analyzed in situ for several physical and chemical parameters. In addition, water samples are brought back to the DEQ Environmental Surveillance Laboratory to test for total suspended solids, nutrients, and FIBs (Enterococci *and E. coli*). The lab provides water quality results to WQS/NPS for identifying exceedances of the CNMI WQS. Enterococci exceedances in coastal waters are reported to the general public and visitors in a publicized beach advisory, on posted signboards, and on social media.

Spikes or trends in WQS exceedances are further investigated by the WQS/NPS in collaboration with the Wastewater, Earthmoving and Erosion Control (WEEC) branch and the Division of Coastal Resources Management (DCRM) through visual field assessments of watersheds and lake and stream sampling. Potential point sources and NPS of pollution in upland areas are geo-referenced using GPS. This information is further analyzed with GIS software.

Since the WQS/NPS program began eight (8) years ago in 2012, there has been a marked improvement in how rapidly point sources of pollution are addressed. As soon as water quality results indicate there has been a point source pollution event, The WQS/NPS and WEEC programs narrow down the potential sources within the watershed. These findings are communicated directly to CUC engineers and field staff so they can examine the suspected sewer lines, lift stations, manholes, etc., for failures in the system, to immediately address the source(s) of contamination.

Should NPSs be identified in the field, WQS/NPS collaborates with DCRM and other watershed stakeholders to implement restoration actions contained in the community vetted IWMPs and TMDL recommendations. In addition, BECQ often collaborates with the local NRCS agents to encourage farmers to adopt sanitary agricultural practices and avail assistance from their EQIP program.

B.2.1.3. Section 401 Water Quality Certification Program

The CWA Section 401 Water Quality Certification Program is administered through provisions contained within the CNMI WQS. A 401 Certification is required for every federal permit, which may result in a pollutant discharge or fill into CNMI waters.

This includes NPDES permits for Saipan's municipal separate storm sewer system; the two municipal CUC WWTP on Saipan; the package Membrane Bioreactor treatment plant on Mañagaha Island; and for EPA General NPDES Permits, such as that for discharges from construction sites larger than one acre.

A Section 401 Certification is also required for any activity requiring an Army Corps of Engineer's Section 404 permit for discharge of fill, and for some activities regulated by the District Attorney under Section 10 of the Rivers and Harbors Act.

B.2.2. Marine Biological Monitoring Program

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The MMT was established in 1996 to better understand current conditions and health trends of jurisdictional coral reef and seagrass assemblages. In the past, the MMT has consisted primarily of BECQ staff whom have been the lead agency in terms of data collection and monitoring at long-term reef sites. The MMT have improved staff training, data collection techniques, data accuracy, methods for analyzing coral health and resiliency, and GIS mapping (Houk and Van Woesik, 2006, Houk and Starmer, 2008, www.cnmicoralreef.net/monitoring.htm). In 2008, a formal MMT long-term monitoring plan was developed, which outlined the program goals, methods, data handling, and other logistics (Houk and Starmer 2008). Currently, the MMT receives periodic support from local NGOs, the local NOAA field office, and faculty and students from the Northern Marianas College and the UoG. Recent coral restoration initiatives in the CNMI have aligned BECQ and DFW program goals such that DFW has once again become an active and engaged member of the MMT.

In the case of the CNMI, as with all island nations, discussions about water quality must include information regarding the status of nearshore marine communities. Marine communities can shift in response to nutrient enrichment, and other water quality impairment (Littler and Littler, 1985, Lapointe, 1997, Fabricius and De'ath, 2001). Similarly, changes in temperature, salinity, pH, Dissolved Oxygen (DO%), and other water quality criteria will also affect coral reef environments (Valiela, 1995). At any particular time, water quality concentrations are affected by rainfall or storm events, tidal fluctuations, and other atmospheric, climatic, and oceanographic conditions. This dynamic nature makes all water quality data very difficult to use for assessing a region, a project's impact on a waterbody, or a pollutant source if there is not a sufficient sample size with which to make inferences. It is much more efficient for island territories to use biological monitoring criteria coupled with water quality data to assess waterbody "health". Given this, the MMT collects regular benthic habitat data on selected and probabilistic sites on the islands' reef flats and slopes, seagrass beds, and lagoons to augment water quality data for assessment purposes.

The overarching goals of the program are to gain a better understanding of how and why marine resources are spatially distributed across the CNMI, what their current status is, how they change through time, and how they are affected by natural and human disturbances and management actions. This information then feeds back to support sound management and policy decisions that promote sustainable development and the conservation of natural resources and environmental integrity. Data gathered and analyzed by the monitoring program are consistently utilized in the planning and implementation of management goals and projects, including the identification and development of IWMPs for priority watersheds in the CNMI. The MMT continues to work closely with the WQS/NPS programs to identify areas of concern and evaluate the efficacy of management actions.

B.2.3. Wastewater, Earthmoving, and Erosion Control Program

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The CWA Section 106 and Section 319 fund BECQ's WEEC Program. These funds produced the "*CNMI and Guam Stormwater Management Manuals", Volume I and II*, which provides a framework for designers, engineers, and contractors to implement effective stormwater BMPs to protect vital water resources. Funds are also used to update field manuals for contractors and site inspectors, and to inventory and inspect in ground Individual Wastewater Disposal Systems (IWDS) throughout the CNMI.

B.2.3.1. Wastewater Treatment Disposal Regulations

Large numbers of CNMI residents rely, and will probably continue to rely, on in-ground IWDS for treatment of the wastewater they generate. The CNMI Wastewater Treatment Disposal (WTD) Regulations stipulates how these systems are to be constructed when no available municipal sewer collection system is available. The WTD Regulations require permits for all new on-site septic systems and "other" small IWDS. The WTD regulations also cover certain types of animal feed operations and sets limitations on, and prohibitions to, livestock grazing near streams and other CNMI waters. The WTD regulations were amended in 2009 to include a certification program for percolation testers, and requirements for wastewater treatment and collection system operators. This enabled the CNMI to administer standard nationalized exams and issue wastewater operator certifications that are fully transferrable to other states.

BECQ administers a prescriptive septic system construction, inspection, and operation permitting program which specifies septic system sizes based on measured percolation rates and surrounding land uses.

Another WTD covered by this program is small package plants, which *do not discharge to waters of the CNMI,* such as the treatment systems operated by the Rota Resort on the island of Rota, and LaoLao Bay Golf Resort on Saipan. These small plants reuse treated effluent for golf course irrigation. Another small plant is the leachate treatment system operated at the Marpi Solid Waste Landfill Facility on Saipan.

WTDs that discharge directly to *waters of the CNMI*, or which are directly hydrologically connected to surface waters (such as the Mañagaha Island treatment system), are regulated by the US EPA through their NPDES program.

In Addition to these protections, the WQS were revised in 2014 to address loop holes identified in the WTD regulations. The first being illicit discharges from outhouses, subsistence farm lots, and other small animal feedlots to stormwater drainages and intermittent stream beds. The WQS now define a waterbody to include water courses, whether “wet or dry”, to prevent these sites from being used for conveying wastewater off-site. In addition, the WQS also established a permitting program for other types of wastewater generation not mentioned in the WTD regulations. This includes the discharge of brine from reverse-osmosis desalination equipment, discharges from oil/water separators, and any other mechanism that may generate a liquid waste stream not covered by the WTD regulations.

B.2.3.2. Earthmoving and Erosion Control Regulations

The Earthmoving and Erosion Control (EEC) Permitting Program provides an overarching “One-Start” structure for the CNMI. Nearly all forms of development or construction within the CNMI are required to obtain a permit prior to commencing the activity.

One-Start Permits include approvals and conditions from three CNMI regulatory agencies, including BECQ, Department of Lands and Natural Resources (DLNR) - DFW, and Department of Community and Cultural Affairs - Historic Preservation Office.

The permit review process assures compliance with the EEC Regulations, which is the primary mechanism by which erosion and sedimentation from new construction sites are regulated within the CNMI, as well as post-construction stormwater quantity and quality. The EEC Regulations dates back to 1993. In 2006, BECQ (née DEQ) substantially revised the regulations by adoption of new site design and construction standards contained in the “*CNMI and Guam Stormwater Management Manuals”, Volume I and II*. This manual added up-to-date standards for both construction and post-construction stormwater treatment and BMP designs. Additional material was added in 2009, with a field manual and training program for construction field staff and erosion control inspectors. These improvements have proven successful, so much so that in 2010, both American Samoa and the Republic of Palau have incorporated the CNMI Manuals into their own regulations.

The One Start Permitting Program continues to evolve with the latest research in new methods and technology for managing erosion and stormwater, and promoting rainwater reuse and recharge, and low impact development to improve water quality treatment and to protect CNMI waters.

B.2.4. Safe Drinking Water and Ground water Management Program

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BECQ's Safe Drinking Water Branch's primary responsibilities are to administer and enforce the CNMI Safe Drinking Water (SDW) Regulations to ensure that the CNMI has a dependable and safe potable water supply. Semi-annual ground water monitoring has been required for years, especially for nitrate and salinity levels. Well owners are also required to test for organics, inorganics and radionuclides from entry points. In addition, a SDW Information System database is used to store and retrieve ground water quality information. However, methods for analyzing the collected data, and actions to be taken based upon the data are still lacking, including a comprehensive ground water management plan.

B.2.4.1. Safe Drinking Water Regulations

The SDW Regulations require that PWSs conduct regular monitoring for potential contaminants based on a schedule set by BECQ that meet or exceed the regulations of the Safe Drinking Water Act. PWSs that use ground water are required to monitor for contaminants that may be present in their raw ground water, as well as within the system if the system does not provide treatment for that specific contaminant at the entry point.

B.2.4.2. Well Drilling and Well Operation Regulations

The SDW branch also administers the CNMI Well Drilling and Well Operation Regulations. These regulations require that wells be drilled by a licensed well driller and specify where wells may be sited including set back distances from potential sources of contamination. Semi-annual water quality analyses are required from all owners of active wells in the CNMI. The regulations also designate geographic ground water management zones on Saipan.

B.2.4.3. Underground Injection Control Regulations

The SDW branch also administers the CNMI Underground Injection (UIC) Control Regulations. These regulations allow only Class V UIC wells for use in the CNMI. Examples of this type of well include in-ground WTDS (e.g., septic system leaching fields, that serve 20 or more people), and drilled injection wells for the disposal of reverse-osmosis brine wastewater.

B.3. COST/BENEFIT ASSESSMENT

The Department of Finance is asked in October to submit a report of the CNMI expenditures for any projects that were carried out during the previous two Fiscal years that would improve or protect ground, surface, and marine water quality. They are given until December 31st of the following Fiscal Year to submit their report, in this case December 31st, 2019.

Unfortunately, the Department of Finance was unable to provide new data this reporting cycle due to interruption of regular government hours of operation as a result of Super Typhoon Yutu and the Covid-19 pandemic. Therefore, the following is an approximation of the economic and social costs and benefits of actions taken to achieve the objectives of the CWA. As of now, current information is not available due to CNMI Government closures. We have included information from the 2018 IR and will include new information when it becomes available.

B.3.1. Costs

Information about the costs associated with capital investments in municipal facilities, and investments in NPS pollution control measures are provided in Table B-4 below. This data was provided by the CNMI Department of Finance.

TABLE B-4. CNMI Capital, Investments, Operation and Maintenance Costs

Expenditures	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
Capital investments in Municipality (Capital Improvement Projects)	$635,396	$366,996	$1,554,170	$772,009	$491,518
Investments in NPS Pollution Prevention (DPW)	$2,863,870	$4,396,047	$3,769,180	$3,064,001	$4,600,903

The average annual FY 16 and 17 DPW operation and maintenance costs of municipal facilities for Saipan, Rota, and Tinian for were $3,411,228, as calculated from date provided in Table B-5.

TABLE B-5. CNMI Annual Operation and Maintenance Costs of Municipal Facilities

Expenditures	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017*
Saipan	$2,069,423	$3,361,718	$2,756,776	$1,822,793	$3,192,001
Rota	$513,587	$624,646	$589,133	$655,322	$702,355
Tinian	$133,671	$171,622	$171,328	$202,394	$247,590
TOTAL	***$2,716,681***	***$4,157,986***	***$3,517,237***	***$2,680,509***	***$4,141,946***

The average annual costs for BECQ to administer CWA requirements, the BEACH Monitoring Program, and water pollution control activities for FY 18 and 19 was $1.18 million.

B.3.2. Benefits

The benefits to the CNMI as a result of the stated cost expenditures include protection and improvement of marine water quality with a total of 99.8 CNMI coastal miles (out of 240.5 miles) supporting all DUs. Since last reporting cycle a total of 15.8 CNMI coastal miles were removed from the 303(d) list as impaired for various water quality exceedances of the WQS. This included Rota's Sabana/Talakhaya/Palie, Uyulanhulo/Teteto, and Chaliat/Talo watersheds that now meet WQS for phosphate, and Saipan's Susupe North watershed that now meets the WQS for Enterococci. These improvements are in part due to the continued operation and maintenance of public utilities and stormwater BMPs.

In addition, the WQS/NPS branch enforces CNMI WQS to prevent point source and NPS contamination of marine waters. As an indirect result, the CNMI continues to entice visitors each year, who report that they come to enjoy area beaches and the surrounding waters. MVA's Visitor Arrivals survey showed a 30% increase in arrivals in FY2017 compared to the previous year, this was, "… the fourth highest fiscal year arrivals in Marianas history" ranking the CNMI as "the third fastest growing tourist destination in the world", according to the United Nations World Travel Organization (Marianas Visitor Authority News Release, October 2017).

Clean water is also important for supporting livelihoods during economic downturns and natural disasters as the CNMI experienced in the 1990's with the loss of the garment industry, and in 2015, 2018 and 2019 after extreme weather events.

Other benefits of CNMI expenditures is ground water protection. This includes identifying high quality aquafers and increasing well production in these areas, while removing impaired wells from production. This results in reduced costs for drinking water treatment due to cleaner intake waters.

Staffing expenditures allow BECQ and other environmental agencies to continue to enforce CNMI laws, regulations, and permit requirements to safeguard the Saipan lagoon, CNMI harbors, and coral reefs. These waterbodies and ecosystems are necessary to protect coastal developments and people from storm surge. They provide habitat for fish and shellfish that are the primary source of seafood for local consumption, and they make the CNMI a worthwhile tourist destination; the backbone of the CNMI economy.

B.4. SPECIAL STATE CONCERNS AND RECOMMENDATIONS

As in previous years, the most common sources of water quality degradation include: 1) stormwater runoff from existing roads and development causing sediment and other pollutant loading; 2) sewage discharge from failing wastewater infrastructure; 3) fecal contamination from free roaming feral and domesticated animals, and from animal containments; and 4) heavy metal contamination from WWII debris and dumpsites.

B.4.1. Erosion and Sedimentation

Erosion of, and sedimentation from, improperly designed secondary coral roads, off-road vehicle recreational activities, and short-term hiking trails cut through vegetation or through streambeds, are all of special concern as these can contribute to sediment loading to surrounding waters, turbidity and other NPS pollution. While hiking trails, and off-road recreational vehicles provide support for the *Aesthetic Enjoyment* DU, every effort should be made on the part of CNMI regulatory agencies to oversee creating, maintaining, and permitting more "sanctioned" trails and off-road areas that can support these activities, while protecting riparian buffer zones and other Areas of Particular Concern (APC) from harm, and preventing erosion and sediment from loading into surrounding waters.

During rainy season, fill material from coral roads and eroded material from disturbed areas washes into the ocean. During the dry season, more fill material is added to repair roads, which in turn erodes away the following rainy season, creating a cycle of repair and impairment. This activity has hindered water quality improvement for decades, and requires continued attention, which BECQ provides through road crew trainings, and infrastructure improvement planning. Aside from identifying funding for continued infrastructure maintenance and major improvements, dedicating land for constructing roadway BMPs has been a primary obstacle to improved water quality.

Environmentally sound construction of even one roadway is extremely costly, but well worth the investment. Phase IIa, IIb and III of the Cross Island Roadway Reconstruction Project was completed this reporting cycle. The reconstruction runs from DanDan watershed through Kagman and the Talofofo watersheds. This significantly reduced sedimentation and resulted in some improvement of bacteriological water quality last reporting cycle. However, once again Kagman has been 303(d) listed for Enterococci exceedances this reporting cycle.

In addition, to these roadway improvements, DPW has plans for constructing Route 36 to connect the paved road from Kingfisher golf course through the Talofofo watershed to Bird Island Look Out in the Kalabera watershed. A request for bids to construct Route 36 was publicized near the end of FY 2017. When completed, Route 36 should significantly improve water quality at Hidden beach, Jeffry's beach, and Old Man by the Sea in Talofofo. DPW will also begin reconstruction of Beach Road from Garapan to Quarter Master Road in Central and South West Takpochau through the North Susupe watersheds on Saipan's west coast. These latter two projects are targeted for completion by next reporting cycle (2017, communication with Henry Bautista, DPW, Engineer).

However, there are many more roadways requiring the same attention, most notably, Mt. Takpochau road, which reaches the highest elevation on Saipan at 1,554 feet. The runoff from this coral roadway adversely impacts several watersheds. It is currently graded with fill at least twice a year to maintain access. CNMI's budgetary constraints makes paving the road with the necessary stormwater BMPs cost prohibitive, and is the primary deterrent to resolving this source of pollution loading.

B.4.2. Failing Septic Systems, and Illicit, and Permitted Wastewater Discharges

BECQ has made significant strides in addressing the second source of water quality degradation, 'failing wastewater infrastructure', through the regulation of new developments using the BECQ WEEC "One-Start" Earth Moving permitting program (See previous Section B.2.3.). However, the problem of how to address older developments remains a challenge given limited funding sources. WEEC staff conduct household surveys on a village by village basis to identify IWDS that require upgrades or are in need of a pump out in order to properly collect and treat wastewater. In addition, CUC has regulations that require for households to hookup to existing sewer lines where available.

These IWDS and municipal sewer line repairs and improvements remain a high priority for the CNMI. A Nitrogen isotope (N) tracking study conducted by American University in FY2017-2018 found that the majority of Saipan's shoreline surface waters had Nitrogen values greater than 3‰ (Kiho, K. 2019. *"Identifying Hotspots of Nitrogen Pollution in Saipan"*. Final Report for NOAA CRCP, DCRM). These findings suggest that there is sewage-derived N availability that may pollute nearshore waters. The study also found that ground water inputs to the lagoon were highest during rainy season and that, "When surface and ground water were analyzed for nutrients, groundwater nitrate concentrations were nearly an order of magnitude higher than those in surface waters, indicating that groundwater flow is an important pathway for nitrogen pollution.", (Kim, 2019). These findings were consistent with findings from the quantitative Polymerase Chain Reaction (qPCR) human-marker Microbial Source Tracking (MST) study conducted by Sinigalliano, et.al., during the same time period (Sinigalliano, et.al., "*Molecular Microbial Source Tracking of LBSP-Associated Fecal Indicating Bacteria in Saipan Coastal Waters for September 2017, March 2018, and August 2018*", Jan 15, 2020, Final Report for NOAA CRCP, DCRM). Sinigalliano, stated that, "The whole region of the west central Saipan Lagoon shoreline appeared to be a relative 'hot spot' for human FIB marker", especially the near shore waters of the South W. Takpochao and North Susupe watersheds, which "appears to be chronically elevated…" due to a combination of NPS runoff and fecal contaminated groundwater discharge, "perhaps indicating sanitary infrastructure problems".

As such, the rehabilitation of Saipan's wastewater infrastructure continues to progress under the auspices of the court's stipulated orders entered into by the CNMI and EPA in 2009.

In addition, BECQ continues to alert CUC engineers where there are "spikes" in coastal water Enterococci levels, and uses the 303(d) list of impaired waters to guide responsible government agencies and policy makers to make informed decisions as to where fiduciary expenditures on wastewater infrastructure would be most beneficial.

The sewer line improvements completed this reporting cycle included replacing dilapidated asbestos cement pipes, installation of new sewer manholes and rehabilitation of existing manholes in South Susupe and West Isley watersheds (2020. As reported by Larry Manacop, CUC engineer). Two lift stations in Garapan were also upgraded. These are shown in Table B-6., on the following page.

The Northern most watershed, Banaderu (Segment 22) remains severely impaired due to Enterococci exceedances of the WQS at the Grotto Cave BEACH monitoring site. The restrooms' septic holding tank is sound and in good working order. However, when the restrooms are locked outside of regular office hours, tourists visiting the site have been reported to resort to using the surrounding jungle area out of necessity.

TABLE B-6. CUC Lift Station and Sewer Line Upgrades for FY2018-2019

	Location	Year Completed
Lift Station		
S-6 Sewer Lift Station	West Takpochao South middle road south of Garapan BEACH site	2019
S-10 Sewer Lift Station	West Takpochao South near to Garapan BEACH site	2019
Sewer lines		
Pachinko Ave., Susupe	South Susupe North East of sugar dock	2018
Tupak St., Susupe		
Hakmang Ave., San Antonio	South Susupe across from Afetna Rd and Saipan Apparel barracks	2018
Laiguan Ave., San Antonio		
Tarakitu St. & Lagua Ave. (SA)		
Pedro Yobbo Ave., Chalan K.	South Susupe between CK Dist #2 drianage and CK District #4 Lally	2018
Brigada St.., Chalan Kanoa		
Barbara Ave., Chalan Kanoa		
Dr. Torres Dr., Chalan Kanoa		
Hilarion St., Chalan Kanoa		
NMC., Finasisu	West Isley	2018

Source 2020 report, Larry Manacop, CUC Engineer

Additionally, when water cannot be trucked in to refill the water tanks, the restrooms must be closed, as they are not hooked up to the CUC water system. Human waste was identified as the primary source of Enterococci using a qPCR-MST human-marker (Sinigalliano, 2020).

To prevent further misuse by visitors, the Tourism Management Working Group comprised of WQS/NPS, DCRM, DLNR Parks and Recreation, and MVA completed a pilot User Capacity Survey at the Grotto in FY2017. This prompted DCRM to hire a NOAA fellow to assess user capacity limits and acceptable fees for entrance into the Grotto, and other prime tourist sites. The assessment will be used to develop a sustainability plan for these sites in FY 2020, the results of which will be shared with the legislature and DLNR, which has jurisdiction over the Park.

This reporting cycle DLNR had sufficient funding to increased Ranger surveillance at the Grotto and to install a gate to prevent visitor access afterhours. In addition, the legislature passed House Bill 21-72, in FY2019 which if passed will turn over any fees collected from tourists visiting sites in Marpi (Banaderu Watershed) from the Department of Public Lands (DPL) to DLNR. Should this transpire collected fees will support park maintenance and enforcement of environmental laws at the Grotto, Banzai Cliff, Kalabera Cave, Bird Island and Bird Island lookout, and Suicide Cliff.

MVA is now in its 2nd year of implementing the Tour Operators' Certification Program. The program educates tour guides about CNMI environmental laws, and promotes their enforcement of proper sanitary practices by their customers. For this, MVA was awarded the Gold Pacific Asia Travel Association Award in Education and Training in Malaysia on September 14th, 2018.

This illustrates the importance of continued water quality monitoring, visual field assessments, and intra-agency collaboration to identify and address sources of fecal contamination.

B.4.3. Feral and Domesticated Animal Fecal Contamination

The third source of water quality degradation is: fecal contamination from free roaming feral animals and livestock; and wastewater discharge from penned domesticated animals. The CNMI WQS gives the WQS/NPS branch authority to impose a "Notice of Violation" (NOV) to any farmer or other individual who discharges animal or human wastewater to any waterbody, and provides for mandatory setbacks. This amendment addresses a previous gap within the DEQ Wastewater regulations for small farm operations and outhouses. Individuals that wish to continue farm operations must come into compliance with the CNMI WQS to avoid fines or penalties. Should violators be unable to pay, they are directed to meet with local NRCS agents to obtain sanitary animal pen designs through their EQIP program. EQIP also offers financial assistance to eligible farmers for design construction to prevent further adverse impacts from improper agricultural operations.

In addition to availing NRCS expertise, WQS/NPS staff act as a liaison between farmers and DPL for obtaining agricultural land exchanges. This has resulted in the relocation of farms to more appropriate areas within the watershed to prevent further contamination of waterbodies downstream.

Implementation of CAPs, IWMPs, and TMDL recommendations by WQS/NPS, WEEC, DCRM, and NRCS is the primary means by which domesticated animal waste pollution is controlled. However, more action is needed to address fecal contamination from feral pigs, and stray dogs and cats that can be found in large numbers at various beach sites, wetland areas, and in stream beds throughout the islands. This was substantiated in Sinigalliano's qPCR-MST study which states, "Dog fecal bacterial marker appeared to be relatively wide-spread about the island, and many sample sites had significantly elevations of dog FIB marker.", (Sinigalliano, 2020). "This includes the western central region of the Saipan Lagoon shoreline."

B.4.4. Toxins and Heavy Metal Contamination of Fish and Other Biota

Traversing from Saipan's northern tip, to the south, and back again; Dr. Denton, et.al, of the UoG WERI found that Kalabera, Talofofo, East and West Isley, South Susupe, Central and North West Takpochau, South and North Achugao, and Banaderu watersheds nearshore sediments were contaminated with heavy metals associated with WWII dumpsites, and other legacy munitions, and munition constituents.

A previous study by Denton in 2011, found elevated levels of mercury (Hg) in biota in the West Takpochau watershed, which was sourced to the hospital incinerator (2011. *Impact of a Medical Waste Incinerator on Mercury Levels in Lagoon Fish from a Small Tropical Island in the Western Pacific*. Denton, et.al). Hg was also found in coastal sediment surrounding the island of Mañagaha.

Denton's 2016 study found high levels of heavy metal contamination in sediment and biota associated with WWII wreckage, dumpsites, and unexploded ordinance. This included Agingan Point wastewater outfall, Central and North West Takpochau, South Achugao watersheds, and Banzai Cliff.

Next reporting cycle, a study of heavy metals and VOCs in streambed sediment will be conducted in six (6) priority watersheds on Saipan. The results of which will direct where further fish tissue and biota studies are needed on Saipan.

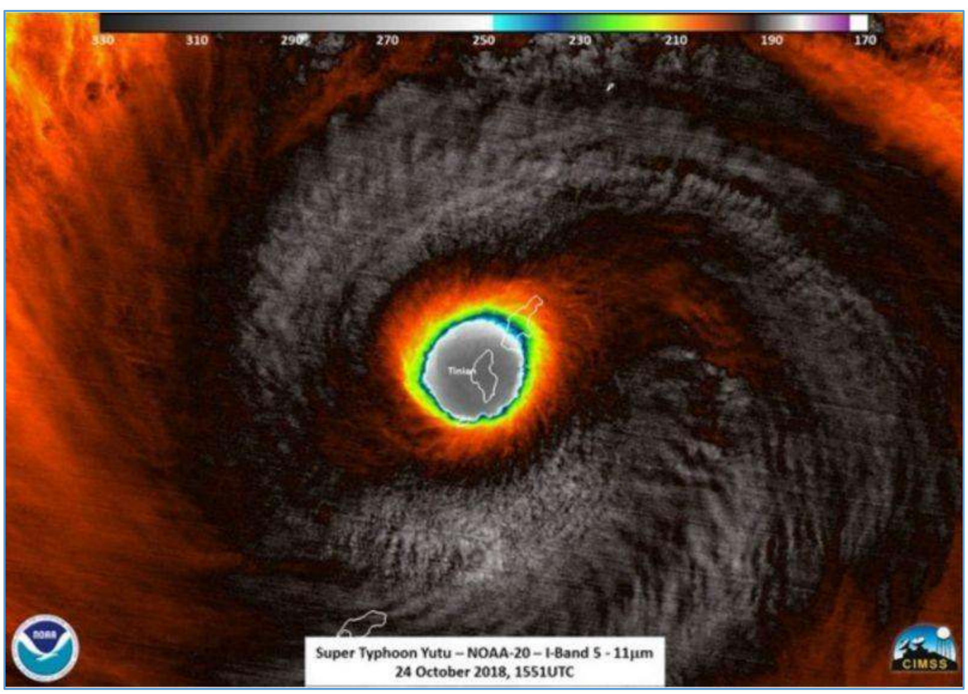
Given myriad of military waste and dumpsites left on Tinian, Rota, Pagan, and Anatahan islands after WWII, and continued bombing exercises on FDM, more information are needed about these islands, and stochastic modeling to better assess the impacts of this contamination on the support of the *Propagation of Aquatic Life,* and the safety of *Fish and Shellfish Consumption* by the general public from waters surrounding these islands.

B.4.5. Climate Related Severe Storm Event Impacts

MMT biological data used in Benavente, et.al.'s, 2019 "*Long-Term Marine Monitoring Program Final Report*" prepared for NOAA., was able to localize, "…effects of climate change related disturbances on CNMI reefs.", (2019. Benavente, et.al.). The report stated that above average ocean temperatures in 2013, resulted in widespread coral bleaching throughout the archipelago and since then, "CNMI reefs have been exposed to above average sea surface temperatures almost annually, with the largest bleaching event occurring in 2017."

In addition to increased temperatures, the CNMI was again hit by several climate related severe storm events this reporting cycle. Typhoon Mangkhut did most of its damage to the island of Rota in September 2018. This was followed by Category – 5 Super Typhoon Yutu the following month (Figure B-6.).

FIGURE B-6. NOAA Satellite Imagery of Super Typhoon Yutu's Eye Over Tinian



The eye of Yutu passed directly over the island of Tinian, causing catastrophic damage there, and to the southern tip of Saipan. This included collapsed infrastructure, fallen trees, flooding, and sediment loading to surrounding waters.

Benavente, et.al., reported that Yutu, "… further affected near-shore marine habitats within the CNMI.", and, "Storm surge pummeled reefs and pulled storm debris (trees, shipping containers, and roofing tin) into the water and scraped, smashed or upturned coral colonies. The effects of these events naturally vary between each type of reef; however, general trends suggest that reef health has declined for most sites as a result of such disturbances." (2019. Benavente, et.al.).

The report also found a general decline in coral cover at long-term monitoring sites related to climate related disturbances. However, BECQ lacks sufficient water quality data at these long-term monitoring sites to confirm whether or not there are water quality pollutant sources contributing to this decline in coral health. The greatest affected long-term sites on Saipan include Bird Island, Tank Beach, Wing Beach, Coral Ocean Point, Obyan, and the associated inner reefs of Mañagaha. In addition, a localized outbreak of Crown of Thorns (COTS) was reported at Bird Island in 2019. The MMT plans to use 2020 surveys to assess coral mortality as a result of COTS predation at this reef site, which will be reported in the next IR.

Given these cumulative climate related impacts, and the expected increase in the intensity of storms (two Super Typhoons in less than five years), every effort must be made to incorporate climate adaptation practices into all new and existing development plans. This includes, but is not limited to, developing green shoreline plans that allow for expanded wetland areas to lessen storm surge impacts such as flooding, and loss of shoreline from scouring and erosion. Climate adaptation plans must also identify funding for necessary maintenance after such events.

PART C. SURFACE WATER MONITORING ASSESSMENT

C.1. MONITORING PROGRAMS

BECQ maintains several monitoring programs; Safe Drinking Water Quality; Marine and Surface Water Quality; and Marine Biological Criteria Monitoring Programs. Together their results are used to evaluate waterbody health. Each branch is asked to submit their water quality and biological monitoring data collected at the end of the two fiscal years (the first week in October of the reporting cycle year, in this case 2019). At the same time BECQ requests that fellow CNMI natural resources agencies share any research or surveys completed over the past two fiscal years. CUC, and DPW are asked to provide reports on what projects were completed to improve and protect ground, surface, and marine water quality. All contributors are given until December 31st (in this case December 31, 2019) to submit their data for inclusion in the IR analysis.

The Safe Drinking Water Monitoring Program that was briefly discussed in Section B.2.4., will be described in further detail in Part D of this report.

C.1.1. Coastal Marine Water Quality Monitoring and Notification

BEACH Act funding supports the WQS/NPS Water Quality Monitoring and Notification Program. Maps of the long-term CNMI BEACH water quality and MMT biological criteria monitoring sites surrounding Saipan, Mañagaha, Rota and Tinian are contained at the beginning of each island's "Five-Part Categorization Subsection" in Sections C.3.5., C.3.6., and C.3.7., respectively.

On a weekly basis, 38 marine water monitoring, or "West Beach" sites are sampled along Saipan's most heavily used west coast. The less used northeast and southeast coasts of Saipan have only six (6) BEACH sites each, which are monitored using an 8-week rotational schedule coupled with the island of Rota (n = 12). When these sites are being monitored weekly, Tinian and Mañagaha sites are only monitored once a month for the entire 8-week cycle. After the 8-weeks, the islands are swapped and Tinian (10 sites) and Mañagaha (11 sites) are sampled weekly, while Saipan's east beach and Rota sites are sampled just once per month. In so doing all beach sites are sampled across the various seasons, while meeting boat transport availability, staffing, and other budgetary constraints.

Samples are collected and given to the BECQ Environmental Surveillance Laboratory for analyses within allowable holding times, as specified in the BECQ Laboratory Quality Assurance Program Plan (QAPP). WQS/NPS and the Lab maintains, and rigorously follows the QAPP, which includes Standard Operating Procedures (SOP) for sampling, testing, and reporting results.

The QAPP has two primary functions: 1) to assure that proper quality control practices are implemented in day-to-day laboratory operations; and 2) to assure that the reported data are valid, of known precision and accuracy, and therefore, scientifically defensible.

The microbiological, chemical and physical parameters include: Enterococci and *E. coli* bacteria (MPN/100ml); salinity (‰), Dissolved Oxygen (DO%); Temperature (°C), pH, Turbidity (NTU), and Total Suspended Solids.

Orthophosphate (PO_4) and Nitrate (NO_3) levels have been tested in drinking water by BECQ laboratory using a Flow Injection Analyzer (FIA) method since 2007. Refinement of the FIA method for marine water began in 2013, as well as training new personnel to perform the analyses. A new BECQ Laboratory Manager was hired last reporting cycle and is trained to perform EPA Method 353.2, which provides accurate and scientifically defensible nutrient levels in marine water. At present, data is limited to BEACH monitoring site and reef flat sites surrounding the islands of Saipan, Mañagaha, Rota and Tinian. However, there are no new nutrient data for the Northern Islands.

Although the data is limited in number, recent results confirm that the 2004 reported orthophosphate levels were inaccurate and should no longer be considered when making an assessment of a waterbody's support of the *Propagation of Aquatic Life* DU.

BECQ Laboratory is also in the process of mastering two qPCR methods with oversight from NOAA's Atlantic Oceanographic and Meteorological Laboratory (NOAA AOML), one of the leading national labs that is conducting technology transfer training of qPCR MST.

The first method, EPA 1609, was adapted for use on the Pall™ GeneDisc system to obtain rapid, same-day Enterococci results. The second is a MST method based on the HF183 human gene, Dog, Pig, Cow and Gull bacteria markers that NOAA AOML adapted for use on the Pall™ system. These markers were used in a pilot study to investigate the source of fecal contamination at several sites surrounding Saipan that frequently exceed the WQS for FIB.

Thanks to NOAA AOML's communication with the Pall™ Corporation, the company is considering producing MST GeneDiscs on a commercial scale for both human and animal source tracking purposes.

Data collected from this pilot study and WQS/NPS and MMT programs in FY2018 – 2019 were used to assess whether CNMI waterbodies support the *Propagation of Aquatic Life*, *Fish and Shellfish Consumption, Recreational Use, and Aesthetic Enjoyment* DUs, as well as determine the source(s) of fecal contamination.

C.1.2. Marine Biological Criteria Monitoring Program

Water Monitoring Programs that only rely on water quality data to assess ecological health may not be statistically rigorous enough to detect change over time due to low sample numbers compared with the high rates of change in pertinent water quality criteria. One obvious way to enhance the collection of water quality data is through the use of continuous recording instruments. Currently, this approach is very expensive and time consuming when considering the vast number of waterbodies that exist in the CNMI. In contrast, a more cost and time efficient method is to gather data on the distribution and abundances of benthic dwelling organisms that live within CNMI's coastal waters, in conjunction with marine water quality data. Therefore, the CNMI MMT was established in 1996 to collect such data.

In 2010, the CNMI collaborated with US EPA Region 9, Guam EPA, and American Samoa EPA to carry out the first National Reef Flat Probabilistic Monitoring project as part of the Environmental Monitoring and Assessment Program for the Pacific Territories. Each island territory was provided with 50 randomly selected reef flat sites generated by EPA Office of Research and Development using a compatible probabilistic design and common set of survey indicators. Of the 50 randomly selected sampling sites assigned to the CNMI, 19 were assigned to Rota, 16 to Tinian, and 16 to Saipan. Each site was tested for pH, temperature, DO%, salinity, turbidity, Photosynthetically Active Radiation, Chlorophyll-a, dissolved nutrients (orthophosphates, nitrites, nitrates, ammonia, total phosphorus, total nitrogen), total suspended solids, and Enterococci. The MMT assessed the floral and faunal composition of the reef flat habitats, using the Aquatic Life Use Support (ALUS) method as described in detail in the Assessment Methodology Section, C.2.3.1.

This same Probabilistic Monitoring was repeated as part of the 2015 National Coastal Condition Assessment (NCCA), and will be conducted again in 2020.

The MMT has collected biological monitoring data from the islands' reef flats, reef slopes, seagrass beds, lagoon, and harbors for over 20 years. This reporting cycle MMT monitoring analyses from FY16 through FY19 (2019. Benavente, et.al.), was used in conjunction with water quality data to assess a waterbodies ability to support the *Propagation of Aquatic Life* DU, and to make other resource management and policy decisions.

C.1.3. Surface Water Quality Monitoring Program

In the past water quality monitoring was limited to coastal waters and Susupe lake on Saipan. However, since the *CNMI Surface Water Quality Monitoring Plan* was completed in 2013, Saipan streams and those in the Talakhaya watershed on Rota are now also monitored. However, data is extremely limited due to the lack of flow outside of rainy season (July through October), as CNMI streams are intermittent or ephemeral by nature. Therefore, BECQ researched alternative means for evaluating stream system health by using biological and physical parameters extrapolated from a rapid assessment method used in Hawaii. In FY2018, DCRM established the CNMI Stream Visual Assessment Protocol (SVAP). This reporting cycle WQS/NPS has refined the protocol and updated data sheets to also allow for evaluation of dry stream beds, when there is no flow, as well as additional biological habitat parameters. This is a work in progress, as WQS/NPS continues training staff to establish the methodology for long-term monitoring of stream health.

C.1.4. Other Outside Information and Data Used for Assessment Purposes

In addition to the water quality monitoring data provided by BECQ's WQS/NPS, WEEC, Safe Drinking Water Quality Programs, and the biological monitoring data gathered by MMT, data from other outside sources have also been used for assessments purposes. These include data collected: on fish tissue and biota contaminants by WERI; coral reef health and resiliency by Dr. Peter Houk of UoG's Marine Lab; data from the pilot MST Study of Land Based Sources of Pollution by Sinigalliano, et.al. of NOAA AOML; and biological monitoring by the NOAA Coral Reef Ecosystem Division (NOAA-CRED) in the remote Northern Islands. In addition, monitoring data are used from six (6) additional monitoring sites in the LaoLao Bay watershed, and several reef flat sites. BECQ considered all data collected with the exception of any data that was considered erroneous. These data are not submitted to WQX, nor used for assessment purposes.

Results from an aquatic survey conducted by the CNMI DLNR DFW in 2008, and current WQS/NPS stream visual field assessments data are used to evaluate the health of Saipan's streams and streambeds.

C.1.4.1. WERI Fish Tissue and Biota Contaminant Studies

Since 2000, UoG WERI has collaborated with CNMI agencies to investigate heavy metal contaminant levels in sediments and marine life found in sites within the Saipan Lagoon and the waters surrounding the island. Data summarized in a 2008 report by Denton (WERI Technical Report No. 123: 50 pp.), indicated that most species sampled throughout the Saipan lagoon *were free of contaminants at any levels of concern*, although some species of bivalves in the Puerto Rico Dump area (North West Takpochau, Segment 19A) had Lead (Pb) levels that exceeded US Food and Drug Administration (FDA) standards. However, the use of these bivalves as an edible species, "… is unlikely".

Fish tissue contaminant data was used in assessing support of the *Fish and Shellfish Consumption* DU. A 2013 study by Denton, et.al, found elevated levels of Hg in more commonly consumed fish species that exceeded US EPA limits for unrestricted fish consumption. These included fish collected from GrandVrio Hotel Beach and Micro Beach areas (Central W. Takpochau, Segment 19B). These are located some distance from known sources of Hg contamination. A follow up investigation identified the former Commonwealth Health Center's medical waste incinerator as the primary source of Hg enrichment to a stormwater drainage. The incinerator was used for the destruction of medical waste from the hospital and other medical clinics on island for about 20 years. Stormwater runoff from the facility entered a drainage network that discharged into the Lagoon at the southern end of GrandVrio Hotel Beach.

Since the old hospital incinerator was shut down in 2006, and corrective action was implemented, more recent 2017 fish tissue data showed that Hg concentrations from the GrandVrio Hotel Beach area are significantly lower than those determined in 2004-2005. All stormwater from the hospital is now prevented from discharging to the surrounding drainage and is collected for treatment and proper disposal.

The most recent studies conducted by Denton et.al, of WERI in 2014 and 2016 assessed the environmental impacts of formerly used defense sites and brownfield sites on aquatic resources. These studies found that "Agingan Point (Set 17A - Isley West Segment 17A) was a 'hot spot' (2014. *Influence of Urban Runoff, Inappropriate Waste Disposal Practices and World War II on the Heavy Metal Status of Sediments in the Southern Half of Saipan Lagoon*, and 2016. *Impact of WWII dumpsites on Saipan (CNMI))*. This site and other WWII dumpsites around the islands require additional study on metal uptake in resident biota. Local people frequently "harvest seaweeds and mollusks for food from the adjacent back reef. The submerged metallic debris and demolition material littering the fore reef also serves as a fish aggregation site and is a favored fishing spot by many." The impact of heavy metals and other toxins from WWII dumpsites on *the safe Consumption of Fish and Shellfish* is of major importance from a public health standpoint. Future fish tissue and biota studies will be conducted as funding is secured for their completion.

C.1.4.2. UOG and NOAA-CRED Studies

Several ecological surveys and limited water quality data was collected in the remote Northern Islands by NOAA during the past two decades. Ongoing research is conducted as funding and federal research vessels are made available from the NOAA-CRED.

NOAA CRED researchers include those from the CNMI government agencies, UOG, and federal scientists and resource managers. The scientific cruises have taken place approximately every two years, since they began in 2003. Each cruise lasts approximately 30 days. Generally, the data summaries show that fish abundances surrounding the remote islands are much larger compared with the populated southern islands (2008. State of the Reef Report, Starmer et.al).

More specifically, Houk and Starmer (2009), provided a detailed analysis of the coral reef assemblages. Their publication shows that benthic assemblages were extremely heterogeneous, and the significant drivers of multi-year trends were natural occurring environmental regimes. The primary driver of coral abundance and size structure was volcanic activity, island size, and connectivity with the islands' aquifers. All of these natural, and uncontrollable regimes explained the vast majority of the variance in coral species richness, differing relative abundances of coral reef taxa, and the nature of reef development. Human influences such as herbivorous fish abundances, percentage of canopy cover in adjacent waterbodies, and the presence of feral animals did not explain any additional amount of the ecological variance. Other studies from tropical islands show that these human influences can alter modern coral assemblages. However, in the remote Northern Islands, the study concluded that natural environmental regimes are strong enough to mask any further human influence, if indeed they would otherwise be evident.

The limited water quality data from the Northern Islands provided high spatial, but extremely low temporal resolution. Thus, only large-scale trends were emergent, such as the salinity patterns due to connectivity with the islands' aquifers.

Interestingly, the 2015 report by Enochs, L.C., et.al. entitled, "*Shift from coral to macroalgae dominance on a volcanically acidified reef*" finds that the volcanically acidified water at Maug, "is equivalent to near-future predictions for what coral reef ecosystems will experience worldwide…" due to ocean acidification. The report notes a "shift from a coral to an algae-dominated state."

Based upon these reports, there is a firm basis for finding both marine and surface waters of the Northern Islands currently in support of the *Propagation of Aquatic Life* DU. However, ocean acidification in the future may lead to less diverse coral reefs and may not be as supportive of the *Propagation of Aquatic Life* DU as they are at present.

C.1.4.3. qPCR-MST Study of Saipan Coastal Waters

A qPCR-MST Study of Saipan Coastal Waters was conducted using samples collected in September 2017, March 2018 and August 2018 from several of Saipan's "hot spots" or locations with frequent Enterococci WQS violations. Results from the study indicated that the primary source of FIB contamination was from either human, dog, or bird, or a combination thereof. The findings from this study are reported under the appropriate Watershed Segment subsections of this report.

C.1.4.4. LaoLao Bay Watershed Restoration Project

The LaoLao Bay Watershed American Recovery and Revitalization Act (ARRA) Restoration Project began in 2010 with the objective of reducing sedimentation in the near shore marine environment. Efforts to meet this objective included upland reforestation of bare badland soil and grasslands, paving the coral road to the Bay, and constructing culverts, sediment catchment basins, and concrete stream crossing BMPs. Road and BMP construction was completed in late 2014. Some of these structures sustained significant damage during Super Typhoon Yutu in 2018 as a result of high storm surge, winds and rainfall. These structures continue to be maintained to date by DPW, BECQ staff, and by other volunteers and the non-profit, Micronesian Islands Nature Alliance (MINA).

Since the onset of this project, monthly monitoring continues at six LaoLao reef flat sites to evaluate the efficacy of these BMPs overtime. Results are discussed in Section C.3.5.4.

C.1.4.5. CNMI Division of Fish & Wildlife Fresh Aquatic Survey

CNMI DFW conducted a freshwater aquatic survey in August of 2008. Specimens from various stream systems in eight watersheds on Saipan were collected using dip net, trap and electrofishing. This survey was "the first freshwater native and introduced species study of its kind". Data from the subsequent report included full species lists, descriptions of each site location, water chemistry information and other findings. This information was used to assess the *Support and Propagation of Aquatic Life* DU for the sampled waterbodies. Details may be found for the streams sampled under each watershed sub-heading in Section C.3.5., beginning with the Talofofo watershed in Section C.3.5.2.

C.2. ASSESSMENT METHODOLOGY

Since 2010 CNMI water quality has been assessed in terms of waterbody segments based on watershed units, Figure C-1., on the following page shows the current watershed boundaries.

C.2.1. Waterbody Segmentation - Watershed Approach

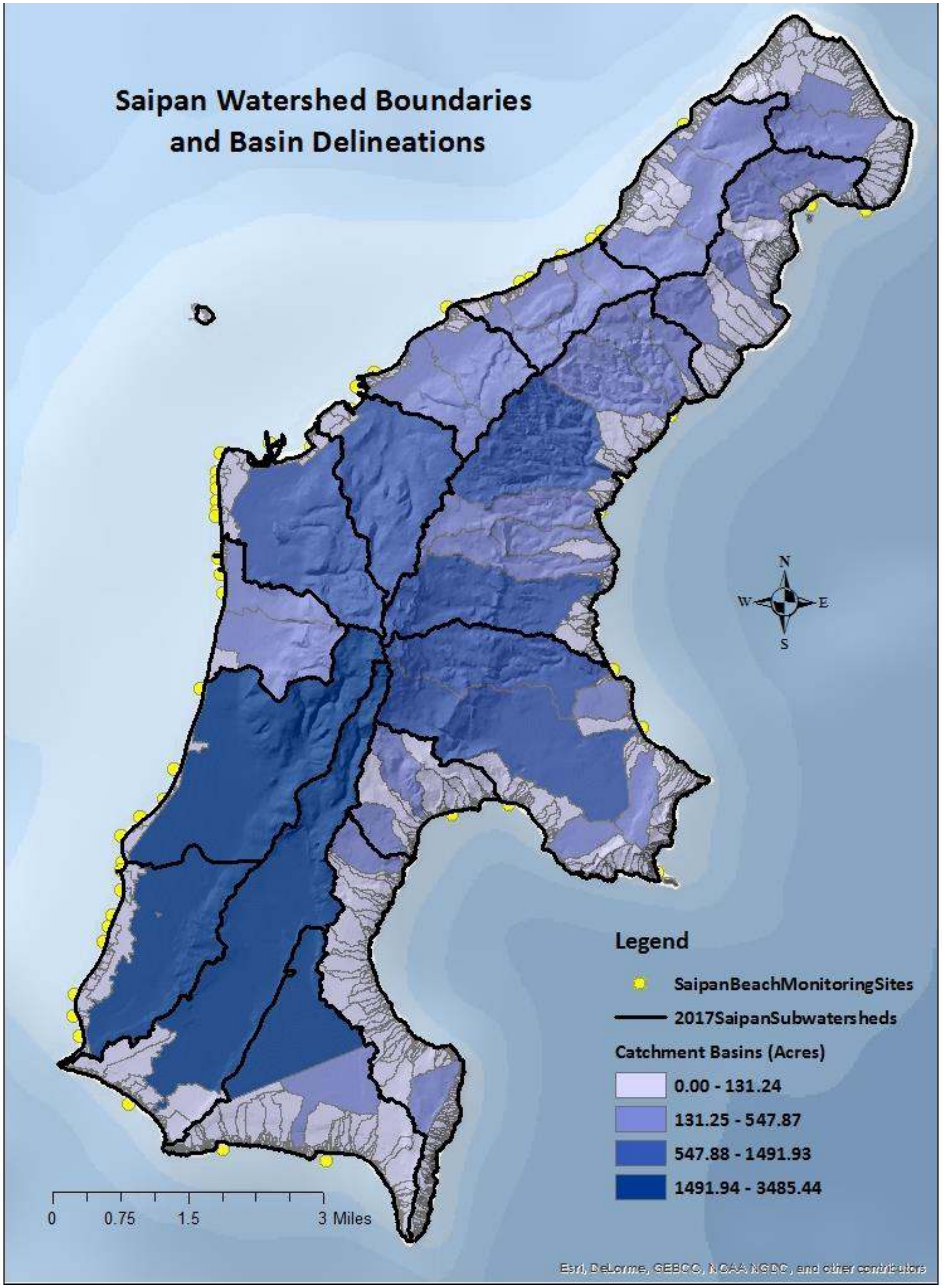
Some watershed units on Saipan have been split into two or more sub-watersheds in order to better tweeze out the causes and sources of pollution revealed using greater amounts of data available from those areas, especially in the densely populated areas on Saipan.

However, those waterbodies with less available information continue to be assigned to only one watershed unit. This is the case for Mañagaha, Aguigan ("Goat Island"), and the Northern Islands, and most CNMI streams systems, lakes, and wetlands.

In previous reports until present, BECQ used watershed segments that were digitized using historic USGS topographic maps. These have been superseded by the higher resolution data available last reporting cycle.

These watershed segments (black outlines) were established using Light detection and ranging (LiDAR) topographic data (2.67 m. resolution) collected by the U.S. Army Corps of Engineers in 2007 as shown in Figure C-1., on the following page.

FIGURE C-1. 2017 Saipan Watershed Delineation and BEACH sites



The 2017 delineation resulted in some long-term BEACH monitoring sites being moved into a different watershed unit, as listed in Table C-1.

TABLE C-1. Long-term Monitoring Site Locations Based on 2017 Catchment Basins

Sample Station ID	Sampling Station Name	Segment IDs Before and Present FY10-15	FY16-Present	Segment Class
		N/A	**Talofofo**	
CNMI-104	Jeffry's Beach Reef flat	*	13	AA
		Lao Lao	**Kagman**	
CNMI-29	Tank Beach Reef flat	*	14	AA
SEB 02	North LaoLao Beach	15	14	AA
ARRA B2	North LaoLao Reef Flat	*	14	AA
ARRA B5	North LaoLao Reef Flat	*	14	AA
ARRA B8	North LaoLao Reef Flat	*	14	AA
		N/A	**Lao Lao**	
CNMI-21	Central LaoLao Beach reef flat	*	15	AA
ARRA C2	South LaoLao Reef Flat	*	15	AA
ARRA C5	South LaoLao Reef Flat	*	15	AA
ARRA C3	South LaoLao Reef Flat	*	15	AA
		N/A	**Dan Dan**	
CNMI 72	DanDan Reef Flat	*	16	A
		N/A	**Isley (East)**	
CNMI-30	Obyan Beach Reef Flat	*	17B	A
		W. Takpochao (South)	**Susupe (North)**	
WB 24	Chalan Laulau	19C	18A	AA
		W. Takpochao (North)	**W. Takpochao (Central)**	
WB 11.2	Inos Peace Park (S. Puerto Rico dump)	19A	19B	A
WB 12	Smiling Cove Marina	19A	19B	A
WB 12.1	American Memorial Park Drain	19A	19B	A
WB 13	Outer Cove Marina	19A	19B	A
		W. Takpochao (Central)	**W. Takpochao (South)**	
WB 21	Garapan Fishing Dock	19B	19C	A
WB 23	Garapan Drainage #3	19B	19C	A
		W. Takpochao (North)	**Achugao (South)**	
WB 09	Sea Plane Ramp	19A	20A	AA

* Water quality data collected from these sites were not used prior to the 2018 CNMI IR assessments.

This data was processed as a digital elevation model and raster surface at two-meter resolution. The BECQ GIS Specialist used the model to calculate slope, aspect, flow direction, and flow accumulation for the entire island of Saipan. These data were then used in ArcGIS Desktop to delineate watershed catchment basins. Catchment basins were then grouped together based on the historic watershed boundaries in which they were previously designated. This information was used to merge and form the 2017 watershed boundaries.

The basins, historic watershed units, and new watershed boundaries were examined by BECQ WQS/NPS staff to assess the re-alignment before finalizing last reporting cycle. Once finalized, ocean shoreline miles were recalculated by the GIS Specialist by converting the watershed polygons to polylines and smoothing the polylines' "zig zags".

The new catchment basins better reflect actual water accumulation, and flow to the coastline. In addition to these changes, there are five (5) near shore reef flat monitoring sites, some of which were established during the 2010 National Coastal Condition Assessment, and six (6) LaoLao bay beach reef flat sites established for monitoring the efficacy of ARRA funded roadway improvements, that are now included for DU assessments.

Detailed watershed maps showing the long-term BEACH monitoring sites are contained at the beginning of each watershed's sub-section, in Section C-3., of this report.

C.2.2. CNMI Designated Uses

Although the language differs somewhat from the terminology used in the CWA, the basic guaranteed DUs of the CWA are reflected in the CNMI WQS, which aim is to ensure that CNMI waters remain "fishable and swimmable", as presented in Table C-2., on the following page.

The 2012 CNMI IR stated that the "fish consumption" designation was not clearly stipulated in the CNMI WQS. This was addressed during the 2013 WQS Triennial review.

EPA Region 9 reviewed the WQS language and determined that the present wording incorporated "fish consumption" by the fact that fish consumption criteria are captured in the list of Priority Toxic Pollutants' Maximum Contaminant Level (MCL) concentrations contained in § 65-130-450 of the CNMI WQS.

However, in the interest of maintaining consistency with other states, the *Fish and Shellfish Consumption* DU is also used in this report, along with criteria for assessing its attainment.

TABLE C-2. CWA vs. CNMI Designated Use Terminology in CNMI WQS

DU Categories Used in this Report	DUs Defined in CNMI Water Quality Standards	
COASTAL WATERS	**Class AA**	**Class A**
Propagation of Aquatic Life	"The support and propagation of shellfish and other marine life", and "conservation of coral reefs and wilderness areas"	"The protection and propagation of fish, shellfish, and wildlife"
Fish Consumption	No specific CNMI language, see above	No specific CNMI language, see above
Recreation	"Compatible recreation with risk of water ingestion by either children or adults."	"Compatible recreation with risk of water ingestion by either children or adults"
Aesthetic Enjoyment/Others	"Aesthetic enjoyment, , and oceanographic research"	"Aesthetic enjoyment"
FRESH WATERS	**Class 1**	**Class 2**
Propagation of Aquatic Life	"The support and propagation of aquatic life"	(not applicable – no class 2 waters in CNMI)
Fish Consumption	No specific CNMI language, but Section 65-130-450 of CNMI WQS lists toxic pollutants in concentrations recommended by EPA	(not applicable – no class 2 waters in CNMI)
Recreation	"Compatible recreation including water contact recreation with risk of water ingestion by either children or adults."	(not applicable – no class 2 waters in CNMI)
Potable Water Supply	"Domestic water supplies, food processing, ground water recharge"	(not applicable – no class 2 waters in CNMI)
Aesthetic Enjoyment/Others	"Aesthetic enjoyment"	(not applicable – no class 2 waters in CNMI)
WETLANDS	**Class 1**	**Class 2**
Propagation of Aquatic and Terrestrial Life	"shall be protected to support the propagation of aquatic and terrestrial life"	(not applicable – no class 2 waters in CNMI)

The CNMI WQS criteria used to assess attainment of each of the DUs for each Class of water are contained in Table C-3., on the following page.

TABLE C-3. CNMI Water Quality Criteria for Assessing Coastal and Fresh Surface Waters

PARAMETER	COASTAL WATERS		FRESH SURFACE WATERS	
	CLASS AA Marine Waters	CLASS A Marine Waters	CLASS 1 Freshwaters	CLASS 2 Freshwaters
Enterococci (CFU/ 100 ml)	GM[1] < 35 <130 Single Sample	GM[1] < 35 <130 Single Sample	GM[1] < 35 <130 Single Sample	GM[1] < 35 <130 Single Sample
E. coli (CFU/100 ml)			GM[1] < 126 <410 Single Sample	GM[1] < 126 <410 Single sample
pH	7.6 – 8.6 <0.5 from ambient	7.6 – 8.6 <0.5 from ambient	6.5-8.5 <0.5 from ambient	6.5 - 8.5 <0.5 from ambient
NO_3 - N (mg/L)	< 0.20	< 0.50		
Total Nitrogen (mg/L)	< 0.4	< 0.75	< 0.75	< 1.50
Orthophosphate (mg/L)	< 0.025	< 0.05	< 0.10	< 0.10
Total Phosphorus (mg/L)	< 0.025	< 0.05	< 0.10	< 0.10
Ammonia (mg/L) (un-ionized)	< 0.02	< 0.02	< 0.02	< 0.02
Dissolved O_2 (%)	≥75	≥75	≥75	≥75
Total Filterable Suspended Solids (mg/L)[2]	5	40	5	40
Salinity (‰)[2]	±10% from ambient	±10% from ambient	±20% from ambient, or Chlorides above 250 mg/L	±20% from ambient, or Chlorides above 250 mg/L
Temperature (°C)[2]	±1.0 from ambient	±1.0 from ambient	±1.0 from ambient	±1.0 from ambient
Turbidity (NTU)[2]	±0.5 from ambient	±1.0 from ambient	±0.5 from ambient	±1.0 from ambient
Radioactive Materials	Discharge prohibited	Discharge prohibited	Discharge prohibited	Discharge prohibited
Oil & Petroleum	ND[3]	ND[3]	ND[3]	ND[3]

[1] GM - Geometric mean of samples over a 30-day period.
[2] Shall not exceed ambient by more or less than the stated percent value.
[3] ND - Non-detectable.

The manner in which water quality criteria data are used to make DU assessments are discussed in more detail in the sections that follow.

C.2.3. Criteria Used to Assess Coastal Marine Waterbodies' Designated Uses

A coastal waterbody's support of each DU in the CNMI was determined based on water quality data, visual field assessments, biological monitoring data from the MMT program, DPW and CUC field observations and activities, and other available studies as stated previously in Section C.1.3.

At present, Saipan's coastal marine waters receive by far the greatest attention from the monitoring programs and has the most data. Therefore, BECQ has high confidence in these assessments, and is gaining a clearer understanding of the other islands as more data is gathered from the islands of Mañagaha, Rota, Tinian, Aguigan, and the Northern Islands.

Table C-4., summarizes the criteria used to assess attainment of a coastal marine waterbody's DUs.

TABLE C-4. Assessment Criteria for Coastal Marine Waters DUs

Designated Use	Criteria for Attainment Criteria to Assess Support of the DUs
Propagation of Aquatic life	• Habitat suitability: biomonitoring criteria (ALUS) score of "fair" or "good" for all sites within segment and other study results • Dissolved oxygen: No more than 10% of samples exceed WQS for all sites within segment • Nutrients: No more than 10% of samples exceeding WQS for all sites within segment. • Ambient water quality criteria met (where data is available) • General provisions met: no floating/settleable solids, no more than 10% of pH samples exceed WQS for all sites within the segment, no radioactive substances
Fish consumption	• Fish tissue/biota collected within segment are found to be free of contaminant concentrations exceeding USEPA standards, or very low likelihood of tissue contamination due to current or historic land use patterns in adjacent watersheds.
Recreation	• Enterococci bacteria: No more than 10% of samples result in beach advisory for all sites within the segment • General provisions met: no floating/settleable solids, no more than 10% of pH samples exceed WQS for all sites within segment, no radioactive substances
Aesthetic Enjoyment/Other	• No floating/settleable solids • Empirical evidence, Research papers, documents, tourist surveys, studies, etc.

A discussion of each DU and the water quality criteria used to assess it follows.

C.2.3.1. Coastal Marine Waters Propagation of Aquatic Life Criteria

<u>Habitat Suitability</u>

The CNMI WQS incorporated numeric marine biological monitoring criteria that has been used for nearly 20 years by the MMT to assess habitat health and resiliency for the *Support and Propagation of Aquatic Life DU*. The methodology is detailed in the *CNMI WQS Implementation Guidance Manual* that was published in the Commonwealth Register along with revisions to the CNMI WQS, which was promulgated in FY2014, and is still in use today.

Biological Assessment of Benthic Substrate

Biological assessment data on the distribution and abundances of benthic dwelling organisms that live within CNMI's long-term probabilistic and selected seagrass, back reef, patch reef, reef flat and reef slope sites are collected by the MMT with assistance from the WQS/NPS branch. This data is used in conjunction with water quality data to evaluate waterbody health and the support of the *Propagation of Aquatic Life* DU in accordance with EPA guidance materials.

In addition to benthic organisms, near shore coral reef and seagrass assemblages show predictable shifts in response to nutrients, sediment loads, turbidity, and other proxies of pollution (Rogers, 1990, Telesnicki and Goldberg, 1995, Houk and van Woesik, 2008). As a result, the CNMI uses several measures of the coral reef and seagrass communities as an additional biological criterion for waterbody assessments.

Regular monitoring surveys have been ongoing by the MMT since 2000. They are conducted by snorkeling for depths less than 2 meters, and by SCUBA for reef slope monitoring at depths at the 7 to 8 meter contours.

The Saipan Lagoon *Halodule uninervis* (seagrass) assemblages were initially evaluated by assessing coverage of seagrass to turf and macroalgae coverage based upon replicated benthic assessment transects during each year. Only *H. uninervis* seagrass habitats were considered in this evaluation because they show the greatest sensitivity to watershed population and development (Houk and van Woesik 2008), and are widely distributed throughout the lagoon. In 2010, Houk and Camacho statistically quantified different cycles of seagrass and macroalgae growth due to annual seasonal cycles (i.e., temperature and sunlight), high pollutant loading, and high natural disturbance regimes (i.e., large swell events that translate to high surface-current velocities and habitat alteration). The study corroborates that relatively large macroalgae blooms are common throughout Saipan lagoon due to the onset of cold (below 28°C) water temperatures in the fall and winter. Subsequently, where healthy water quality was found, macroalgae stands would typically die off or be carried away during tidal exchanges. Where polluted waters were found, persistent macroalgae stands could emerge and persist through time (up to two years), to successfully out-compete the seagrass for sunlight and nutrients, and eventually space. Where high disturbance regimes and pollutant loading were noted, persistent macroalgae growth would occur until wintertime when large-swell events increased lagoon surface currents beyond the threshold for macroalgae attachment. Thus, seagrass remains as the dominant canopy where disturbance regimes were high, even in the face of tainted water quality.

Biological Assessment of Seagrass Assemblages

In accordance with these findings, Seagrass Assemblages surveyed between October 2017 and September 2019 were evaluated as indicators of Aquatic Life Use Support (ALUS) as follows:

Good Natural seasonal changes are apparent, existing assemblage has statistically more *H. uninervis* than macroalgae, and seagrass abundance has remained stable or increased from the previous survey (where data is available).

Fair Natural seasonal changes are apparent, existing assemblage has statistically similar abundances of *H. uninervis* and macroalgae, or existing assemblage has statistically more *H. uninervis* than macroalgae but seagrass abundance has declined significantly since the previous survey.

Poor Seasonal cycles are masked by persistent macroalgae growth, or, persistent macroalgae growth dominates unless a disturbance event (i.e., large-swell and high surface currents) occurs.

Biological Assessment of Coral Assemblages

Coral reef assemblages were initially evaluated by calculating a ratio of reef-accreting benthos (coral, crustose coralline algae, and branching coralline algae), which are favorable attributes for sustainable coral assemblages, to non-accreting benthos (turf, macroalgae, and fleshy coralline algae), which are unfavorable attributes (CNMI's 2008 IR; supported by Rogers, 1990, Richmond, 1997, Fabricius and De'ath, 2001, Houk and van Woesik 2010). A second metric of the coral assemblages was simultaneously considered: coral species richness per unit area, which is supported by work by Houk and van Woesik (2010), who showed significant affinities between species richness and watershed population and development in the southern Mariana Islands. In the current IR, CNMI benthic assemblage ratios and coral richness estimates were compared to global mean values to come up with a final ALUS evaluation status.

In accordance with these findings ***Coral Assemblages*** surveyed between October 2017 and September 2019 were evaluated as indicators of aquatic life use support (ALUS) as follows:

Good Minimal or no significant impacts reported from disturbance events. If natural disturbances impacted coral assemblage metrics then *statistically significant recovery is currently underway*. If no significant impacts from natural disturbances then metrics were evaluated relative to those expected from the last 2018 reporting cycle and *found to be higher than the mean average.*

Fair Minimal or significant impacts reported from disturbance events. If natural disturbances impacted coral assemblage metrics then *non-significant recovery trends are* *currently apparent.* If no significant impacts from natural disturbances then metrics were evaluated relatively to those expected from the last 2018 reporting cycle and *found to be similar to the mean average.*

Poor Minimal or significant impacts reported from disturbance events. If natural disturbances impacted coral assemblage metrics then *no recovery trends are currently apparent.* If no significant impacts from natural disturbances then metrics were evaluated relatively to those expected from the last 2018 reporting cycle and *found to be lower than the mean average.*

For this reporting period, the knowledge base presented above is utilized in conjunction with recent analyses of the long-term monitoring dataset for the southern islands to make ALUS assessments. For all comparisons noted, statistical change over time refers to the results from pairwise T-tests, making post-hoc corrections for multiple comparison years when and if appropriate. The biological data analyzed for this reporting cycle is contained in Appendix III.

In addition to biological monitoring data, the following water quality criteria is used to assess the support of the *Propagation of Aquatic Life* DU:

Dissolved Oxygen

Dissolved Oxygen (DO%) results are used along with biological monitoring assessments to determine whether a waterbody supports the *Propagation of Aquatic Life* DU. DO% levels are not to be less than 75%, more than 10% of the time in order to support this DU.

BECQ measures DO% in-situ with a portable YSI™ meter, Model 556. The accuracy of the portable meter depends on a number of factors, including proper calibration of the instrument, and following SOPs according to the BECQ Environmental Surveillance Laboratory's QAPP, in order to obtain scientifically defensible results. This reporting cycle the aging YSI™ meter, Model 556, was found to be frequently malfunctioning. Therefore, some results were erroneous and not reflective of waterbody health. In response, BECQ ordered a newer model YSI™ ProDDS, which will be in use by next reporting cycle.

All water quality criteria data used for assessment purposes in this reporting cycle is contained in Appendix II.

Nutrients

Marine water concentrations of Orthophosphate (PO_4) reported in 2004 were tested using the Hach PhosVer3 (Ascorbic Acid) Method 8048. While this method is approved by EPA for drinking water (EPA Method 365.1) and wastewater analysis (EPA Method 4500-P-E), it is not for seawater. There is an EPA approved Ascorbic acid method for testing seawater (EPA Method 365.5), but this method was not used by BECQ laboratory. Therefore, the Orthophosphate results from FY 2004 IR should not have been used for assessments or 303(d) listing purposes. The previous listing resulted in several waterbodies erroneously being reported as impaired and unsupportive of the *Propagation of Aquatic Life* DU.

Since 2016, the BECQ Environmental Surveillance Laboratory has been testing marine waters for Orthophosphate (PO_4), Nitrates (NO_3-N), Nitrites (NO_2-N), and Total Nitrates as Nitrogen (NO_3 and NO_2-N) using the EPA approved FIA method (EPA Method 353.2).

Recent results confirm that many of the BEACH monitoring sites surrounding the islands of Saipan and Tinian did not meet the CNMI WQS for Orthophosphate or NO_3-N. However, Rota's coastal waters surrounding the Sabana/Talakhaya/Palie, and Uyulanulo/Teteto watersheds on Rota, and all reef flat sites surrounding the islands of Saipan, Tinian and Rota easily met the CNMI WQS.

It is important to note that BECQ has not conducted a study to establish nutrient levels that represent natural healthy conditions in CNMI Waters. CNMI adopted nutrient standards from other states and jurisdictions. Therefore, these levels may not be protective for CNMI waterbodies. During the next reporting cycle, CNMI BECQ scientists hope to expand the study of the correlation between water quality nutrient levels and the health of biological seagrass and coral reef assemblages.

General Provisions

The presence of floating or settleable solids, e.g., flotsam, jetsam, marine debris, sediment and the like, is undesirable and unsupportive of the *Recreational* DU. Additionally, their presence is physically harmful to the *Propagation of Aquatic Life* DU due to entanglement, strangulation, affixation, smothering, availability of sunlight, etc. Their presence is also unsupportive due to the potential for pollutants adsorbed onto settleable solids to disassociate and disperse, thus becoming biologically available for uptake and/or bioaccumulation.

Radioactive substances are also unsupportive to most DUs. The WQS prohibit any level of radioactivity in CNMI waters.

The narrow range of pH necessary to maintain the calcium skeleton of a coral reef ecosystem is well documented. The CNMI has been monitoring pH of coastal waters since the early 1990's along with salinity and temperature.

To date, pH levels at most monitoring sites, and site specific monitoring sites for NPDES permit compliance, show little variance from the allowable levels set forth in the *CNMI WQS Implementation Guidance Manual*. However, as was stated for DO%, the aging YSI™ meter, Model 556, was found to be frequently malfunctioning for pH. Therefore, some results were erroneous and not used for assessment purposes. The new YSI™ ProDDS, will be in use for the next reporting cycle.

It was noted that a few shallow sites next to heavily urbanized and developed areas have shown exceedances of the WQS for pH. These exceedances are specified and discussed in the subsequent watershed subsections in this report.

C.2.3.2. Coastal Marine Water Fish and Shellfish Consumption Criteria

Fish Tissue and Biota Contamination

Mercury contamination of fish tissue in waters surrounding Saipan's Central W. Takpochau watershed and Mañagaha, and other metals in waters surrounding the West Isley watershed have been documented in previous IRs.

According to the more recent heavy metal studies conducted by Denton, et.al, since 2014, other watersheds on Saipan also have elevated levels of heavy metal contamination in sediment and/or biota surrounding WWII debris and dumpsites, a few sites have levels of a public health concern.

However, to date not all watersheds have been studied. Given the amount of military equipment, unexploded ordinance and other WWII debris remaining in the Marianas Archipelago, there is a clear need for further studies, especially in those watersheds that are the most heavily harvested for consumption.

BECQ strives to continue research fish tissue and biota contamination research. However, this can only be accomplished by earmarking funding and other necessary resources.

C.2.3.3. Coastal Marine Waters Recreational Use Criteria

***Fecal Indicator Bacteria* - Enterococci**

Enterococci concentrations exceeding CNMI WQSs may pose a public health threat for individuals fishing or swimming in waters (should they indicate the presence of actual fecal contamination rather than re-suspended sediment containing naturally occurring Enterococci not associated with wastewater). However, as a conservative protective measure, a Beach Advisory is publicized for coastal marine waters ***whenever*** Enterococci levels exceed the WQS.

The proposed 2012 US EPA Recreational Water Quality Criteria were adopted by the CNMI in 2014. These WQS are used to determine when a Public Beach Advisory or "Red Flag" should be issued, at which time the public is advised not to swim or fish within 300 feet of these coastal waters for 48 hours, or until further testing demonstrates that the WQS have been met.

The CNMI uses a two tiered trigger for Beach Advisories. The triggers are: 1) The **single sample result** from that day is greater than the Statistical Threshold Value (STV) of 130 MPN/100ml (the 90^{th} percentile or confidence interval, that there is a risk of illness for 3.6% of recreational users); or 2) The **Geometric Mean** (GM) is greater than 35 MPN/100 ml over a 30-day period *AND* so is the single sample result from that day.

In other words, Beach Advisories are publicized and posted for sites whenever:

> A single sample result exceeds the **Enterococci STV of 130 MPN/100ml** for any Class of ***Marine Waters***; ***OR*** when the **GM exceeds 35 MPN/100ml** based on samples taken within any 30-day interval, **UNLESS** the **Single Sample** Result is **<35 MPN/100ml**.

That is to say that when the STV and GM meets the WQS, the CNMI is 90% confident that not more than 36 users per 1000 (<4%) may become ill from recreating in those waters.

Although a case could be made for using only the GM for assessment, the issuance of an advisory using both the STV and GM is necessary to determine whether or not *Recreational* DUs are attained for those locations that are only monitored on an 8-week rotational schedule. This is true for Tinian, Rota, Mañagaha, and Saipan's eastern beaches that at times are only sampled once per month. Therefore, weekly data does not exist for calculating a GM for a 30-day period. In these circumstances, the STV alone is used to gauge the suitability of water quality for a safe *Recreational* DU even though the Enterococci result is 24 hours after the sample was taken. This suggests that using a GM calculated for a longer time period along with the single sample STV (whether the sample is a weekly sample or a monthly sample) would be a more conservative trigger for determining when a Public Beach Advisory is needed. Therefore, the Advisory would more likely prevent potential exposure to a public health risk.

It has been shown in many well documented studies that storm surge can re-suspend sediment carrying naturally occurring Enterococci causing false positive WQS exceedances; and consequently, unnecessary Beach Advisories when no actual fecal contamination exists at a site. Consequently, some "red flags" are merely precautionary, as a discharge of fecal contamination has not actually occurred; only a discharge of NPS pollution from drainages (as ground-truthed during visual field assessments). Many scientific studies have established that though "Enterococci, shows a significant correlation with illness in marine beaches impacted by *point* source pollution, … a similar correlation has not been identified at beaches impacted by *non-point source* pollution on subtropical marine beaches" (Abdelzaher, A.M., et.al, (2010) *Presence of Pathogens and Indicator Microbes at a Non-Point Source Subtropical Recreational Marine Beach*, Applied and Environmental Microbiology, Feb., p. 724-732 0099-2240/10, doi:10.1128/AEM.20127-09.).

Therefore, the method for determining whether a waterbody supports the *Recreational* DU was based on Public Beach Advisories derived from the 30-day GM and the single sample STV exceedances. An entire waterbody segment is listed as unsupportive when there is more than 10% Public Beach Advisories in a given Fiscal Year, for any single monitoring site within the segment.

Tables containing each Island's assessment of DU support and the cumulative CALM categories are provided at the beginning of Island's sub-sections, C.3.5., through C.3.8., of the Assessment Results section of this report.

General Provisions

The same General Provisions used for the assessing the *Support and Propagation of Aquatic Life* DU, are used to assess the *Recreational* DU (see Section C.2.3.1. for details).

C.2.3.4. Coastal Marine Waters Aesthetic Enjoyment and Other Uses Criteria

The CWA does not provide a scientific framework for determining if a waterbody supports the *Aesthetic Enjoyment and Other Uses* DU. However, by applying the general definition of *Aesthetic*

Enjoyment as "appreciation of beauty", one may assess if this DU is attained based on reported appreciation of CNMI waterbodies.

The MVA with the assistance of Market Research and Development, Inc., began conducting tourist satisfaction exit surveys in 2011, which continues to date. MVA asks visitors to report their satisfaction with their experience based on a 7-point scale ranging from "very dissatisfied/strongly disagree" to "very satisfied/strongly agree". These data, and other diver surveys, along with anecdotal information, and professional judgement were used to assess the *Aesthetic Enjoyment* DU.

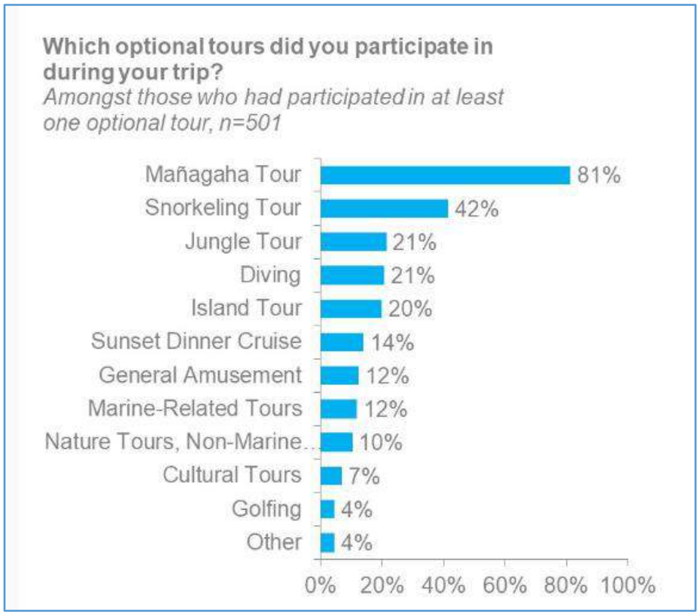
The MVA tourist exit survey responses through Fiscal Year 2015 found that 80% of those surveyed said their primary reason for visiting the CNMI was for pleasure/vacation. Their secondary reasons (Figure C-2., on the following page), were tropical climate, sea, or beach, followed by snorkeling and nature activities.

MVA's 2015 survey also found that of the optional tours offered to visitors, snorkeling, SCUBA, and water sports received a satisfaction score of better than 80 (1 being lowest, and 100 being highest) and Scenery / Parks and Beaches, received a Satisfaction Score of 83 or more.

FIGURE C-2. 2015 MVA Tourist Exit Survey Results for Secondary Reasons to Visit the CNMI

Since much of CNMI tourism is promoted by word of mouth or social media, this could be why the majority of visitors chose a water-related tour as their optional tour preference in 2018. MVA's 2018 exit survey results are shown in (Figure C-3.).

FIGURE C-3. 2018 MVA Tourist Exit Survey Results for Most Popular Optional Tours



Most visitors reported choosing Mañagaha (81%), followed by snorkeling (42%), and diving (21%) as their optional tour. The diving option tied with Jungle Tours, which takes tourists to visit Saipan's more remote beach sites.

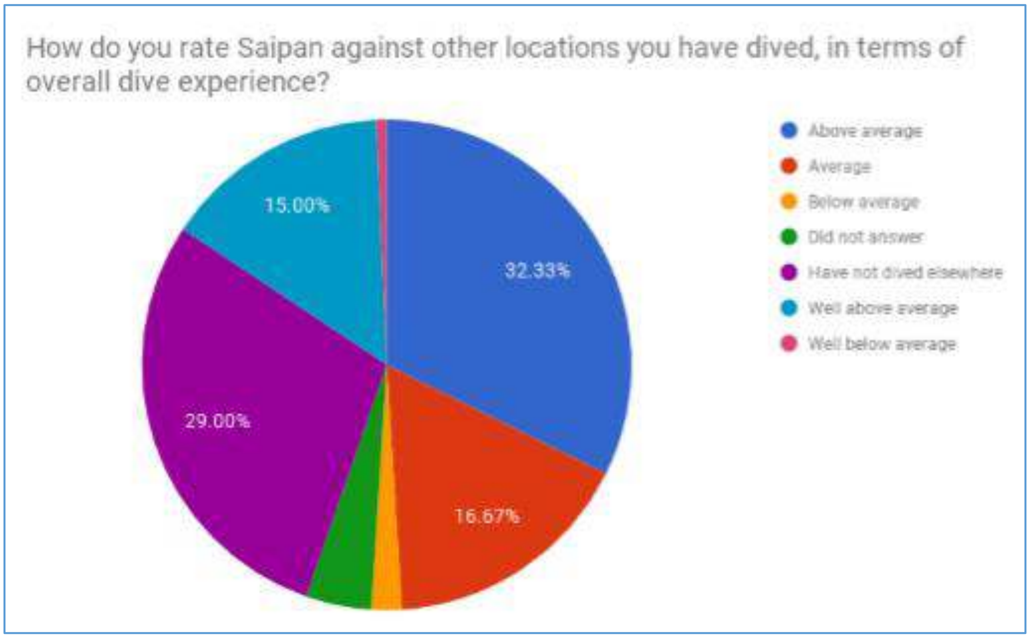
Another tourist survey was conducted by DCRM in 2017. DCRM contracted Pacific Marine Resources Institute, Inc (PMRI) and MINA to determine divers' experience at LaoLao Bay, one of Saipan's premier dive destinations (2017. *"Final Report PMRI/MINA – Saipan Diver Survey*"). The report's survey used indicators such as returning to Saipan to dive, recommending Saipan as a dive destination to others, and overall satisfaction. Figure C-4., below shows respondents rating of the quality of their dive based on marine life, water quality, and monetary value.

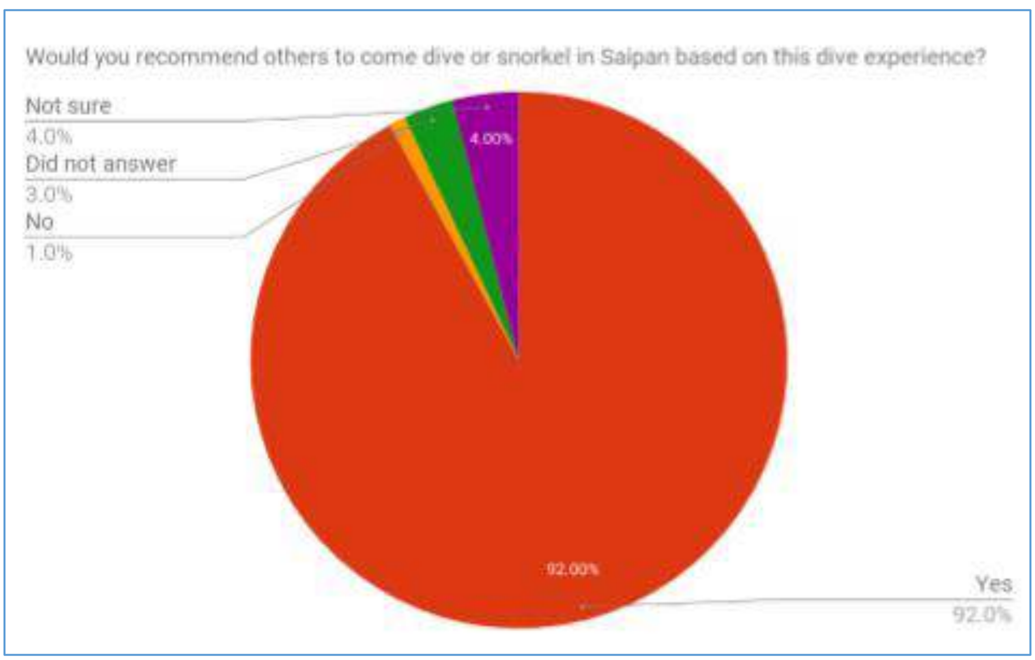
FIGURE C-4. 2017 Tourist Divers' Rating of their LaoLao Bay Dive Experience

	Very Poor %	Poor %	Moderate %	Good %	Excellent %	Did not answer %
Corals	1	3	23	42	27	4
Fish Life	1	1	21	43	34	1
Other Marine Life	2	4	33	35	21	5
Overall Satisfaction	1	0	12	44	42	1
Value of Money	1	2	22	39	34	3
Water Cleanliness	1	1	19	48	29	2
Water Visibility	1	4	19	47	28	1

Overall, 21% rated the experience as Moderate, 43% as Good, and 31% as Excellent. The report went on to state that "Of those surveyed, it was clear that an overwhelming percentage would recommend diving or snorkeling in Saipan based on their dive experience.", Figure C-5.

FIGURE C-5. 2017 Tourist Divers' Appreciation and Recommending Saipan to Others





Given these results, and the fact that island residents enjoy these same beaches every day, it was determined that all coastal waters of the CNMI are presently supporting the *Aesthetic Enjoyment* DU, with the exception of FDM, which is discussed in detail in Section C.3.8.10.

The CNMI defines "*Other Uses*" of this DU as oceanographic research, of which there has been a pronounced increase since the designation of the Marianas Trench National Marine Monument. Students, scientists and hobbyists continue to study CNMI coastal waters, coral reefs, fishes and other marine life, as they have for decades. This is substantiated by the many published scientific papers and research documents referenced within this IR. Therefore, all waters of the CNMI are presently supporting "*Other Uses*".

C.2.4 Criteria Used to Assess Fresh Surface Waterbodies' Designated Uses

Table C-5., summarizes criteria used to assess a fresh surface waterbody's support of each DU.

TABLE C-5. Assessment Criteria for Fresh Surface Waters

Designated Use	Criteria to Assess Support of the DUs
Propagation of Aquatic life	• Habitat suitability: Stream visual assessment score of "fair" or "good" for all sites within segment and other study results • DO%: No more than 10% of samples exceeding WQS for all sites within segment • General provisions met: no floating/settleable solids, no more than 10% of pH samples exceed WQS for all sites within the segment, no radioactive substances
Fish consumption	• Fish tissue/biota collected within the segment are to be free of contaminant concentrations exceeding USEPA standards; or very low likelihood of tissue contamination due to current or historic land use patterns in adjacent watersheds; or lack of edible fish species present in water.
Recreation	• *E. coli* or Enterococci bacteria: No more than 10% of samples result in exceedance of WQS • General provisions met: no floating/settleable solids, no more than 10% of pH samples exceed WQS for all sites within segment, no radioactive substances
Potable Water Supply	• *E. coli* bacteria: No more than 10% of samples result in exceedance of WQS • General provisions met: no floating/settleable solids, no more than 10% of pH samples exceed WQS for all sites within segment, no radioactive substances
Aesthetic Enjoyment & Other Uses	• No floating/settleable solids • Empirical evidence, Research papers, documents, tourist surveys, studies, etc.

The criteria used to assess support of the wetlands support of the *Propagation of Aquatic Life* DU is contained in Section C.4. "Wetlands Program", of this report.

C.2.4.1. Fresh Surface Water Propagation of Aquatic Life Criteria

Habitat Suitability

The *CNMI Surface Water Quality Monitoring Plan* for streams was established in late 2013. Implementation of the plan began in earnest in late 2014. Water quality data and information from visual stream assessments are used to map potential sources of pollution, the location of freshwater pools, and to evaluate the type and diversity of aquatic life therein. However, to date there is insufficient water quality data due to lack of regular stream flow in CNMI's intermittent and ephemeral stream systems. Therefore, visual biological assessments have become the foundation for determining whether stream water DUs are being supported in each waterbody segment. Given the CNMI's tropical conditions, gaining access to streams covered by jungle growth is very challenging, and sometimes hazardous given strenuous hiking conditions especially during dry season when temperatures can exceed the average of 85°F and 79% humidity. Therefore, to date only a few priority watersheds with high incidences of "Red Flags" have been mapped using GPS and visual assessments.

In order to make the current assessment method more efficient, the WQS/NPS branch collaborated with DCRM Planners to adapt Hawaii's *Stream Visual Assessment Protocol* (SVAP) for biological assessment of CNMI streams and their support of each DU. This Protocol combined the 1989 US EPA rapid bio-assessment protocol, with an NRCS, and Ohio EPA's protocols. The resulting 2018 SVAP measures elements of the physical and biological characteristics of instream and riparian environments with each element assigned a numerical score relative to reference conditions, and an overall score for the stream reach. The CNMI SVAP has been pilot tested this reporting cycle and the corresponding data sheets have been updated to better reflect the health of streambed conditions when streams are not flowing, as well as to include additional biological parameters. WQS/NPS staff have been trained in using this protocol in the South Achugao watershed, and have almost finished assessments of the South Achugao this reporting cycle. LaoLao watersheds streams will be assessed in the next reporting cycle.

In Addition, to this information, findings from the 2008 study by McKagan, et al, was also used. The DLNR DFW completed a two-week survey in eight different watersheds on Saipan to assess native and introduced freshwater species. Species were collected using a dip net, and where possible, electrofishing for identification and accessing aquatic life. Although, this study provides data on some streams within Saipan there is insufficient data on the remaining stream systems on Saipan, Rota, and the Northern Islands to determine if all are supporting the *Propagation of Aquatic Life* DU.

Dissolved Oxygen, Nutrients, and General Provisions.

The water quality criteria used for fresh surface waters are measured in the same manner as that for coastal waters, with the exception that the in-situ meters and laboratory instruments are calibrated at an appropriate salinity or conductivity level for freshwaters.

See each of the water quality criteria subsections (Dissolved Oxygen, Nutrients, and General Provisions) above in C.2.3.1 "Coastal Water Propagation of Aquatic Life Criteria", for details.

C.2.4.2. Fresh Surface Water Fish/Shellfish Consumption Criteria

Fish Tissue - Biota

At present, testing for contaminants in freshwater fish tissue or biota has been limited for assessing support of the *Fish and Shellfish Consumption* DU. Some heavy metal contaminants have been found in sediments and bivalves in Saipan streams that contain WWII debris dumpsites (2009, 2016, Denton, et.al). However, in the case of the Northern Islands and other remote locations on the inhabited islands where fish tissue or biota data is unavailable, the remoteness of these streams from any potential anthropogenic sources of toxic pollution is taken into consideration for assessment purposes. These remote areas are usually considered supportive of the *Fish and Shellfish Consumption* DU based on visual field assessments and professional judgement. The islands of Pagan and Anatahan which had more WWII activity will be discussed in further detail in Sections C.3.8.5. and C.3.8.9. respectively.

C.2.4.3. Fresh Surface Water Recreational Use Criteria

Fecal Indicator Bacteria – Enterococci or E. coli

There were no new water quality data collected this reporting cycle for assessing the *Recreational* DU of fresh surface waters outside of Talakhaya watershed on Rota. This was due to limited rainfall resulting in low or no flow in streambeds. However, Talakhaya flows regularly and in situ data plotters are also available to collect physical parameters. When sufficient data was available, exceedances of the WQS for Enterococci and *E. coli*, are calculated as follows:

1) A Single Sample Result exceeds the **Enterococci STV of 130 MPN/100ml** for any Class of ***Freshwaters***; ***OR*** when the **GM exceeds 35 MPN/100ml** based on samples taken within any 30-day interval, **UNLESS** the **Single Sample** Result is **<35 MPN/100ml**; or
2) A Single Sample Result exceeds the **E.coli STV of 410 MPN/100ml** for any Class of ***Freshwaters***; ***OR*** when the **GM exceeds 126 MPN/100ml** based on samples taken within any 30-day interval, **UNLESS** the **Single Sample** Result is **<126 MPN/100ml.**

Due to the lack of available stream water quality data, professional judgment, anecdotal information collected during visual field assessments, and GIS analyses are used to assess whether or not surface water streams are supportive of the *Recreational* DU.

General Provisions

The same General Provisions used for assessing support of the *Propagation of Aquatic Life* DU for coastal marine waters, are used to assess the *Recreational* DU for fresh surface waters (see the General Provisions subsection under Section C.2.3.1. Propagation of Aquatic Life, for details).

C.2.4.4. Potable Freshwater Supply Criteria

CNMI streams are not used as *Potable Water Supplies,* nor is Susupe Lake, the surrounding Susupe potholes, or the Lakes on Anatahan or Pagan. However, Susupe Lake could potentially be used with appropriate treatment. Presently, rainwater catchment and ground water are the more economically feasible sources in the CNMI. All ground water supplies under the influence of surface waters are treated and monitored for quality by CUC before distribution to users, and therefore meet the *Potable Water Supply* DU.

C.2.4.5. Fresh Surface Water Aesthetic Enjoyment and Other Uses Criteria

As stated for the *Recreational* DU, no data are systematically collected concerning visitor or residents *Aesthetic Enjoyment* of fresh surface waters. However, professional judgment, anecdotal information from users, and visual field assessments are used to assess this DU.

C.2.5. Five-Part Consolidated Assessment and Listing Method Categories

The five EPA recommended Consolidated Assessment and Listing Methodology (CALM) Categories were utilized in this IR, and are presented in Table C-6.

TABLE C-6. EPA CALM Reporting Categories

EPA CALM CATEGORY:	DESCRIPTION
1	All designated uses (DU) are supported, no DU is threatened
2	Attains some DUs, no DU is threatened, and there is insufficient information to determine if remaining DUs are attained/or impaired
3	There is insufficient available data and/or information to determine if DUs are supported or impaired. Potential presence of stressors that may cause impairment
4a	A TMDL to address a specific segment/pollutant combination has been approved or established by EPA
4b	A DU impairment caused by a pollutant is being addressed by the state through other pollution control requirements
4c[1]	A DU is impaired, but the impairment is not caused by a pollutant[1]
5	Available information indicates that at least one DU is not being supported or is threatened, and a TMDL is needed (a DU is threatened if a waterbody is currently attaining WQS, but is expected to not meet WQS by the next listing cycle).
5-alt	An alternative restoration approach is being pursued to meet WQS, in the interim while a TMDL remains undeveloped.

1 CWA defines “pollution not caused by a pollutant” as “the man-made or man-induced alteration of the chemical, physical, biological, or radiological integrity of water” (Section 502(19))

The CALM categories are described in full in the "*2006 EPA Guidance for Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the CWA"* and in the more recent "*2016 USEPA Memorandum from US EPA containing information concerning 2016 CWA Sections 303(d), 305(b), and 314 Integrated Reporting and Listing Decisions".* Each coastal marine and surface waterbody has been assigned a CALM Category based on this methodology.

Each category is discussed in further detail in subsections C.2.5.1., through C.2.5.5., that follow.

C.2.5.1. CALM Category 1

Calm Category 1 is achieved when a waterbody segment is, "*Meeting all Water Quality Standards and is attaining all DUs, and none are threatened".*

Category 1 represents the highest level of attainment. A waterbody classified as Category 1 meets all applicable WQS and criteria throughout the entire waterbody. Assessment is based on combined evaluation of the following information:

1) Current data (collected within 5 years) indicates attainment, with no trend toward expected non-attainment within the listing period. Greater weight is placed on more recent water quality and biological criteria data (< 2 years) if improvement is shown;
2) Old data (> 5 years) indicates attainment and no change in any associated conditions;
3) Qualitative data or information from professional sources indicates attainment of standards and shows no identifiable sources of pollution and low impact land use. Most coastal waters surrounding the Northern Islands, for example, are assumed to be Category 1 in part due to the fact that they are mostly uninhabited and undeveloped, in spite of limited available monitoring data.

C.2.5.2. CALM Category 2

Category 2 is achieved when a waterbody segment, "*Attains some of the DUs; no DU is threatened or impaired; and insufficient data or no data and information is available to determine if the remaining DUs are attained, threatened, or impaired* (*with presumption that all DUs are attained*)".

A *Category 2* assessment is based on combined evaluation of the following information:

1) Current data (collected within 5 years) for some standards indicate attainment, with no trend toward expected non-attainment within the listing period, or an inadequate density of data to evaluate a trend;
2) Old data (>5 five years) for some standards indicates attainment, and no change in associated conditions;
3) Insufficient data for some standards, but qualitative data/information from professional sources indicate a low likelihood of impairment from any potential sources (e.g. high dilution, intermittent/seasonal effects, low intensity land use, etc.).

C.2.5.3. CALM Category 3

A Category 3 is achieved when there is, "*Insufficient data and information to determine if DUs are attained*", within a waterbody.

Waterbody segments assigned to *Category 3* have both insufficient, or no data available, and in contrast to Category 2, *there is reasonable potential that one or more uses are not being attained*.

Category 3 waterbody segments are therefore priorities for future monitoring as resources become available. Assessment is based on combined evaluation of the following information:

1) Insufficient or conflicting data that does not confirm either attainment or non-attainment of DUs;
2) **NOTE**: *This category should not be used when data and/or information is available about impairments due to pollution not caused by a pollutant, including for instance, where hydrologic alteration or impacts from habitat alteration impairs a designate use, but no narrative or numeric water quality criteria can be assessed: such water should be placed in* Category 4c*.*
3) Qualitative data or information from professional sources show the potential presence of stressors that may cause impairment of one or more DUs. However, no quantitative water quality data confirms the presence of impairment-causing stressors. For example, fish tissue or biota data are not available for many waterbody segments of the CNMI, but the contamination that has been found in other tissue or biota has occurred only in waterbodies where either current or previous land uses include potential sources of contamination. Therefore, most CNMI waterbodies that have been contaminated from legacy WWII ammunitions, dumps, abandoned equipment, or may have other anthropogenic stressors would be listed as Category 3;
4) Old data, with:
    a. low reliability, no repeat measurements (e.g. one-time synoptic data);
    b. a change of conditions without subsequent re-measurement; or
    c. no evidence of human causes or sources of pollution to account for observed water quality condition.

C.2.5.4. CALM Category 4

Category 4 is reached when a waterbody segment is determined to be*, "Impaired or threatened for one or more DUs, but does not require development of a TMDL."*

A waterbody is listed as *Category 4* when pollution/impairment is not caused by a pollutant (manmade or man-induced alteration); or *if* impairment is caused by a pollutant, a TMDL has already been completed; or other enforceable controls are in place. Assessment is based on combined evaluation of the following information:

1) Current or old data for a WQS indicates either impaired use, or a trend toward expected non-attainment within the listing period, but also where enforceable management changes are expected to correct the condition;
2) Water quality models that predict impaired use under loading for some WQS, also predict attainment when required controls are in place; or,
3) Quantitative or qualitative data/information from professional sources indicate that the cause of impaired use is not from a pollutant(s) (e.g. habitat modification, hydrological changes, or over-harvesting).

Waters are listed in one of the following subcategories of CALM Category 4 when:

Category 4a: *TMDL is completed,* but insufficient new data exists to determine that attainment has been achieved.

Category 4b: *Other pollution control requirements are reasonably expected to result in attainment of WQS in the near future,* but where no new data are available to determine that attainment has been achieved. Enforceable controls may include new wastewater discharge permits issued without preparation of a TMDL, other regulatory orders, IWMPs are in place and being implemented, or contracts for hazardous waste remediation projects are in place.

Category 4c: *Pollution is not caused by a pollutant, e.g.,* waters or biological communities impaired by human activity such as habitat modification, hydrologic alteration, which may be climate change related, or over harvesting. Jurisdictions can employ a variety of watershed restoration tools and approaches to address sources of impairment.

C.2.5.5. CALM Category 5

Category 5 is achieved when*, "Waters are impaired or threatened for one or more DUs by a pollutant(s) and a TMDL is required*."

Waterbody segments are listed as *Category 5* when:

1) Current data (collected within five years) for a WQS or other criteria either indicates impaired use, or a trend toward expected impairment within the listing period, and where quantitative or qualitative data/information from professional sources indicates that the cause of impaired use is from a pollutant(s);
2) Water quality models predict impaired use under current loading for a WQS, and where quantitative or qualitative data/information from professional sources indicates that the cause of impaired use is from a pollutant(s); or

3) Those waterbodies have been previously listed on the State's 303(d) list of impaired waters, based on current or old data that indicated the involvement of a pollutant(s), and where there has been no change in management or conditions that would indicate attainment of DUs.

C.3 ASSESSMENT RESULTS

This subsection presents the results of all CNMI waterbody assessments for each type of waterbody in and surrounding the southern islands of Saipan, Mañagaha, Rota, Tinian, Aguigan ("Goat Island"), and the Northern Islands. This includes assessing attainment of each DU and reporting the resulting CALM category, beginning with a general overview of the islands, and then providing further detail on each of the islands' watersheds.

This section also provides summaries of impaired causes and their sources in a 303(d) list, and culminates with an explanation of the criteria used to determine when a waterbody segment may be removed from the 303(d) list of impaired waters.

C.3.1. Five-Part Categorization All CNMI Surface Waters

A total of 15 years (2004 through 2019) of monitoring data were reviewed in the preparation of this 2020 IR (see Appendix II). Based on these data, other studies, and professional judgment CNMI waterbodies were assessed and categorized as shown in the Table C-7.

TABLE C-7. Size of All CNMI Waters Assigned to Each CALM Category

Waterbody Type	Category							total Assessed	total in State
	1	2	3	4a	4b	4c	5		
Stream (Miles)		*50.2					50.3	100.5	100.5
Lake (Acres)		?	**210.0				57.4	267.4	267.4
Ocean coast (Miles)	99.8	6.3	36.4				98.0	240.5	240.5
Wetland (Acres)	58.6	1.6	29.0			628.6		717.8	717.8

* Northern Islands' stream systems have not been mapped or measured. Miles unknown.

** Anatahan's Lake "Hagoi Lagu" have not been delineated or measured. Acreage unknown.

C.3.2. Section 303(d) List and TMDL Development Status

The CWA requires that each state and territory submit a list of impaired (CALM Category 5) waters requiring TMDLs, the pollutants causing the impairment, and the sources responsible for the impairment. These are contained in the 303(d) list contained in Tables C-8., through C-10., on the following pages. A TMDL for Saipan's Coastal Waters Impaired by Bacteria was approved by EPA in 2018, which allowed several watersheds to be delisted for Enterococci last reporting cycle.

TABLE C-8. Rota Waterbody Segment/Pollutant Combinations on 303(d) Impaired List

Seg ID	Segment Name	Size	Cause Name	Source	Cycle First Listed	Comments
ROTA:						
2	Sabana/Talakaya/Palie	7.3 miles	Enterococci (215)	Grazing in Riparian or Shoreline zones	2008	Last five years cannot remove
				Groundwater loading		Last five years cannot remove
				On-site Treatment Systems Septic		Last five years cannot remove
				Wet Weather Discharges (NPS)		Last five years cannot remove
			pH	**Source unknown**	**2020**	
2STR	Sabana/Talakaya/Palie Stream	6.1 miles	**Enterococci (215)**	**On-site Treatment Systems, Grazing in Riparian or Shoreline zones, Wet Weather Discharges**	**2020**	
3	Songsong	7.9 miles	Enterococci (215)	On-site Treatment Systems Septic	2004	Last five years cannot remove
				Wastes from pets		
			phosphate (340)	Marina Boat Maintenance	2004	New data.
			DO%(205)	**Groundwater loading**	**2020**	
				Marina Boat Maintenance		
				On-site Treatment Systems Septic		
			pH	**Source unknown**	**2020**	**No trend, Aging pH meter is suspect**
4	Uyulanhulo/Teteto	3.5 miles	**Enterococci (215)**	**Wet Weather Discharges (NPS)**	**2020**	
			pH, Low (490)	**Source unknown**	**2020**	
5	Chaliat/Talo	2.6 miles	Enterococci (215)	on-site treatment systems	2004	Within last 5 years cannot remove
			Nitrate (302)	**Golf Courses**	**2020**	**New data.**
				Groundwater loading		**New data.**
			pH, Low (490)	**Source unknown**	**2020**	

The items with **bold red fonts** are new causes, or newly listed sources this reporting cycle.

TABLE C-9. Tinian Waterbody Segment/Pollutant Combinations on 303(d) Impaired List

Seg ID	Segment Name	Size	Cause Name	Source	Cycle First Listed	Comments
TINIAN:						
7	Masalok	3.5 miles	phosphate (340)	Source unknown	2004	New data.
			Nitrate (302)	**Source unknown**	**2020**	
			pH	**Source unknown**	**2020**	**No trend. Aging probe suspect.**
9	Makpo	3.0 miles	phosphate (340)	Source unknown	2004	New data.
			pH, Low (490)	Source unknown	2018	
9H	Makpo (Harbor)	1.5 miles	phosphate (340)	Marina Boat Maintenance	2004	
			DO% (205)	Marina Boat Maintenance	2018	
				On-site Treatment Systems Septic	2010	
10	Puntan Diaplolamanibot	9.9 miles	phosphate (340)	**Illegal dumps or inappropriate disposal**	2004	**New source listed**
			Nitrate (302)	**Illegal dumps or inappropriate disposal**	**2020**	**New data.**
			***Enterococci* (215)**	**Waste from pets**	**2020**	**New source listed**
11	Puntan Tahgong	6.4 miles	***Enterococci* (215)**	**Recreation and Tourism (non-boating)**	**2020**	**No public toilet facilities.**
			phosphate (340)	Source unknown	2004	New data.
			Nitrate (302)	**Source unknown**	**2020**	**New data.**
			pH	**Source unknown**	**2020**	**No trend. Aging probe suspect.**

The items with **bold red fonts** are new causes, or newly listed sources this reporting cycle.

TABLE C-10. Saipan Waterbody Segment/Pollutant Combinations on 303(d) Impaired List

Seg ID	Segment Name	Size	Cause Name	Source	Cycle First Listed	Comments
SAIPAN:						
12	**Kalabera**	**4.1 miles**	Phosphate (340)	Waterfowl	2004	Sea and shore bird guano
			Nitrates (302)	**Waterfowl**	**2020**	**Sea and shore bird guano**
13	**Talofofo**	**5.4 miles**	Phosphate (340)	Golf Courses	2004	New data.
				Grazing in Riparian or Shoreline zones		New data.
				Waterfowl		New data.
			Nitrates (302)	**Golf Courses**	**2020**	**New data.**
				Grazing in Riparian or Shoreline zones		**New data.**
				Waterfowl		**New data.**
			pH	**Source Unknown**	**2020**	**New data.**
13STR	Talofofo Stream	34.5 miles	Enterococci (215)	Grazing in Riparian or Shoreline zones	2018	
				Wet Weather Discharges (NPS)		
14	**Kagman**	**6.7 miles**	Phosphate (340)	Golf Courses	2004	New data.
				Groundwater loading		New data.
				On-site Treatment Systems Septic		New data.
			Nitrates (302)	**Golf Courses**	**2020**	**New data.**
				Groundwater loading		**New data.**
				On-site Treatment Systems Septic		**New data.**
			pH	**Source Unknown**	**2020**	**No trend. Aging probe suspect.**
15	**Lao Lao**	**1.4 miles**	Phosphate (340)	On-site Treatment Systems Septic	2004	New data.
				Wet Weather Discharges (NPS)		New data.
			Nitrates (302)	**On-site Treatment Systems Septic**	**2020**	**New data.**
				Wet Weather Discharges (NPS)		**New data.**
17A	Isley (West)	1.7 miles	copper (163)	NPS Pollution from Military	2014	
			lead (267)	NPS Pollution from Military	2014	
			Phosphate (340)	Source Unknown	2004	
			pH, Low (490)	**Source Unknown**	**2020**	

* TMDL for Saipan's coastal waters impaired by bacteria was approved in 2017 and is being implemented

TABLE C-10. Saipan Waterbody Segment/Pollutant Combinations on 303(d) Impaired List, continued

Seg ID	Segment Name	Size	Cause Name	Source	Cycle First Listed	Comments
SAIPAN:						
17B	**Isley (East)**	**4.2 miles**	Phosphate (340)	Source Unknown	2004	
			pH	**Source Unknown**	**2020**	**No trend. Aging probe suspect.**
18 A	Susupe (North)	2.4 miles	DO% (205)	Groundwater loading	2010	
				Sanitary Sewer Overflows		
				Urban Runoff/Storm Sewers		
			Phosphate (340)	Groundwater loading	2004	New data.
				Sanitary Sewer Overflows		New data.
				Urban Runoff/Storm Sewers		New data.
			Nitrates (302)	**Groundwater loading**	**2020**	**New data.**
				Sanitary Sewer Overflows		**New data.**
				Urban Runoff/Storm Sewers		**New data.**
			pH, Low (490)	**Source Unknown**	**2020**	**New data.**
18 B	Susupe (South)	2.8 miles	**DO% (205)**	Groundwater loading	2010	New data.
				On-site Treatment Systems Septic		**New data.**
				Sanitary Sewer Overflows		New data.
				Urban Runoff/Storm Sewers		New data.
			Phosphate (340)	Groundwater loading	2004	New data.
				On-site Treatment Systems Septic		New data.
				Sanitary Sewer Overflows		New data.
				Urban Runoff/Storm Sewers		New data.
			Nitrates (302)	**Groundwater loading**	**2020**	**New data.**
				On-site Treatment Systems Septic		**New data.**
				Sanitary Sewer Overflows		**New data.**
				Urban Runoff/Storm Sewers		**New data.**
			pH	**Source Unknown**	**2020**	**No trend. Aging probe suspect.**

TABLE C-10. Saipan Waterbody Segment/Pollutant Combinations on 303(d) Impaired List, continued

Seg ID	Segment Name	Size	Cause Name	Source	Cycle First Listed	Comments
SAIPAN:						
18LAK	Susupe (South) Lake	57.4 acres	pH, High (491)	naturally occuring/analysis needed	2014	
			DO% (205)	Sanitary Sewer Overflows	2010	
				Urban Runoff/Storm Sewers		
				On-site Treatment Systems Septic		
19 A	W. Takpochau (North)	1.0 miles	**pH**	**Source Unknown**	**2020**	**data since 2016 meets WQS**
			lead (267)	NPS Pollution from Military	2018	No trend.
			Phosphate (340)	Commercial Harbor/Port Activities	2004	New data.
				Sanitary Sewer Overflows		New data.
				Urban Runoff/Storm Sewers		New data.
			Nitrates (302)	**Commercial Harbor/Port Activities**	**2020**	**New data.**
				Sanitary Sewer Overflows		**New data.**
				Urban Runoff/Storm Sewers		**New data.**
19 B	W. Takpochau (Central)	4.4 miles	pH, Low (490)	Roads, Infrastructure New Construction	2018	
				Marina Boat Maintenance		
			DO% (205)	Groundwater loading	2010	
				Sanitary Sewer Overflows		
				Urban Runoff/Storm Sewers		
			Hg in fish (467)	Impervious surface/ Lot Runoff	2010	
			Phosphate (340)	Groundwater loading	2004	New data.
				Sanitary Sewer Overflows		New data.
			Nitrates (302)	**Groundwater loading**	**2020**	**New data.**
				Sanitary Sewer Overflows		**New data.**
			Copper (163)	**NPS Pollution from Military (Other than port)**	**2020**	**New data.**
				Releases from Waste site or Dumps		**New data.**
			lead (267)	**NPS Pollution from Military (Other than port)**	**2020**	**New data.**
				Releases from Waste site or Dumps		**New data.**

TABLE C-10. Saipan Waterbody Segment/Pollutant Combinations on 303(d) Impaired List, continued

Seg ID	Segment Name	Size	Cause Name	Source	Cycle First Listed	Comments
SAIPAN:						
19 C	W. Takpochau (South)	1.9 miles	DO% (205)	On-site Treatment Systems Septic	2008	
				Sanitary Sewer Overflows	2008	
				Urban Runoff/Storm Sewers	2008	
			pH, Low (490)	Roads, Infrastructure New Construction	2016	
				Marina Boat Maintenance	2016	
			Nitrates (302)	On-site Treatment Systems Septic	2018	
				Sanitary Sewer Overflows	2018	
				Urban Runoff/Storm Sewers	2018	
19STRB	W. Takpochau (Central) Stream	3.2 miles	Hg in fish (467)	Impervious surface/ Lot Runoff	2010	
			Enterococci (215)	Grazing in Riparian or Shoreline zones	2018	
				Sanitary Sewer Overflows	2018	
				Urban Runoff/Storm Sewers	2018	
				Wet Weather Discharges (NPS)	**2020**	**New source listed**
20 A	Achugao (North)	1.9 miles	DO% (205)	Roads, Infrastructure New Construction	2010	
			Phosphate (340)	**Source Unknown**	**2020**	**New data.**
20 B	Achugao (South)	2.4 miles	DO% (205)	Grazing in Riparian or Shoreline zones	2010	
				On-site Treatment Systems Septic	2010	
				Sanitary Sewer Overflows	2010	
				Urban Runoff/Storm Sewers	2010	
			lead (267)	NPS Pollution from Military (Other than	2018	
20STRB	Achugao (South) Stream	6.5 miles	lead (267)	NPS Pollution from Military (Other than	2018	
			Enterococci (215)	Grazing in Riparian or Shoreline zones	2018	
				On-site Treatment Systems Septic	2018	
				Sanitary Sewer Overflows	2018	
				Urban Runoff/Storm Sewers	2018	
21	As Matuis	2.2 miles	DO% (205)	Source Unknown	2009	
			pH, Low (490)	Source Unknown	2018	
			Phosphate (340)	**Source Unknown**	**2020**	**New data.**
			Nitrates (302)	**Source Unknown**	**2020**	**New data.**
22	Banaderu	5.1 miles	**Phosphate (340)**	**Source Unknown**	**2020**	**New data.**

TABLE C-11. Mañagaha Waterbody Segment/Pollutant Combinations on 303(d) Impaired List

Seg ID	Segment Name	Size	Cause Name	Source	Cycle First Listed	Comments
MANAGAHA:						
23	Managaha	0.6 miles	pH, Low (490)	Marina Boat Maintenance	2017	unconfirmed
			Phosphate (340)	**Source Unknown**	**2020**	**New data.**
			Nitrates (302)	**Source Unknown**	**2020**	**New data.**

TABLE C-12. Northern Islands Waterbody Segment/Pollutant Combinations on 303(d) Impaired List

Seg ID	Segment Name	Size	Cause Name	Source	Cycle First Listed	Comments
NORTHERN ISLANDS:						
24	Farallon de Medinilla	4.2 miles	**Other**	**NPS pollution from military base facilities (other than a port)**	**2020**	**Lack of access to support Aesthetic Enjoyment due to safety concerns. New satellite imagery shows permanently altered topography from live fire bombing exercises.**

Table C-13., on the following page lists the size of each waterbody type that is impaired whether by a pollutant or non-pollutant (i.e., habitat alteration, flow regime modification, non-native aquatic plants, or non-native fish/shellfish). Only impairments caused by a pollutant require a TMDL be established.

TABLE C-13. Size of Each Waterbody Type Impaired and the Causes (including Non-pollutants)

Coastal Waters	Miles	Streams	Miles	Wetlands	Acres	Lakes	Acres
Enterococci	82.8	Enterococci	50.3	Habitat Alteration	568.4	Non-Native Fish/Shellfish	57.4
Phosphate	76.1	Lead	6.5	Flow Regime Modification	568.4	E. coli	57.4
Habitat Bioassessment	58.4	Habitat Aleration	3.2	Non-Native Aquatic Plants	568.4	pH, High	57.4
Nitrate	55.3	Mercury	3.2			Habitat Bioassessment	57.4
pH	45.2	Flow Regime Modification	3.2			DO%	57.4
DO%	27.4	Habitat Aleration	3.2				
pH, Low	22.3						
Lead	9.5						
Copper	6.1						
Mercury	4.4						
Other	4.2						

Bacteria and nutrient exceedances of the CNMI WQS was the most frequently listed cause of impairment for CNMI waters. It should be noted that although Enterococci is listed less frequently, this is because of the completion of the 2018 TMDL for bacteria rather than there being an actual decrease in WQS violations throughout most of Saipan's coastal waters.

This reporting cycle, there has been an increase in waterbodies 303(d) listed as impaired for heavy metals. The recent studies by Denton, et.al, of WERI, indicate that heavy metals are transported into sediment and biota from nearby WWII debris dumpsites. This is of significance given the DoD interest in increasing military training exercises in the CNMI in the future.

C.3.2.1. Criteria for Removal of Water Segment/Pollutant Combinations from the 303(d) List

BECQ shall remove a pollutant of a waterbody as impaired based on one or more of the following criteria:

1. USEPA approved a TMDL for the pollutant;
2. The data used for previous listing is superseded by more recent credible and scientifically defensible data showing that the water meets the applicable numeric or narrative water quality standard.

3. All historical data is considered, with a greater weight placed on more recent data (*last five years*), except for BEACH Coastal Waters (beaches for swimming), that have a greater weight placed on the last *2 years* of data because of the large number of samples collected at these locations;
4. The surface water no longer meets the criteria for impairment based on a change in the applicable water quality standard or a DU approved by USEPA;
5. The surface water no longer meets the criteria for impairment for the specific narrative water quality standard based on a change in narrative water quality standard implementation procedures;
6. A re-evaluation of the data indicate that the surface water does not meet the criteria for impairment because of a deficiency in the original analysis; or
7. Pollutant loadings from naturally occurring conditions alone are sufficient to cause a violation of applicable WQS.

BECQ may only upgrade the entire waterbody from CALM Category 5 if all the previous listed pollutants for that waterbody have been removed from the 303(d) list.

C.3.2.2. CNMI Waters Removed from the 303(d) List

Last reporting cycle, several waterbodies on Tinian and Rota were removed from the 303(d) list as impaired for Enterococci. This cycle many have been relisted. It is thought to be the result of naturally occurring bacteria in stormwater sediment as the result of severe rain events prior to and after Super Typhoon Yutu in late October 2018.

This cycle North Susupe watershed on Saipan was delisted for Enterococci as data from the last five (5) years have met the WQS for Enterococci at least 90% of the time. This was attributed to the post-phase of El Nino causing diminished rain events, and to sewer upgrades and newly constructed roadway BMPs.

Nutrient testing began again in earnest this reporting cycle. Every coastal waterbody was tested using the approved FIA EPA Method 353.2. Most of Saipan's and Tinian's watersheds had at least one exceedance of the CNMI WQS for orthophosphate or NO_3-N. Given the very limited number of data points, this resulted in most watersheds being added to the 303(d) list as impaired for a nutrient. Potential sources include urban runoff, ground water seeps, sewer overflows, failing on-site IWDSs, marina boat maintenance, and Golf Courses. However, three of Rota's watersheds were delisted as impaired for phosphate this reporting cycle, given that nutrient data from the 2004 IR is known to be erroneous. Table C-14., on the following page lists all waterbody segment/pollutant combinations (15.8 coastal miles), which are being delisted as a result of the 2020 assessment, along with the rationale for each delisting, using US EPA's established reasoning.

TABLE C-14. Segment/Pollutant Combinations Removed from CNMI's FY 2020 303(d) List

Segment/Pollutant Combination on Previous CNMI 303(d) List					Summary Rationale for Delisting Segment/Pollutant Combinations (Identify number of reason) 1. State determines water quality is being met. 2. Flaws in original listing. 3. Other point or Non-point source controls expected to Water Quality Standards. 4. Impairment due to non-pollutant. 5. EPA approval of TMDL. 6. Waterbody no in state's jurisdiction. 7. Other	
Seg ID	Segment Name	Pollutant	Segment Size	First listed	Reason	Comments
ROTA:						
2	Sabana/Talakhaya/Palie	phosphate (340)	7.3	2004	2	New FIA data supersedes 2004 Hach Data
4	Uyulanhulo/Teteto	phosphate (340)	3.5	2004	2	New FIA data supersedes 2004 Hach Data
5	Chaliat/Talo	phosphate (340)	2.6	2004	2	New FIA data supersedes 2004 Hach Data
SAIPAN:						
18a	Susupe (North)	enterococci (215)	2.4	2004	1	CUC rehabilitated A-7 Lift Station. Was delisted in 2018 IR for reason 5.
		TOTAL Coastal Miles Delisted	**15.8**			
		TOTAL Lake Acres Delisted	**0**			

In addition to establishing a 303(d) impaired list, the CWA requires each State and Territory to provide a priority ranking for TMDL development. The waterbody segment/pollutant combinations requiring a TMDL were ranked and scheduled by priority using professional judgment based on the following criteria:

HIGH Priority: 2025

- severe or widespread impairment (multiple sites impaired);
- frequent recreation use;
- high economic (tourism or fishing) value;
- fish tissue contamination in edible species; or
- known sources of pollutants.

MEDIUM Priority: 2030

- limited area of impairment (one or few sites impaired);
- less frequent recreation use; or
- few or unknown sources of pollutants.

LOW Priority: 2035

- isolated location and/or very infrequent recreation use;
- Impaired for only for suspected data quality issues; or
- few or unknown sources of pollutants.

Given available human resources and funding, High priority TMDLs will be the first to be initiated. In addition, BECQ will continue to collaborate with UoG WERI and other institutions to continue heavy metal testing in fish tissue and biota throughout the islands where there are known WWII dumpsites.

Table C-15. and 16, on the next pages lists the status of TMDL development for impaired waterbody segments and the schedule for TMDL submission, or removal from the 303(d) list, based on their priority.

TABLE C-15. TMDL Development Status for Saipan

Seg ID	Segment Name	Class	Pollutant/ Combination	TMDL ID	*Priority	Project Status	Year first listed	Projected TMDL Submittal or Removal Date
SAIPAN:								
12	Kalabera	AA	Enterococci (215)	CN12-215		Completed 2018	2004	**DONE**
			phosphate (340)	CN12-340	Med	Continue FIA monitoring	2004	2030
			Nitrate (302)	**CN12-302**	**Med**	**Continue FIA monitoring**	**2020**	**2030**
13	Talofofo	AA	Enterococci (215)	CN13-215		Completed 2018	2004	**DONE**
			phosphate (340)	CN13-340	Med	Continue FIA monitoring	2004	2030
			Nitrate (302)	**CN13-302**	**Med**	**Continue FIA monitoring**	**2020**	**2030**
			pH	**CN13-pH**	**Low**	**Use new pH probe**	**2020**	**2035**
13STR	Talofofo Stream	1	Enterococci (215)	CN13STR-215	Low	Continue monitoring	2018	2033
14	Kagman	AA	**Enterococci (215)**	**CN14-215**		**RELISTED 2020/Completed 2018**	**2006**	**DONE**
			phosphate (340)	CN14-340	Med	Continue FIA monitoring	2004	2030
			Nitrate (302)	**CN14-302**	**Med**	**Continue FIA monitoring**	**2020**	**2030**
			pH	**CN14-pH**	**Low**	**Use new pH probe**	**2020**	**2033**
15	Lao Lao	AA	Enterococci (215)	CN15-215		Completed 2018	2004	**DONE**
			phosphate (340)	CN15-340	Med	Continue FIA monitoring	2004	2030
			Nitrate (302)	**CN15-302**	**Med**	**Continue FIA monitoring**	**2020**	**2030**
17A	Isley (West)	A	Enterococci (215)	CN17A-215		Completed 2018	2006	**DONE**
			copper (163)	CN17A-163	High	Invitation to bid for TMDL 2027	2014	2028
			lead (267)	CN17A-267	High	Invitation to bid for TMDL 2027	2014	2028
			phosphate (340)	CN17A-340	Med	Continue FIA monitoring	2004	2030
			pH, Low (490)	**CN17A-490**	**Low**	**Use new pH probe**	**2020**	**2033**
17B	Isley (East)	AA	Enterococci (215)	CN17B-215		Completed 2018	2004	**DONE**
			phosphate (340)	CN17B-340	Med	Continue FIA monitoring	2004	2030
			pH	**CN17B-pH**	**Low**	**Use new pH probe**	**2020**	**2033**
18A	Susupe (North)	AA	Enterococci (215)	CN18A-215		**DELISTED/ Completed 2018**	2006	**DONE**
			DO% (205)	CN18A-205	Med	Continue monitoring	2010	2030
			pH, Low (490)	**CN18A-490**	**Low**	**Use new pH probe**	**2020**	**2035**
			phosphate (340)	CN18A-340	Med	Continue FIA monitoring	2004	2030
			Nitrate (302)	**CN18A-302**	**Med**	**Continue FIA monitoring**	**2020**	**2030**
18B	Susupe (South)	AA	Enterococci (215)	CN18B-215		Completed 2018	2004	**DONE**
			DO% (205)	CN18B-205	Med	Continue monitoring	2010	2030
			pH	**CN18B-pH**	**Low**	**Use new pH probe**	**2020**	**2033**
			phosphate (340)	CN18B-340	Med	Continue FIA monitoring	2004	2030
			Nitrate (302)	**CN18B-304**	**Med**	**Continue FIA monitoring**	**2020**	**2030**
18LAK	Susupe (South) Lake	1	E. coli (217)	CN18LAK-217		Completed 2018	2012	**DONE**
			DO% (205)	CN18LAK-205	Low	Continue monitoring	2010	2033
			ph, High (491)	CN18LAK-491	Low	Continue monitoring	2014	2033
19A	W. Takpochau (North)	A	Enterococci (215)	CN19A-215		Completed 2018	2004	**DONE**
			pH	**CN19A-pH**	**low**	**Use new pH probe**	**2020**	**2035**
			lead (267)	CN19A-267	High	Invitation to bid for TMDL 2027	2018	2028
			phosphate (340)	CN19A-340	Med	Continue FIA monitoring	2004	2030
			Nitrate (302)	**CN19A-302**	**Med**	**Continue FIA monitoring**	**2020**	**2030**

TABLE C-15. TMDL Development Status for Saipan Continued

Seg ID	Segment Name	Class	Pollutant/ Combination	TMDL ID	*Priority	Project Status	Projected TMDL Submittal or Removal Date
19B	W. Takpochau (Central)	AA	Enterococci (215)	CN19B-215		Completed 2017	DONE
			pH, Low (490)	CN19B-490	Low	Use new pH probe	2035
			DO% (205)	CN19B-205	Med	Continue monitoring	2030
			phosphate (340)	**CN19B-340**	**Med**	**Continue FIA monitoring**	**2030**
			Nitrate (302)	**CN19B-302**	**Med**	**Continue FIA monitoring**	**2030**
			copper (163)	CN19B-163	High	Invitation to bid for TMDL 202	2025
			lead (267)	CN19B-267	High	Invitation to bid for TMDL 202	2025
			Hg in fish (467)	CN19B-467	High	Invitation to bid for TMDL 202	2025
19STRB	W. Takpochau (Central) Stream	1	Hg in fish (467)	CN19STRB-467	High	Invitation to bid for TMDL 202	2025
			Enterococci (215)	CN19STRB-467	Low	Invitation to bid for TMDL 202	2035
19C	W. Takpochau (South)	AA	Enterococci (215)	CN19C-215		Completed 2017	DONE
			DO% (205)	CN19C-205	Med	Continue monitoring	2030
			pH, Low (490)	CN19C-490	Low	Use new pH probe	2035
			Nitrate (302)	CN19C-302	Med	Continue FIA monitoring	2030
20A	Achugao (North)	AA	Enterococci (215)	CN20A-215		Completed 2017	DONE
			DO% (205)	CN20A-205	Med	Continue monitoring	2030
			phosphate (340)	**CN20A-340**	**Med**	**Continue FIA monitoring**	**2030**
20B	Achugao (South)	AA	Enterococci (215)	CN20B-215		Completed 2017	DONE
			DO% (205)	CN20B-205	High	Invitation to bid for TMDL 2019	2025
			lead (267)	CN20B-267	Med	Invitation to bid for TMDL 2020	2030
20B	Achugao (South) Stream	1	Enterococci (215)	CN20B-215	Low	Invitation to bid for TMDL 2020	2035
			lead (267)	CN20B-267	High	Invitation to bid for TMDL 2020	2025
21	As Matuis	AA	Enterococci (215)	CN21-215		Completed 2017	DONE
			DO% (205)	CN21-205	Low	Invitation to bid for TMDL 2019	2035
			pH, Low (490)	CN21-490	Low	Use new pH probe	2035
			phosphate (340)	**CN21-340**	**Med**	**Continue FIA monitoring**	**2030**
			Nitrate (302)	**CN21-302**	**Med**	**Continue FIA monitoring**	**2030**
22	Banaderu	AA	Enterococci (215)	CN22-215		Completed 2017	DONE
			phosphate (340)	**CN22-340**	**Med**	**Continue FIA monitoring**	**2030**
MANAGAHA:							
23	Managaha	AA	Enterococci (215)	CN23-215	Low	Continue monitoring	2025
			pH, Low (490)	CN23-490	Low	Use new pH probe	2035
			Nitrate (302)	**CN23-302**	**Med**	**Suspect erroneous, monitor**	**2030**
			phosphate (340)	**CN23-340**	**Med**	**Suspect erroneous, monitor**	**2030**

Medium and Low priority watersheds will have their TMDLs initiated as soon as resources allow, or alternative pollution control requirements can be employed in the interim while a TMDL remains undeveloped, e.g., sewer upgrades, roadway improvements with BMPs, IWMPs implementation, etc.

TABLE C-16. TMDL Development Status for Rota and Tinian and Northern Islands

Seg ID	Segment Name	Class	Pollutant/ Combination	TMDL ID	*Priority	Project Status	Year first listed	Projected TMDL Submittal or Removal Date
ROTA:								
2	Sabana/Talakaya/ Palie	AA	Enterococci (215)	CN2-215	Low	Continue monitoring	2008	2033
			pH	**CN2-pH**	**Low**	**Use new pH probe**	**2020**	**2033**
2STR	Sabana/Talakaya/ Palie Stream	1	**Enterococci (215)**	**CNS-215**	**Low**	**Continue monitoring**	**2020**	**2035**
3	Songsong	A	Enterococci (215)	CN2-215	Low	Continue monitoring	2004	2033
			phosphate (340)	CN2-340	Low	Continue FIA testing	2004	2033
			DO% (205)	**CN2-205**	**Low**	**Continue monitoring**	**2020**	**2033**
			pH	**CN2-pH**	**Low**	**Use new pH probe**	**2020**	**2033**
4	Uyulanhulo/Teteto	AA	**Enterococci (215)**	**CN4-215**	**Low**	**Continue monitoring**	**2020**	**2033**
			pH, Low (490)	**CN4-490**	**Low**	**Use new pH probe**	**2020**	**2033**
5	Chailat/Talo	AA	Enterococci (215)	CN5-215	Low	Continue monitoring	2004	2033
			pH, Low (490)	**CN5-490**	**Low**	**Use new pH probe**	**2020**	**2033**
			Nitrate (302)	**CN5-302**	**Low**	**Continue FIA testing**	**2020**	**2033**

C.3.3. CNMI Summaries of Designated Use Support

The CWA requires that each state and territory provide summaries of the DU status for each waterbody segment including: *Propagation of Aquatic Life, Fish/shellfish Consumption, Recreational,* and *Aesthetic enjoyment/other uses.* Each waterbody's assigned CALM categories are discussed in each island's subsection of this report. In addition, tables for each waterbody type are contained in the Appendices including coastal waters, streams, lakes, and wetlands respectively.

ALL CNMI – COASTAL MARINE WATERS

Taking into account all the information discussed in the Sections above, the CNMI's most developed and economically important waterbodies on Saipan have the most causes of impairment of any of the watersheds. The only DU that continues to be fully supported is the *Aesthetic Enjoyment* DU, except for the island of FDM, as ongoing military bombing exercises prevent individuals from visiting and enjoying the island in its natural state.

Most coastal waters of the southern inhabited islands are not supporting at least one DU as shown in Table C-17., below.

TABLE C-17. Individual DUs Support Summary for CNMI Coastal Marine Waters

Designated Use	Not Supporting (miles)	Threatened (miles)	Insufficient Data (miles)	Not Assessed (miles)	Fully Supporting (miles)	Total Assessed (miles)
ALL COASTAL WATERS (Class AA and A)						
Propagation of fish and other aquatic life	102	0	0	0	138.5	240.5
Recreation with risk of waterborne illness	79.1	0	6.7	0	154.7	240.5
Fish/shellfish consumption	9.5	0	121.1	0	109.9	240.5
Aesthetic enjoyment /other uses	4.2	0	0	0	236.3	240.5

However, the remote Northern Islands of Sarigan, Guguan, Alamagan, Agrihan, Asuncion, Maug, and Farallon de Pajaros, and the Carolinas watershed on Tinian, and the Dugi/Gampapa/Chenchon watershed on Rota fully support all DUs. These coastal waters are undeveloped and, in many cases, too difficult for people to regularly visit. Based on this and professional judgement, there are 99.8 coastal miles fully support all their DUs that were assigned a CALM Category 1.

However, the remaining 140.7 miles of Commonwealth coastline were found to be impaired for at least one cause, whether by a pollutant or not. These are shown in Table C-18., on the following page. The most frequently unsupported DU is *Recreational use*, due to Enterococci exceedances of the WQS. However, this is now being addressed on Saipan by implementing the 2018 TMDL for bacteriology.

TABLE C-18. Size of CNMI Coastal Marine Waters Impaired by Causes

Parameter	Cause (miles)	Meeting Criteria (miles)	Observed Effect (miles)	Insufficient Information (miles)	Total Assessed (miles)
ALL COASTAL WATERS (Class AA and A)					
Enterococci	82.8	10.4	0	0	93.2
Phosphate	76.1	13.4	0	0	89.5
Biota/Habitat Bioassessment	58.4	31.5	0	5.4	95.3
Nitrate	55.3	0	0	0	55.3
pH	45.2	0	0	0	45.2
Dissolved Oxygen	27.4	0	0	0	27.4
pH, Low	22.3	0	0	0	22.3
Lead	9.5	0	0	0	9.5
Copper	6.1	0	0	0	6.1
Mercury	4.4	0	0	0	4.4
Other	4.2	0	0	0	4.2

Although, most coastal waters had a series of public beach advisories posted, others showed a decrease in the percent of Enterococci violations. These include: Susupe (North), and Achugao (North) on Saipan; Mañagaha; Aguigan; Masalok, Makpo, and Makpo Harbor watersheds on Tinian; and Chaliat/Talo watershed on Rota. There are myriad of sources of Enterococci contamination as listed in Table C-19., on the following page.

The CNMI's decrease in Enterococci violations are associated with: 1) upgrades to the CUC municipal sewer line and completion of the Cross Island Road reconstruction project on Saipan; 2) A decrease in rain events; and 3) a substantive decrease in Rota's and Tinian's populations. In coming years, CUC will continue to upgrade the wastewater infrastructure on Saipan.

At this time, the source of pH exceedances of the CNMI WQS at several of CNMI coastal BEACH sites is unknown and requires further study. However, it should be noted that BECQ's aging pH probe has been shown to be less reliable than in past years. A new meter and probe have been ordered for the next reporting cycle.

Overall, biological conditions were degrading this reporting cycle. The southern islands generally received a "fair" to "poor" ranking due to climate related events resulting in wide spread coral bleaching in 2014 and 2017. This exacerbated the effects of the 2003 through 2006 natural Crown of Thorns (COT) starfish predation.

A few sites have consistently received poor ratings by the MMT over time. Biological monitoring data, and professional judgement suggests that degradation at these sites is likely due to a reduction in herbivory and/or water quality. However there has been an insufficient amount of water quality data collected at these long-term MMT fore reef sites to confirm whether or not there are water quality pollutant sources contributing to this decline.

Enterococci water quality violations are consistently higher in the more populated watersheds and those with piggeries, cattle, and feral dogs and cats near streams and shorelines.

TABLE C-19. Size of CNMI Coastal Marine Waters Impaired by Sources

Sources of Impairment	Confirmed Source (miles)	Unconfirmed Source (miles)	Total Impaired (miles)	Comments
ALL COASTAL WATERS				
Source Unknown	33.8	68.2	102	
Wet Weather Discharge NPS	8.6	28.4	37	
Groundwater Loadings	6.3	29.7	36	Fresh water seeps
On-site treatment systems (septic)	10.3	23.3	33.6	
Wastes from Pets	4.4	24.9	29.3	Feral dogs and cats
Recreation and Tourism (non-boating)	14.7	9.2	23.9	Lack of public toilets
Grazing in Riparian or Shoreline zones	0	19.3	19.3	
Sanitary Sewer overflows/ system failures	4.4	12.2	16.6	
Marina boat maintenance	0	15.7	15.7	
Urban Runoff/Storm Sewers	6.3	8.6	14.9	
Golf courses	0	14.7	14.7	
NPS from Military bases other than ports	11.3	2.4	13.7	
Illegal dumps or other inappropriate	0	9.9	9.9	
Waterfowl	9.5	0	9.5	Sea and shore birds
Highways,bridges, new construction	0	8.2	8.2	
Releases from waste sites or dumps	4.4	0	4.4	
Impervious Surface/Parking lot runoff	4.4	0	4.4	Hospital

It is the goal of BECQ MMT to continue to utilize benthic substrate, coral reef, and seagrass conditions to provide estimates of the trends that biological assemblages are headed, and rank the associated waterbodies in accordance with those trends. However, some adjustments to the biological ranking protocol may be necessary in the future, especially for the island of Rota.

In general, it is thought that Rota has “naturally” lower coral cover than the islands of Saipan and Tinian. This stems from geological, hydrological, and biological (coral larva transport) differences between the islands, rather than anthropogenic impacts. Rota may have received a low biological rating relative to Saipan and Tinian in this report. However, given that Rota’s biological monitoring sites are those with the lowest level of anthropogenic stressors compared to Saipan and Tinian, the present reef and seagrass biological ranking could perhaps reflect the “healthy” or "ambient" state of Rota's waters and reefs, as opposed to "not supporting *propagation of aquatic life*". Thus, the conundrum between the ALUS rankings, and professional judgement when it comes to the current ranking protocol for the island of Rota.

In an effort to restore coral reef resiliency at other sites that have received a consistently poor ranking, BECQ WQS/NPS continues to conduct watershed visual field assessments upland of these sites to identify the type and source of land-based sources of pollutants driving these poor rankings. This information is used to directly address violations, and prioritize impaired watersheds for remediation or restoration efforts.

Sections C.3.5., through C.3.8., of this report provide detailed discussion of each island's coastal waters.

ALL CNMI – FRESHWATER STREAMS

The WQS/NPS staff began implementing the CNMI Surface Water Quality Monitoring Program in earnest in 2014. Water samples are collected from intermittent and ephemeral streams as rain events permit. The location of potential sources of contamination are located and mapped during SVAP assessments. Table C-20., provides the total miles of freshwater streams supporting or not supporting DUs, or having insufficient information available to assess a DU.

TABLE C-20. Individual DUs Support Summary for CNMI Freshwater Streams

Designated Use	Not Supporting (miles)	Threatened (miles)	Insufficient Data (miles)	Not Assessed (miles)	Fully Supporting (miles)	Total Assessed (miles)
STREAMS (Class 1)						
Propagation of fish and other aquatic life	3.2	0	19.3	15.3	62.7	100.5
Fish/shellfish consumption	9.7	0	75.5	15.3	0	100.5
Recreation with risk of waterborne illness	50.3	0	50.2	0	0	100.5
Aesthetic enjoyment /other uses	3.2	0	0	0	97.3	100.5
Potable Water	0	0	0	100.5	0	100.5

*No streams have been measured in the Northern Islands to establish stream miles.

In some instances, SVAP assessments have determined that no surface water pools exist to sustain aquatic life as their flow is too infrequent or the stream flows subterraneously to the coast. This is the case for LaoLao watershed on Saipan, and for Aguigan ("Goat Island"), Tinian, Mañagaha, and FDM islands.

Although, SVAP Assessments have been completed in the Talakhaya watershed on Rota and have begun in the Achugao watershed of Saipan, they have not been completed for the rest of the watersheds or islands. However, many of these streams are expected to lack surface waters pools based on assessments completed thus far, and reports from various studies by other researchers.

SVAP Assessments of the streams in Susupe watershed have not been conducted. However, a report by the USGS service in 2000 stated that, "Stream channels on the western coastal plain … are not discernible in the field or on topographic maps." There does appear to be "Some surface runoff from the southwest flank of Mount Tagpochau (sp), which does have discernable stream channels on the topographic maps." This is supported by the 2017 NHD, and wetland and stream GIS data layers. The USGS report goes on to state that during "dry years, surface runoff into the lake is probably negligible." Based on these findings there is most likely not enough volume or frequency in flow to collect a sufficient number of stream samples each year to make an assessment of Susupe's streams.

In point, there has been insufficient water quality data collected on most streams to make scientifically defensible assessments of the *Recreational* DU. For the stream systems with sufficient data, Enterococci was found to be the most frequent cause of impairment. Likewise, where fish tissue or biota data was available, an assessment of the *Fish and Shellfish Consumption* DU could be assessed and heavy metals were identified as the cause for impairment. These findings are listed in Table C-21., including the causes (pollutants and non-pollutants) and miles of freshwater stream systems impaired.

TABLE C-21. Size of CNMI Freshwater Streams Impaired by Causes

Parameter	Cause (miles)	Meeting Criteria (miles)	Observed Effect (miles)	Insufficient Information (miles)	Total Assessed (miles)
ALL STREAMS (Class 1)					
Enterococci	50.3	0	0	27.4	77.7
Lead	6.5	0	0	0	6.5
Biota/Habitat Bioassessment	3.2	53.2	0	3.5	59.9
Habitat Alterations	3.2	0	0	0	3.2
Flow Regime Modification	3.2	0	0	0	3.2
Mercury	3.2	0	0	0	3.2

* This does not include the streams on the Northern Islands

The sources of these impairments are listed in Table C-22., on the following page. An assessment of the *Support and Propagation of Aquatic Life* DU was possible for a few stream systems where visual assessments were completed, and by referring to the survey results from the 2008 study conducted by DLNR DFW (2008, McKagan et.al).

However, there is a lack of available fish tissue and biota contaminant data for the majority of streams to assess the *Fish and Shellfish Consumption* DU. Therefore, most stream systems are assigned a CALM Category of 2 or 3, for lack of information.

However, all streams were found to support the *Aesthetic Enjoyment* DU with the exception of Central W. Takpochau watershed. The constructed concrete conveyances therein lack natural beauty and cannot be enjoyed as other streams systems are, but not due to a pollutant.

TABLE C-22. Size of CNMI Freshwater Streams Impaired by Sources

Sources of Impairment	Confirmed Source (miles)	Unconfirmed Source (miles)	Total Impaired (miles)	Comments
ALL STREAMS (Class 1)				
Grazing in Riparian or Shoreline zones	6.5	43.8	50.3	Domestic livestock
Impervious Surface/Parking lot runoff	3.2	0	3.2	
Anthropogenic land use changes	3.2	0	3.2	
Introduction of Non-native organisms	3.2	0	3.2	
Wet Weather Discharge NPS	0	43.8	43.8	
On-site Treatment systems (septic)	0	12.6	12.6	
Urban Runoff/Storm Sewers	0	9.7	9.7	
Sanitary Sewer overflows/ system failures	0	9.7	9.7	
NPS pollution from military Not port	0	6.5	6.5	WWII debris, dumpsite

* This does not include the streams on the Northern Islands

As was the case for coastal waters surrounding most of the Northern Islands, these islands' stream systems, also retain a CALM Category 1, due to their remoteness and lack of any consistent anthropogenic stressors or pollutants at this writing. The exception to this are the stream systems on Anatahan and Pagan. These islands had more impacts from the WWII campaign, than the other Northern Islands. Given that heavy metal contamination has been found in sediment and biota surrounding Saipan's WWII debris and dumpsites, this would suggest that there is great potential for Anatahan and Pagan stream systems to be contaminated as well.

Should military exercises be expanded to Pagan, new impacts cannot be practicably avoided in total. Therefore, further study of these Tier 3 waters is of utmost importance to establish baseline ambient conditions.

Sections C.3.5., through C.3.8, of this report will provide further detailed discussion of each island's stream systems.

ALL CNMI – WETLANDS

At this time, CNMI wetlands are not regularly monitored for water quality unless there are proposed developments within the area.

For the wetlands that have biological information available, an assessment of the *Propagation of Aquatic Life* DU was made. Table C-23., provides a summary of the acres of wetlands support or not supporting the DU.

Pagan and West Isley's wetlands have insufficient information to assess of the support of the *Propagation of Aquatic Life* DU, for which they are assigned a CALM category 3. This is due to potential impacts from WWII debris, and stressors associated with urbanization, respectively.

TABLE C-23. Individual DUs Support Summary for CNMI Wetlands

Designated Use	Not Supporting/ due to non-pollutant	Threatened (Acres)	Insufficient Data / Does not exist (Acres)	Not Assessed (Acres)	Fully Supporting (Acres)	Total Assessed (Acres)	*Total in State (Acres)
ALL WETLANDS (Class 1)							
Propagation of shellfish and other aquatic life	568.4	0	90.8	0	58.6	717.8	717.8

*Wetlands have not been fully delineated in the Northern Islands

For those wetlands found unsupportive of the *Propagation of Aquatic Life* DU, the causes of impairment are not pollutants and therefore not 303(d) listed. They are listed in Table C-24.

TABLE C-24. Size of CNMI Wetlands Impaired by Causes

Parameter	Cause (acres)	Meeting Criteria (acres)	Observed Effect (acres)	Insufficient Information (acres)	Total Assessed (acres)	Comments
ALL WETLANDS (Class 1)						
Habitat Alterations	568.4	0	0	60.2	628.6	Non-pollutant
Non-Native aquatic plantts	568.4	0	0	0	568.4	Non-pollutant
Flow Regime Modification	568.4	0	0	0	568.4	Non-pollutant
unspecified metals in sediment	0	0	0	30.6	30.6	

The sources of impairment are non-pollutants and listed in Table C-25., on the next page, but not in the 303(d) list (Table C-10., in Section C.3.2.).

There is further discussion of wetlands contained within each watershed in Sections C.3.5., through C.3.8, of this report. In addition, Section C.4., provides a detailed discussion of BECQ's current Wetland Protection Program and new projects that will be undertaken in coming years.

TABLE C-25. Size of CNMI Wetlands Impaired by Sources

Sources of Impairment	Confirmed Source (acres)	Unconfirmed Source (acres)	Total Impaired (acres)	Comments
ALL WETLANDS (Class 1)				
Introduction of non-native organisms	217.8	325.5	543.3	Non-pollutant
Anthropogenic land use changes	217.8	325.5	543.3	Non-pollutant

All lakes in the CNMI are publicly owned. Their trophic condition, and the programs in place to protect these lakes from pollution, and to improve their water quality follows.

C.3.4. Section 314 (Clean Lakes Program)

There are now five (5) lakes (267.4 acres not including the new lake on Anatahan) within the CNMI archipelago, all of which are brackish. There is one Lake on Saipan, Susupe Lake (57.4 acres), and the other four are in the Northern Islands. There are now two Lakes on Anatahan as the result of natural subsidence that occurred after the 2005 eruption, and two on Pagan. Lake Sanhalom on Pagan otherwise known as, "inner lake" (34 acres) lies closer to the volcano, and Laguna Sanhiyong (27 acres) is in close proximity to Pagan's west coast (Pacific Planning and Design Consultants (1978). *Physical Development Master Plan for the CNMI.* Volume V, Pagan, Government Printing Office).

Table C-26., on the following page provides a summary of the acres of public lakes fully supporting, or not supporting their DUs, and those needing further information to make a DU assessment.

Both BECQ's WQS and DCRM's Regulations provide procedures and processes for managing land use to protect lakes from land-based sources of pollution. All lakes fall within DCRM's APC. Any development proposed within an APC requires an APC Permit before it may commence and must comply with stipulated setbacks and buffers from the lake's shoreline. The permitting process requires an anti-degradation review for any actions that have the potential to lower water quality, including temporary, long-term and cumulative impacts. In addition, a section 401 Water Quality Certification and federal consistency review is required for any project requiring an Army Corps of Engineers Section 404 permit, as required by the CWA, and for Section 10 Permits under the Rivers and Harbor Act of 1899.

TABLE C-26. Individual DUs Support Summary for CNMI Lakes

Designated Use	Not Supporting (acres)	Threatened (acres)	Insufficient Data (acres)	Not Assessed (acres)	Fully Supporting (acres)	Total Assessed (acres)
ALL LAKES (Class 1)						
Propagation of fish and other aquatic life	57.4	0	149	0	61	267.4
Fish/shellfish consumption	0	0	267.4	0	0	267.4
Recreation with risk of waterborne illness	57.4	0	149	0	61	267.4
Aesthetic enjoyment /other uses	0	0	0	0	267.4	267.4
Potable Water	0	0	267.4	0	0	267.4

* Hagoi Lagu on Anatahan that formed after the 2005 eruption has not been delineated

The lakes in the Northern Islands of Anatahan and Pagan have not been fully assessed due to their remoteness, and in the case of Anatahan, safety hazards associated with the potential for volcanic activity. Therefore, the lakes are only tested when other research is being conducted on the islands at the same time.

No one presently lives on Anatahan due to its recent volcanic activity, which has impacted the lakes ability to be used as a Potable water supply due to volcanic gases being dissolved or mixing with the water.

Pagan is only sparsely populated, which precludes significant new anthropogenic stressors to water quality. However, Pagan's lakes may have been contaminated with heavy metals or other toxins associated with WWII debris and unexploded ordnance. Baseline data is lacking to assess the *Fish and Shellfish Consumption* and *Potable Water Supply* DUs. Every effort should be made to collect this data given the US military's interest in expanding exercises to the island.

Susupe Lake covers 57.4 acres in Saipan's South Susupe watershed. It is the only regularly monitored fresh surface waterbody. It is tested bi-weekly for the bacteriological FIB, *E. coli*, as well as for pH, turbidity, conductivity, DO%, and temperature. Susupe lake does not support the *Recreational* or *Propagation of Aquatic Life* DU due to high pH (>8.5), diminished DO% (<75%), and *E. coli* exceedances of the CNMI WQS. The lake also has several introduced species (see Table C-27., causes of impairment on the following page).

TABLE C-27. Size of CNMI Lakes Impaired by Causes

Parameter	Cause (acres)	Meeting Criteria (acres)	Observed Effect (acres)	Insufficient Information (acres)	Total Assessed (acres)	Comments
ALL LAKES (Class 1)						
E. Coli	57.4	0	0	210	267.4	Non-pollutant
Biota/Habitat Bioassessment	57.4	0	0	210	267.4	Non-pollutant
Non-native Fish/Shellfish/Zooplankton	57.4	0	0	0	57.4	Non-pollutant
Dissolved Oxygen	57.4	0	0	0	57.4	
pH, High	57.4	0	0	0	57.4	
Unspecified metals in sediment	0	0	0	210	210	

*Does not include Hagoi Lagu on Anatahan

Sources of Susupe Lake's impairment is listed in Table C-28., below. They include on-site treatment systems, urban runoff, and sewer overflows contributing to *E. coli* loading.

TABLE C-28. Size of CNMI Lakes Impaired by Sources

Sources of Impairment	Confirmed Source (acres)	Unconfirmed Source (acres)	Total Impaired (acres)
ALL LAKES (Class 1)			
Natural Conditions - WQS Use Attainability Needed	0	57.4	57.4
Souce Unknown	0	57.4	57.4
Urban Runoff/Storm Sewers	0	57.4	57.4
Sanitary sewer overflows (collection system failure)	0	57.4	57.4
On-site treatment systems (septic or decentralized)	0	57.4	57.4

The source for the high pH levels is unproven at this time. However, the diminished oxygen levels are associated with microbial loading, naturally decaying plant life and warm temperatures associated with shallow inland lakes. Lake pH levels can fluctuate daily due to photosynthesis and respiration driving CO_2 levels up, thus raising pH levels. Table C-29., on the following page lists the trophic status of all four of CNMI's publicly owned lakes.

TABLE C-29. Trophic Status of Significant Publicly Owned Lakes

Trophic Status	Description	Number of Lakes	Acres of Lakes
Total in the CNMI (Not including Anatahan's Hagoi Lagu)		**5**	**267.4**
Assessed		1	57.4
Oligotrophic	Poor in nutrient and plant life and rich in oxygen	0	0
Mesotrophic	Intermediate productivity, commonly clear water with beds of submerged aquatic plants and medium levels of nutrients.	0	0
Eutrophic	Rich in nutrients, abundant plant life in process of decaying depletes oxygen supply	1	57.4
Hypertrophic	Enriched with nutrients, have a poor ecosystem due to decreased dissolved oxygen	0	0
Dystrophic	Brownish acidic waters, a high humic matter, and a small plant population.	0	0
Unknown		4	210.0

Since there is a lack of available water quality or other data for the lakes in the Northern Islands, only Susupe Lake could be assessed for trends in water quality.

Appendix II contains the annual percent of exceedances of the WQS for *E. coli*, pH, and DO%. These data were used to complete Table C-30., that follows.

TABLE C-30. Trends in CNMI Lake Water Quality

Description	Number of Lakes	Acres of Lakes
Assessed for Trends	1	57.4
Improving	0	0
Stable	0	0
Degrading	1	57.4
Fluctuating	0	0
Trend Unknown	4	210.0

There does not appear to be a steady trend in the percent exceedances of the WQS for *E. coli*, pH or DO% in Susupe Lake. This emphasizes the need for further study.

It is also important for BECQ WQS/NPS and WEEC programs to continue coordination and collaboration with CUC to implement the 2018 TMDL recommendations for to improve the lake's bacteriological quality. This includes surveying households to identify those currently using aging on-site systems and requiring them to connect to the available sanitary sewer line in compliance with CUC regulations. In addition, BECQ will continue to alert CUC of visual field findings to establish which sewer lines and/or lift stations should be prioritized for upgrades and repair to diminish *E. coli* loading.

There is further detailed discussion of Susupe Lake in Sections C.3.5.7, and the lakes in the Northern Islands in Section C.3.8., of this report.

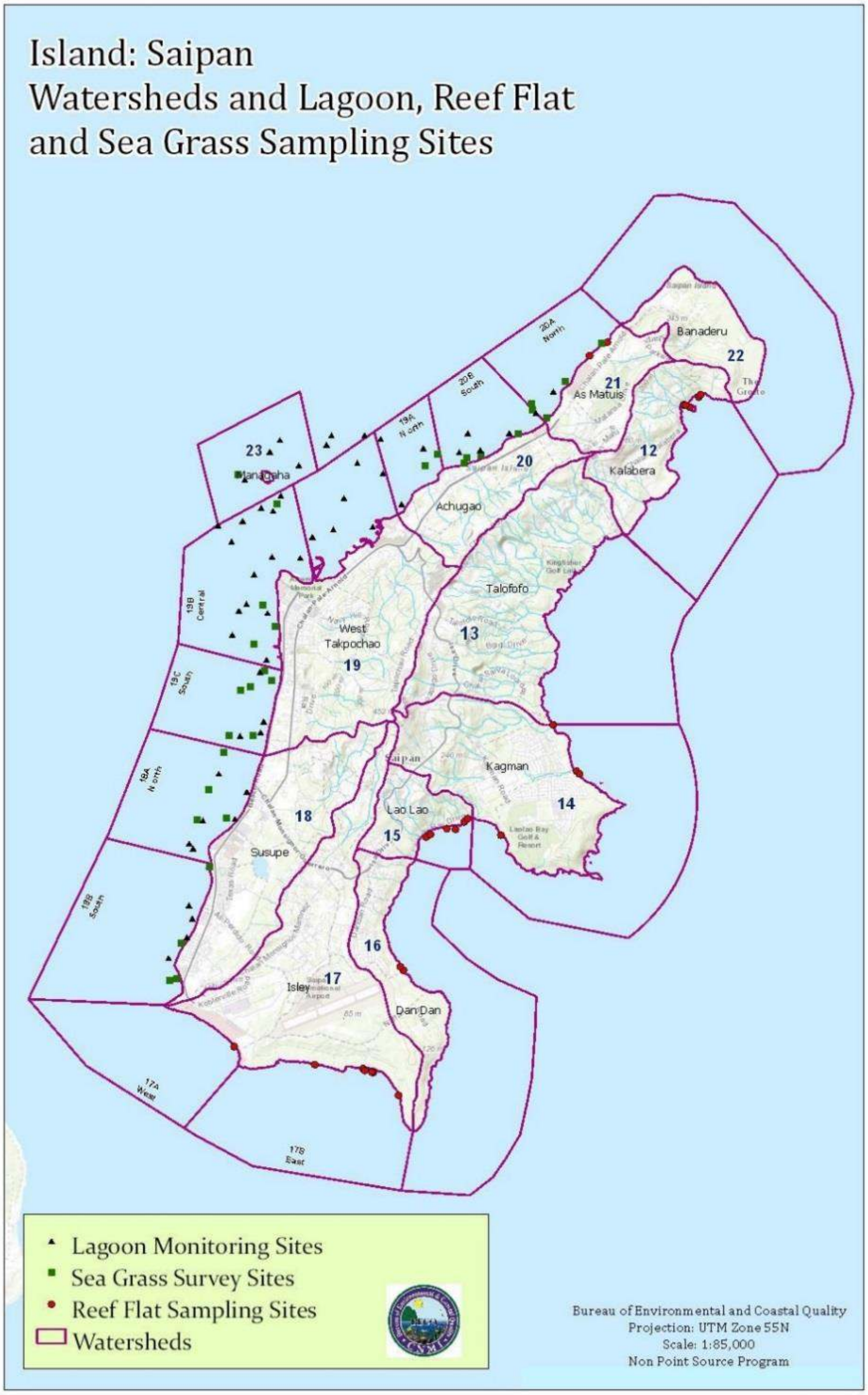
C.3.5. Five-Part Categorization of Saipan's and Mañagaha's Surface Waters

The following section and sub-sections provide a detailed assessment of each of Saipan's watersheds, and of Mañagaha's water quality status for the benefit of watershed communities, government policy and lawmakers, students, researchers, resource managers and other stakeholders interested in improving the health of the waterbodies in which they fish and swim.

The island of Saipan has 17 designated watersheds (or waterbody segments). Four of these watersheds are further sub-divided as more data is available on these areas water quality. Traveling from North to South these include the Achugao, West Takpochau, Susupe, and Isley watersheds. Each watershed will be discussed at length in later in this report.

Figure C-6., on the following page shows the 58 long-term coastal marine water quality BEACH monitoring and notification sites surrounding Saipan, and 11 surrounding Mañagaha. There are an additional 50 lagoon and 30 seagrass biological monitoring sites in Saipan Lagoon, and 21 reef flat sites. on the previous page shows Saipan's and Mañagaha's long-term BEACH monitoring sites.

FIGURE C-6. Saipan Selected and Probabilistic Biological Criteria Monitoring Sites



SAIPAN and MANAGAHA - COASTAL MARINE WATERS

TABLE C-31. Criteria Assessment of Individual DUs Support of Saipan's and Mañagaha's Coastal Waters

		Bird Island Beach	Hidden, Jeffreys, and Old Man by the Sea	Forbidden, Marine, Tank beach, North Lao Lao	South Lao Lao	Private beach off cliff behind airport landing strip	Obyan, Ladder,	Unai Dankulo (Coral Ocean Point)	San Antonio lift station to Sugar Dock	Saipan Community School to Chalan Laulau Beach	Garapan Beach, Drainage #3, Garapan Fishing Dock	Hafa-Adai Drainage#2 to Inos Peace Park	DPW Channel Bridge	Sea Plane Ramp to Tanapag meeting hall	Aqua Resort to Nikko Hotel	Pau Pau beach to Wing Beach	Grotto Cave	Managaha beaches
		NEB02	NEB07, NEB03-04, CNMI-104	SEB01-02, NEB 05-06, CNMI-29, ARRA B2,5,8	SEB03, CNMI-21, ARRA C2,5,8	CNMI 72	SEB04-05, CNMI-30	SEB06	WB37-30	WB23,2-11.2	WB22,23 and WB21	WB20-11.2	WB10	WB9-7	WB6-3	WB2-1, CNMI-19	NEB01	MG01-11
	WATER BODY SEGMENT ID	12	13	14	15	16	17 Isley		18 Susupe		19 W. Takpochau			20 Achugao		21	22	23
	Designated Use	Kalabera	Talofofo	Kagman	Lao Lao	Dan Dan	B (East)	A (West)	B (South)	A (North)	C (South)	B (Central)	A (North)	B (South)	A (North)	As Matuis	Banaderu	Managaha
Coastal Waters	Aquatic Life	***Poor Habitat, Orthophos & NO3 Exceed***	No biological data, ***Orthophos & NO3 Exceed,*** pH exceed	***Fair Habitat, Orthophos & NO3 Exceed, pH Exceed***	Poor Habitat, ***Orthophos & NO3 Exceed***	F	***Poor Habitat, Orthophos & pH Exceed***	Poor Habitat, ***Orthophos & pH Low***	Fair Habitat, DO% low & ***pH Exceed, Orthophos & NO3 Exceed***	Good Habitat, DO% & ***pH low***, ***Orthophos & NO3 Exceed***	Poor Habitat, DO% & pH low, Nitrate Exceeds	***Poor Habitat***, DO% & pH low, ***Orthophos & NO3 Exceed***	Poor Habitat, ***Orthophos & NO3 Exceed***	Poor Habitat, DO% low	Fair Habitat, DO% low, ***Orthophos Exceeds***	***Poor Habitat, Orthophos & NO3 Exceeds*** DO% low, pH	***Orthophos Exceeds***	pH Low, ***Orthophos & NO3 Exceeds***
	Fish Consumption	i	i	i	i	i	i	Cu & Pb in biota	i	i	i	Hg in Fish tissue, ***Pb & Cu in bivalves***	Pb in bivalves	Pb in bivalves	F	i	i	i
	Recreation	Entero exceed	Entero & pH exceed	***Entero & pH Exceed***	Entero Exceed	F	Entero & ***pH Exceed***	Entero & ***pH Low***	Entero & ***pH Exceed***	***pH low***	Entero exceed, pH low	Entero exceed, pH low	Entero exceed	Entero exceed	Entero exceed	Entero exceed	Entero exceed	pH Low
	Aesthetic enjoyment/others	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F	F
	CALM Assessment Category	***5***	***5***	***5***	***5***	2	5	5	5	5	5	5	5	5	5	5	***5***	5

F - Fully supported | i - Insufficient Information | TMDL completed | Not Supporting DU | ***Changes bold italics***

Table C-31., on the previous page lists the assessment results for Saipan's and Mañagaha's coastal waters, and whether or not they attain each of their DUs.

Presently, none of Saipan's or Mañagaha's coastal waters fully support *all* DUs, with the *Propagation of Aquatic Life* and *Recreational* DUs as the uses most commonly unsupported.

Most of Saipan's and Mañagaha's coastal waters' benthic habitat were ranked as "Fair" to "Poor", except for North Susupe (18A), which was ranked as "Good".

These ALUS rankings are based upon benthic habitat, coral reef, and seagrass assemblage assessments over the years with a greater weight placed on more recent data (*last five years*), except for BEACH Coastal Waters (beaches for swimming), that have a greater weight placed on the last *two* (*2) years* of data due to the large number of samples collected at these sites. The biological monitoring results for each waterbody are listed in tables contained in Appendix III.

The water quality criteria which resulted in most watersheds being listed as unsupportive of the *Propagation of Aquatic Life* DU were low DO%, pH exceedances, or high Nutrient levels.

There is still insufficient fish tissue and biota data to determine whether or not most of Saipan's and Mañagaha's coastal waters support the *Fish and Shellfish Consumption DU*, save for the West Isley (17A), Central (19B) and North West Takpochau (19A), and South Achugao (20B) watersheds' coastal waters which do not supported this DU due to elevated levels of heavy metals (2010, 2014 and 2018 studies by Denton, et.al, of UoG WERI).

Several segments of the western shoreline of Saipan consistently do not support the *Recreational* DU due to greater than 10% exceedances of the of CNMI WQS for Enterococci annually. However, LaoLao, North Susupe, North Achugao, and Mañagaha's coastal waters did show improvement. On Saipan, this is associated with the NRCS Kagman Watershed Project and completion of the Cross Island Road Reconstruction project, which traverses several watersheds as shown in Figure C-6., on the following page. Road improvements included stormwater BMPs to prevent sediment from entering coastal waters.

In addition, there were several upgrades to Saipan's municipal sewer system this reporting cycle and limited rainfall events due to the post-peak phase of the strong El Nino years that began in FY2015. This and the completion of the 2018 TMDL for Saipan, has provided natural resource managers with recommendations for limiting bacterial loading based on the identified sources in each watershed.

The identified causes and sources of impairment will be discussed in detail in the watershed sub-sections of C.3.5.1., through C.3.5.12. that follow.

FIGURE C-7. Phases of the Cross Island Road Reconstruction Project

SAIPAN – FRESHWATER STREAMS

There are no rivers within the CNMI, or streams on Mañagaha. Although there are numerous intermittent and ephemeral streams on Saipan. Ephemeral streams have less flow than intermittent streams, they are typically shallow, and flow briefly in response to rainfall leaving them normally dry for most of the year. Table C-32., on the following page lists the assessment results for Saipan's stream systems.

Stream water quality data, SVAP assessments collected this reporting cycle, the 2008 fish survey by McKagan, the 2017 NHD, and the Wetland and Stream GIS data layers, provided vastly more information to make assessments of the *Support of Propagation of Aquatic Life* DU. These new findings will be discussed in detail in each watersheds' sub-section (C.3.5.1 through C.3.5.12).

TABLE C-32. Assessment of Saipan's Waterbodies DUs – Freshwater Streams

		Bird Island Beach	Hidden Beach drainage, Talofofo, and Hasngot stream	Marine, and Tank beach drainages, North LaoLao streams	South Lao Lao streams	Private beach off cliff behind airport landing strip	Obyan, Ladder,	Unai Dankulo (Coral Ocean Point)	San Antonio lift station to Sugar Dock	Community School to Chalan Laulau Beach	Garapan Fishing Dock, Garapan Drainage #3, Garapan Beach	Falipe Stream, Garapan Drainages #1-#2	Tasi Stream, Isa Rd, Chalan Pale Arnold culverts, DPW Channel Bridge Mangroves	Achugao, Dogas and Agatan Streams	Aqua Resort to Kensington Hotel	Pau Pau beach to Wing Beach	Grotto Cave	Managaha beaches
			TAL 01-03	KAG01-02, LAO 01	LAO 02-05							WTC 01-03	WTN01	ACH01-03				
WATER BODY SEGMENT ID		**12**	**13**	**14**	**15**	**16**	**17** Isley		**18** Susupe		**19** W. Takpochau			**20** Achugao		**21**	**22**	**23**
							B	**A**	**B**	**A**	**C**	**B**	**A**	**B**	**A**			
	Designated Use	Kalabera	Talofofo	Kagman	Lao Lao	Dan Dan	(East)	(West)	(South)	(North)	(South)	(Central)	(North)	(South)	(North)	As Matuis	Banaderu	Managaha
Streams	**Aquatic Life**		Native Habitat	Native Habitat			i	i	i	i	i	Non-native species	i	Native Habitat, Visual Field good	Native Habitat Visual Field good	i		
	Fish Consumption		i	i			i	i	i	i	i	Hg in biota	i	Hg, Pb in bivalves	i	i		
	Recreation	i	Entero exceed	i	i	i	i	i	i	i	i	Entero exceed	i	Entero exceed	i	i		
	Potable Water Supply																	
	Aesthetic Enjoyment/others	F	F	F	F	F	F	F	F	F	F	N	F	F	F	F		
	CALM Assessment Category	2	5	3	3	2	3	3	***3***	2	***3***	5	2	5	2	2		

F - Fully support DU | I - Insufficient Information | N - Not Attaining DU | ***Changes in bold italics*** | Does not exist

The 2016 fish tissue and biota study by Denton, et.al, indicate that heavy metal levels in Central West Takpochau and South Achugao streams systems are unsupportive of the *Fish and Shellfish Consumption* DU. Sources include runoff from the old hospital incinerator in Garapan, and heavy metal transport into sediment at WWII debris dumpsites sites.

There is insufficient water quality data to assess support of the *Recreational DU* for the majority of Saipan's streams due to limited rainfall this reporting cycle. However, visual assessments, GIS analysis, and results from the pilot qPCR MST study conducted this reporting cycle have provided sufficient information to identify sources of FIB contamination, which are used to target stream restoration efforts.

Likewise, there has been no systematic survey to measure visitor or residents' *Aesthetic Enjoyment* of streams. However, many residents and visiting tri-athletes hike within Saipan's streambeds for training, athletic competitions, or general recreation in the tradition of the "Hash House Harriers". Since 1984, Saipan residents have set a "Hash" trail every Saturday, for a non-competitive hiking/running event. Trails are made through various pristine forested areas so "hashers" may enjoy the beauty of these remote locations. Tourists and visiting tri-athletes have also been known to take part in the "Hash". However, regulatory agencies should carefully review the effects of these activities on water quality and APCs to formulate appropriate management plans for resource protection. Based solely on this anecdotal evidence, the *Aesthetic Enjoyment* DU is supported for all of Saipan's streams except for the concrete conveyances within the Central West Takpochau watershed.

SAIPAN – WETLANDS AND LAKES

Saipan has several isolated wetland regions, and numerous small open water "pot holes" within the wetland area of the Susupe watershed. This is also where Susupe Lake is located. There are no wetlands on Mañagaha. Table C-33., on the following page lists the assessment results for Saipan's wetlands and Susupe Lake.

New wetland delineations or valuations on Saipan have not been conducted this reporting cycle. Therefore, some wetlands have been assigned a CALM Category 3 for lack of information. However, the *Propagation of Aquatic Life* DU is considered under threat on Saipan due to wetland loss. Wetlands now cover less than 2% of the land, based on current GIS analysis, 1989 National Wetland Inventory, and the 1990 CNMI Wetlands Conservation Plan. Historical (pre-CWA) losses include Garapan - 200 acres; San Roque - 50 acres; Flores Pond - 130 acres; Lake Susupe area - 200 acres; and Kagman and Lower Base - 600 acres. Most wetland losses are believed to have occurred for agricultural purposes during the Japanese administration of the islands, although wetland fills for U.S. military development following the 1944 invasion probably accounts for some losses, as well as some more recent permitted fills.

The wetlands of Susupe, West Takpochau, and the Achugao watersheds have been studied the most by wetland delineators. Visual assessments, and the 2017 NHD, and Wetland and Streams GIS data layers, were used to evaluate these wetlands support of the *Propagation of Aquatic Life* DU. Hydrological alterations from fill and the introduction of invasive species, and plants, were found to be the cause of impairment of these wetlands, but not due to a pollutant. Therefore, these wetlands were assigned a CALM Category of 4c.

Susupe Lake was also found unsupportive of the *Propagation of Aquatic Life*, and *Recreational* DUs, for having both invasive species, and water quality exceedances of the WQS. This is discussed in more detail in the South Susupe watershed sub-section, C.3.5.7.

TABLE C-33. Assessment of Saipan's Waterbodies DUs – Wetlands and Susupe Lake

WATER BODY SEGMENT ID		12	13	14	15	16	17 Isley		18 Susupe		19 W. Takpochau			20 Achugao		21	22	23
							B	A	B	A	C	B	A	B	A			
Waterbody Type	**Designated Use**	Kalabera	Talofofo	Kagman	Lao Lao	Dan Dan	(East)	(West)	(South)	(North)	(South)	(Central)	(North)	(South)	(North)	As Matuis	Banaderu	Managaha
Lakes	Aquatic Life								N									
	Fish Consumption								I									
	Recreation								N									
	Potable Water Supply								X									
	Aesthetic Enjoyment/others								F									
CALM Assessment Category									***5***									
Wetlands	**Aquatic Life**		i	F		i	i	i	N	N	X	N	N	N	N			
CALM Assessment Category			***4c***	1		***4c***	3	***4c***	4c	4c	X	4c	4c	4c	4c			

Subsections C.3.5.1-C.3.5.12., that follow provide specific details about each of Saipan's watersheds, and the condition of each type of waterbody that lies within.

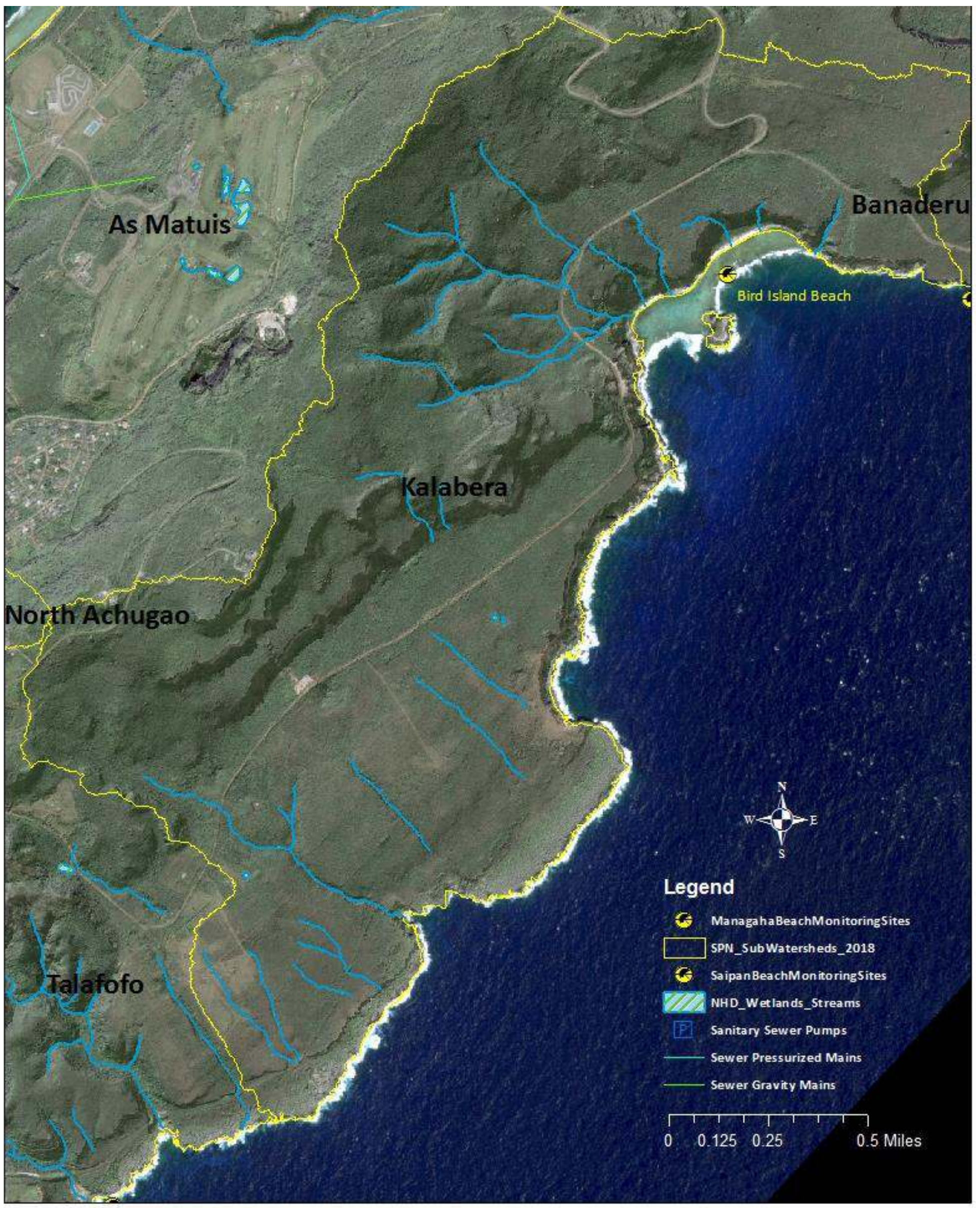
C.3.5.1. KALABERA - Waterbody Segment 12

Kalabera Watershed is the northernmost watershed on Saipan's east coast. It is rural in nature, with few roads or impervious land cover, as can be seen in Figure C-8., on the following page. Kalabera has only one long-term BEACH monitoring site, which is located next to Bird Island Beach's shoreline.

Kalabera - Coastal Marine Waters

Kalabera is one of the least developed watersheds on Saipan. It receives very little rainfall compared to other watersheds and as stated in the 2018 TMDL, Kalabera is, "…characterized by steep topographic relief from the central mountains to a wide shelf. The road network is paved in the northern end and serves as a transport corridor for popular tourist destinations." The exception to this is a coral road leading to Kalabera Cave. Although, this area is on the coastal shelf it is, "well buffered from the coastal waterbody through both vegetation and distance."

FIGURE C-8. Kalabera Watershed (Segment 12)



The watershed is also known for the Bird Island Sanctuary, a rookery for nesting swiftlets and other seabirds, which receives an estimated 29,000 visitors per month (2016-2017, MVA Site Visitation Numbers). An outlook on the upper cliff line allows for panoramic scenic views of Bird Island and the clear coastal waters below, which is often used as a backdrop for tourist photos. Therefore, Kalabera's coastal waters easily supports the *Aesthetic Enjoyment* DU.

The ALUS assessment of Kalabera's fore reefs were ranked as "Poor" this reporting cycle due to a significant decrease in the benthic substrate ratio trend at Bird Island. The primary cause of this decline is attributed to a widespread bleaching event in 2017. The MMT noted that there was less reef accreting substrate (corals) compared to non-accreting substrate (algae, macro algae, etc.). However, BECQ lacks sufficient water quality data at this long-term fore reef monitoring site to confirm whether or not there are indeed water quality pollutant sources causing this decline in coral health.

In addition, new nutrient water quality levels were measured using the FIA EPA Method 353.2. Kalabera's coastal waters at Bird Island BEACH site exceeded the CNMI WQS for Orthophosphate and NO_3-N. The source of these nutrients is thought to be from bird guano, as there are no other plausible sources. Therefore, these coastal waters were added to the 303(d) list as impaired for Phosphate and Nitrate, which is not supportive of the *Propagation of Aquatic Life* DU.

A heavy metal study was conducted by Denton, et.al, in 2016. The study evaluated the extent of *sediment* impacted by WWII wastes, but did not test for heavy metals in fish or other biota. The study identified, "…high risk areas where… traditionally harvested foods have levels beyond that acceptable for human consumption…" Soil and sediment samples were taken from the dumpsite, "… drainage pathways, or coastal discharge points". The study noted that levels from Bird Island Beach south along the coastline to the Talofofo watershed was of "particular interest and imply rather widespread Cd contamination along this stretch of coastline." This is of importance given that metals are taken up by food organisms that may be harvested by local residents. It should be noted that although Bird Island Beach is a "no-take" conservation area, some individuals have been known to fish there illegally. Therefore, further study of heavy metal contamination in fish tissue and/or biota should be conducted to assess whether Bird Island's coastal waters support the *Fish and Shellfish Consumption* DU.

For this reporting period, Kalabera's coastal waters remain unsupportive of the *Recreational* DU due to Enterococci exceedances of the WQS. However, the contamination is most likely, "natural background from bird guano sources at Bird Island", and "from soil sources, delivered as sediment during rainfall events.," (2018 TMDL). Therefore, these exceedances may not pose a health hazard to recreational bathers.

Surveys confirm that there are only a few dispersed houses and roaming domesticated livestock in the upper watershed, which are far removed from the vegetated coastline. In addition, Sinigalliano's qPCR-MST study concurred that birds were the predominant contributor to fecal contamination at the site using a seagull/seabird marker, and not due to human or other agricultural sources (Sinigalliano, 2020). Sinigalliano went on to note that, "the potential of bird fecal contributions and their relatively lower-risk to human health should be considered when assessing observed exceedances of general fecal indicator such as Enterococci or *E. coli*, especially as bird fecal contributions may serve to confound general water quality assessments".

Kalabera – Freshwater Streams

Kalabera's stream systems are ephemeral and only flow during torrential rain events. No freshwater pools have been found during visual field assessments of the northern half of the watershed. Visual assessments have not been completed on the flat southern shelf of the watershed, but available aerial imagery, the 2017 NHD, and the Wetlands and Streams GIS data layers indicate that the geology and topography is less likely to support regular stream saturation and flow for seasonal freshwater pools to exist. Therefore, the *Support and Propagation* of *Aquatic Life,* and *Fish and Shellfish Consumption* DUs have been removed for assessment purposes.

Kalabera's ephemeral streambeds rarely flow to allow for water quality sample collection. Therefore, there are no Enterococci data currently available for determining if the *Recreational* DU is supported.

The ephemeral streams flow too infrequently to provide streambed saturation or a stable and sufficient *Potable Water Supply*. Therefore, this DU has also been removed for assessment purposes.

However, Kalabera's northern dry streambeds are known to be used by beach goers, "hashers", hikers, and by professional athletes to access bird island beaches and for exercise and training. Therefore, Kalabera streambeds continue to fully support the *Aesthetic Enjoyment* DU.

Kalabera – CALM Categories

Kalabera's coastal waters were downgraded to a CALM Category 5 this reporting cycle due to exceedances of the WQS for Orthophosphate and NO_3-N, which does not support the *Propagation of Aquatic Life* DU. The Enterococci exceedances are being addressed through implementation of the 2018 TMDL for bacteria.

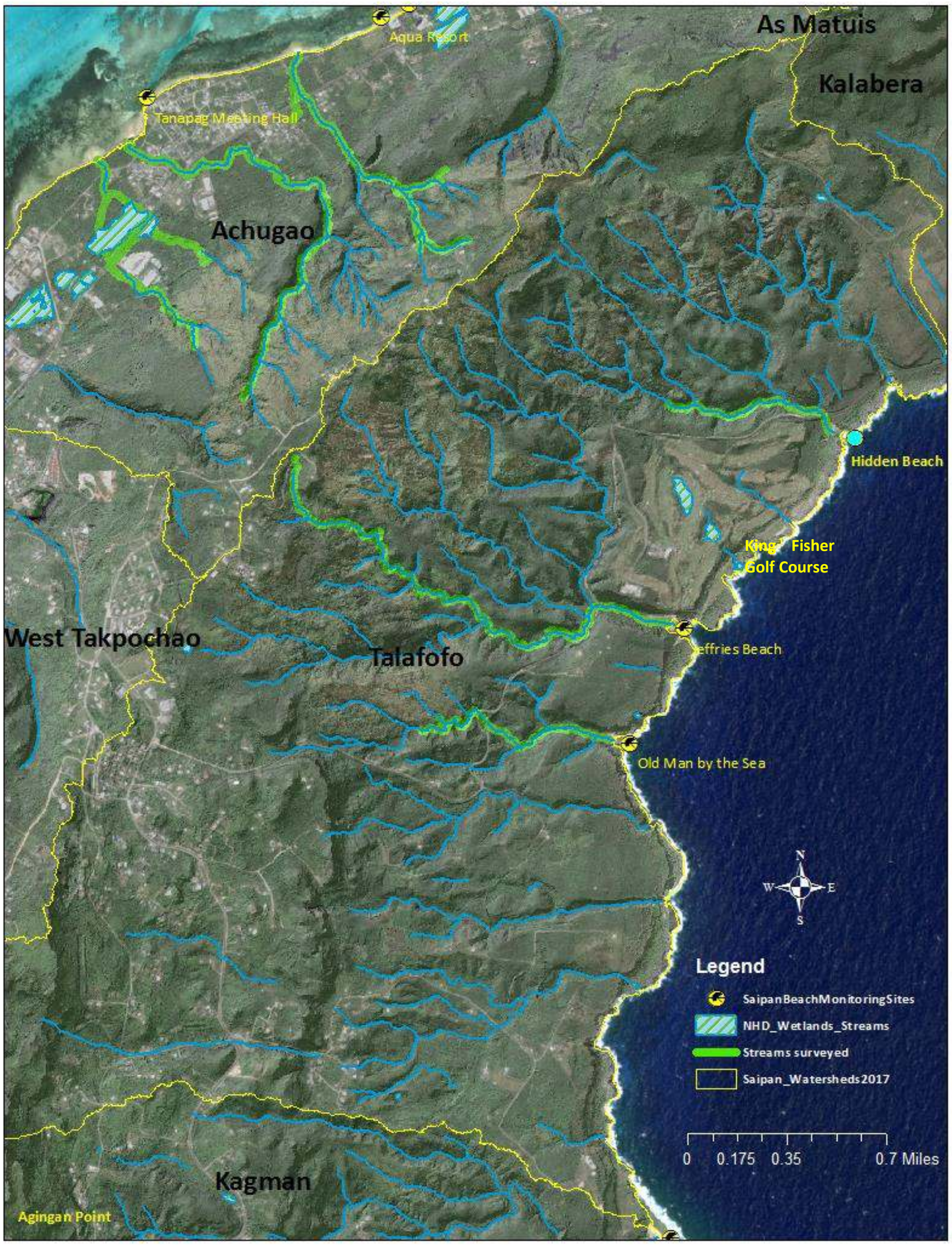
Kalabera's freshwater streams retain a CALM Category 2, due to insufficient water quality data to assess the *Recreational* DU.

C.3.5.2. TALOFOFO - Waterbody Segment 13

Talofofo Watershed's long-term BEACH monitoring sites are located in the waters surrounding three remote beaches: Hidden, Jeffrey's, and Old Man by the Sea, as shown in Figure C-9., on the following page. An additional MMT biological reef flat site (CNMI-104) is located in the shallows of Jeffry's fore reef. It was established in 2010 as part of EPA's National Coastal Condition Assessment (NCCA).

The Talofofo Watershed is more developed than Kalabera's. It contains "a mix of land uses in a topographically complex environment." (2018 TMDL). The King Fisher Golf Course is located between Hidden and Jeffrey's beaches. Visual field assessments and aerial imagery reveal only a few houses and small subsistence farms in the upper half of the southern portion of the watershed.

FIGURE C-9. Talofofo Watershed (Segment 13)



Talofofo – Coastal Marine Waters

Talofofo's "landscape is a patchwork mosaic of grasses and mixed scrub forest types, with frequent maintenance by fire to promote grasses… or clear land for agricultural" (2018 TMDL).

This practice exposes hilltops and, "contributes directly to steep ravines that flow directly to the coastal edge…" Within this coastal edge lies two coral road beach accesses to Hidden and Jeffry's Beach, and a foot path to Old Man by the Sea. All of these remote sites are popular tourist destinations, none of which offer proper infrastructure for access, restroom facilities or trash collection services.

Visitors enjoy the ruggedness of this unspoiled terrain, and the isolation of its far-off beaches. The rutted coral roads leading down to Hidden and Jeffry's beaches in the lower watershed are, "… directly in-line with the slope…and are deeply eroded." (2018 TMDL). The erosion is almost entirely due to heavy traffic by tour companies and independent rented SUVs driving in "the gully networks" which contribute to sediment-laden stormwater flowing directly to coastal waters.

Due to high surf hazards, ALUS biological assessments have not been conducted on Talofofo's coastal waters. Therefore, there is insufficient data for the MMT to provide an ALUS ranking.

However, new nutrient water quality data was collected this reporting cycle. Levels exceeded the CNMI WQS for Orthophosphate and NO_3-N, as did pH levels, but only at Hidden Beach without a notable trend. These findings resulted in Talofofo's coastal waters being added to the 303(d) list as impaired for Phosphate, Nitrate, and pH. The source of pH exceedances is unknown. Although unproven, potential sources of elevated nutrient levels may be run off from the Kingfisher golf course, and sea birds. Therefore, water quality monitoring data from the Golf Course should be pursued.

The 2016 heavy metal sediment study conducted by Denton, found "Other major site exceedances of Saipan's soil screening levels for Copper (Cu) at 'Old Man by the Sea Beach… The 2016 heavy metal sediment study conducted by Denton, found "Other major site exceedances of Saipan's soil screening levels for Copper (Cu) at 'Old Man by the Sea Beach….", and Zinc (Zn) at the 'Hospital Dump'", which is "located on the Kingfisher Golf Course at the base of a small cliff", further study of heavy metal contamination in fish tissue and/or biota in Talofofo's coastal waters should be conducted at this highly contaminated coastline to assess the *Fish and Shellfish Consumption* DU."

Talofofo's coastal marine waters surrounding Hidden, Jeffrey's and Old Man by the Sea exceeded the CNMI WQS for Enterococci. The primary sources of bacteriological impairment include NPS soil sediment carrying naturally occurring Enterococci, free-range domestic and feral animals, and human waste observed in caves adjacent to area beaches. The latter is due to a drastic increase in tourists visiting these remote locations where public restrooms are not available. Sinigalliano's qPCR-MST study reported elevated human and sea bird markers in the waters surrounding Jeffrey's beach. These findings resulted in DCRM preparing a request for proposals to equip the entrance to Jeffrey's beach with a public toilet and pervious surface parking area with trash bins, to prevent further contamination from unsanitary practices. In conclusion, Talofofo's coastal waters do not support the *Recreation* DU.

Talofofo coastal waters continue to attract thousands of visitors each month to view the dramatic shoreline, raised reef platforms and tide pools, and spectacular rock formations. Based on the consistent visitor numbers, this waterbody fully supports the *Aesthetic Enjoyment* DU.

Talofofo - Freshwater Streams

The Talofofo Watershed has intermittent streams that flow the most consistently of any of Saipan's watersheds. The stream that discharges to the coastal waters of Jeffrey's Beach most likely has the largest average flow volume of any stream system in the CNMI.

However, all of the stream systems in the upper and mid-watershed have limited flow during dry season (November through June). McKagan's 2008 fish survey of Talofofo's surface waters sighted a great number of *Macrobrachium lar* and *Caridina typus (*a native shrimp species) in the streams of the upper watershed, which empty into Hidden Beach. The streams in the lower watershed have good species diversity as well, and contain three species of shrimp and two native fish, "fock flagtails (*Kuhlia rupestris*) and gobies (*Stiphodon elegans*). These streams flow into Jeffry's beach and are considered "pristine". Based on these findings, DO% levels, and visual field assessments, Talofofo's freshwater streams are considered supportive of the *Propagation of Aquatic Life* DU.

Although heavy metal contamination has been noted in Talofofo's sediments, no fish tissue and/or biota contamination studies have been conducted in Talofofo's streams. Therefore, there is insufficient data for assessing the *Fish and Shellfish Consumption* DU.

Talofofo's stream water quality cannot be tested year round due to the lack of flow during dry season, and existing data is very limited. Data collected in FY 2016 exceeded the CNMI WQS for Enterococci. Therefore, these streams were added to the 303(d) list as impaired, and to date they do not support the *Recreational* DU.

Visual field assessments of the streambeds (thick green lines in Figure C-9., on page 105) established that fecal contamination from free-range cows, goats, feral pigs, and soil-laden stormwater were the most likely sources of Enterococci contamination in the streams. This finding resulted in an agricultural land exchange in 2017 to move a farm operation out of the steep upper watershed down to a more appropriate level agricultural plot away from the stream. However, free-range domesticated animals remain a problem.

Although, Talofofo streams flow more regularly than those in other watersheds, they still do not flow year-round and are not used as a *Potable Water Supply* for Saipan. However, the aquifers in this watershed are pumped for ground water and are considered the most reliable and best quality water sources on Saipan by CUC.

Talofofo's verdant streambeds and waterfalls are frequented by hunters, hikers, and triathletes for enjoyment, thus fully supporting the *Aesthetic Enjoyment* DU.

Talofofo - Wetlands

The Talofofo watershed has a few small isolated riparian areas located in the upper watershed near the ridge that are surrounded by homes and a few businesses. However, the wetlands have not been delineated or assessed using the CNMI Wetland RAM as of this writing. Therefore, there is insufficient information to evaluate the *Support and Propagation of Aquatic Life* DU.

Talofofo – CALM Categories

Talofofo's coastal waters were downgraded from CALM Category 4a, to CALM Category 5 due to Orthophosphate, NO3-N, and pH exceedances of the CNMI WQS, which are unsupportive of the *Propagation of Aquatic Life* and *Recreational* DUs. Enterococci exceedances are being addressed by the 2018 TMDL for bacteria.

Talofofo's freshwater streams retain a CALM Category 5 due to previous exceedances of the WQS for Enterococci*,* which are unsupportive of the *Recreational* DUs.

Talofofo's wetlands are assigned a CALM Category designation of 4c due to insufficient information about the *support of the Propagation of Aquatic Life* DU, and the potential presence of stressors from nearby urban development that may cause habitat alterations.

C.3.5.3. KAGMAN - Waterbody Segment 14

The Kagman Watershed borders LaoLao Bay and contains the Lao Lao Bay Golf Resort. It has three long-term BEACH monitoring sites located in the waters surrounding Marine (NEB 05), and Tank Beaches (NEB 06), and Forbidden Island (SEB 01) shown in Figure C-10., on the following page.

The remote Forbidden Island site is rarely monitored. However, its location is far removed from any development, providing its coastal waters with protection from almost any anthropogenic stressors, except marine debris.

In addition, there is also the North LaoLao (SEB 02) BEACH monitoring site, three (3) LaoLao ARRA reef flat sites (B2, B5, and B8), and the MMT Biological reef flat site (CNMI-29) used to assess Kagman's coastal waters.

The ARRA sites were established in 2010 to evaluate the efficacy of the LaoLao Bay road construction project, and revegetation and community outreach efforts. The project's aim was to minimize the amount of sediment and other NPS pollution from entering LaoLao Bay. These ARRA sites in addition to the Tank Beach reef flat site (CNMI-29) are all within wading distance to the shoreline and are monitored regularly. These sites are adjacent to LaoLao's northern beach, one of Saipan's most popular dive sites.

FIGURE C-10. Kagman Watershed (Segment 14)

Kagman's uplands are composed of porous karst soil that allows surface water to percolate into the ground water aquifer and flow out to coastal waters through freshwaters seeps. Kagman watershed also has one of the highest incidence rates of rainfall, and a relatively shallow slope in the lower watershed, which is why it has become "The single largest concentration of cropland" on Saipan (CNMI SWCS, Soil survey 1986).

Kagman's headwaters form on the steep upper slopes of Mount Takpochau and flow into "a complex network of streams and gullies, with a large (paved) road network, and large and flat lowland areas suitable for agriculture and development." (2017, TMDL). As such, it is also "the largest growing homestead area on Saipan, with approximately 6,000 inhabitants". However, a municipal sewage collection and treatment facility is unavailable for village residents. So, several low-income families unable to afford "permittable" IWDS and leaching fields often are forced to rely on pit latrines out of necessity. Given, Kagman's karst soils, nutrient loading into ground and coastal waters is of growing concern. In addition, no monitoring data is currently provided on LaoLao Bay Golf Course's contribution to nutrient loading.

Kagman - Coastal Marine Waters

Kagman's upper watershed, like Talofofo's, is frequently burned by fire and at times, intentionally to clear land. The steep and unpaved road leading to the Mt. Takpochau parking area in the upper watershed is used by off-road all terrain tour vehicles, which contribute to very high levels of erosion. However, the 2018 TMDL report noted that the NRCS Kagman Watershed Project has made "significant infrastructural investments… in stormwater management and sediment mitigation". Completion of the project's 70 million gallon reservoir and waterway would divert even more stormwater from adversely impacting the biological habitat of the Tank Beach Conservation area, while providing essential water for agricultural irrigation purposes.

It is hoped that this next phase of the Kagman Watershed Project will be completed by next reporting cycle to provide further protection to Kagman's reefs from sedimentation that compound impacts from climate related events. The MMT noted a significant loss in coral density at the Tank Beach site this reporting cycle resulting in downgrading the ALUS ranking to "Poor" this reporting cycle. Therefore, Kagman's overall ALUS ranking was reduced to "Fair".

New nutrient water quality data exceeded the CNMI WQS for Orthophosphate and NO_3-N, which is of importance given the increase in Kagman's population and lack of a municipal wastewater collection and treatment system. As with the Laolao watershed, visual observations have shown excessive algal growth in Laolao Bay during the rainy season months of September and October. These elevated nutrient levels resulted in Kagman coastal waters being added to the 303(d) list as impaired for Phosphate and Nitrate.

In addition, pH levels exceeded the CNMI WQS at Marine beach in FY2018 and there was one exceedance at two of the North LaoLao ARRA beaches in FY2019, but with no notable trends. The source of pH exceedances is unknown. These findings indicate that Kagman's coastal waters no longer support the *Propagation of Aquatic Life* DU.

There has not been any data collected on fish tissue and/or biota contamination of Kagman's coastal waters to assess support of the *Fish and Shellfish Consumption* DU.

However, Enterococci levels were again found to exceed the CNMI WQS at three (3) North ARRA reef flat sites B2, B5 and B8 this reporting cycle, but not at the North Laolao BEACH site (SEB 02). These exceedances along with the pH exceedances indicates that Kagman's coastal waters no longer support the *Recreational DU*.

Once again, Kagman's coastal waters that surround Forbidden Island, Marine Beach and Tank Beach Conservation Area support the *Aesthetic Enjoyment* DU based on the number of visitors who come to enjoy the dramatic shorelines, sandy beaches, scenic views, and to swim and snorkel in their waters.

Kagman - Freshwaters Streams

To date, only two streams within the Kagman watershed have been mapped on foot and by aerial drone imagery. Additional information was taken from the 2008 study by McKagan, et.al, which reported on the aquatic life observed in the streams in the upper watershed. The study considered the streams "fairly pristine", with two species of shrimp. Based on these findings, Kagma's freshwater stream systems support the *Propagation of Aquatic Life* DU this reporting cycle.

However, there is insufficient data concerning fish tissue or biota contamination in Kagman's stream systems to assess the *Fish and Shellfish Consumption* DU.

Water quality samples were not collected from Kagman's ephemeral streams this reporting cycle. However, the few water quality data showed elevated Enterococci levels, which would impair these waters when flowing, but the data is insufficient in number to fully assess the *Recreational* DU. The potential sources of Enterococci contamination include soil-laden stormwater runoff, and failing on-site systems based on professional judgement and the 2018 TMDL.

The ephemeral streams in the Kagman Watershed do not have a sufficiently sustained volume to provide a reliable *Potable Water Supply*. Therefore, they are not been assessed for this DU.

Like the other Saipan stream systems, Kagman Watershed's streambeds continue to meet the *Aesthetic Enjoyment DU* based on their continued use by "hashers", and recreational and professional athletes.

Kagman - Wetlands

The Kagman Watershed contains several small isolated marsh wetlands in the upper watershed and a constructed mitigation wetland, called "Education Island" in the mid-watershed (Segment 14WET). The mitigation was to offset wetland loss due to the construction of the reservoir for the NRCS Kagman Watershed Project. The mitigated wetland is used to educate schoolchildren about the importance of wetlands for their functions, and wildlife habitat. The wetland is maintained by NRCS and for this reason supports the *Propagation of Aquatic Life* DU.

Kagman – CALM Categories

Kagman's coastal waters were downgraded from CALM Category 3 to a CALM Category 5, due to Orthophosphate, NO_3-N, and pH exceedances this reporting cycle, which do not support the

Propagation of Aquatic Life or *Recreational* DUs. Enterococci exceedances are being addressed through the implementation of the 2018 TMDL for bacteria.

Kagman's freshwater streams retain a CALM Category 3 due to insufficient water quality data to assess the *Recreational* DU, although there is the potential presence of Enterococci contamination.

Kagman's wetlands retain CALM Category 1.

C.3.5.4. LAOLAO - Waterbody Segment 15

LaoLao watershed borders LaoLao Bay, which has both important historical and cultural significance.

FIGURE C-11. LaoLao Watershed (Segment 15)

The watershed contains an ancient latte stone site and is home to many traditional medicinal plants that are still used today by local healers.

The LaoLao watershed has one long-term BEACH monitoring site, South LaoLao (SEB 03); three (3) ARRA reef flat sites (C2, C5 and C8); and one MMT biological reef flat site (CNMI-21) that are used for assessing LaoLao watershed's coastal waters.

All the ARRA sites and the reef flat site are within wading distance of the coast and have continued to be monitored regularly since their establishment in 2010 to evaluate the efficacy of the ARRA LaoLao Road Improvement Project and its maintenance.

LaoLao - Coastal Marine Waters

LaoLao Bay's coastal waters are home to the Laulau Bay Sea Cucumber Sanctuary. The shoreline is used by fisherman for launching boats and picnickers daily. LaoLao coastal waters are enjoyed daily by residents and visitors for picnics, fishing, swimming and snorkeling, for which they fully support the *Aesthetic Enjoyment* DU.

The MMT's biological ALUS assessment of the fore reefs in front of the north LaoLao dive site and the southern LaoLao's reef site had no significant improvement to the benthic substrate or coral assemblages. However, the MMT also noted that the ecology of these reef systems is dynamic throughout. The variations in reef structure are primarily attributed to exposure, water quality, and nutrient flushing. Although, the "health" of each reef is not uniform, in general LaoLao Bay's overall reef health has decreased as a result of the 2017 bleaching event. However, BECQ lacks sufficient water quality data at these long-term fore reef monitoring sites to confirm whether or not there are water quality pollutant sources contributing to this decline. Therefore, LaoLao's coastal marine waters retain an overall ALUS ranking of "Poor" again this reporting cycle.

The MMT study conducted in 2010 on LaoLao Bay detected many exceedances of the CNMI WQS for ammonia, total filterable suspended solids, temperature, and turbidity. The source was associated with surface water runoff as upland soils are volcanic, and much less permeable than the karst soils located in Kagman's watershed. Therefore, rain cannot percolate into the ground water. Instead it flows over land to discharge into the Bay. It should be noted that road runoff has substantially decreased in LaoLao watershed since the completion of the Cross Island Road Reconstruction Project, and the ARRA LaoLao Road Improvement Project.

New nutrient water quality data exceeded the CNMI WQS for Orthophosphate and NO_3-N, the source of which is unproven, but may be associated with failing septic systems in the upper watershed. Observations in LaoLao Bay have shown excessive algal growth during the rainy season, especially September through October, which may be a result of additional nutrient loading associated with runoff. Therefore, LaoLao's coastal waters were added to the 303(d) list as impaired for Phosphate and Nitrate, which is not supportive of the *Propagation of Aquatic Life* DU.

LaoLao's coastal waters were removed from the 303(d) list of impaired waters for Enterococci last reporting period. There was only one exceedance of the Geomean for Enterococci this reporting cycle due to high surf conditions associated with the aftermath of Typhoon Mangkhut that skirted Saipan and hit Rota directly on September 10^{th} 2018. This brought torrential rains and high surf conditions. This and the aftermath of Super Typhoon Yutu drastically decreased the number of samples that could be collected for this reporting cycle; only nine (9) samples were collected in FY2018, and eight (8) in FY2019. This means it took only one sample with an STV of 41 MPN/100ml and a Geomean of 51 MPN/100 ml to trigger a beach advisory for Enterococci resulting in 11% violations of the WQS for Enterococci in FY 2018. However, had there only been one more clean sample taken, this would not be an exceedance.

However, it should be noted that the average STVs for FY2018 was only 18 MPN/100 ml and 15 MPN/100 ml for FY2019 with an overall two-year Geomean of 14 MPN/100ml. There were no exceedances of any sites in FY2019. Therefore, the source was most probably due to sediment-laden stormwater after Typhoon Mangkhut carrying naturally occurring Enterococci and not actual fecal contamination, or exceedances would have continued and been much higher in concentration. Resource managers continue to implement the 2018 TMDL recommendations for improving bacteriological quality in these coastal waters.

There is insufficient data concerning fish tissue or biota contamination on LaoLao's coastal waters to assess the *Fish and Shellfish Consumption* DU.

LaoLao - Freshwater Streams

GPS mapping of Laolao's major stream systems was completed in 2015. The wide green lines in Figure C-11, on page 112, represent the streams that were mapped using GPS points and ArcGIS. These lines match very closely with the latest 2017 NHD, and Wetland and Streams GIS data layers. Based on these findings it appears that the precipitation, topographical, and geological features in the LaoLao watershed are too limited to sustain freshwater pools for any aquatic life to exist. However, BECQ plans to test this assumption using the SVAP assessment of Laolao's streams during the next reporting cycle. In the time being, the *Propagation of Aquatic Life,* and *Fish and Shellfish Consumption* DUs are not assessed for Laolao's stream systems.

The topographical and geological features in the LaoLao watershed are too limited to support a *Potable Water Supply*. Therefore, this DU is also no longer assessed.

Water quality samples were not collected from LaoLao's ephemeral streams this reporting cycle. However, limited water quality data show elevated Enterococci levels, which would impair these waters when flowing, but the data is insufficient to fully assess the *Recreational* DU. The 2018 TMDL identified, "road runoff during storm events and failing septic systems", as the primary sources of Enterococci contamination in LaoLao's freshwater streams.

Like the other Saipan stream systems, LaoLao's streambeds continue to attain the *Aesthetic Enjoyment* DU based on their continued use by hikers, "hashers", and recreational and professional athletes.

LaoLao – CALM Categories

LaoLao's coastal waters were downgraded to CALM Category 5 this reporting cycle due to exceedances of the CNMI WQS for Orthophosphate and NO_3-N, which does not support the

Propagation of Aquatic Life DU. However, the Enterococci exceedances are being addressed by the implementation of the 2018 TMDL for bacteria.

LaoLao's streams retain CALM category 3 due to insufficient information, but there is potential presence of Enterococci contamination, which does not support the *Recreational* DU.

C.3.5.5. DANDAN - Waterbody Segment 16

The majority of DanDan watershed's population resides in the upper watershed well away from the coastal shelf and cliff line. A municipal sewer line is unavailable for this watershed. Therefore, DanDan residents rely on IWDS for their wastewater collection and treatment.

The large Hawaiian Rock Quarry is located in the southern part of the watershed also far removed from the cliff line.

There is only one long-term MMT reef flat biological monitoring site (CNMI-72) that is sampled annually for assessment purposes and is shown in Figure C-12., on the following page. It is located adjacent to a pristine beach next to the cliff line.

DanDan - Coastal Marine Waters

Dan Dan's coastal waters are separated from any development activities and homesteads by a sharp cliff line. The adjacent beach may only be accessed via a private road, with permission from the adjacent land owners. Visitors allowed to visit the beach must use a rope to descend to the shoreline, which provides this remote beach and its surrounding waters with substantial protection from anthropogenic sources of pollution.

Although, biological ALUS criteria were not assessed for Dan Dan's coastal waters this reporting cycle, new nutrient water quality data was collected at the reef flat biological monitoring site (CNMI-72). All nutrient and other water quality data was well within CNMI WQS. Therefore, Dan Dan's coastal waters fully support the *Propagation of Aquatic Life,* and *Recreational* DUs.

No fish tissue or biota contamination data is available on Dan Dan's coastal waters to assess the *Fish and Shellfish Consumption* DU.

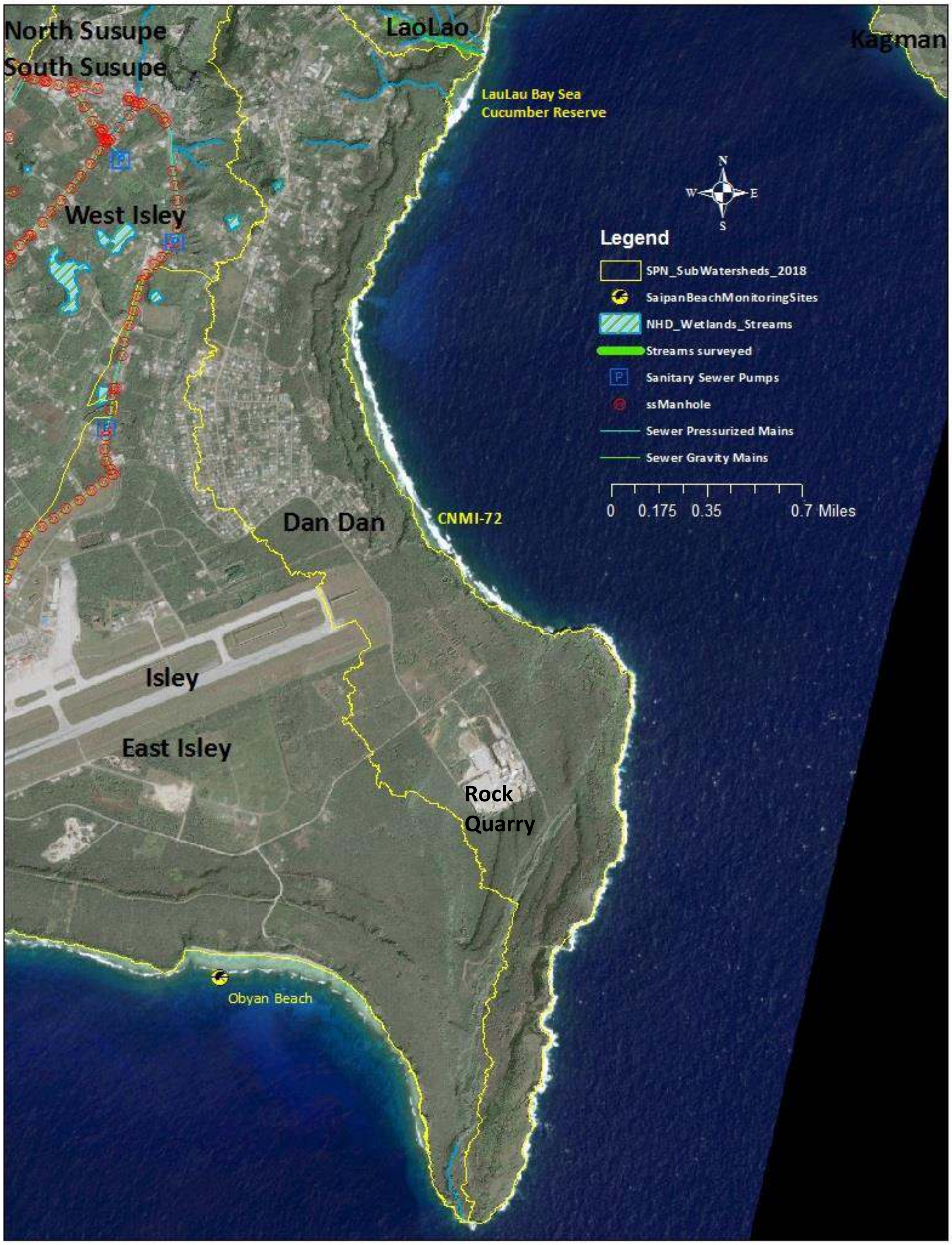
Dan Dan's rugged coastline is "pristine" with breathtaking reef assemblages for those few visitors with the opportunity to enjoy them. For this reason, Dan Dan's coastal waters fully support the *Aesthetic Enjoyment* DU.

DanDan – Freshwater Streams

The 2017 NHD, and Wetlands and Streams GIS data layers indicate that there are two stream systems in the northernmost part of the DanDan watershed. The soils surrounding these streams are well drained with a 5-15% slope of Chinen clay loam and Takpochao-Rock outcrop complex, (2000, USGS Geological Survey). Residents have confirmed that these stream systems only flow during torrential rains and then quickly dry up. They do not contain any freshwater pools to support the *Propagation of Aquatic Life,* or *Fish and Shellfish Consumption* DUs, so these DUs are not assessed in Table C-20., on page 86.

An assessment of the *Recreational* DU has not been possible as stream flow is too limited to allow for timely water sample collection to analyze Enterococci concentrations.

FIGURE C-12. DanDan Watershed (Segment 16)



The topographical and geological features in the DanDan watershed are too limited to support a *Potable Water Supply*. So, this DU is also no longer assessed.

However, these streambeds are used for residents to hike to the LaoLao Bay Sea Cucumber Sanctuary to swim and picnic on the beach. Therefore, Dan Dan's stream systems fully support the *Aesthetic Enjoyment* DU.

Dan Dan - Wetland

The 2017 NHD, and Wetland and Stream data layers show a very small riparian wetland in Dan Dan's upper middle watershed. However, it has not been delineated or valuated using the CNMI Wetland RAM at the time of this writing to assess the wetlands' support of the *Propagation of Aquatic Life* DU.

Dan Dan – CALM Category

Dan Dan's coastal waters retain a CALM Category of 2 due to insufficient information about fish tissue and biota contamination to assess the *Fish and Shellfish Consumption* DU. All other DUs are fully supported.

The Dan Dan's ephemeral stream systems retain a CALM Category of 2, due to insufficient Enterococci data to assess the *Recreational* DU.

The Dan Dan wetlands was assigned a CALM Category 4c due to insufficient information. However, there is the potential presence of anthropogenic stressors from nearby residences altering habitat, but this is not a pollutant.

C.3.5.6. ISLEY - Waterbody Segments 17A and 17B

The Isley Watershed is divided into two sub-watersheds, East (17B) and West (17A), Figure C-13., on the following page.

Isley's headwaters start at the centrally located peak of Mt. Takpochau at 1554 feet. Mt. Takpochau's surface waters flow from its ridge to the south coast.

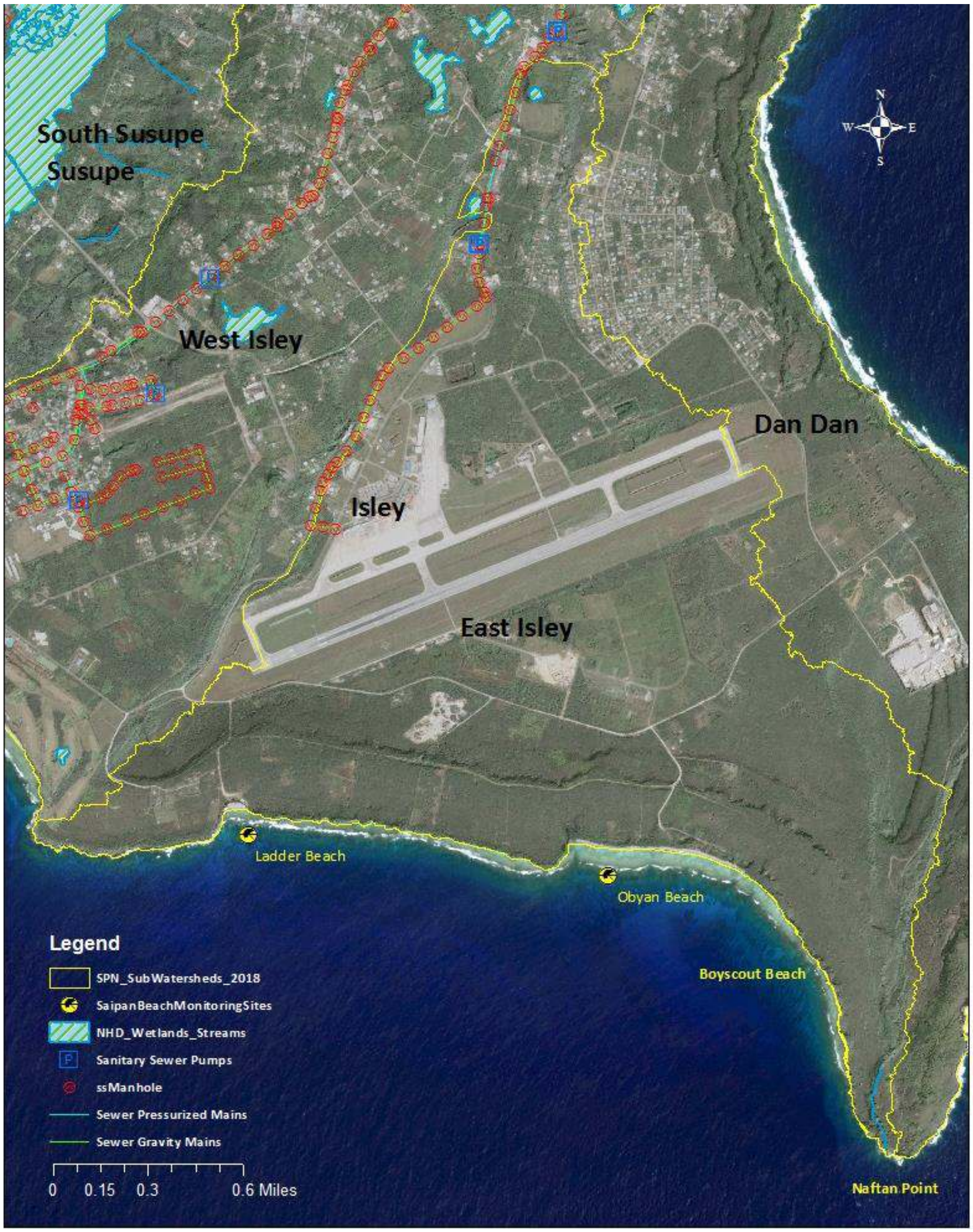
The CUC municipal sewer infrastructure is available for Isley residents and businesses to use. By CNMI law, all users are required to connect to the CUC sewer system where available. However, some residents may still be using IWDSs for wastewater collection, or in some older structures, wastewater holding tanks. These residents, if new owners or renters, may not even be aware that they are not hooked up to the municipal sewer line.

FIGURE C-13. Isley Watershed (Segment 17A and 17B)

East Isley – Waterbody Segment 17B

East Isley's Watershed (Figure C-14.) contains Saipan's present day, Francisco C. Ada International Airport, and a WWII military dumpsite located at Naftan Point.

FIGURE C-14. East Isley Watershed (Segment 17B)



The East Isley watershed is sparsely populated with a few homes compared to the west. There are two long-term BEACH monitoring sites located at Obyan, and Ladder beaches, one reef flat site off Ladder Beach, and an MMT biological monitoring site at Boy Scout Beach.

East Isley - Coastal Marine Waters

Obyan is a large public sandy beach, which is a nascent Green Sea Turtle nesting site. This beach is also a popular site for camping, snorkeling, and SCUBA. Boy Scout beach is a more remote pocket beach off Obyan's east coast and is harder to access by land, thus providing further protection to its unique *Porites rus* interstitial reef from anthropogenic stressors. It is a favorite SCUBA and snorkeling site. However, due to the difficulty in reaching Boy Scout Beach it does not have a long-term BEACH water quality monitoring site.

Further west of Obyan lies Ladder beach a small sandy pocket beach surrounded by cliffs, undercuts, and caves accessible only by a set of stairs that have become dilapidated from erosion during heavy rainfall events, and after Super Typhoon Yutu. A new restaurant was constructed next to the stairs this reporting cycle, and this is a favorite site for weddings and other photo opportunities. Thus, East Isley's coastal waters attain the *Aesthetic Enjoyment* DU.

The MMT conducted a biological ALUS assessment of Obyan Beach's fore reefs and found a significant decrease in benthic substrate quality due to its lack of coral diversity. The reef in front of Boy scout Beach had no improvement since being ranked as "Fair" last reporting cycle. Therefore, East Isley's coastal waters overall ALUS ranking was downgraded to "Poor" this reporting cycle. However, BECQ lacks sufficient water quality data at the long-term fore reef monitoring sites to confirm whether or not there are indeed water quality pollutant sources causing this decline in coral health.

New nutrient water quality data exceeded the CNMI WQS for Orthophosphate in FY 2019, and pH levels in FY 2018, the source of these impairments is unknown. Therefore, East Isley's coastal waters were added to the 303(d) list as impaired for Phosphate and pH, which is unsupportive of the *Propagation* of *Aquatic Life* DU.

The 2016 heavy metal sediment study conducted by Denton, et.al, found that soil collected from the "extensively fired ravine dump at 'Naftan Point' …was notably enriched with all metals, especially Ag, Cd, Cu, Hg, Pb, and Zn.", (2016. Denton). This is of importance given that metals are taken up by territorial "food" organisms. However, it should be noted that Naftan Point has no easily accessible path to gain access to the coast for harvesting food. The currents are also very strong here, which is inconducive for reef spearfishing, which provides a degree of protection against public health hazards associated with consuming tainted reef fish. However, further study of heavy metal contamination in fish tissue and/or biota should also be conducted here, as well as at all highly contaminated sites to fully assess the *Fish and Shellfish Consumption* DU.

This reporting cycle, Ladder Beach once again had Enterococci levels exceeding the WQS. This is attributed to potentially free-range cattle, and visitors at this remote beach. Ladder beach has seen an uptick in visitor numbers since the construction of a new restaurant this reporting cycle. The restaurant has a permitted IWDS public toilet with leaching field. However, human waste has been observed in the shoreline caves, potentially from visitors who do not want to ascend the stairs to use the restaurant's toilet facilities. This has been brought to the attention of MVA who is responsible for educating Tour Guides and Operators, and to be responsible for their patron's responsible use of tourist sites.

There is also a great number of off-road all-terrain vehicles visiting the cliff line. The heavy traffic on East Isley's coral roads has resulted in erosion and large volumes of soil laden stormwater runoff entering Ladder beach's surrounding coastal waters during torrential rain events. Given this and the pH exceedances, East Isley's coastal waters do not support of the *Recreational* DU.

East Isley – Freshwater Streams

At this writing, the remote East Isley ephemeral stream systems have not been mapped using GPS, nor have they been SVAP assessed, or sampled for water quality. This is due to the difficulty in accessing these stream systems which are far removed from any road or trail system. However, based on the 2017 NHD, and Wetlands and Streams GIS data layers, there are very limited topographical or geological features in the entire Isley watershed to support stream systems. Most precipitation flows by subterranean transport from land to sea. Freshwater streams are located in the very upper watershed near Mt. Takpochau. Another stream also emerges upland of Naftan Point, where it discharges to the ocean.

In addition, no information is available about the presence of freshwater pools or aquatic life in the stream system for assessing the *Support and Propagation of Aquatic Life,* or *Fish and Shellfish Consumption* DUs. However, given Denton's findings from his 2016 study which detected heavy metal contamination in soil collected from Naftan Point's WWII site, there is the potential presence of metal contaminants in the stream systems as well.

It is clear that there is insufficient precipitation in the East Isley Watershed to support the *Potable Water Supply* DU, as reflected in Table C-29., on page 80.

However, East Isley residents have reported hiking in the dry watercourses of the watershed to hunt and for exercise. Based on this, and professional judgement West Isley's streambeds fully support the *Aesthetic Enjoyment* DU.

East Isley - Wetlands

The 2017 NHD, and Wetlands and Streams GIS data layers show very small emergent or marsh wetlands in the upper East Isley watershed. Due to their small size and difficulty in accessing these remote wetlands, they have not been delineated or valuated to date. Therefore, there is insufficient data to assess support of the *Propagation of Aquatic Life* DU.

East Isley – CALM Category

East Isley's coastal waters retain a CALM Category 5 due to elevated Orthophosphate, and pH Exceedances of the CNMI WQS, which is not supportive of the *Propagation of Aquatic Life,* and *Recreational* DUs. The Enterococci exceedances are being addressed with the implementation of the 2018 TMDL for bacteria.

The East Isley's freshwater streams retain a CALM category of 3 due to lack of sufficient information, and the potential presence of anthropogenic contaminants from legacy WWII debris.

The East Isley's wetlands retain a CALM category of 4c due to lack of sufficient information, and the potential presence of anthropogenic stressors from urban development.

West Isley - Waterbody Segment 17A

West Isley's watershed contains the remains of the WWII Koblerville Airfield. At least annually, US EPA with the assistance of BECQ tests the airfield's monitoring wells for Volatile Organic Compounds (VOCs) and other water contaminants associated with fuel spill(s) from wartime activities.

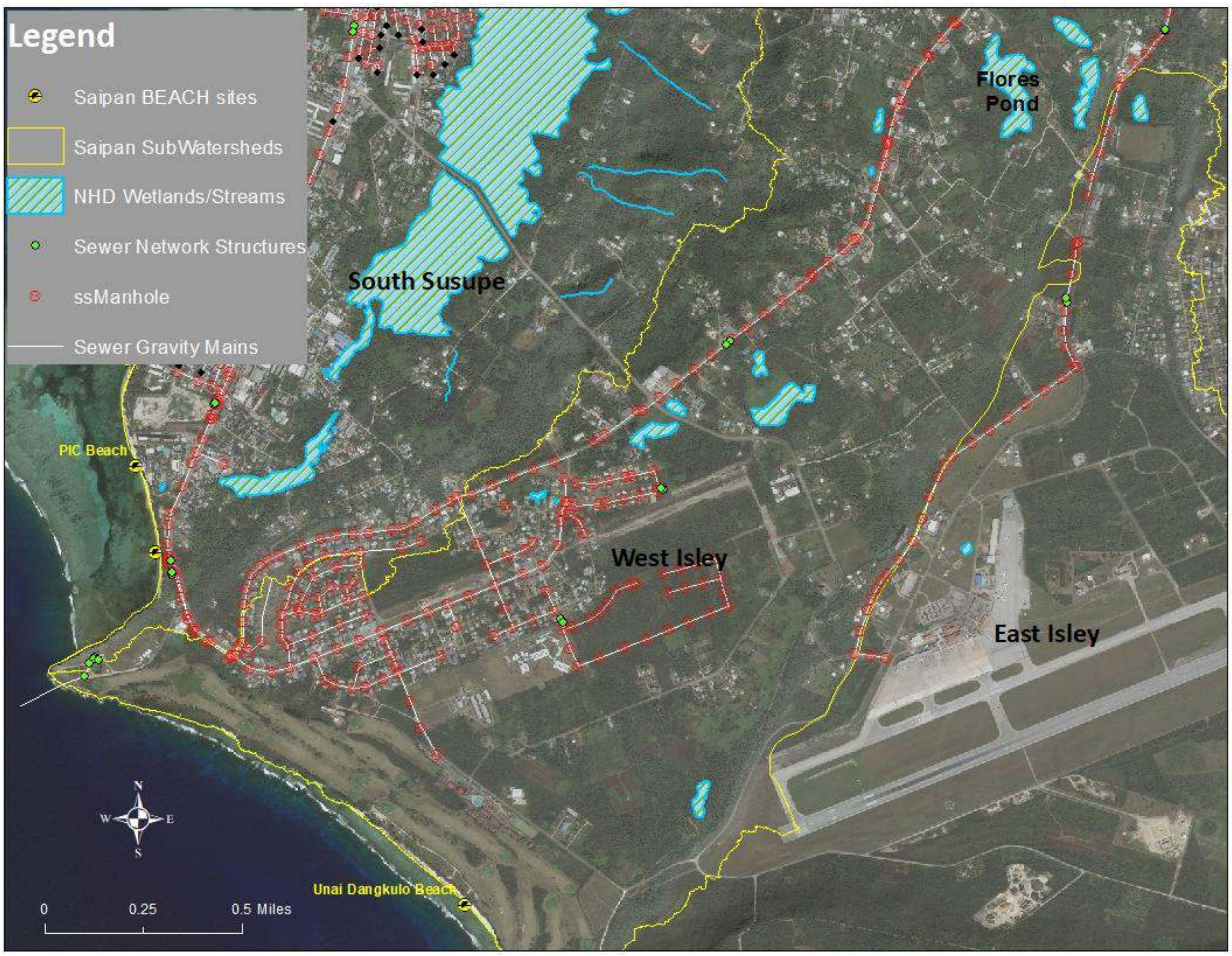
West Isley is more densely populated than East Isley with the majority of residents and businesses connected to the CUC municipal sewer system. CUC's Agingan WWTP outfall is located off "Agingan Point" on the western tip of the watershed, adjacent to the South Susupe watershed. The WWTP, which is NPDES permitted, is now only working at approximately 50% capacity (2017 Watershed Working Group presentation, William Gilmore, CUC Deputy Director). West Isley has one long-term BEACH monitoring site located on Unai Dangkolo Beach located west of Coral Ocean Point Golf Course and Resort, as shown in Figure C-15., on the following page. It should be noted that Coral Ocean Point Golf Course and Resort has been closed since Super Typhoon Yutu.

West Isley - Coastal Marine Waters

The ALUS biological assessment of West Isley's coral fore reefs were ranked as "Poor" again this reporting cycle. The MMT found that Unai Dangkolo Beach's reefs had a significant decrease in benthic substrate quality. However, BECQ lacks sufficient water quality data at the long-term fore reef monitoring sites to confirm whether or not there are indeed water quality pollutant sources contributing to this decline. In addition, new nutrient water quality data for West Isley's BEACH sites exceeded the CNMI WQS for Orthophosphate in FY 2019, and were added to the 303(d) list as impaired for Phosphate. pH levels were low in FY 2018, and were also added to the 303(d) list as impaired. The source of the elevated Phosphate levels and low pH is unknown. These findings indicate that West Isley's coastal waters are no longer supportive of the *Propagation* of *Aquatic Life* DU.

A 2016 study by Denton, et al., reported Cu and Pb contamination of biota within West Isley coastal waters. The heavy metal contamination is thought to be associated with a former WWII debris dumpsite at Agingan point. The study found the site "extensively contaminated with several elements that could conceivably induce adverse biological effects in sensitive species." In addition, the Agingan WWTP's treated effluent is discharged here into a mixing zone. This finding has resulted in West Isley's coastal waters remaining unsupportive of the *Fish and Shellfish Consumption* DU.

FIGURE C-15. West Isley Watershed (Segment 17A)

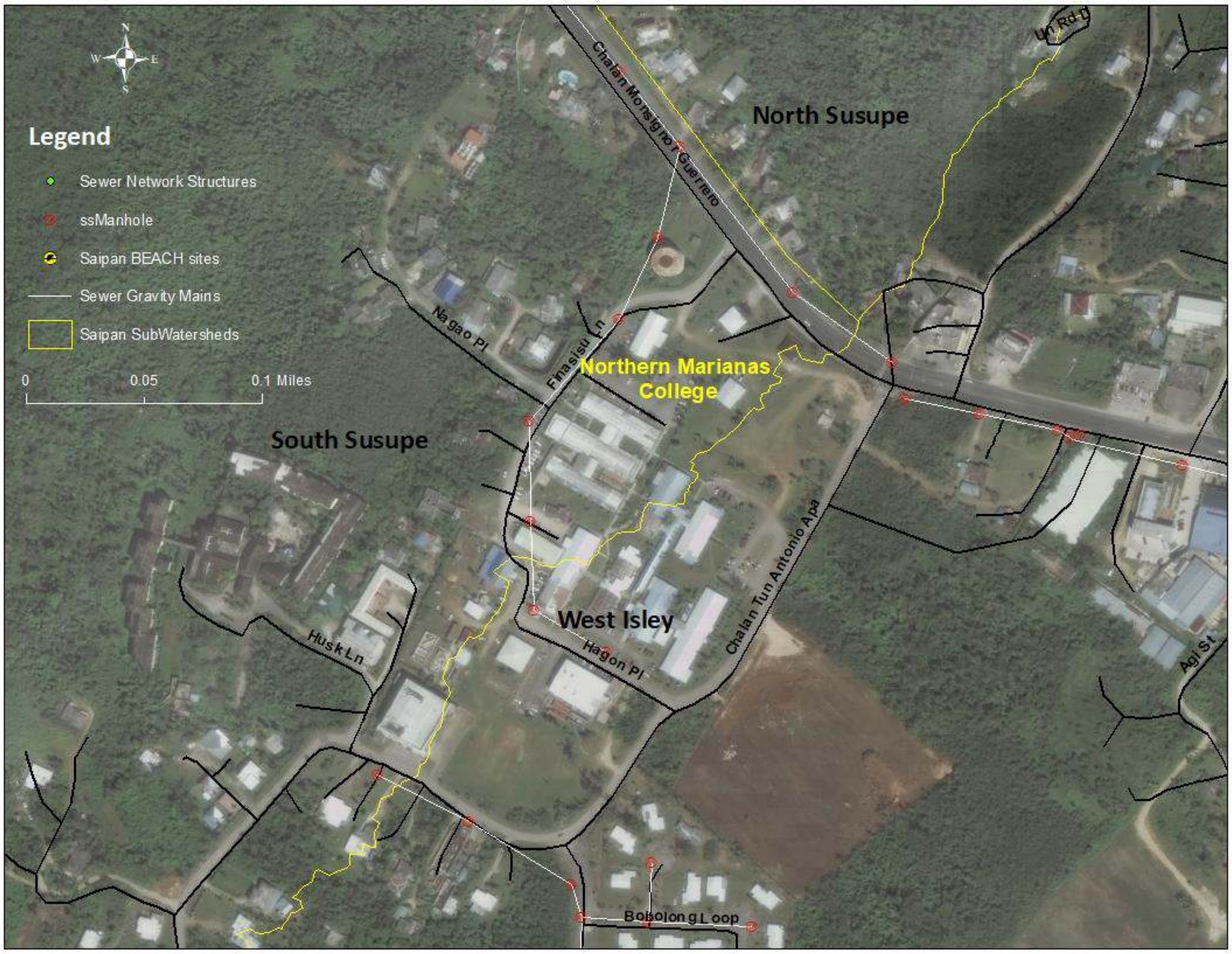


In 2018, CUC upgraded Northern Mariana's College's (NMC) sewer line (2020. As reported by Larry Manacop, CUC engineer). The dilapidated asbestos cement pipes were replaced and reconnected to the existing lateral sewer lines. New sewer manholes were also installed and existing manholes were repaired (see Figure C-16).

However, this did not prevent West Isley's coastal water quality from exceeding the CNMI WQS for Enterococci. The source of the elevated Enterococci levels is unproven, but may be associated with other sewer lines in need of upgrades or failing on-site septic systems. These exceedances and the low pH levels, resulted in West Isley's coastal waters being 303(d) listed as impaired for Enterococci, and Low pH and are no longer supportive of the *Recreational* DU.

Unai Dangkolo is a popular strand of beach located west of Coral Ocean Point Golf Course. It is a local favorite for snorkeling, picnicking, and fishing, for which West Isley's coastal waters fully attain the *Aesthetic Enjoyment* DU.

FIGURE C-16. Northern Mariana's College Sewer Line Upgrade



West Isley – Freshwater Streams

West Isley shares the stream system near Mt. Takpochau with East Isley. The 2017 NHD, and Wetlands and Streams GIS data layers show very limited topographical and geological features to support stream systems. Most precipitation flows by subterranean transport from land to sea. There have not been any visual field assessments or water quality monitoring completed in this stream system due to the difficulty in accessing the ridge which is heavily vegetated with sawgrass. Therefore, there is no water quality data to assess the *Recreational* DU.

In addition, no information is available about the presence of freshwater pools to support the *Propagation of Aquatic Life,* or *Fish and Shellfish Consumption* DUs. However, given Denton's findings from his 2014 study which found heavy metal contamination inf West Isley's soils associated with legacy WWII dumpsites, there is the potential presence of contaminants to the stream systems as well.

It is clear that the West Isley's watershed, has insufficient precipitation to support the *Potable Water Supply* DU, as reflected in Table C-20., on page 86.

However, West Isley residents have reported hiking in the dry watercourses of the watershed to hunt and for exercise. Based on this, and professional judgement West Isley's streambeds fully support the *Aesthetic Enjoyment* DU.

West Isley - Wetlands

The 2017 NHD, and Wetlands and Streams GIS data layers display other significant natural emergent wetlands, or marsh areas in the mid and upper West Isley watershed including Flores Pond, and a constructed mitigation wetland. These wetlands exist due to the clay geology, which acts as an aquitard and holds the freshwater longer than in other places on Saipan. These wetlands are important for migratory bird habitat and for the Mariana Moorhen. Access to these areas is difficult because they are all on, or adjacent to private property. Therefore, there is the presence of anthropogenic stressors from urban development encroaching into these areas. BECQ hopes to further assess these wetlands' habitat using the CNMI Wetland RAM and test their water quality in the future. However, at the time of this writing there is insufficient information to assess the support of the *Propagation of Aquatic Life* DU.

West Isley – CALM Category

The West Isley coastal waters retain a CALM Category 5 due to heavy metal contamination of fish tissue and biota, Orthophosphate, low pH, and Enterococci exceedances of the CNMI WQS, which is unsupportive of the *Propagation of Aquatic Life, Fish and Shellfish Consumption,* and *Recreational* DUs.

The West Isley's freshwater streams retain a CALM category of 3 due to lack of sufficient information, and the potential presence of anthropogenic contaminants from legacy WWII debris.

The West Isley's wetlands are assigned a CALM category of 3 due to lack of sufficient information, and the potential presence of anthropogenic stressors from urban development altering habitat.

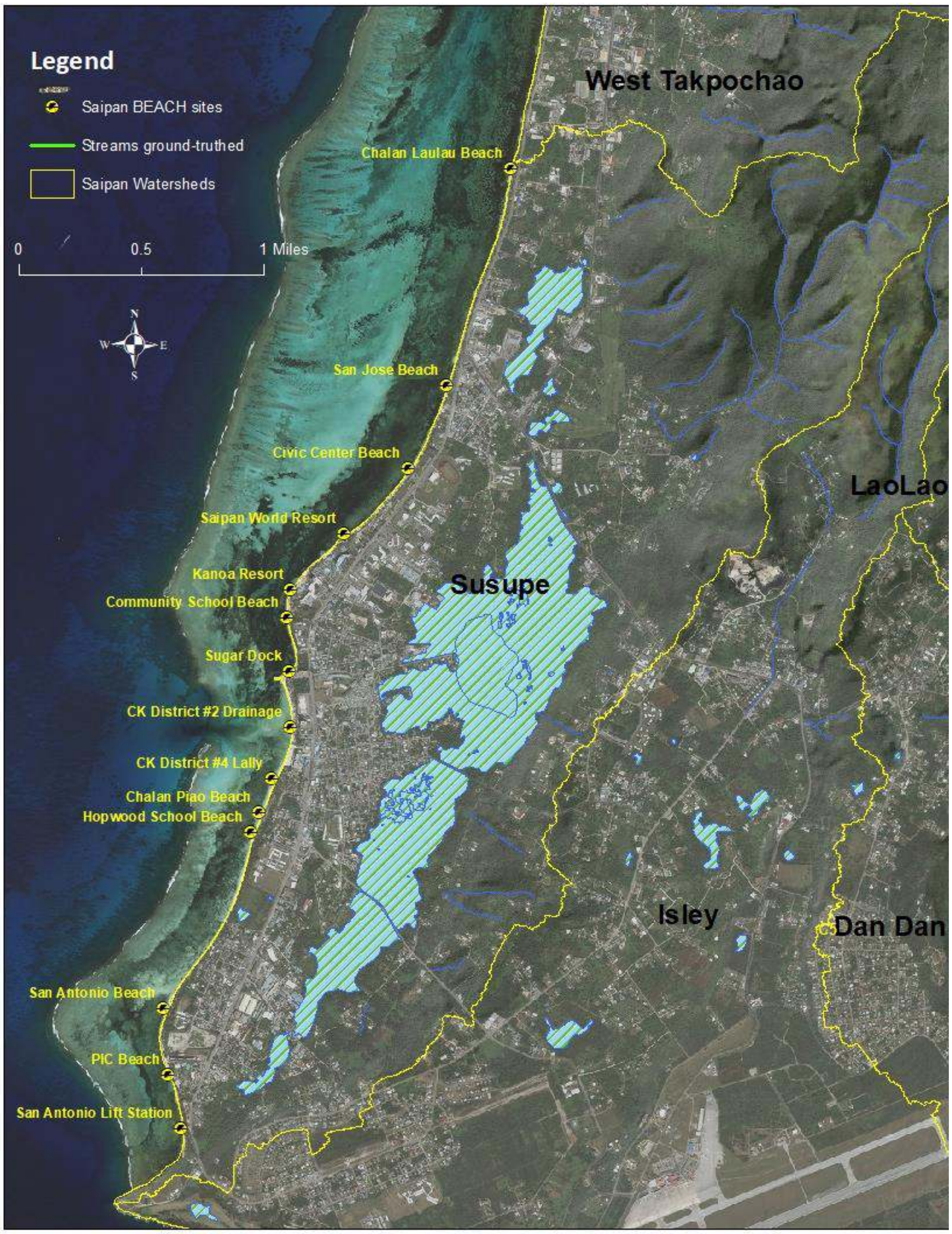
C-3.5.7. SUSUPE - Waterbody Segment 18

The large Susupe watershed on Saipan's west coast is subdivided into two sub-watersheds, North (18A) and South (18B), as shown in Figure C-17., on the following page.

The sub-watersheds' boundaries are based primarily on Saipan's catchment basins, and also on general topography, placing the entire Susupe Lake in the southern half of the watershed for ease of reporting purposes.

The entire Susupe watershed is a very developed urban area, second only to the West Takpochau watershed, with many hotels, resorts, restaurants, stores, gas stations, a public library, two Local markets, and a cinema. CUC's municipal sewer system runs the entire length of this watershed.

FIGURE C-17. Susupe Watershed (Segment 18A and 18B)



South Susupe – Waterbody Segment 18B

South Susupe Watershed contains the largest wetland in the CNMI covering 292.4 acres and the only lake on Saipan (57.4 acres), Figure C-18.

FIGURE C-18. South Susupe Watershed (Segment 18B)

There are eight (8) long-term BEACH monitoring sites. The CUC San Antonio Sewer Lift Station A-16 is the southernmost Site. Sugar Dock is the northernmost site and contains a boat launch. It is a popular swimming and boogie boarding site. The end of the dock is also used as a dive platform for jumping into Saipan Lagoon's clear waters.

South Susupe - Coastal Marine Water

The South Susupe watershed drains into the southern part of Saipan's lagoon. The lagoon's clear waters and sandy beaches are adjacent to many resorts, restaurants, and public beach parks with "Pala Palas" (covered picnic structures) and barbeque pits. These are enjoyed daily by residents and visitors. Therefore, South Susupe continues to fully support the *Aesthetic Enjoyment* DU.

The MMT found no significant improvement in the benthic substrate, or seagrass assemblages in the San Antonio Village's coastal waters. Therefore, South Susupe's overall ALUS was ranked as "Fair" again this reporting cycle.

However, new nutrient water quality data exceeded the CNMI WQS for Orthophosphate and NO_3-N, resulting in South Susupe's coastal waters being added to 303(d) list as impaired for Phosphate and Nitrate. Although, DO% levels noticeably improved, Sugar Dock and Chalan Piao BEACH sites still had exceedances more than 10% of the time in FY 2018. There also were exceedances of the WQS for pH at Sugar Dock in 2019, but no trends were notable. The source of elevated nutrient levels and diminished DO% is unproven, but may be associated with urban runoff during heavy rains, sewer overflows, or groundwater seeps carrying nutrients and aerobic microbes, resulting in decreased oxygenation of coastal waters. The source of the pH exceedances is unknown. These findings indicate that South Susupe's coastal waters do not support the *Propagation of Aquatic Life* DU.

The 2016 heavy metal sediment study conducted by Denton, et.al, found exceedances of DEQ's screening levels for Cu, Pb, and Zn in soils taken from the former 'Agingan Point' dump, which was used for ocean disposal of ammunition after WWII, and for civilian wastes up into the 1970s. The study concluded that "The sediment quality guideline exceedances for Pb, Cu, and Hg at this site ...also suggest that sensitive species living in close proximity to these deposits may be exhibiting adverse biological effects." Therefore, further study of heavy metal contamination in fish tissue and/or biota in South Susupe's coastal waters should be conducted at this highly contaminated site to fully assess the *Fish and Shellfish Consumption* DU.

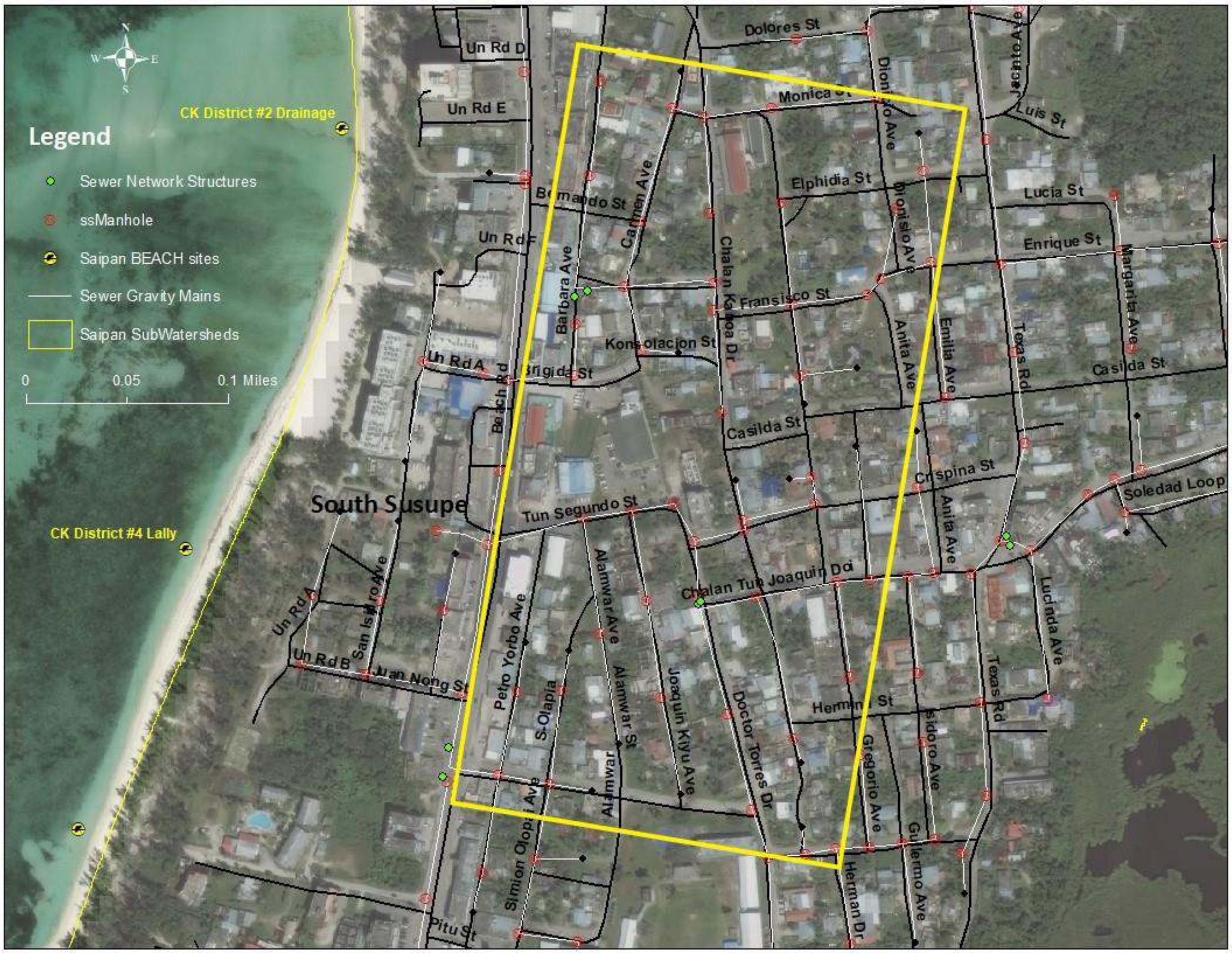
The South Susupe coastal waters remain impaired due to Enterococci exceedances of the WQS at Sugar Dock, and CK District #2 drainage BEACH monitoring sites. It should be noted that CUC is actively trying to improve the sewer lines in this area. In FY 2018, CUC replaced dilapidated asbestos cement pipes, installed new sewer manholes, and rehabilitated existing manholes inland of Sugar Dock (2020. As reported by Larry Manacop, CUC engineer). The area is outlined in yellow in Figure C-19.

FIGURE C-19. South Susupe Sewer Line Replacement Project - North East of Sugar Dock

In addition, CUC sewer lines were also rehabilitated between CK District #2 Drainage and CK District #4 Lally Beach (Figure C-20).

In addition, to failing sewer lines in this area, there are *many* other potential sources of contamination at Sugar Dock and CK District #2 drainage including leftover picnic waste (diapers), urban road run-off, stray dogs and cats, and more significantly, illicit connections, and failing IWDSs. Of note, a large multi-story apartment complex was built across from Sugar Dock in early 2015 and was connected to the municipal sewer line in April 2015. All of the units are currently occupied significantly increasing the volume of wastewater produced in the area. Two additional lift station upgrades are planned for the near future in South Susupe Watershed (one near Sugar Dock), both of which will increase sewer capacity and improve water quality.

FIGURE C-20. South Susupe Sewer Line Replacement Project – Between CK#2 and CK#4



It should be noted that the other BEACH sites located south of CK District #2 drainage have met the CNMI WQS for Enterococci for the past four years. This may be due to CUC's successful sewer line upgrades across from Afetna Road in 2018 (Figure C-21 on the following page).

FIGURE C-21. South Susupe Sewer Line Replacement Project – East of Afetna Road

South Susupe – Freshwater Streams

The 2000 USGS report on Lake Susupe stated that, "Stream channels on the western coastal plain … are not discernible in the field or on topographic maps," and that during "dry years, surface runoff into the lake is probably negligible." However, 2016 imagery and the 2017 NHD, and Wetland and Stream data layers indicate that ephemeral streams probably run during rainy season in the upper watershed near the ridge line. However, there is no road access in this rugged undeveloped area. Therefore, to date, visual field assessments of the streams have not been completed. In addition, it is unlikely that water quality samples could ever be collected while the streams are flowing given how long it would take to reach these areas during a rain event. Therefore, there is insufficient information to assess the *Support and Propagation of Aquatic Life, Fish and Shellfish Consumption*, or *Recreational* DUs for South Susupe's stream systems. However, given Denton's 2016 study which found heavy metal contamination in soils taken from the former 'Agingan Point' dump, further studies on fish tissue and biota from streams in this area should also be conducted.

There is insufficient flow in South Susupe's ephemeral stream systems to support a *Potable Water Supply*. Therefore, this DU is not assessed.

However, due to the streams' remoteness in this undeveloped portion of the watershed, the South Susupe streams, like the streambeds in other watersheds are considered to be fully supporting the *Aesthetic Enjoyment* DU, based on professional judgement.

South Susupe – Wetlands and Susupe Lake

Saipan's only lake, "Susupe Lake" and the adjoining wetland complex, is located primarily in the South Susupe Watershed (Figure C-25., on the following page). Lake water quality is tested by-weekly.

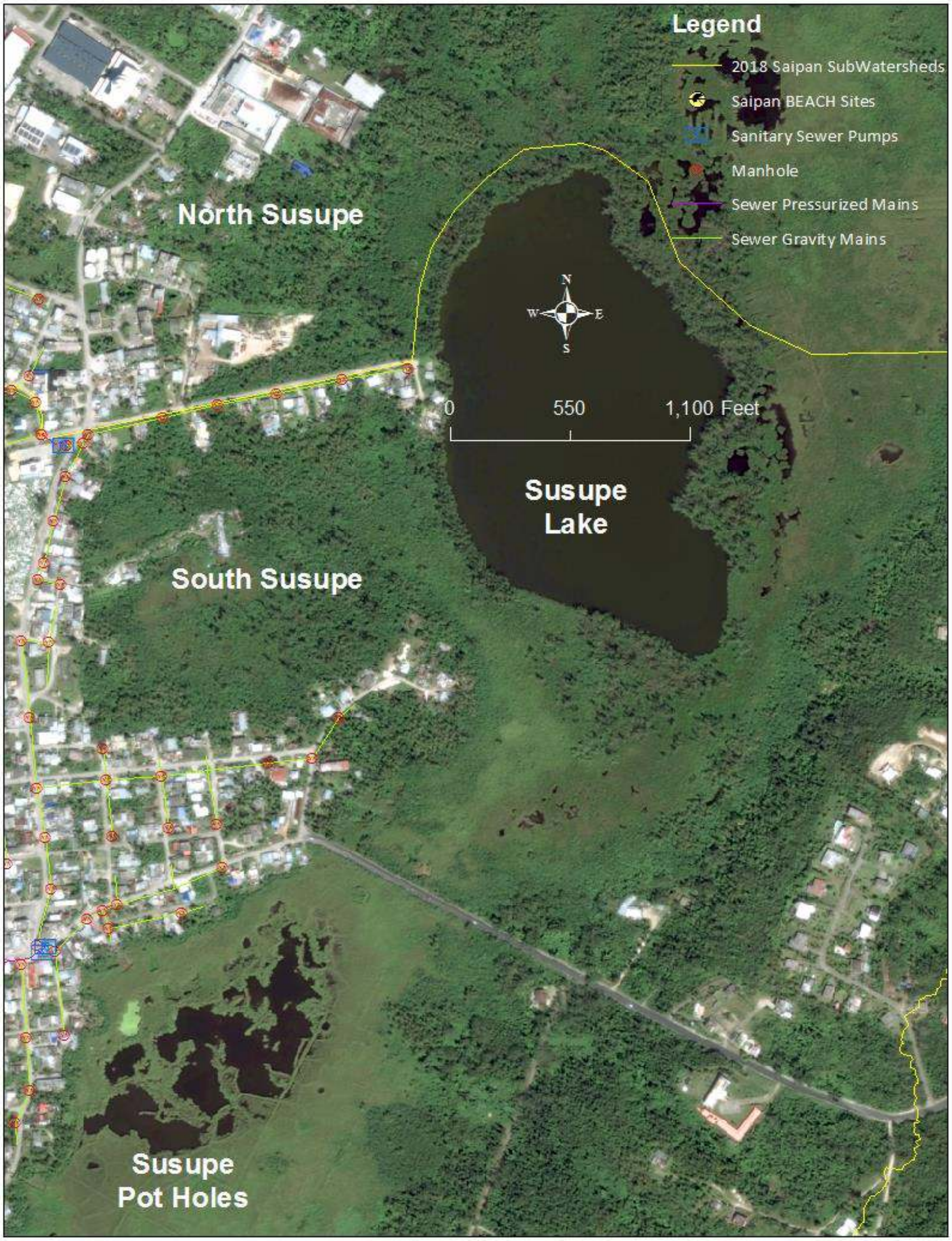
Although, a recent delineation and valuation has not been completed in the marsh wetland area or Susupe Pot holes, there has been a plethora of research done in the area by wetland experts and hydrologists exploring the feasibility of using the lake as a *Potable Water Supply* (US Dept. of the Interior, 2000; Davis, M.M., 2001 & 2005; Caruth, R.L., 2003; and Environet, 2006). This research shows that there have been substantial hydrological alterations in the surrounding area from fill for agriculture, homesteads, roadways, and developments (some permitted and some unpermitted resulting in local and federal violations and penalties). Therefore, South Susupe's wetlands do not support the *Propagation of Aquatic Life* DU, but not due to pollutants.

The most recent study by Environet, Inc., in 2006, entitled "*Assessment of Toxicity and Water Quality of Lake Susupe*", concluded that Susupe Lake "consists primarily of rainfall with minimal ground water influence" and is "isolated from surrounding ground water and seawater systems". Chloride levels also have "quite pronounced" seasonal variations, as do other constituents. "No organochlorine pesticides, PCBs, volatile or semi-volatile compounds were detected." The study went on to conclude that the Lake would require treatment to be a *Potable Water Supply* due to chloride (unpalatability) and *E. coli* levels. Therefore, Susupe Lake could support the *Potable Water Supply* DU given appropriate treatment. However, as stated previously, no surface water on Saipan is used as a potable water supply. Therefore, the *Potable Water Supply* DU for Susupe Lake (segment 18LAKB) is not assessed.

In addition to these impairments, wildlife samples taken from the surrounding banks of the Lake by McKagan, et.al, in 2008, contained three types of non-native snails, mangrove prawns, Tilapia, sailfin molleys, and mosquitofish. The lake provides habitat for migratory waterfowl. There is also a predominance of introduced Red-eared slider turtles. Although Susupe Lake supports the *Propagation of Aquatic Life* DU, many are invasive non-native species.

Water quality is also poor for several causes. This reporting cycle the lake water frequently exceeded the WQS for *E. coli*, and showed diminished DO%, and high pH concentrations resulting in the lake remaining on the 303(d) list of impaired waters for DO% and high pH. However, the lake was removed from the list for *E. coli* as the 2018 TMDL for bacteria is now being implemented to address this cause.

FIGURE C-22. Susupe Lake and the Surrounding Wetlands and Potholes



The sources of diminished DO% and elevated *E. coli* concentration are associated with nutrient loading from failing septic systems, sewer line overflows, and polluted runoff from roadways resulting in aerobic microbial activity depleting oxygen levels. The source of increased pH levels in this shallow lake is unproven at this time and requires further investigation to see if the alkalinity is related to natural daily fluctuations from photosynthesis and respiration increasing pH levels. For these reasons Susupe Lake is unsupportive of the *Propagation of Aquatic Life* DU.

No fish tissue and/or biota contamination data has been collected on Susupe Lake to assess the *Fish and Shellfish Consumption* DU.

However, Susupe Lake is enjoyed by residents living near the lake, who paddle boat, kayak, or fish in its waters. Naturalists also enjoy bird watching and exploring this area; one of the last open water wetland complexes in the CNMI. For these reasons, the Lake and wetlands in the South Susupe watershed attain the *Aesthetic Enjoyment* DU.

South Susupe – CALM Categories

South Susupe's coastal waters retain a CALM Category 5 due to exceedances of the CNMI WQS for Orthophosphate, NO_3-N, DO% and pH, which are unsupportive of the *Propagation of Aquatic Life* and *Recreational* DUs. There is insufficient information concerning heavy metal contamination. However, there is the potential presence of heavy metal contamination from legacy WWII dump sites. Enterococci exceedances are being addressed by the 2018 TMDL for bacteria.

South Susupe's Streams were downgraded to a CALM Category 3 due to insufficient information. However, there is the potential presence of heavy metal contamination from legacy WWII dump sites.

The South Susupe wetlands and potholes (18WETB) retain a CALM Category of 4c, due to non-native aquatic life, habitat alterations, and flow regime, which are not considered pollutants.

Susupe Lake retains a CALM Category of 5, due to exceedances of the CNMI WQS for DO%, pH, and *E. Coli*, which are unsupportive of the *Propagation of Aquatic Life* and *Recreational* DUs. The *E. Coli* impairment is being addressed by the 2018 TMDL for bacteria.

North Susupe – Waterbody Segment 18A

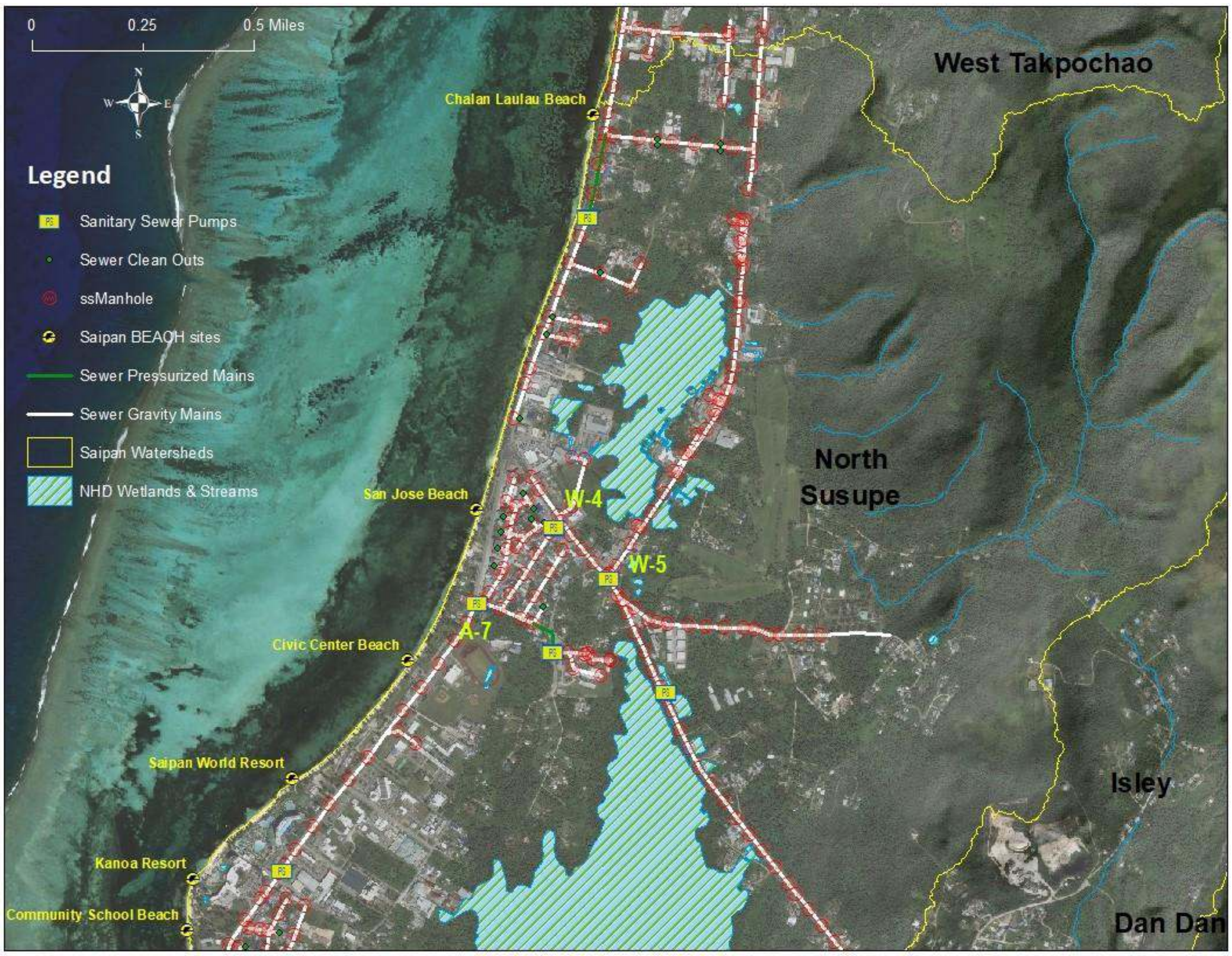
The North Susupe coastline extends from Saipan Community School in the south to Chalan LauLau Beach in the north.

There are several large resorts, hotels, public beach parks, two Saturday public markets, and basketball courts (Figure C-23., on the following page). The strand of beach between San Jose Beach and Civic Center Beach across from Ada Gym is also used to park traditional outrigger canoes ("galaide"), and is used by many resident paddlers for training and competitions. Tourists and residents regularly enjoy these beaches for their scenic views, picnics, marine sports, swimming, and fishing, which is why North Susupe's coastal waters fully support the *Aesthetic Enjoyment* DU.

North Susupe - Coastal Marine Waters

Although, the North Susupe seagrass assemblages near Kanoa Resort were not assessed this reporting cycle, they were ranked as "Good" in the previous CNMI IR. The MMT were able to assess the seagrass in front of Civic Center Beach and found no significant change in the benthic substrate, thereby it retained an ALUS ranking of "Good". Therefore, North Susupe's reefs retain an overall ALUS ranking of "Good" considering data collected over the past five years.

FIGURE C-23. North Susupe Watershed (Segment 18A)



However, new nutrient water quality data exceeded the CNMI WQS for Orthophosphate and NO_3-N, resulting in North Susupe's coastal waters being added to the 303(d) list as impaired for Phosphate and Nitrate. DO% levels were again diminished at almost all the BEACH sites and remain listed. The source of nutrients and diminished DO% is unproven, but may be associated with urban runoff during heavy rains, sewer overflows, and groundwater seeps carrying nutrients and aerobic microbes, resulting in decreased oxygenation of coastal waters. In addition, pH levels were low at the Chalan Laulau BEACH site, and therefore are added to the 303(d) list as impaired. The source of the low pH levels is unknown. These findings indicate that North Susupe's coastal waters are not supportive of the *Propagation of Aquatic Life* DU.

There has been insufficient data collected on fish tissue and/or biota contamination from North Susupe's coastal waters to assess the *Fish and Shellfish Consumption* DU.

Last reporting cycle the A-7 and W-5 Lift Stations located between San Jose (WB25) and Civic Center Beach (WB26) were upgraded and rehabilitated. In addition, dilapidated asbestos cement pipes were replaced, manholes were rehabilitated or replaced, new gravity sewer mains and new sewer forcemains were installed, and the old W-4 Lift station was eliminated. Additional upgrades to one additional lift station are planned over the next five years (2020, personal communication with Larry Manacop, CUC Chief Engineer). This is the fifth year that all of the BEACH sites met the CNMI WQS for Enterococci 90% of the time or better, resulting in this watershed being delisted for Enterococci. This improvement is associated with the sewer line upgrades implemented by CUC. However, due to North Susupe's diminished DO% and low pH its coastal waters still do not support the *Recreational* DU.

North Susupe – Freshwater Streams

The USGS report completed in 2000 stated that there appears to be, "Some surface runoff from the southwest flank of Mount Tagpochau (sp), which does have discernable stream channels on the topographic maps." This correlates with the latest 2017 NHD, and wetland and stream GIS data layers, which also show a distinct stream system in the remote upper half of the North Susupe watershed. There are no roads to access this rugged undeveloped area. Therefore, to date, visual field assessments of the streams have not been completed. In addition, it is unlikely that water quality samples could ever be collected while the streams are flowing given the difficulty in reaching these remote sites in time to collect a sample. Therefore, there is insufficient information on North Susupe's stream system to assess the *Support and Propagation of Aquatic Life, Fish and Shellfish Consumption*, and *Recreational* DUs. There is also insufficient flow for a *Potable Water Supply* to exist, and therefore this DU is not assessed.

However, due to the streams' remoteness in this undeveloped portion of the watershed, the North Susupe freshwaters streams are considered to be fully supportive of the *Aesthetic Enjoyment* DU as are Saipan's other streams, based on professional judgement.

North Susupe – Wetlands

Although a recent wetland valuation has not been completed in the North Susupe wetlands using the CNMI Wetland RAM, BECQ wastewater and WQS/NPS staff conducted an investigation of the wetlands behind the CNMI Department of Corrections and Marianas Business Plaza across from Texas road. Field staff reported many disturbed areas and illegal fill activities for which the responsible parties were held responsible, and made to conduct restoration activities. In addition, the wetlands located between the Joeten Superstore and Chalan Pale Arnold road also have many disturbed areas, altered hydrology, and introduced non-native species. Therefore, the

North Susupe wetlands do not support the *Propagation of Aquatic Life* DU, but not due to pollutants.

North Susupe – CALM Categories

North Susupe's coastal waters retain a CALM Category 5 due to low DO% and pH, which are unsupportive of the *Propagation of Aquatic Life* and *Recreational* DUs. Enterococci levels have been meeting the CNMI WQS over the last five years, and therefore are delisted this reporting cycle.

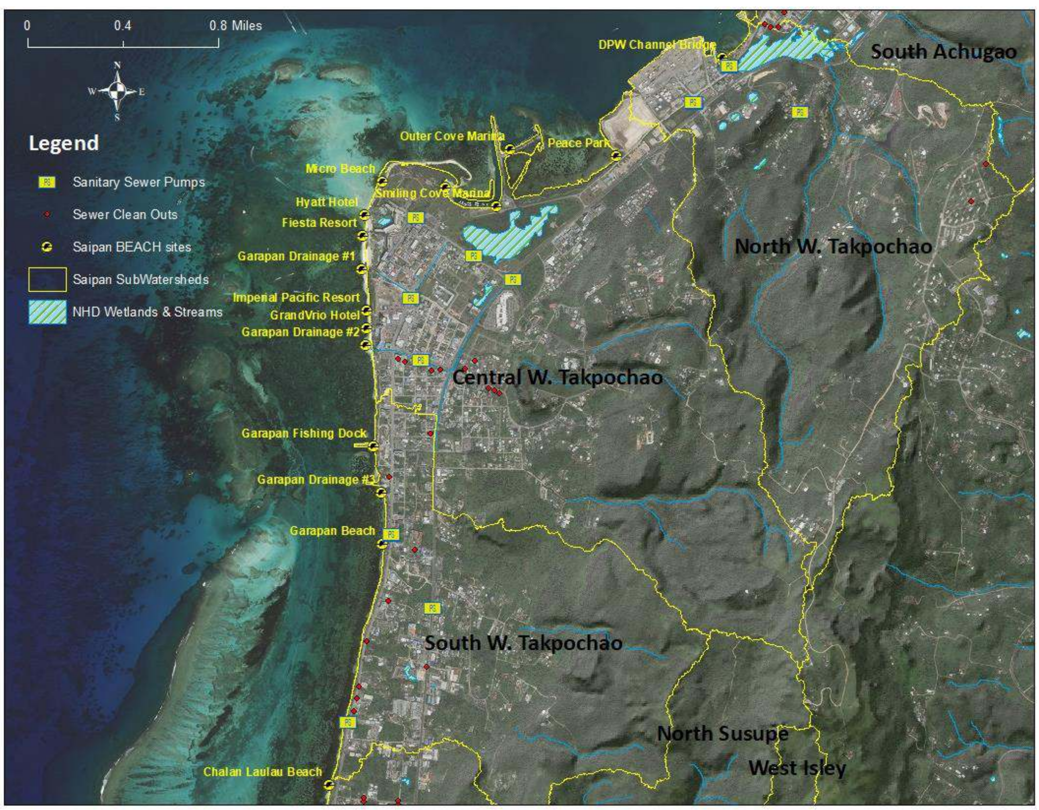
The North Susupe streams retain a CALM Category 2 due to insufficient information, but are not considered threatened due to their remote location.

The North Susupe wetlands retain a CALM Category of 4c, due to habitat alterations, non-native aquatic life, and flow regime, but not due to pollutants.

C.3.5.8. WEST TAKPOCHAU – Waterbody Segments 19A, 19B, and 19C

The West Takpochau watershed (Figure C-24) is the most urbanized watershed in the CNMI, and the heart of Saipan's tourist district. It also has the greatest pressure from rapid development.

FIGURE C-24. West Takpochau Watersheds (Segments 19A, 19B, and 19C)



The CUC municipal sewer system runs the entire length of this watershed, but some older dwellings may still be relying on aging IWDSs for wastewater treatment. It is by far the most challenging watershed from an NPS management standpoint due to its rapid growth, population density, and diversity. More than 15 languages and dialects are spoken within the Central Garapan tourist district (2010, Census).

This watershed flows from Saipan's highest peak, Mt. Takpochau, into Saipan Lagoon. It is divided into three sub-watersheds (19A, B, and C).

The sub-watershed boundaries were newly delineated last reporting cycle using the 2017 Saipan watershed catchment basins.

South W. Takpochau – Waterbody Segment 19C

The South W. Takpochau Watershed contains three (3) long-term BEACH monitoring sites at Garapan Beach (WB22), north of the "13 Fishermen Monument", Garapan Drainage #3 (WB21), and Garapan Fishing Dock (WB22). These are displayed in Figure C-25., on the following page.

The lower watershed is densely populated with private homes and small businesses. There are a few hotels in the South West Takpochau sub-watershed and apartment complexes that are separated from the coast by Beach Road and other impervious surfaces. Sewer infrastructure is available for all homes and businesses in the lower watershed.

South W. Takpochau - Coastal Marine Waters

The MMT found a significant decrease in the quality of the benthic substrate at the seagrass site near Garapan Beach. There was no improvement to the seagrass site near Chalan Laulau Beach. However, BECQ lacks sufficient water quality data at these long-term monitoring sites to confirm whether or not there are water quality pollutant sources causing this decline. Therefore, the overall ALUS ranking for South West Takpochau's coastal waters remained "Poor" this reporting cycle.

In addition, new nutrient data at several BEACH sites again exceeded the CNMI WQS for NO3-N. In addition, pH and DO% levels remained low, exceeding the CNMI WQSs more than 10% of the time. Therefore, these coastal waters remain 303(d) list as impaired. The suspected source of Nitrate and diminished DO% levels are ground water seeps carrying nutrients from failing septic systems, and sanitary sewer overflows, urban runoff from expansive paved and populated areas (2017, TMDL) that contribute to an excess of nutrients and aerobic bacteriological activity resulting in decreased oxygenation of coastal waters.

Although not proven, low pH levels may be associated with boat maintenance, road or other new construction projects in the area (2017, TMDL), or with residual cleaning solutions or other chemicals used on boat decks or hull surfaces at Garapan fishing dock.

These findings demonstrate that South West Takpochau's coastal waters do not support the *Propagation* of *Aquatic Life* DU.

FIGURE C-25. South W. Takpochau Watershed (Segment 19C)

There is insufficient data collected on fish tissue and/or biota contamination from South W. Takpochau's coastal waters to assess the *Fish and Shellfish Consumption* DU.

Although, in 2019 CUC upgraded and rehabilitated the existing sewer lift stations S-6, and S-10, South West Takpochau's coastal waters again exceeded the CNMI WQS for Enterococci. The source for this continued fecal contamination is primarily associated with sanitary sewer overflows, failing on-site systems, and animal waste from feral dogs observed frequently in the area. The qPCR-MST and nitrogen isotope source tracking studies found that coastal waters surrounding the Garapan Fishing Dock had high levels of Human marker (Sinigalliano, 2020), and that the ground water samples strongly suggested that sewage derived Nitrogen was the dominant source of Nitrogen in the environment (Kim, 2019), further supporting the assumption that the sewer line or failing IWDS are the primary source of contamination. In addition, Sinigalliano also found significantly high levels of dog FIB marker, which is unsurprising given the number of stray dogs roaming in the area and the number of people whom walk their dogs along the beach path.

Due to these findings the South West Takpochau's coastal waters are unsupportive of the *Recreational* DU.

However, South W. Takpochau' coastal waters fully support the *Aesthetic Enjoyment* DU due to the expansive sandy beaches and the widely used 'Saipan Beach Pathway', which begins in this watershed and runs into the North W. Takpochau sub-watershed. The pathway is enjoyed by joggers, bikers and walkers who can be seen enjoying the path every morning and evening, taking in the cool ocean breeze while appreciating a sunrise or sunset.

South W. Takpochau – Freshwater Streams

There are two ephemeral streams in the South West Takpochau watershed as seen in the 2017 NHD, and Wetlands and Stream GIS data layers. The streams' headwaters start at the ridge separating North Susupe from the South West Takpochau watershed. The streams flow on the surface from the steep upper watershed in the west, then subterraneous through the lower watershed, then discharge through freshwater seeps into Saipan Lagoon. At this writing, visual field assessments have not been completed in the upper watershed to see if freshwater pools exist to support *Aquatic Life*, nor has any water quality data been collected from these remote streams. Therefore, there is insufficient data on South West Takpochau's stream systems to assess the *Support and Propagation of Aquatic Life,* the *Fish and Shellfish Consumption,* and the *Recreational* DUs. However, there are ground water seeps in this watershed that may cause nutrient loading.

In addition, these ephemeral streams flow too infrequently to provide a stable and sufficient *Potable Water Supply* in this densely populated watershed, and therefore are not assessed for this DU.

However, these streambeds continue to provide hikers, "hashers", and recreational and professional athletes with a place to exercise and train, for which South West Takpochau's freshwater streambeds fully support the *Aesthetic Enjoyment* DU.

South W. Takpochau – Wetlands

There are no fully functioning wetlands in the South West Takpochau watershed other than a few small drainage areas demonstrating wetland soils, some wetland plants, and hydrology. Therefore, they do not appear in Table C-33., on page 101 this reporting cycle.

However, these drainage areas still require protection from fill or alteration to continue to provide stormwater retention and treatment before discharging to the lagoon.

South W. Takpochau – CALM Categories

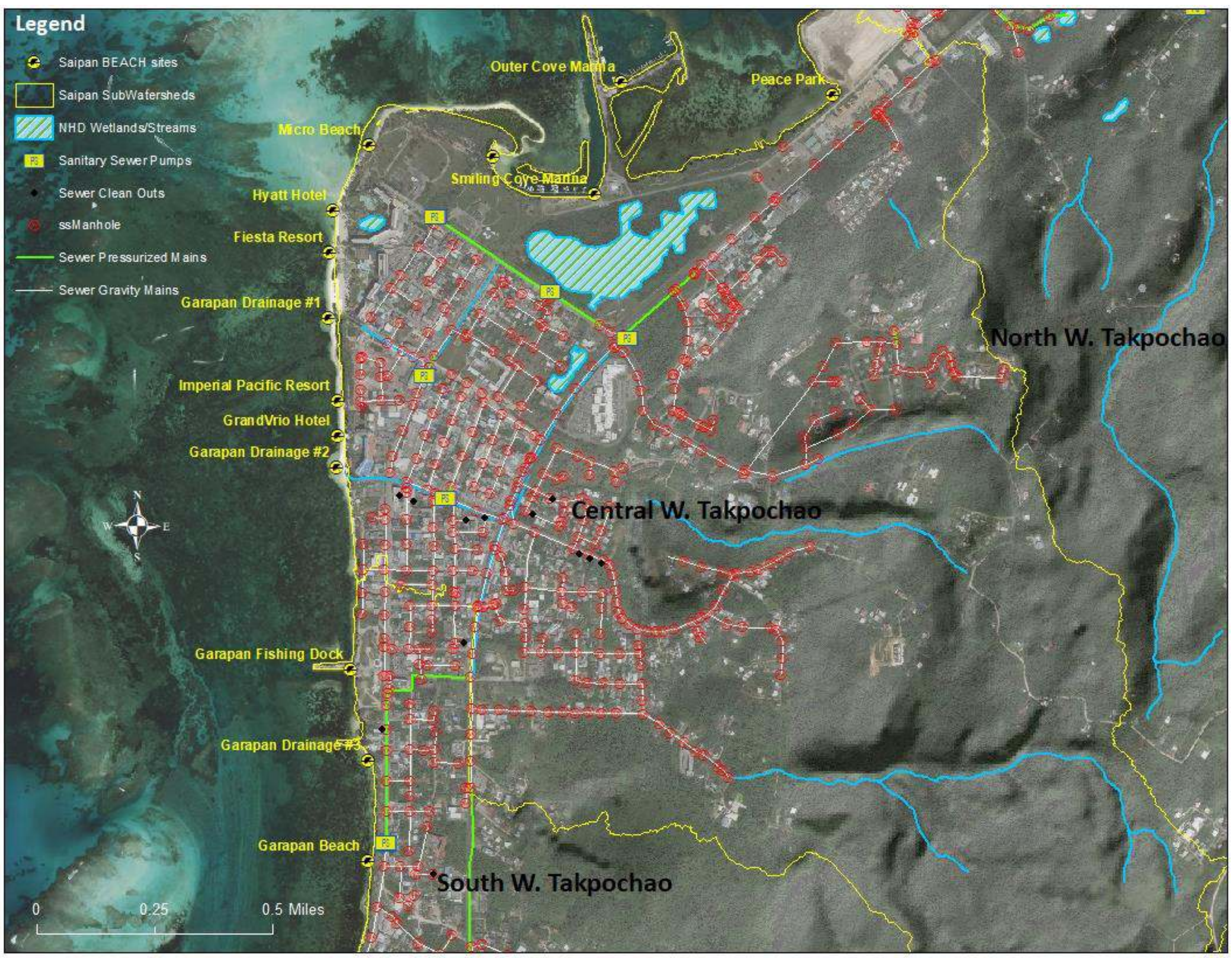
The South W. Takpochau's coastal waters retain a CALM Category 5, due to exceedances of the WQS for DO%, low pH, and Nitrate, which are unsupportive of the *Propagation of Aquatic Life* and *Recreational* DUs. Enterococci exceedances are being addressed by the 2018 TMDL for bacteria.

South W. Takpochau's freshwater streams are downgraded to CALM Category 3 due to insufficient information, and the potential presence of nutrient loading from ground water seeps.

Central W. Takpochau – Waterbody Segment 19B

The Central W. Takpochau sub-watershed contains 11 long-term BEACH monitoring sites starting at Garapan Drainage #2 BEACH site (née Hafa Adai Hotel Drainage) and running north up to the Eloy Inos Peace Park site (née South Puerto Rico dump site) as shown in Figure C-26.

FIGURE C-26. Central W. Takpochau Watershed (Segment 19B)



The lower part of the Central West Takpochau sub-watershed contains many large-scale resort hotels, apartment buildings, nightclubs, restaurants, boutiques, duty free shops and other stores in what is called the 'Garapan Tourist District'. This is Saipan's busiest shopping and dining district. Homes, apartments, and businesses in the area are required to connect to the CUC municipal sewer system. However, there still may be older homes that rely on separate IWDSs for wastewater treatment.

The multi-million dollar 14-story Imperial Pacific Resort and Casino is still under construction, and is sited upland of the ancient Samoa Housing area. A Continuous Deflective Separator (CDS) stormwater treatment unit has been installed in the reconstructed Garapan Drainage #2 BEACH site as part of the casino's major siting permit requirements. Information about the CDS may be found at: http://www.conteches.com/Products/Storm water-Management/Treatment/CDS.aspx).

Although the CDS in installed, it has not been connected to the outfall and therefore, is not operational at this time. It is hoped that when functioning, the CDS will pretreat stormwater before being discharged into the Saipan Lagoon, and thereby improve water quality.

Other large-scale resorts are located northward of the casino, adjacent to Micro Beach and south of the American Memorial Park. The park is a US National Historical Park, which contains a relatively large wetland, with some disturbed wetland features, and some of the CNMI's last remaining natural mangroves. A smaller artificial wetland was enhanced in the late 1990's, to pre-treat stormwater runoff from the Garapan Tourist District before discharging into Smiling Cove Marina's coastal waters.

Saipan's Beach Path winds its way along the Central West Takpochau's shoreline into Saipan's "industrial area". The coastal waters surrounding the industrial area have been designated as Class A waters. As was discussed previously in Section B.1.4.2, these coastal waters contain Smiling Cove and Outer Cove Marinas.

The 'Beach Path' terminates at the Eloy Inos Peace Park, the island's officially closed dump site that was established during the WWII era. The dump's closure was officially approved by EPA in 2003. It is "rumoured to contain a plethora of toxic chemicals of both military and civilian origin (Ogden Environmental and Energy Services, 1994), as cited in Denton's 2009 study.

The mid-watershed contains Saipan's only hospital, several clinics, small grocery stores, repair shops, and several multi-story apartment complexes. The upper watershed contains small livestock farms and homesteads (2017, TMDL). There is a current effort led by DCRM to develop an IWMP for the W. Takpochau Central (Garapan) Watershed in FY 2020.

Central W. Takpochau - Coastal Marine Waters

The MMT found no significant improvement to the benthic substrate of the fore reef near Garapan Beach, which remains in "Fair" condition. However, both reef sites, one near Fiesta Resort and Imperial Pacific Resort and Casino, and another near Garapan Drainage #3 had significant decreases in substrate quality. Therefore, the Central W. Takpochau's ALUS biological assessment was ranked as "Poor", a downgrade since last reporting cycle. However, BECQ lacks sufficient water quality data at these long-term fore reef monitoring sites to confirm whether or not there are indeed water quality pollutant sources causing this decline in coral health.

In addition, new nutrient data exceeded the CNMI WQS for Orthophosphate and NO3-N, which resulted in Central West Takpochau's coastal waters being added to the 303(d) list as impaired for Phosphate, and Nitrate. The suspected source of which is ground water seeps and urban stormwater runoff carrying nutrients from failing septic systems, and sanitary sewer overflows.

DO% and pH levels remain low at several BEACH sites. The source of diminished DO% is unproven, but may be associated with urban runoff during heavy rains, sewer overflows, and groundwater seeps carrying nutrients and aerobic microbes, resulting in decreased oxygenation of coastal waters.

The source of low pH is also unknown, but may be associated with new construction projects in the Garapan Tourist District and with residual cleaning solutions or other chemicals used on boat decks or hull surfaces at the marinas. Therefore, Central West Takpochau's coastal waters remain unsupportive of the *Propagation of Aquatic Life* DU.

Fish tissue samples were collected in 2004 and 2005 by Denton, et.al, of WERI, to test for heavy metal accumulation in the near shore environment. Fish samples taken from the coastal outlet of Drainage #2 were found to have elevated levels of Hg. The source of the contamination was traced back to the drainage leading from the Commonwealth Health Care Corporation (née Commonwealth Health Center), which is "a few meters down gradient of an old incinerator site." (2011, Denton, et.al).

In 2016, Denton, conducted further toxicity studies of alga, seagrass, bi-valves and sediment around the Marina's and American Memorial Park. Bivalve samples taken next to the closed dump (Eloy Inos Peace Park), "had copper values ranging from 44-140 ug/g when expressed on a wet weight basis, thus exceeding the maximum allowable concentration..." (2018. Denton, et.al.). The study also found, "moderate to significant lead enrichment still exists in surface deposits between Smiling Cove Marina and the dump.", that is associated with WWII debris. The levels were not at levels to cause adverse impacts to sensitive species, but, "…were sufficient to elevate lead in resident bivalves east of the causeway to levels beyond that considered suitable for human consumption."

For this reason, Central West Takpochau's coastal waters remain 303(d) listed as impaired for Hg, and Cu, and Pb are added to the list, which does not support the *Fish and Shellfish Consumption* DU. Of note, the hospital incinerator has since been upgraded and all stormwater runoff in the area is collected for treatment, and no longer discharges to the drainages. However, Denton further concluded that the elevated mercury levels are associated with a storm drain immediately above it which receives drainage from a wetland area and should be further tested.

Over the last five years, the Garapan Tourist District has had an upgrade to CUC's sewer line in the Garapan tourist district (2019. Personal communication, Larry Manacop, CUC Engineer). The upgrade included replacement of asbestos cement pipes, lateral lines, installation of new manholes, and road restorations. However, frequent bacteriological exceedances of the CNMI WQS for Enterococci is still an ongoing issue. This includes the Eloy Inos Peace Park, American

Memorial Park drainage, Hyatt Hotel, Fiesta Resort (née Dai-Ichi Hotel) and GrandVrio Hotel (née Hafa-Adai Hotel) BEACH sites. The source of fecal contamination is attributed to, "sanitary sewer overflow, and runoff from roads and construction/maintenance during rain events." (2018 TMDL). In order to address this, additional upgrades to two lift stations are planned by CUC over the next five years (2020. Personal Communication, Larry Manacop, CUC Engineer).

The qPCR-MST study substantiated that sewage was a contributing factor to Central W. Takphochau's contamination, as coastal waters surrounding Garapan Drainage #1 were found to have chronically elevated levels of the Human FIB marker (Sinigalliano, 2020). Human FIB markers were also detected at reef sites here and "indicates that LBSP (Land based sources of pollution) derived microbial contaminants are indeed reaching the reef tract and that corals of this area of Saipan Lagoon are being exposed to these contaminants and therefore potentially exposed to pathogens and other contaminants that might be associated with this LBSP pollutant transport."

Dog FIB marker was also found in significantly elevated levels, which coincides with the number of strays that are seen roaming freely in the area. Interestingly, the study did not attribute the fecal contamination in the waters surrounding the American Memorial Park's Drainage to human, but instead to seabirds. In 2018 the Bacteriological TMDL for Saipan was approved by EPA, resulting in the Central W. Takpochau's coastal waters being removed from the 303(d) list for Enterococci last reporting cycle.

However, these waters remain 303(d) listed as impaired due to low pH, and therefore, do not support the *Recreational* DU.

This reporting cycle, Central W. Takpochau coastal waters continue to fully support the *Aesthetic Enjoyment* DU. Its sandy shores are enjoyed daily by tourists and residents for sunbathing, swimming, and wind and kite surfing. Saipan's Beach Pathway also provides joggers with a well-maintained trail terminating at the top of the Peace Park for a panoramic view of Saipan's Lagoon.

Central W. Takpochau – Freshwater Streams

The headwaters of the ephemeral streams in the Central W. Takpochau sub-watershed begin at Mt. Takpochau and flow northwest into the mid-watershed. GPS mapping of the streams has been completed, but visual field assessments using the CNMI SVAP have not. These visual field assessments are scheduled to take place in 2023.

However, a 2008 stream study conducted by McKagan, et.al, surveyed the lower half of the watershed. Fishermen living near the streams reported the presence of freshwater shrimp, and eels. These streams drain into constructed concrete conveyances that eventually flow out of Garapan Drainage #1. This drainage was also found to contain Thiarid snails and Sailfin Molleys (*Poecilia latipinna*) as the predominant species, along with juvenile milk fish, and "one Tilapia specimen". This resulted in the streams of Central West Takpochau having the most disturbed systems surveyed thus far, but not by a pollutant. Therefore, Central West Takpochau freshwater streams do not support the *Propagation of Aquatic Life* DU, but are not included in the 303(d) list of pollutants.

In addition, the Central West Takpochau streams are 303(d) listed as impaired due to the presence of Hg contamination sourced back to the hospital parking area drainage. Therefore, they do not support the *Fish and Shellfish Consumption* DU.

Stream water quality data has not been collected from Central West Takpochau this reporting cycle. However, previous data exceeded the CNMI WQS for Enterococci. The source is thought to be from urban stormwater and sewer overflows, erosion and sediment, and piggeries and other small animal pens in the upper watershed that are in close proximity to the streams. Some farms are operating without appropriate BMPs in place, or animal wastewater collection systems. Therefore, Central West Takpochau's streams do not support the *Recreational* DU.

The ephemeral flow in Central West Takpochau is too infrequent to provide a stable and sufficient *Potable Water Supply* for this densely populated watershed, and therefore, these streams are not assessed for this DU.

In addition, the Central West Takpochau streams are considerably altered. The mid and lower streambeds are highly urbanized, with concrete conveyances channeling flow to the lagoon. Therefore, Central W. Takpochau freshwater streams are Saipan's only waterbodies that do not support the *Aesthetic Enjoyment* DU.

Central W. Takpochau - Wetlands

The Central West Takpochau mangroves located east of American Memorial Park have not been delineated recently or valuated by BECQ staff using the CNMI Wetland RAM. However, the mangroves are known to have been hydrologically altered due to both pre- and post-WWII activities, and known to contain invasive vegetation. However, they still provide stormwater treatment and a home for a few endangered Mariana Common Moorhens and native fish (2016 communication, Mike Gawel, National Park Service, Integrated Resources Program Manager). However, given the amount of land use alteration, and urban encroachment, these wetlands are not considered supportive of the *Propagation of Aquatic Life* DU, but not due to pollutants.

The artificial wetland that was reconstructed in the Park in the mid-1990s acts as a stormwater catchment and treatment basin before discharging into Smiling Cove Marina. The wetlands also have introduced invasive aquatic vegetation and non-native fish species, but this artificial wetland is not considered Commonwealth waters by definition. So, it is not included for assessment purposes. However, efforts to restore the mangroves and plant more native trees are planned within the next reporting cycle.

Central W. Takpochau – CALM Categories

Central W. Takpochau's coastal waters retain CALM Category 5, due to elevated Orthophosphate, NO_3-N, Hg in fish, Cu and Pb in bi-valves, and Low pH exceedances of the CNMI WQS. These findings are unsupportive of the *Consumption of Fish and Shellfish*, *Propagation of Aquatic Life* and *Recreational* DUs. However, the Enterococci exceedances are being addressed by the 2018 TMDL for bacteria.

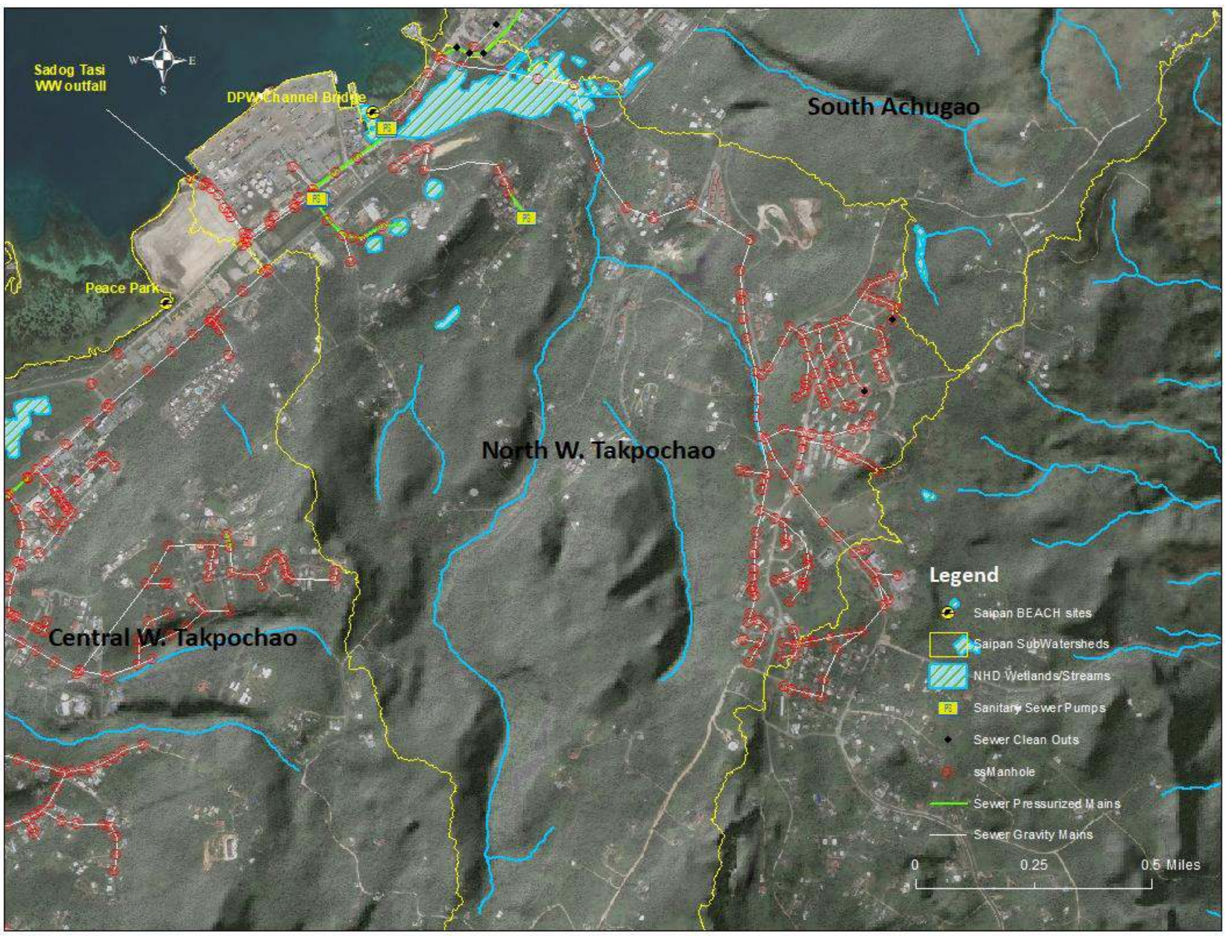
Central W. Takpochau streams also retain CALM Category of 5 due to Hg contamination, water quality exceedances of the CNNI WQS for Enterococci, and significant alteration of their natural channel structure, and invasive species,

The wetlands retain a CALM Category of 4c, as aquatic native life is present, but they are also introduced invasive plants, and hydrological changes. However, these stressors are not pollutants.

North W. Takpochau – Waterbody Segment 19A

There is only one (1) BEACH monitoring site in the North W. Takpochau Watershed, at DPW Channel Bridge (Figure C-27., below). The site is located adjacent to one of the last remaining mangroves on Saipan.

FIGURE C-27. North West Takpochau Watershed (Segment 19A)



The CUC municipal sewer system running through the mangrove is in need of significant upgrades. Repairs to CUC's lift station S-1 between the mangrove and the DPW Channel Bridge was completed in late 2017 (2018. Personal communication, Larry Manacop, CUC Chief Engineer).

However, subsequent spikes in Enterococci concentrations led WQS/NPS and CUC staff to further investigate other sources last reporting cycle and discovered another collapsed asbestos sewer pipe in the mangrove, and other aging unmapped pipes dating back to the pre-WWII Japanese occupation (1930s - 1940s). Many repairs have had to be made within this location over the past five (5) years, and more are expected.

In addition, new hotels and housing developments are under construction in the mid and upper watershed above the mangrove's lift station, increasing wastewater pump volumes and pressure.

North W. Takpochau - Coastal Marine Waters

The ALUS biological assessments of North West Takpochau's seagrass assemblages have not been conducted since 2008 when it was ranked as "Poor". Therefore, until new biological assessments are conducted, the ALUS ranking remains "Poor". However, BECQ lacks sufficient water quality data at these long-term reef monitoring sites to confirm whether or not there are water quality pollutant sources contributing to this ranking.

New nutrient water quality data exceeded the CNMI WQS for Orthophosphate and NO_3-N, at the DPW channel bridge site, the source of which is wastewater from sanitary sewer overflows, urban runoff, commercial harbor and port activities. Although pH levels were again well within CNMI WQS there has been an exceedance in FY 2015. Therefore, North West Takpochau's coastal waters are added to the 303(d) list as impaired for Nitrate, and remain listed for Phosphate and pH, which does not support the *Propagation of Aquatic Life* DU.

A 2009 study by Denton, et.al, (Mar Poll Bulletin 58 (2009) 424-455) tested heavy metals in sediment, biota and tissue from juvenile fish traditionally harvested for food by local residents. Samples were collected from within the tidal zone at 12 sites within Tanapag Lagoon starting at the base of Eloy Inos Peace Park in the south to Pau Pau Beach in the North Achugao's sub-watershed. "Levels of copper, lead, and zinc in sediment from the base of the dump were at least two orders of magnitude higher than the lowest values..." elsewhere in the lagoon. Three species of bivalves collected from in front of the Peace Park to the Lower Base Channel (north of Central Repair Shop in the South Achugao watershed had Pb levels in exceedance of US FDA advisory guidelines. The study concluded that this was of greatest concern "From a human health standpoint...", as all other metals were well below critical threshold levels of concern. Therefore, North West Takpochau's coastal waters remain 303(d) listed as impaired for Pb in bivalves, which does not support the *Fish and Shellfish Consumption* DU.

As was the case for the South West Takpochau's coastal waters, the northern waters remain unsupportive of the *Recreational* DU due to Enterococci exceedances of the WQS, and the pH exceedance in FY 2015. The primary sources being the aging CUC Municipal sewer line in the mangrove, which has since been by-passed at the time of this writing. Other potential sources include the Sadog Tasi WWTP outfall, and urban runoff and the commercial industrial port complex.

However, although North West Takpochau's coastal waters are industrialized, they continue to fully support the *Aesthetic Enjoyment* DU, as local residents use this beach daily for fishing, to picnic, or a sunset under the shade of the iron wood trees surrounding the coastline.

North W. Takpochau – Freshwater Streams

Initial visual field assessments and mapping of North W. Takpochau's stream systems were carried out in 2013, but have not been confirmed using the CNMI SVAP. BECQ plans to conduct the SVAP in this watershed in 2022. There has also been very limited water quality data collected thus far, and no new data this reporting cycle due to lack of flow. Therefore, there is insufficient data to assess the *Support and Propagation of Aquatic Life* and *Recreational* DU.

The heavy metal studies by Denton, et.al, did not mention collecting fish tissue or biota samples from North West Takpochau stream systems upland from the DPW Channel Bridge BEACH site. Visual assessments conducted in the stream revealed no overt evidence of WWII debris. Therefore, there is insufficient information to assess the *Fish and Shellfish Consumption* DU.

North W. Takpochau's ephemeral streams systems flow too infrequently to collect water samples. Therefore, there is insufficient information to assess the *Recreational* DU.

These stream systems do not provide a stable and sufficient *Potable Water Supply* for this densely populated watershed, and therefore they are not assessed for this DU.

However, the North West Takpochau streams continue to meet the *Aesthetic Enjoyment* DU based on their continued use by hikers, "hashers", and recreational and professional athletes for training and exercise.

North W. Takpochau – Wetlands

To date, the mangrove wetland within the North West Takpochau sub-watershed has not been assessed using the CNMI Wetland RAM. However, this wetland has some non-native plants, and has had many alterations since the pre-WWII Era until present. Many mangrove trees were felled by Super Typhoon Soudelor and though they are growing back, this area has not fully recovered. In addition, the mangrove also lies within Saipan's industrial port area, where there are many potential anthropogenic stressors that are not supportive of the *Propagation of Aquatic Life* DU.

North W. Takpochau – CALM Categories

North West Takpochau's coastal waters retain a CALM Category 5, due to elevated Orthophosphate, NO_3-N, and Pb contamination in bi-valves, and the pH exceedance in FY 2015, which does not support the *Propagation of Aquatic Life,* and *Fish and Shellfish Consumption* DUs. The Enterococci exceedances of the WQS are being addressed by implementation of the 2018 TMDL for bacteria.

North West Takpochau streams retain a CALM Category 2 due to insufficient information.

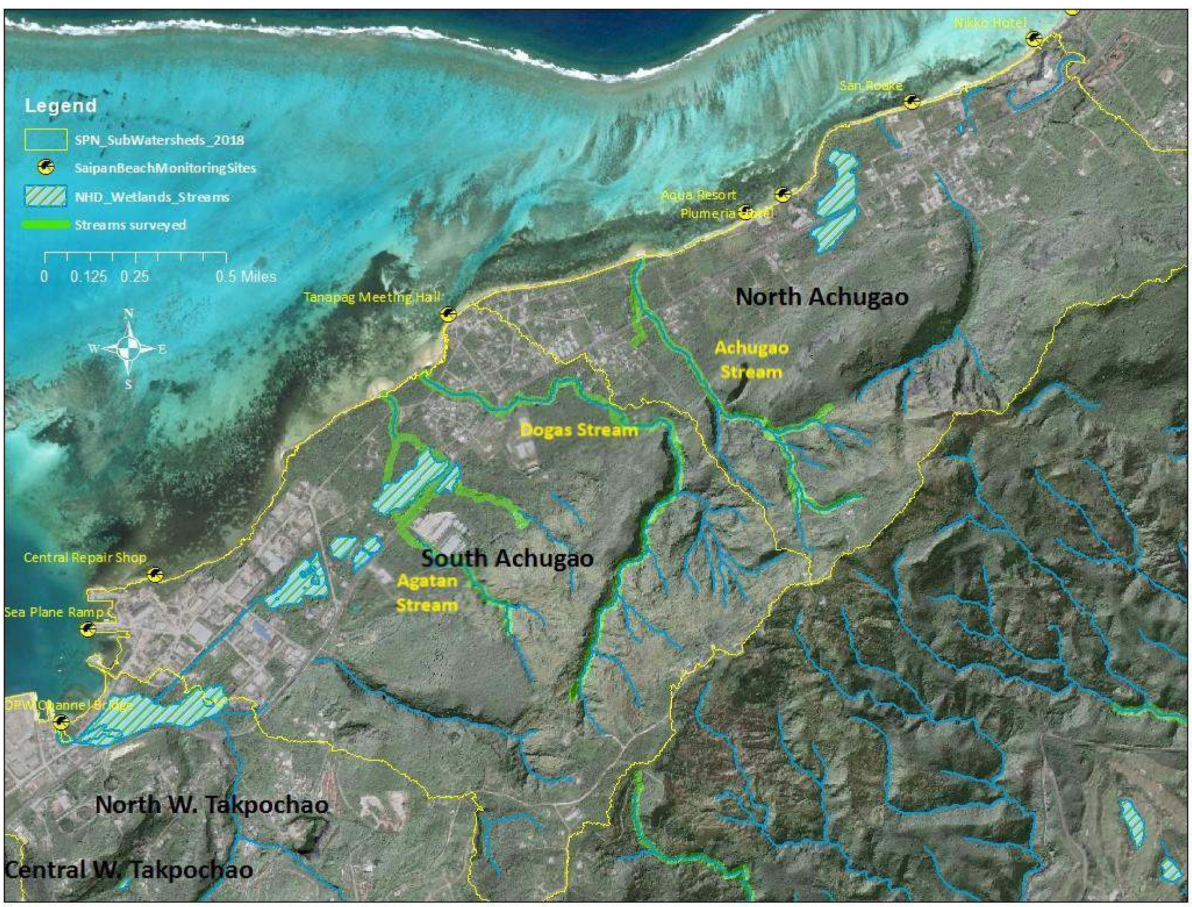
The wetlands retain a CALM Category 4c due to hydrological changes, and non-native species, which are not pollutants. Therefore, although North West Takpochau's Mangrove wetlands are not supportive of the *Propagation of Aquatic Life* DU, they are not 303(d) listed.

C.3.5.9. ACHUGAO - Waterbody Segments 20A and 20B

The headwaters of Achugao Watershed flow from "Wireless Ridge" in the southeast and empties into the Tanapag Lagoon. Achugao's coastline contains the northern portion of Saipan's industrial area ("lower base"), whose coastal waters are designated as Class A (Figure C-28., on the following page).

There are several small farming operations and a few worker barracks located in the low to mid-watershed in South Achugao, east of Route 30 ("Middle Road"). Some of these farms and the barracks have contributed to fecal contamination in the wetlands located in the immediate vicinity.

FIGURE C-28. Achugao Watershed (Segment 20)



Presently, there are two large resorts in operation in the North Achugao's lower watershed, with more developments that have cleared extensive portions of land, but have not begun construction this reporting cycle.

Large grasslands cover the upper watershed along Wireless Ridge, which frequently burns due to wildfires, whether accidentally or intentionally by hunters. In addition, there are three major stream systems that flow from ridge to reef starting with Saddok Agatan, and Dogas in the southern sub-watershed, and the Achugao Stream in the north.

Several cisterns from the Japanese occupation, and waste from WWII munitions, planes and other military equipment can be found in the mid and upper Saddok Dogas stream system. Several lush bamboo strands and small pristine waterfalls, and riffle pools are located above this in the upper watershed. BECQ is currently working on developing a new IWMP for the Achugao Watershed in FY 2021.

South Achugao – Waterbody Segment 20B

South Achugao contains Tanapag Village located north of the Lower Base industrial area. The South Achugao Sub-watershed contains three BEACH monitoring sites; two in the Industrial Class A waters, the Sea Plane Ramp and Central Repair Shop BEACH sites; and one in front of the Tanapag Meeting Hall to the north (Figure C-29., on the following page).

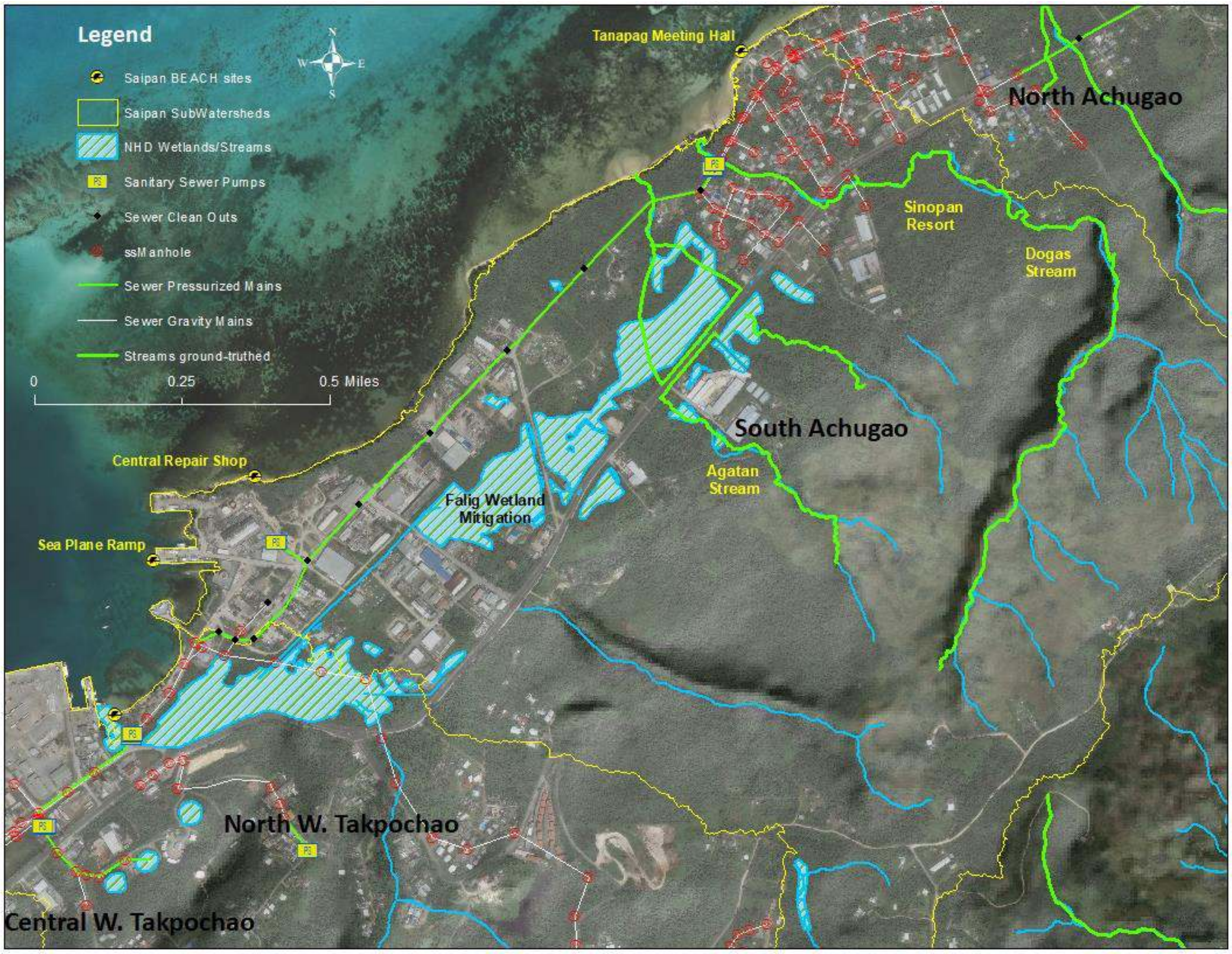
South Achugao - Coastal Marine Waters

The MMT did not assess the seagrass assemblages near the Tanapag Meeting Hall this reporting cycle. Therefore, the ALUS biological assessment of South Achugao's seagrass assemblages remain ranked as "Poor". However, BECQ lacks sufficient water quality data at these long-term monitoring sites to confirm whether or not there are water quality pollutant sources contributing to this decline.

Once again, DO% was diminished this reporting cycle at the Central Repair Shop BEACH site. Based on visual field assessments the sources of diminished DO% are associated with runoff from boat maintenance, failing sewer lines, and septic systems at the worker barracks, and unsanitary agricultural practices at small scale farms causing an excess of aerobic bacteriological activity that depletes oxygenation in coastal waters. Therefore, South Achugao's coastal waters remain 303(d) listed as impaired for diminished DO%, which is unsupportive of the *Propagation of Aquatic Life* DU.

A 2009 study by Denton, et.al, tested heavy metals in sediment, biota, and tissue from juvenile fish traditionally harvested for food by local residents. "Levels of copper, lead, and zinc in sediment from the base of the dump were at least two orders of magnitude higher than the lowest values..." elsewhere in the lagoon. Three species of bivalves collected from the Eloy Inos Peace Park to the Lower Base Channel (north of Central Repair Shop) had Pb levels in exceedance of US FDA advisory guidelines. The study concluded that this was of greatest concern, "From a human health standpoint...", as all other metals were well below critical threshold levels of concern. Therefore, South Achugao's coastal waters remain on the 303(d) list as impaired for Pb in bivalves, which is unsupportive of the *Fish and Shellfish Consumption* DU.

FIGURE C-29. South Achugao Sub-watershed (Segment 20B)



South Achugao's coastal waters again exceeded the CNMI WQS for Enterococci. Sources of contamination include failing septic systems, sewer backups and overflows, stray dogs, and free-range feral animals and livestock, urban runoff, and sedimentation. Sinigalliano's qPCR-MST study supports this, and found significantly elevated dog FIB marker in the waters surrounding the Tanapag Meeting Hall area, where residents can frequently be seen playing with their dogs in the water in front of the Tanapag boat ramp, and at the Central Repair Shop site where many strays are found. Therefore, South Achugao's coastal waters do not support the *Recreational* DU.

However, the local community continues to use the Tanapag Meeting hall, the surrounding playground, boat ramp, and sandy beaches for fishing, swimming and picnicking, thus fully supporting the *Aesthetic Enjoyment* DU.

South Achugao – Freshwater Streams

As an impaired and priority listed Watershed, visual field assessments and mapping have been conducted within and around the South Achugao As Agatan and Saddok Dogas stream systems. This reporting period WQS/NPS began thorough assessments of Saddok Dogas stream using the CNMI SVAP. In the mid and upper watershed WWII dumpsites can be found containing rusted out metal drums, aircraft and motor vehicle parts, and other types of military hardware.

McKagan's 2008 study found As Agatan stream to be relatively pristine upland of Tanapag village with *Macrobrachium lar* shrimp present. This has been substantiated by WQS/NPS staff observing both shrimp and eels in As Agatan and Saddok Dogas stream systems in the mid and upper watersheds where perennial freshwater pools are located. Therefore, South Achugao's freshwaters fully support the *Propagation of Aquatic Life* DU.

The 2009 study by Denton, et.al, found high Hg levels in the "sediment from the mouth of Saddok Dogas", which was associated with "past military activities further upstream". In addition, the three species of bivalves collected from the Lower Base Channel, a drainage of the stream system north of Central Repair Shop (shown in Figure C-29), had Pb levels in exceedance of US FDA advisory guidelines and were considered a human health concern. A more recent 2016 study by, Denton, et.al, also found heavy metals in sediment and biota samples taken from As Agatan and Saddok Dogas streams. Given these findings and the amount of WWII debris seen during stream assessments of the Agatan and Dogas streams, South Achugao watershed streams remain on the 303(d) list as impaired for Pb, and does not support the *Fish and Shellfish Consumption* DU.

There is limited water quality data available from South Achugao streams' middle and upper sampling sites. However, samples taken in the past from the lower sites regularly exceeded the CNMI WQS for Enterococci. Therefore, the South Achugao streams remain on the 303(d) as impaired for Enterococci and are unsupportive of the *Recreational* DU.

There are several sources of fecal contamination including CUC sewer overflows, failing septic systems, and urban runoff from the lower watershed, and to a lesser degree feral animals and piggeries belonging to homesteaders in the mid and upper watershed (2018 TMDL). Realizing that these farms are owned by low-to-zero income families, BECQ created a community based NPS educational and outreach campaign. Three videos were created for staff to share with subsistence farmers found in violation of WQS regulations. The videos may be easily uploaded to cell phones and tablets for sharing with farmers in the field. This has improved community cooperation with litter removal, and compliance with animal pen setback requirements from streams and wetlands. The videos may be viewed at: https://crm.gov.mp/resources-publications/dcrm-videos/watershed-protection/.

The South Achugao stream systems only flow during heavy rain events. They are too low in volume, and flow too infrequently to provide a stable and sufficient *Potable Water Supply* for this watershed, and therefore they are not assessed.

The As Agatan stream in the lower watershed nearer to the shoreline is deep enough for homeowners living adjacent to the stream to kayak and fish year round. The upper As Agatan and Saddok Dogas stream systems are also used by hikers and "hashers" for exercise and training, thus supporting the *Aesthetic Enjoyment* DU.

South Achugao – Wetlands

The Falig Mitigation and other wetlands located in South Achugao's lower watershed have not been fully delineated or valuated using the CNMI Wetland RAM. However, the wetland's hydrology is known to have been altered by roadway construction and fill, especially during the Japanese Era prior to WWII. Some non-native plants have also been observed in these very disturbed wetland systems. Therefore, South Achugao's wetlands are not considered supportive of the *Propagation of Aquatic Life* DU, but not due to pollutants. Therefore, they are not included on the 303(d) list as impaired.

Of note, a new resort development was permitted last reporting cycle with several wetland protection requirements, e.g., 50ft vegetated buffesr on either side of the streams, and a 50ft buffer from the wetland itself. The permittees cleared a significant portion of land in close proximity to the wetland, which poses new anthropogenic stressors to the wetland and riparian zones. Construction is expected to begin next reporting cycle and will require regular monitoring to ensure permit requirements are followed to minimize the risk of adverse impacts from development.

South Achugao – CALM Categories

South Achugao's coastal waters retain a CALM Category 5, due to Pb contamination in biota, and diminished DO% exceeding the CNMI WQS, which is unsupportive of the *Propagation of Aquatic Life,* and *Fish and Shellfish Consumption* DUs. However, Enterococci exceedances are now being addressed by the 2018 TMDL for bacteria.

South Achugaos' streams retain a CALM Category 5 due to heavy metal contamination and exceedances of the CNMI WQS for Enterococci, which is unsupportive of the *Propagation of Aquatic Life, Fish and Shellfish Consumption,* and *Recreational* DUs.

The wetlands retain a CALM Category of 4c due to alteration of habitat, non-native plants, and hydrological changes from roadways and fill, that do not support the *Propagation of Aquatic Life* DU, but not due to a pollutant.

North Achugao – Waterbody Segment 20A

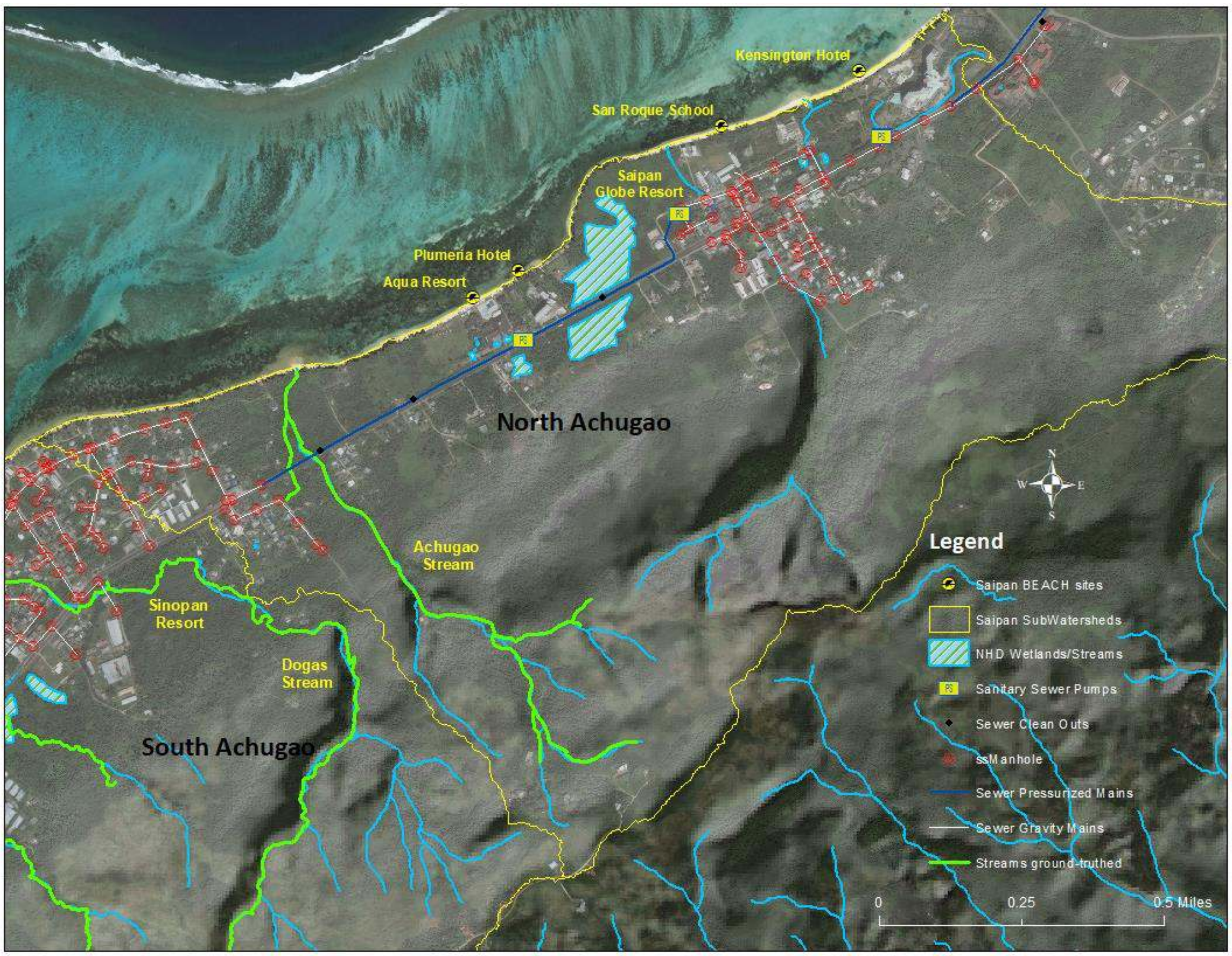
The North Achugao Sub-watershed has similar topography to that of South Achugao, with its headwaters beginning on Wireless Ridge and flowing into Tanapag lagoon (Figure C-30., on the following page). San Roque village is located in the lower watershed, as is San Roque Elementary School. There are also four hotels: Aqua Resort, Plumeria Hotel, Saipan Globe Resort and, Kensington Hotel (née Nikko Hotel). More villas have been permitted in this watershed and are currently under construction this reporting cycle. There are four (4) long-term BEACH monitoring sites located at these same locations.

The Plumeria Hotel has been out of operation for the past four years, but the other three hotels are in full operation.

North Achugao - Coastal Marine Waters

The MMT assessed the seagrass assemblages near San Roque School and found no significant change to the benthic substrate. However, assessments at the other seagrass sites near Plumeria Hotel and Aqua Resort were not completed Therefore, the ALUS biological assessment of North Achugao's coastal waters retain a "Fair" ranking overall.

FIGURE C-30. North Achugao Sub-watershed (Segment 20A)



New nutrient water quality data exceeded the CNMI WQS for Orthophosphate at all four sites in FY 2019, the source of which is unknown. DO% levels have also improved at the Kensington Hotel and San Roque School sites, with all sites meeting the CNMI WQS. This is most likely due to the upgrade to the CUC Lift stations near the Kensington Hotel last reporting cycle.

These findings resulted in North Achugao's coastal waters being added to the 303(d) list as impaired for Phosphate. They remain on the list for DO%, due to the diminished levels in FY 2016 and 2017. Therefore, North Achugao's coastal waters are unsupportive of the *Propagation of Aquatic Life* DU.

The 2009 study by Denton, et.al, found traces of heavy metal contamination in fish tissue and other biota (seagrass, sea cucumbers, and bivalves) taken from the Plumeria Hotel and San Roque School BEACH sites. However, levels did not pose a public health concern. Heavy metal concentrations, "were well below critical threshold levels of concern when weighted against existing USA advisories…and food standards of other countries". Therefore, North Achugao's coastal waters support the *Fish and Shellfish Consumption* DU.

In addition, North Achugao's coastal water quality data met the CNMI WQS for Enterococci, an ongoing trend from the last reporting cycle. However, they did not in FY 2015. Therefore, North Achugao's coastal waters remain 303(d) listed, and cannot be said to be supportive of the *Recreational* DU at this time. This improvement in water quality is thought to be associated with the upgrade of CUC's SR-1 lift station located between San Roque School and Plumeria Hotel, which was completed last reporting cycle. There are no longer sewer overflows occurring in this area as a result of the upgrade. The SR-3 lift station located between Aqua Resort and Plumeria Hotel was also rehabilitated in 2015 (2019. Personal communication, Larry Manacop, CUC Engineer). Additionally, CUC has repaired a collapsed sewer line that existed in San Roque Village.

North Achugao's sandy beaches and calm coastal waters are used daily by local residents and tourists for fishing, swimming, and picnicking, thus fully supporting the *Aesthetic Enjoyment* DU.

North Achugao – Freshwater Streams

A preliminary visual field assessment and GPS mapping of the Achugao Stream system was conducted last reporting cycle, but not of the northern most stream that flows to San Roque village north of the wetland.

The Achugao stream flows from Wireless Ridge through the pristine upper watershed and into the Lagoon. There are very few homes nearby, but some have subsistence piggeries.

There are several freshwater pools within the Achugao stream system that contain many shrimp and eels in the upper and mid-watershed, thus North Achugao's streams support the *Propagation of Aquatic Life* DU.

There has been no data collected on North Achugao's streams' water quality, or on fish tissue and/or biota contamination to assess the *Fish and Shellfish Consumption,* or the *Recreational* DUs.

Achugao stream was formerly used by CUC for potable water supply. However, North Achugao's stream is no longer used by CUC. The volume was too low to provide a stable and sufficient *Potable Water Supply* for Achugao's population.

However, many “Hashers”, hikers, and tri-athletes enjoy training throughout the jungle areas and within dry streambeds in the pristine upper and mid-watershed. Therefore, North Achugao’s streams fully support the *Aesthetic Enjoyment* DU.

North Achugao – Wetland

The centrally located wetland in North Achugao’s lower watershed has not been fully delineated or valuated using the CNMI Wetland RAM. However, the wetland’s hydrology is known to have been altered by fill for the roadway that dissects the wetland. There are many introduced non-native species within the wetland, and new changes in land use taking place in the area surrounding the wetland that have the potential to further impact this wetland. Therefore, North Achugao’s wetland does not support the *Propagation of Aquatic Life* DU, but not due to pollutants. Therefore, it is not included in the 303(d) list as impaired.

Of note, the Saipan Globe Resort under construction lies in close proximity to the North Achugao wetland. In efforts to minimize the risk of adverse impacts, the permit has several wetland protection BMP requirements, e.g., 50ft vegetated buffesr on either side of the riparian zones and from the wetland itself. The permittees are also required to remove invasive plants from the vegetative buffers. This site is being monitored to ensure compliance with permit requirements to prevent further alteration and anthropogenic impacts from future development activities.

North Achugao – CALM Categories

North Achugao’s coastal waters retain a CALM Category 5, due to elevated Orthophosphate levels. Although both DO% levels and Enterococci concentrations are improved, they remain listed due to impairment in the last five years. The Enterococci impairment continues to be addressed by implementing the 2018 TMDL for bacteria.

The Achugao stream system retains CALM Category of 2 due to insufficient information.

The wetlands retain CALM Category of 4c due to alteration of habitat, and hydrological changes from roadways and fill, and non-native species, but which are not pollutants.

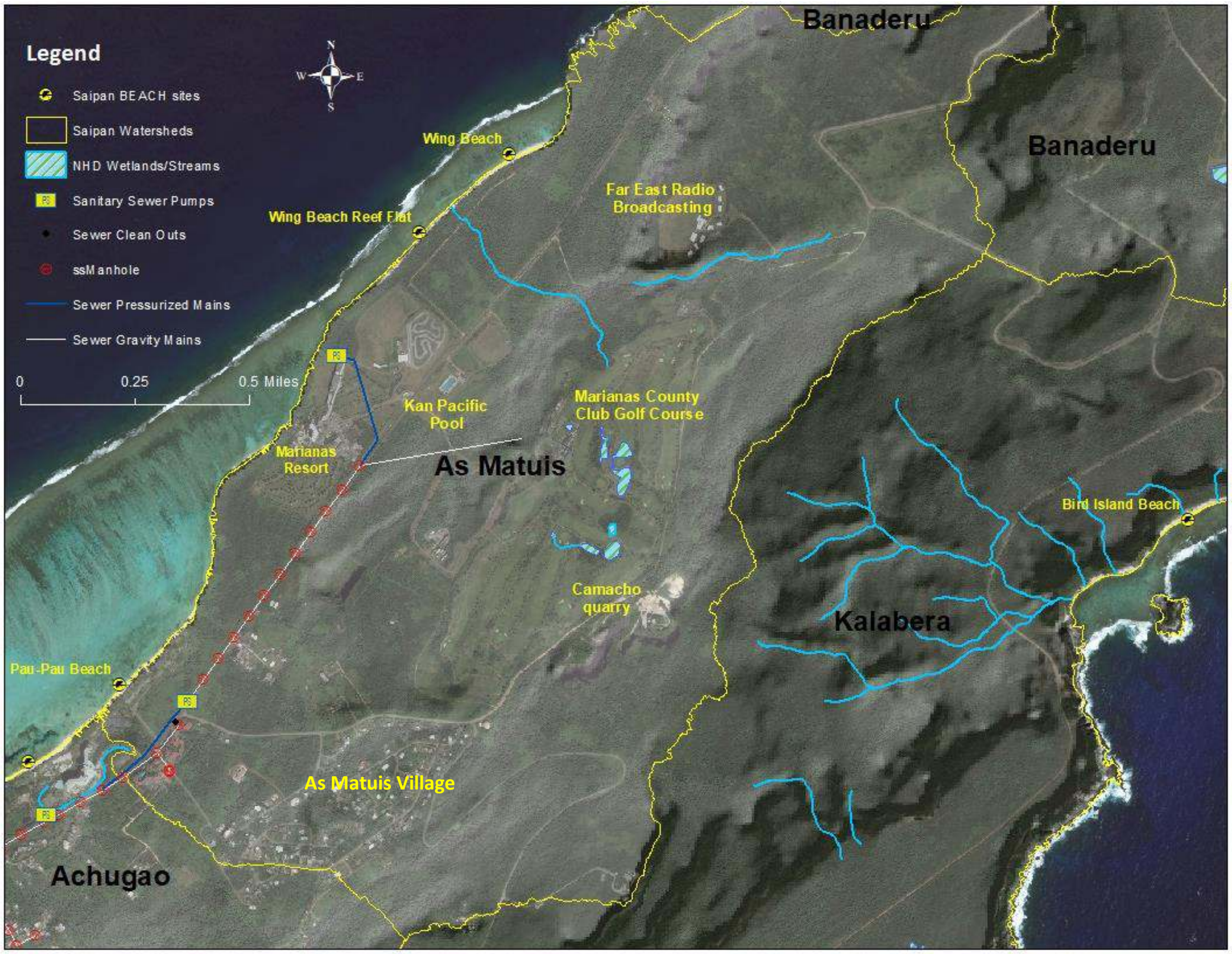
C.3.5.10. AS MATUIS – Waterbody Segment 21

The As Matuis watershed contains the closed Camacho Quarry near the ridge in the north (Figure C-31, on the following page).

Marianas Resort, also lies in the north and is located next to the coast, but is no longer in operation due to a change in ownership. The public swimming pool is across the road from the Resort, and Marianas Country Club Golf Course is in the upper watershed. It is part of the same property as the Resort. However, they too are no longer in operation. This may change by next reporting cycle should the new owners complete their renovations.

In addition to these commercial facilities, there is one residential village located in the south of the watershed, mid-way to the ridgeline.

FIGURE C-31. As Matuis Watershed (Segment 21)



The CUC municipal sewer line ends at Marianas Resort and is only available for connection with homes and businesses located next to Chalan Pale Arnold ("Middle Road") in the lower watershed. Therefore, the majority of homes within the As Matuis village, which lies further away from the sewer line infrastructure relies on IWDS for wastewater collection and treatment.

As Matuis - Coastal Marine Waters

As Matuis has two (2) long-term BEACH monitoring sites at Pau Pau and Wing Beaches, and has one additional reef flat site at Wing Beach.

The MMT found a significant decrease in the health of the benthic substrate of Wing Beach's fore reef. However, an assessment was not conducted at the reef near Pau Pau beach. No assessment of seagrass assemblages was conducted either. However, it was ranked as "Poor" last reporting period. Therefore, the overall ALUS biological assessment of As Matuis' coastal waters were ranked as "Poor"; a downgrade from last reporting cycle. However, BECQ lacks sufficient water quality data at these long-term fore reef monitoring sites to confirm whether or not there are indeed water quality pollutant sources causing this decline in coral health.

New nutrient water quality data exceeded the CNMI WQS for both Orthophosphate and NO_3-N, and DO% was diminished at the Pau Pau BEACH site. Although, pH levels once again meet CNMI WQS this reporting cycle, they did not in FY 2017. These findings result in As Matuis' coastal waters being added to the 303(d) list as impaired for Phosphate and Nitrate, and remain listed for DO% and pH, which is not supportive of the *Propagation* of *Aquatic Life* DU. The source of the diminished DO% levels, and exceedance of the CNMI WQS for nutrients is unknown.

There has been no data collected on fish tissue and/or biota contamination of As Matuis's coastal waters to assess the *Fish and Shellfish Consumption* DU.

However, As Matuis' bacteriological water quality at Pau Pau BEACH once again exceeded the CNMI WQS for Enterococci this reporting cycle. The reason for the increase in violations is unknown. Given that As Matuis was inadvertently not included in the 2018 TMDL, it remains on the 303(d) list as impaired, and a TMDL is still required.

Given that As Matuis's coastal waters remain on the 303(d) list as impaired for DO%, pH and Enterococci exceedances of the CNMI WQS, this watershed is unsupportive of the *Recreational DU.*

As Matuis' shoreline is a relatively long drive from Saipan's busy tourist district. However, both Pau Pau and Wing Beaches are very popular picnic, camping, swimming, and snorkeling areas for tourists and residents. Pau Pau's calm and shallow waters are ideal for triathletes training for open water swimming competitions.

In addition, Wing Beach has very limited light pollution. This attribute makes it a very important nascent nesting site for the endangered Green Sea Turtle. Wing Beach was closed off from vehicular traffic in 2004 for this very reason. This has allowed a return of its natural beach profile, and native vegetation providing a suitable location for turtles to nest. Divers and bloggers alike have referred to Wing Beach as the "Jewel of Saipan". For this reason, As Matuis' coastal waters fully support the *Aesthetic Enjoyment* DU.

As Matuis – Freshwater Streams

The As Matuis watershed is comprised of porous soil, so the streams only flow during torrential rain events. Therefore, to date no water quality data has been collected. In addition, visual field assessments have not been completed in the remote upper watershed to determine if freshwater pools exist there to support aquatic ecosystems. However, their existence is unlikely. They do not exist in the mid and lower watershed. Therefore, there is insufficient information to assess the *Support and Propagation of Aquatic Life, Fish and Shellfish Consumption,* and the *Recreational* DUs.

These streams are insufficient to provide a viable *Potable Water Supply,* and therefore they are not assessed for this DU.

However, many "Hashers", hikers, bikers, and tri-athletes enjoy exercising and training throughout the remote jungle areas of As Matuis watershed, and within the dry streambeds. Tour companies also operate jungle trekking and all-terrain vehicle tours in the remote upper portions of the watershed. Thus, As Matuis' streambeds fully support the *Aesthetic Enjoyment* DU.

As Matuis – Wetland

The 2017 NHD, and Wetlands and Streams GIS data layers exhibit a few wetland areas in the As Matuis Watershed. These are actually artificial wetlands created as water traps in the Marianas Country Club's Golf Course. Therefore, they are not considered a CNMI waterbody, and therefore, they are not assessed.

As Matuis – CALM Categories

As Matuis's coastal waters retain CALM Category 5, due to low DO%, elevated Orthophosphate and Nitrate, pH exceedances, and elevated Enterococci, which are unsupportive of the *Propagation of Aquatic Life* and *Recreational* DUs. As Matuis is still in need of a TMDL for bacteria in its coastal waters.

As Matuis' freshwater streams retain CALM category of 2 due to insufficient information.

C.3.5.11. BANADERU – Waterbody Segment 22

Banaderu is the northernmost watershed on Saipan. It contains Banzai Cliff lookout, Marpi's Public Cemetery, the Veteran's Cemetery, many WWII memorials, and the EPA certified Marpi Municipal Landfill (Figure C-32., on the following page). There are no municipal water supplies or sewer infrastructure available for homesteads or businesses here. The few homes that are located in the watershed use IWDSs for wastewater collection and treatment.

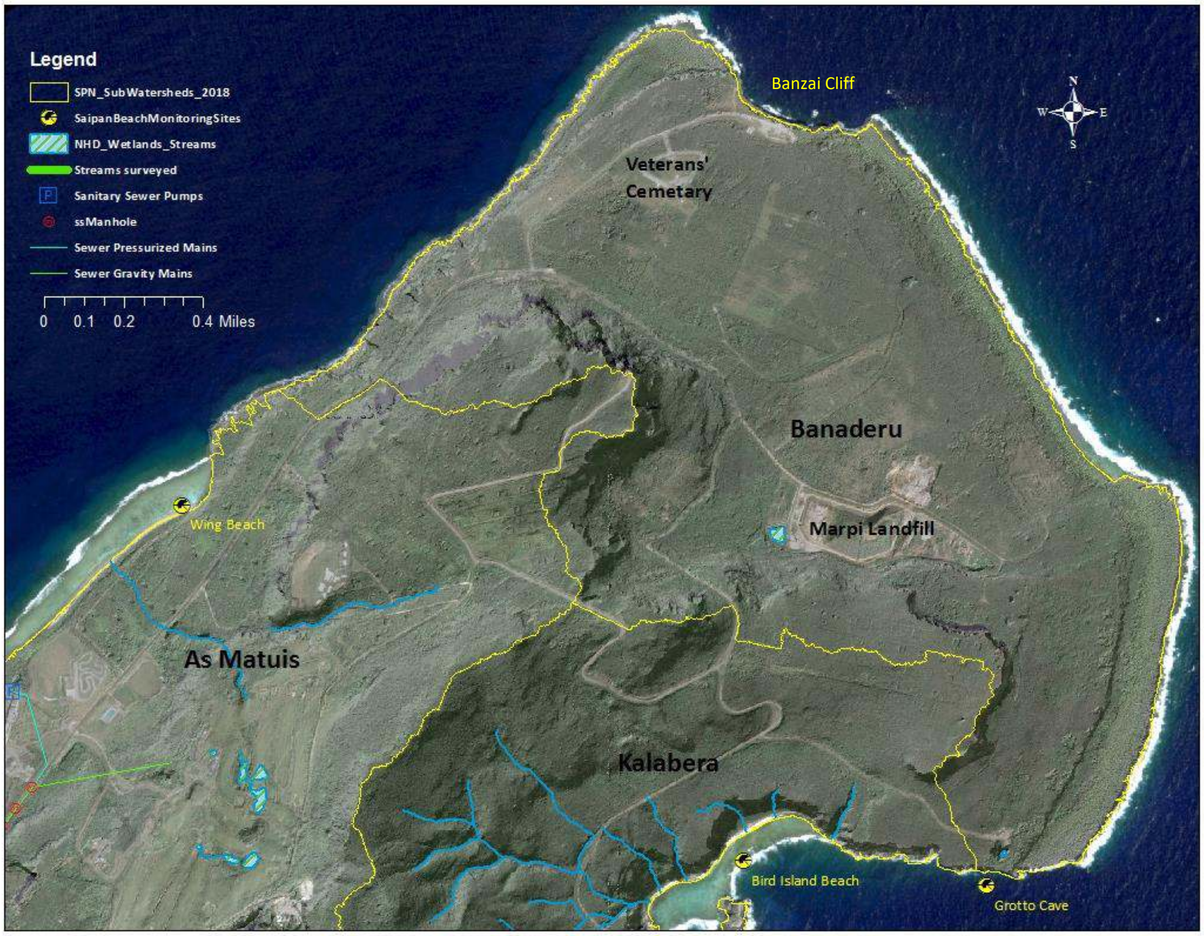
Banaderu lacks any surface water streams, or natural wetlands. However, there is one artificial wetland located in the Marpi Landfill for treating leachate and stormwater runoff from the site.

Banaderu - Coastal Marine Waters

There is only one (1) long-term BEACH monitoring site located in the Grotto Cave. The Grotto formed naturally over time from the dissolution and collapse of karst soil near the cliff line creating openings to the surrounding ocean water. There is very limited development in this remote watershed and the cemeteries and the Marpi Landfill are located well away from the coastline.

There are no biological ALUS monitoring sites within Banaderu's coastal waters. It is difficult to assess the biological health at the remote, rugged cliff lines in this watershed. However, the grotto itself has some of the most diverse coral reef coverage in Saipan and a plethora of fish, as attested by the hundreds of thousands that SCUBA dive at the Grotto each year.

FIGURE C-32. Banaderu Watershed (Segment 22)



New nutrient data was collected this reporting cycle and Orthophosphate levels exceeded the CNMI WQS at Grotto Cave. Therefore, Banaderu's coastal waters remain 303(d) listed as impaired for Phosphate, the source of which is unknown. Given these findings, Banaderu's coastal waters are unsupportive of the *Propagation of Aquatic Life* DU.

There has been no data collected on fish tissue and/or biota contamination at the Grotto BEACH site to assess the *Fish and Shellfish Consumption* DU. However, a heavy metal sediment study conducted by Denton, et.al, in 2016 found "Other major site exceedances of Saipan's soil screening levels for …Pb and Zn at a former dumpsite and ocean disposal tipping point atop 'Banzai Cliff'" (Denton, G.R.W., et.al., (2016). *Impact of WWII dumpsites on Saipan (CNMI): heavy metal status of soils and sediments,* Environ Sci Pollut Res, DOI 10.1007/s11356-016-6603-7.) It should be noted that Banzai cliff is at a great distance from the Grotto Cave and there are no beaches located in these coastal waters. In addition, Banzai's waters are quite hazardous for recreational purposes, although it is a popular spot for cliff fishing.

Banaderu's coastal waters do not support the *Recreational* DU due to exceedance of the CNMI WQS for Enterococci again this reporting cycle. The Grotto Cave had an average of 27% violations over the past two fiscal years. This is not surprising given that MVA reports that the Grotto has over 30,000 visitors per month (2017 MVA Tourist Survey).

The qPCR-MST study conducted by NOAA AOML indicated that humans were the primary source of fecal contamination at the Grotto (Sinigalliano, 2020). The study also noted that the fecal contamination at the Grotto Cave, "may be due to direct shedding from high densities of recreational bathers and divers at the site.", and given the difficult stair climb, some swimmers may be unwilling to ascend just to use the public restroom. The study also stated that a temporary closure of the grotto for a period of time could be used to allow for natural flushing, "to improve both general safety and water quality of this popular and unique Saipan attraction."

To address this contamination, DLNR Parks and Recreation installed an access gate this reporting cycle to prevent individuals from visiting the site while the public restrooms are locked, and to prevent crowding for safety purposes. Unfortunately, while restrooms are locked or out of service, people resort to using the surrounding jungle as a restroom. A security guard is also present at the Grotto during normal operating hours. Although a visitor capacity study is currently underway by DCRM, a limit has not been set on the number of people allowed into the grotto at any one time. DCRM is currently completing a Sustainable Primary Tourist Site plan, which will provide recommendations for a user capacity limit for the Grotto and other popular tourist sites to improve public safety and protect natural resources. In addition, MVA's Tour Operator Education Program is ongoing at the Northern Mariana College. The Program teaches all licensed tour operators and guides about CNMI environmental laws and regulations. The operators and guides are certified to operate only after successfully passing an examination at the end of the course. Certified operators and guides are then held responsible for informing their patrons of these laws and regulations, and ensuring their compliance with these and other public health sanitary practices.

The walls of the Grotto Cave have ledges from which swimmers can dive into its deep clear waters. It is often featured in numerous international dive publications as a premier dive destination. It is considered one of CNMI's top tourist sites for visitors to snorkel, SCUBA, or even to just take a moment to take a photo and appreciate its natural beauty. It is for this reason, and its high ranking in MVA's tourist exit surveys that Banaderu coastal waters continue to fully support the *Aesthetic Enjoyment* DUs.

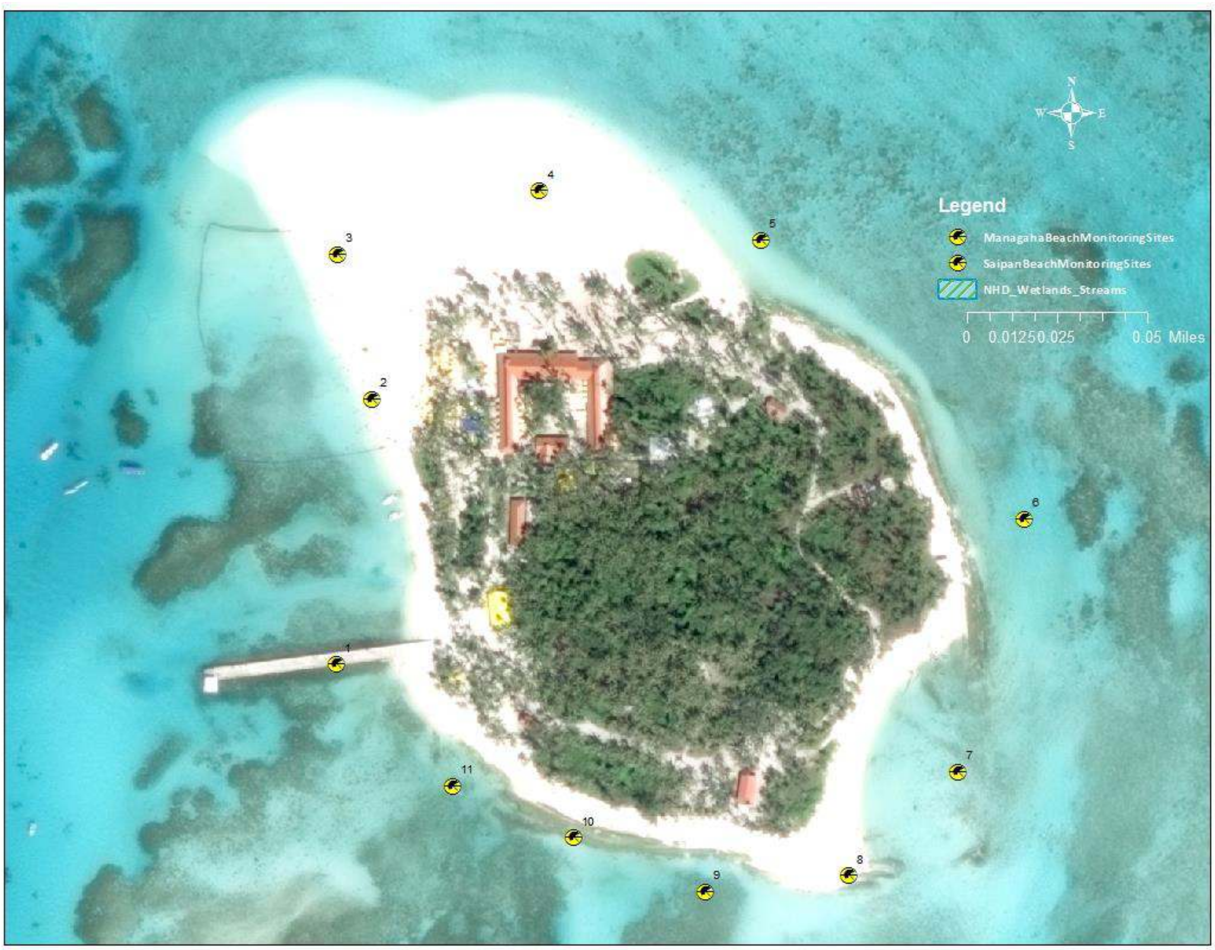
Banaderu – CALM Categories

Banaderu's coastal waters were downgraded to a CALM Category 5 due to Orthophosphate levels, which do not support the *Propagation of Aquatic Life* DU. Bacteriological contamination is being addressed through the implementation of the 2018 TMDL for Enterococci.

C.3.5.12. MAÑAGAHA - Waterbody Segment 23

Mañagaha Island is a small sand cay located in the Saipan Lagoon covering only 0.03 square miles, with 0.6 miles of coastline (Figure C-33., below). It is the number one destination for tourists visiting the CNMI with close to 300,000 visitors a year (MVA tourist exit surveys, 2016).

FIGURE C-33. Mañagaha (Segment 23)



Mañagaha is surrounded by a "no-take" Marine Protected Area and contains a terrestrial conservation area for pelagic Wedge-tailed Shearwater (*Ardenna pacifica*) birds that nest here each year. It also contains public restrooms and showers. The wastewater generated from these facilities is collected and treated with a Membrane Bioreactor WWTP that has a NPDES permit through EPA.

The cay has insufficient precipitation, topographical and geological features to support any surface waters. Precipitation flows directly by subterranean transport from land to sea.

There are 11 long-term BEACH monitoring sites surrounding Mañagaha's shoreline and pier.

Mañagaha - Coastal Marine Waters

The MMT assessed the patch reef located in the Mañagaha's MPA, and the reef further outside of Mañagaha's MPA. There was a significant decrease in benthic substrate of the patch reef. The other reefs in the MPA, and the outside reef had no significant change. Therefore, the overall ALUS ranking was downgraded to "Fair" this reporting cycle.

In FY 2017 and 2018, Mañagaha had low pH levels at BEACH site M01 near the pier where boats tie up to embark and disembark passengers, but individuals are not allowed to enter the water here as a safety precaution. The source of low pH is unconfirmed, but is thought to be associated with on board cleaning activities of boats.

This reporting cycle Mañagaha's coastal waters exceeded the CNMI WQS for both Orthophosphate and NO_3-N levels at three different BEACH sites (MG 02, 07, and 10), the source of which is unknown. Therefore, Mañagaha's coastal waters are returned to the list as impaired for Phosphate, and added to the list for elevated Nitrate levels.

Mañagaha exceeded the WQS for Enterococci in FY2015. However, it was not added to the 303(d) list due to the fact that exceedances only occurred at one site, and there were very few data collected that year. The lack of data was due to WQS/NPS staff activities being redirected to recovery efforts after Super Typhoon Soudelor, instead of monitoring. Given, Mañagaha's historical water quality data and pristine condition, the waterbody was not included on the list based on the annual geometric mean values for Enterococci.

However, Mañagaha's remains listed for pH. This too is based on very limited data due to WQS/NPS participating in Super Typhoon Yutu recovery efforts in FY 2019. Given these findings, Mañagaha's coastal waters are unsupportive of the *Propagation of Aquatic Life* DU.

There has been no data collected on fish tissue and/or biota contamination of Mañagaha's coastal waters to assess the *Fish and Shellfish Consumption* DU.

Although, Mañagaha's coastal waters were again well within the CNMI WQS for Enterococci at all BEACH sites, there is low pH at the pier (MG 01) which does not support the *Recreational* DU.

Mañagaha's wide sandy beaches, panoramic views, and recreational activities draw the largest number of visitors each year than any other tourist site in the CNMI. For this reason, Mañagaha's coastal waters fully support the *Aesthetic Enjoyment* DUs.

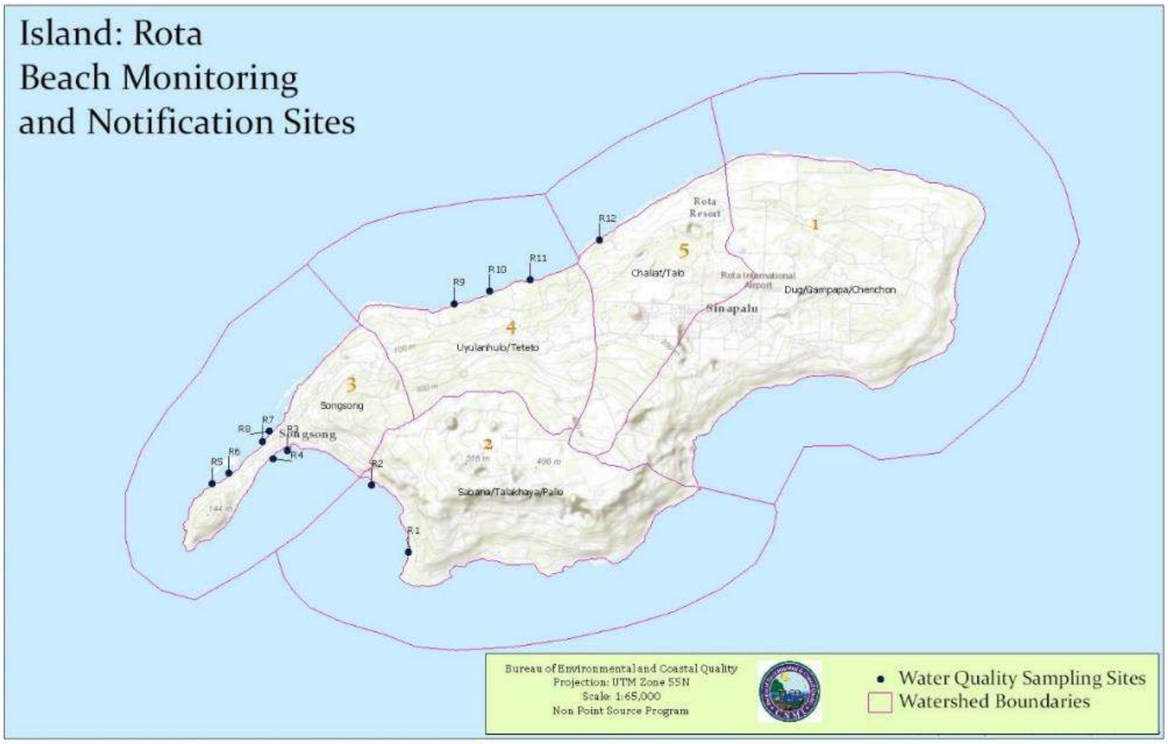
Managaha – CALM Categories

Mañagaha 's coastal waters retain a CALM Category 5 due to elevated nutrient levels, and Low pH, which are unsupportive of the *Propagation of Aquatic Life* and *Recreational* DUs.

C.3.6. Five-Part Categorization of Rota's Surface Waters

"Rota's topography has five geomorphic subdivisions including coastal lowlands, a northern plateau, a southern plateau (the Sabana), a volcanic area, and the western peninsula." (2017, Talakhaya Watershed Soil Loss Assessment).

FIGURE C-34. Rota's BEACH Water Quality Monitoring Sites

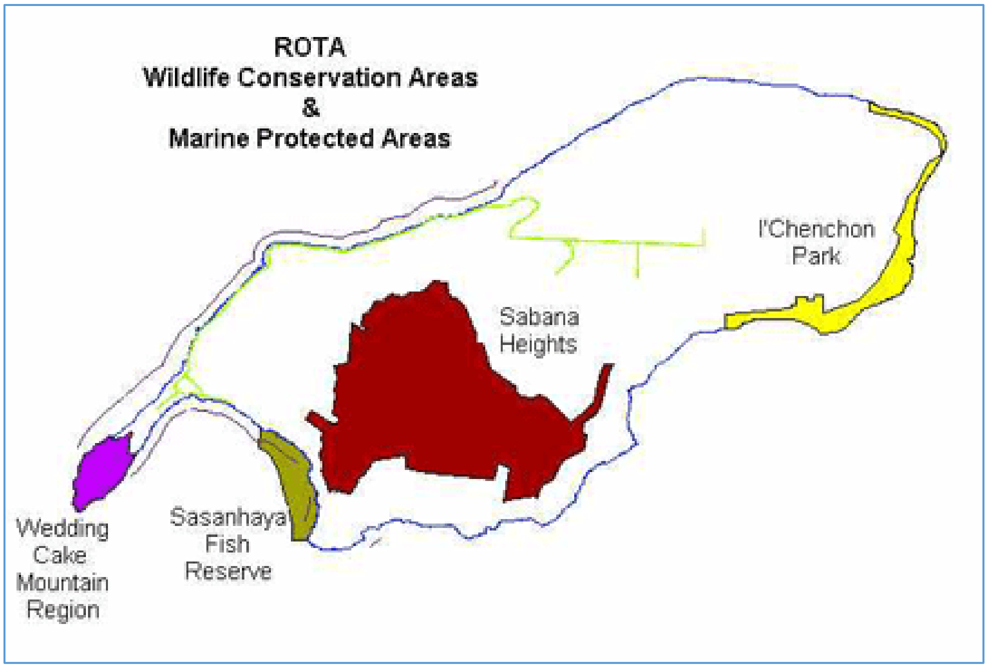


Rota has the lowest population of the three southern islands of the archipelago. The 2010 Census listed only 2,527 residents. However, there are much fewer residents today due to an economic downturn, and the closure of many businesses and hotels on the island (February 2018, personal communication, Malcolm Johnson, NOAA Coral Reef Fellow). This was followed by residents leaving the island due to infrastructure damage and power outages in the aftermath of Typhoon Mangkhut that hit Rota on September 10, 2018, followed by Super Typhoon Yutu on October 25-26, 2018.

Rota is developed to a far lesser degree than Saipan or Tinian. There are two villages; Songsong on the western coast, and Sinapalo on the central plateau. Most of the population and administrative buildings are located in Songsong village and most of the island's agricultural activities take place in and around Sinapalo village. At present the island lacks a municipal sewage treatment facility, and landfill. Area residents rely on IWDSs for wastewater treatment and an unlined dump for disposing solid waste.

Rota is split into five (5) watersheds, with 12 regularly monitored BEACH sites. In addition, Rota has three wildlife preserves: The Wedding Cake Mountain Region on the southwest peninsula; Sabana Heights in the island's upper plateau; and l'Chenchon Park on the Dugi/Gampapa/Chenchon watershed's coastline. Rota also has one Marine Protected Area, the Sasanhaya Fish Reserve off the Sabana/Talakhaya/Palie coastline.

FIGURE C-35. Rota's Wildlife Preserves and Marine Protected Area (DLNR DFW Website)



There is limited data available on Rota's coastal water quality due to limited staffing on island, the logistical difficulties of shipping samples and supplies between Rota and Saipan, and a truncated 8-week sampling schedule. However, the schedule does allow for seasonal year-round sampling of Rota's BEACH sites. This is necessary to make the best use of limited staffing, and resources for air travel between Saipan and Rota.

There are also five (5) weekly monitored streams sites within Rota's Sabana/Talakhaya/Palie watershed. These sites are used to measure the efficacy of revegetation efforts in the watershed's upper badlands (discussed in detail in sub-section C.3.6.2., that follows).

Comparatively speaking, Rota's flora has been less altered than Saipan or Tinian, leaving vast canopies in the upper and lower watersheds. This is partially due to there being comparatively, fewer devastating impacts on Rota from the WWII conflict, and less land clearing for development.

ROTA - COASTAL MARINE WATERS

TABLE C-34. Assessment of Rota Waterbodies' DUs – Coastal Marine Waters

		No sites, but very remote	Coral Garden, Kokomo, Talakhaya	Mobil, E. Harbor, Teweksberry, W. Harbor, Storm drains	Vet Memorial, Teteto, & Guata	Swimming Hole
			R1-R2 R13	R3-R8	R9-R11	R12
WATER BODY SEGMENT ID		1	2	3	4	5
	Designated Use	Dugi/Gampapa/Chenchon	Sabana/Talakhaya/Palie	Songsong	Uyulanhulo/Teteto	Chaliat/Talo
Coastal Waters	Aquatic Life	***Fair Habitat***	Fair Habitat, ***pH Exceed***	Fair Habitat, ***Orthophos, DO% & pH Exceed***	Fair Habitat, ***pH Low***	Poor Habitat, ***NO3 Exceed & pH Low***
	Fish Consumption	F	i	i	i	i
	Recreation	F	Entero & ***pH exceed***	Entero & ***pH exceed***	***Entero & pH Low***	***pH Low***
	Aesthetic enjoyment/others	F	F	F	F	F
	CALM Assessment Category	1	5	5	***5***	5
	DU not supported		Insufficient Information			Supported

Rota's coastlines are relatively untouched. Residents regularly barbeque under the covered "Pala Pala" picnic areas along the coastline. These sites are often used for government hosted community events. Rota's beaches are also ideal camp sites and provide residents and visitors with beautiful tide pools and vistas to enjoy, thus fully supporting the *Aesthetic Enjoyment* DU for all its coastal waters (Table C-34., on the previous page).

ALUS biological assessments of benthic habitat and coral reef assemblages in Rota's coastal waters ranged from "fair" for four watersheds, to "poor" for the Chaliat/Talo watershed. Therefore, Rota's overall ranking is "Fair", for the *Support and Propagation of Aquatic Life* DU. This is in contrast to Saipan's overall rating of "Good" to "Fair". The MMT stated in their 2019 report that, "After the COTS outbreak in the early 2000's, it was observed that reefs in Rota recovered quicker than those in Tinian and Saipan. Given Rota's isolation and a relatively small human population, it was surmised that the lack of anthropogenic stressors affecting the ecosystem aided these reefs toward recovery.", (2019. Benavente et.al.).

However, the MMT also noted that, "Rota has not been spared from the recent bleaching and storm events, coupled with the increase in anthropogenic stress, many of its reef systems have declined alongside the rest of the Marianas".

This lack of clarity when comparing Saipan and Rota's reefs is not unique to this report. Two recent peer reviewed publications have had contradicting results. In general, the paper by Houk, et al., (2014), demonstrates that *Rota's* reefs are more resilient to disturbances caused by the Crown of Thorns Sea Star, while Maynard et al. determined that *Saipan's* reefs are more resilient to the threats caused by climate change (2015, *Assessing Relative Resilience Potential of Coral Reefs to Inform Management in the CNMI*). Therefore, it may be speculated that the present protocol for determining the status of marine biological communities maybe more complex, and insufficient for assessing Rota's unique tropical reef setting.

Nutrient levels were successfully tested this reporting cycle. Only two BEACH sites had exceedances of the WQS, in the West Harbor Marina and the Swimming Hole's coastal waters. Therefore, SongSong and Chailiat/Talo watersheds remain 303(d) listed as impaired for Phosphate and Nitrate, respectively.

There has not been a fish tissue or biota study completed for the island of Rota. Therefore, there is insufficient information to assess the *Fish and Shellfish* DU at the time of this writing.

Rota's Sabana/Talakhaya/Palie, Songsong, and Uyulanhulo/Teteto watersheds again do not support the *Recreation* DU. The primary sources of Enterococci contamination in the sparsely populated Sabana/Talakhaya/Palie watershed are soil-laden stormwater runoff from eroded badlands, and free-range livestock grazing. The sources of contamination in Songsong's and Uyulanhulo/Teteto coastal waters include freshwater seeps carrying human waste from failing septic systems, and animal waste from free-range livestock.

Although, there was improvement to the bacteriological water quality of Chaliat/Talo coastal waters, the improvement is associated with a drastic decrease in both the island's resident population and visitor numbers. However, it could not be delisted for Enterococci given the exceedances of the WQS at the Swimming Hole BEACH site in 2013 and 2015. Therefore, Chaliat/Talo's coastal waters remain unsupportive of the *Recreation* DU this reporting cycle.

ROTA – FRESHWATER STREAMS

Rota has riparian areas and several lush streams. The Sabana/Talkakaya/Palie watershed is the only watershed on Rota that provides sufficient precipitation, topographical and geological features to support a freshwater spring system. The water caves in this watershed provide 90% of Rota's potable water. The assessment results for these streams are provided in Table C-35., on the following page.

TABLE C-35. Assessment of Rota Waterbodies' DUs – Freshwater Streams

		No sites, but very remote	Coral Garden, Kokomo, Talakhaya	Mobil, E. Harbor, Teweksberry, W. Harbor, Storm drains	Vet Memorial, Teteto Beach	Swimming Hole
			R1-R2 R13	R3-R8	R9-R11	R12
WATER BODY SEGMENT ID		1	2	3	4	5
	Designated Use	Dugi/Gampapa/Chenchon	Sabana/Talakhaya/Palie	Songsong	Uyulanhulo/Teteto	Chaliat/Talo
Streams	Aquatic Life		*F*			
	Fish Consumption		i			
	Recreation		*Entero Exceeds*			
	Potable Water Supply					
	Aesthetic Enjoyment/others		F			
	CALM Assessment Category		*5*			

Not Attaining DU | Insufficient Information | Support | No fresh surface water

The stream systems also contain beautiful waterfalls for which they fully support the *Aesthetic Enjoyment* DU. All other waterbodies' precipitation flows through subterranean transport from land to sea.

ROTA – WETLANDS AND LAKES

There are no lakes on Rota. Rota's wetlands have been reported as artificial, or created in the past. However, a complete valuation of potential emergent or riparian wetland areas on Rota has not been completed by BECQ using the CNMI Wetland RAM at the time of this writing.

TABLE C-36. Assessment of Rota Waterbodies' DUs – Wetlands

		Rota				
WATER BODY SEGMENT ID		1	2	3	4	5
Waterbody Type	Designated Use	Dugi/Gampapa/Chenchon	Sabana/Talakhaya/Palie	Songsong	Uyulanhulo/Teteto	Chaliat/Talo
Lakes	Aquatic Life					
	Fish Consumption					
	Recreation					
	Potable Water Supply					
	Aesthetic Enjoyment/others					
	CALM Assessment Category					
Wetlands	Aquatic Life	i	i	i	i	i
	CALM Assessment Category					

Not Attaining | Insufficient Information | Support | No fresh waters

The following watershed sub-sections, C.3.6.1., through C.3.6.5, provide further detail about each of Rota's watersheds', coastal waters, and fresh surface waterbodies contained therein.

C.3.6.1. DUGI/GAMPAPA/CHENCHON – Waterbody Segment 1

The Dugi/Gampapa/Chenchon is the largest watershed on Rota based on land coverage and is the most remote and undeveloped area, as shown in Figure C-36., on the following page. Rota's Benjamin Taisacan Manglona International Airport is located here.

FIGURE C-36. Dugi/Gampapa/Chenchon (Segment 1)

Dugi/Gampapa/Chenchon - Coastal Marine Waters

The Dugi/Gampapa/Chenchon watershed does not contain paved roads or any consistently well-maintained trails to allow easy access to the remote coastline for regular water quality monitoring. Therefore, there is not an established long-term BEACH monitoring site for this watershed. The rugged cliff line drops off to deep water, with extremely hazardous surf most of the year. This has resulted in very limited water quality data as samples may only be collected by boat during calm weather, which is usually done in conjunction with biological monitoring of reef flat sites.

The MMT found no significant change to the reef site near Route 1 in Rota's Dugi/Gampapa/Chenchon coastal waters. The predominant environmental stressor to the reef environment is runoff from agriculture and free-range cattle. Most farming is conducted in this watershed (2018, communication, Malcolm Johnson, NOAA Fellow).

However, given that no other anthropogenic sources of pollution are present in this undeveloped area, this may mean that Dugi/Gampapa/Chenchon's reef systems are in their ambient condition.

Therefore, its coastal waters retain an ALUS ranking of “Fair”, and are considered supportive of the *Propagation of Aquatic Life* DU.

For this same reason, the Dugi/Gampapa/Chenchon coastal waters also attain the *Fish and Shellfish Consumption*, and *Recreational* DUs based on visual field assessments and professional judgement.

Dugi/Gampapa/Chenchon - Freshwater Streams

The Dugi/Gampapa/Chenchon watershed has insufficient precipitation, topographical and geological features to support stream systems. Precipitation flows through subterranean transport from land to sea. Therefore, there are no streams present for assessment purposes.

Dugi/Gampapa/Chenchon – CALM Categories

The Dugi/Gampapa/Chenchon watershed retains a CALM Category 1 for its coastal waters.

C.3.6.2. SABANA/TALAKHAYA/PALIE – Waterbody Segment 2

The Sabana/Talakhaya/Palie watershed is steeply sloped with barren badlands in Talakhaya’s upper watershed as shown in Figure C-37., on the following page. This is the result of vast clear cutting for agriculture, which began during the Japanese occupation. Clearings above Rota’s primary potable water source, the Water Cave, have continued in recent years for new agricultural plots.

To prevent further erosion of the badlands, a multi-phase revegetation project was instituted by DCRM in 2007. It is ongoing and is currently supported through NOAA funding. The project’s aim is to stabilize soils and prevent sediment from entering Sabana/Talakhaya/Palie’s coastal waters. A NOAA Coral Program Fellow was stationed on Rota from 2017-2019 to oversee restoration efforts in the Sabana/Talakhaya/Palie watershed.

Sabana/Talakhaya/Palie - Coastal Marine Waters

There are three long-term BEACH water quality monitoring sites in the Sabana/Talakhaya/Palie watershed. However, one site, at Coral Garden beach was discontinued in FY 2010 due to hazards associated with accessing the shoreline.

Regular monitoring of the Talakhaya site began in earnest in the latter part of FY 2015. Therefore, assessments are based primarily on BEACH water quality data from Kokomo, and Talakhaya beaches.

The MMT stated in their 2019 Monitoring report that since the 2004 crown of thorns (COTS) event, “Talakhaya has had a slow recovery, …in part due to the amount of freshwater influence” from upland stream systems., (2019, Benavente, et.al.). The MMT was alerted by island residents that another localized outbreak of COTS had occurred in 2019. The MMT conducted a survey and indeed found, “… a higher abundance of these corallivores at Talakhaya.”, (2019. Benavente, et.al.). The report also noted that although Talakhaya appeared to be less affected by coral bleaching events in 2013 and 2014, "… the 2017 bleaching event had a greater negative impact on the reefs".

FIGURE C-37. Sabana/Talakhaya/Palie (Segment 2)

These findings resulted in a significant decrease in the benthic substrate of the sites near the Talakhaya BEACH site and the Talakhaya stream outlets, which were considered in "Poor" condition compared to "Fair" in previous IRs. There was no significant change to the Coral Garden reef site, which remains in "Good" condition. Therefore, Sabana/Talakhaya/Palie's coastal waters retain an overall ALUS ranking of "Fair" again this reporting cycle.

This reporting cycle, Sabana/Talakhaya/Palie's coastal waters were tested for nutrients. All BEACH sites were well within the CNMI WQS for both nutrients. Since previous data reported in the 2004 IR are known to be erroneous, these coastal waters have been removed from the 303(d) list as impaired for phosphate.

However, there were exceedances of the CNMI WQS for pH at the Kokomo Beach Club in FY2019, but there was no apparent trend. The reason for this is unknown, but could be due to the aging YSI probe. Therefore, these coastal waters were added to the 303(d) list as impaired for pH, and are unsupportive of the *Propagation of Aquatic Life* DU, this reporting cycle.

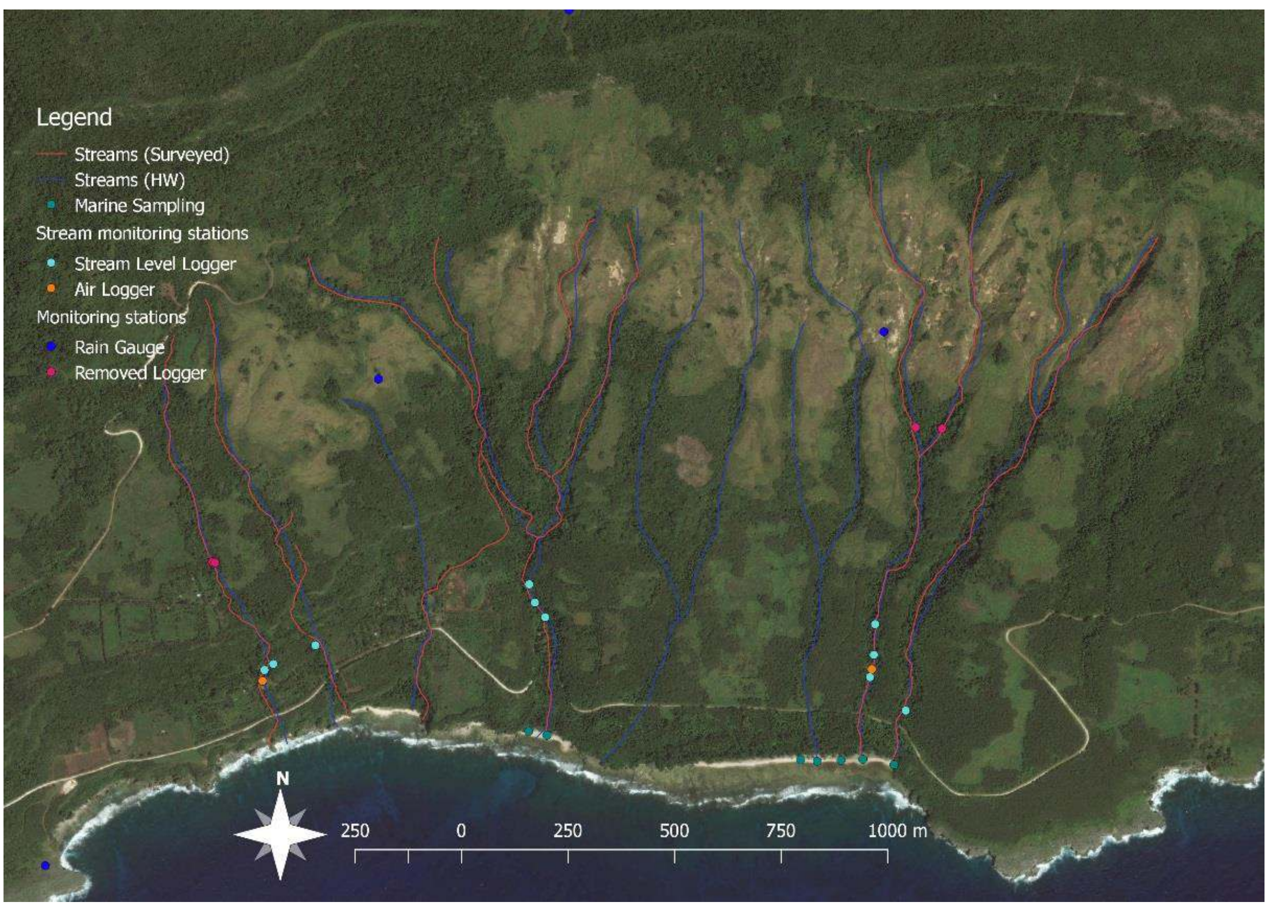
No data is available on fish tissue and/or biota contamination from Sabana/Talakhaya/Palie's coastal waters to assess the *Fish and Shellfish Consumption* DU.

Again, this reporting cycle water quality exceeded the CNMI WQS for Enterococci at the Talakhaya site. The sources of Enterococci in this sparsely populated watershed is associated with freshwater seeps carrying human waste from failing septic systems, animal waste from free-range livestock, and sediment laden stormwater. Therefore, this watershed's coastal waters remain 303(d) listed as impaired for Enterococci, and do not support the *Recreational* DU.

Sabana/Talakhaya/Palie – Freshwater Streams

Sabana/Talakaya/Palie is the only watershed with perennial freshwater streams on Rota, as shown in Figure C-38., below. This watershed contains the Talakhaya springs that feed into the stream system. However, the streams are not used as a *Potable Water Supply* so this DU is not assessed.

FIGURE C-38. Talakhaya Stream Water Monitoring Sites



A portion of the Water Caves' lush stream system flows to the coast primarily during rainy season. Other portions are hyporheic during dry season. There are 10 stream water quality sampling sites within the Talakhaya area that are monitored with a data logger to evaluate the efficacy of the revegetation project in the upper badlands.

Residents, and some tourists, trek through the Okgok trail in the Sabana/Talakhaya/Palie watershed to view beautiful waterfalls. Residents regularly fish in the freshwater pools for prawns (*Macrobrachium lar),* Eels (*Anguilla marmorata),* and fish (*Kuhlia rupestris*) (2018 email, Malcolm Johnson, NOAA Coral Reef Fellow). Therefore, the idyllic Sabana/Talakaya/Palie freshwater stream systems fully support the *Propagation of Aquatic Life,* and the *Aesthetic Enjoyment* DUs.

No data is available on fish tissue and/or biota contamination from Sabana/Talakhaya/Palie's stream systems to assess the *Fish and Shellfish Consumption* DU.

Water quality data collected this reporting period found exceedances of the CNMI WQS for Enterococci in Sabana/Talakaya/Palie's freshwater streams. Sources of Enterococci exceedances are associated with failing septic systems, free-range livestock, and sediment laden stormwater.

Therefore, these waters were added to the 303(d) list as impaired, and do not support the *Recreational* DU.

Sabana/Talakhaya/Palie – CALM Categories

Sabana/Talakhaya/Palie's coastal waters retain a CALM Category 5 due to Enterococci and pH exceedances of the CNMI WQS, which are unsupportive of the *Propagation of Aquatic Life* and *Recreational* DUs.

The Sabana/Talakhaya/Palie's freshwater streams were downgraded to CALM Category 5 this reporting cycle due to Enterococci exceedances of the CNMI WQS, which does not support the *Recreational* DU.

C.3.6.3. SONGSONG – Waterbody Segment 3

There are six (6) long-term BEACH monitoring sites surrounding the Songsong watershed on Rota's western peninsula (Figure C-39., on the following page). The peninsula contains the most developed and densely populated area on Rota, Songsong Village. It also contains the East and West Harbor and the Mobil fuel depot, which are Rota's only designated Class A waters.

FIGURE C-39. Songsong (Segment 3)

Songsong - Coastal Marine Waters

Residents and tourists visit Tweksberry beach, and more frequently the beaches adjacent to Songsong's harbors, and Mobil fuel depot. There they can enjoy picnics, fishing and sunsets. Therefore, this watershed's coastal waters fully support the *Aesthetic Enjoyment* DU.

The MMT found a significant change to the reef site near East Harbor which was ranked as "Poor"; a downgrade from the reef's "Good" rankings since FY 2010. The benthic substrate has significantly less accreting coral and now contains much more turf algae than in previous years. However, the reef near Rota's West Harbor had no significant change from the past five years and was again ranked as "Fair". Therefore, Songsong's coastal waters retain an overall ALUS ranking of "Fair".

In FY 2019, Songsong's coastal waters exceeded the CNMI WQS for DO% at several sites, and pH at the Mobil Storm Drainage site. However, the latter showed no apparent trend and the source of which remains unknown. The potential sources for the diminished DO% include freshwater seeps and drainages carrying nutrients from failing septic systems in Songsong village, runoff from boat maintenance in the marina, and nutrients from other impervious surfaces, causing increased aerobic microbial activity and depleted oxygen levels.

The West Harbor Marina BEACH site exceeded the CNMI WQS for Orthophosphate. Runoff from the marina is again the suspected source for phosphate contamination.

Together, these findings resulted in Songsong's coastal waters being added to the 303(d) lists as impaired for DO% and pH, and they remain listed for phosphate. Together, these exceedances are unsupportive of the *Propagation of Aquatic Life* DU.

No fish tissue and/or biota contamination data is available on Songsong's coastal waters to assess the *Fish and Shellfish Consumption* DU.

Once again, West Harbor Marina and District #2 storm drain exceeded the CNMI WQS for Enterococci. Therefore, Songsong's coastal waters remain on the 303(d) list as impaired. This along with the pH exceedances, is unsupportive of the *Recreational* DU. The sources of Enterococci loading include freshwater seeps and drainages carrying human waste from failing septic systems, and possibly animal waste from free-roaming domestic pets. It is hoped that further qPCR/MST study on Rota can help pinpoint Enterococci sources in the future.

Songsong - Freshwater Streams

The Songsong watershed has insufficient precipitation, topographical and geological features to support stream systems. Precipitation flows through subterranean transport from land to sea. Therefore, there are no streams present for assessment purposes.

Songsong – CALM Categories

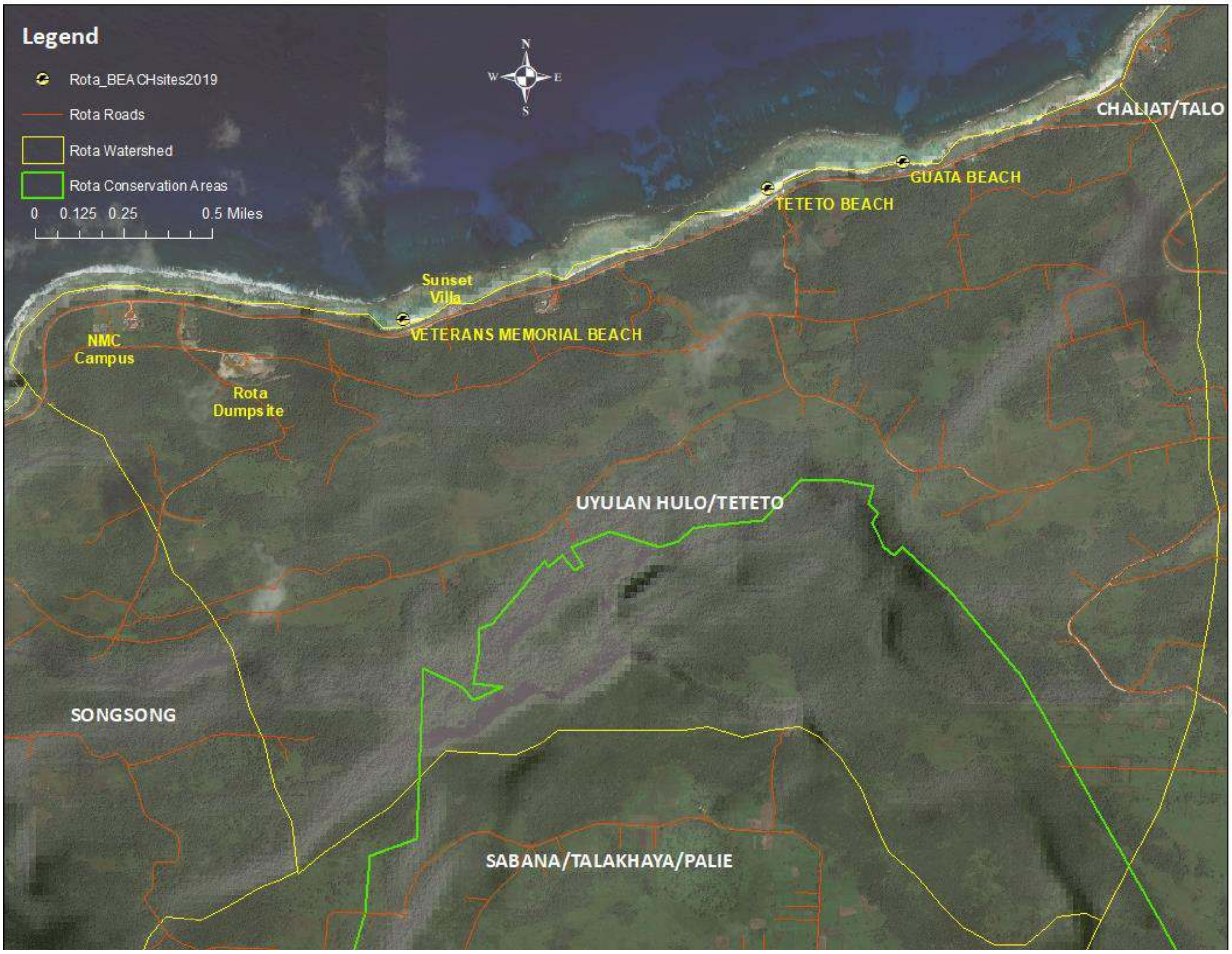
Songsong's coastal waters retain a CALM Category of 5 this reporting cycle due to DO%, pH, Orthophosphate and Enterococci exceedances of the CNMI WQS, which are unsupportive of the *Propagation of Aquatic Life* and *Recreational* DUs.

C.3.6.4. UYULANHULO/TETETO – Waterbody Segment 4

The Uyulanhulo/Teteto watershed contains Rota's Northern Marianas College's Campus, the closed Sunset Villa Hotel, and three (3) BEACH monitoring sites: Veterans' Memorial; Teteto; and Guata beaches (Figure C-40., on the next page). These idyllic beaches are frequented by residents and tourists, for swimming, picnicking and barbeques, even more so then those beaches along the Songsong coastline.

Uyulanhulo/Teteto's coastal waters are exposed to much less NPS pollution from the immediate shoreline than Songsong's. However, Rota's unlined dumpsite is located in the lower watershed not far from the shoreline. It is a potential source of pollutants leaching to coastal waters through freshwater seeps.

FIGURE C-40. Uyulanhulo/Teteto (Segment 4)



Uyulanhulo/Teteto - Coastal Marine Waters

Uyulanhulo/Teteto coastal waters again received an ALUS coral reef assemblage ranking of “Fair” this reporting cycle. The MMT found no significant change to the reefs in front of Rota’s dump site, or in front of Sunset Villa, which have remained in “Good to Fair” condition over the past five years. Therefore, Uyulanhulo/Teteto’s coastal waters retain an overall ALUS ranking of “Fair”.

The water quality at Guata Beach in FY 2019 had low pH levels exceeding the CNMI WQS. Guata Beach is far removed from the dump or any other anthropogenic stressors. Therefore, the source of this is unknown. Due to the pH levels, Uyulanhulo/Teteto’s coastal waters were added to the 303(d) list as impaired, and do not support the *Propagation of Aquatic Life* DU.

This reporting cycle, Uyulanhulo/Teteto’s coastal waters were tested for nutrients. All BEACH sites were well within the CNMI WQS for both nutrients. Since previous data reported in the 2004 IR are known to be erroneous, these coastal waters have been removed from the 303(d) list as impaired for phosphate.

No fish tissue and/or biota contamination data is available on Uyulanhulo/Teteto coastal waters to assess the *Fish and Shellfish Consumption* DU.

In addition to the low pH levels at Guata Beach, the water quality at Teteto Beach in FY 2019 exceeded the CNMI WQS for Enterococci. The source of Enterococci in this undeveloped rural area may be the result of resuspension of naturally occurring Enterococci in stormwater, and not actually fecal contamination. However, this has not been proven. Uyulanhulo/Teteto coastal waters were added to the 303(d) list as impaired, which is unsupportive of the *Recreational* DU. It is hoped that further qPCR/MST studies on Rota can help to determine sources of Enterococci contamination.

The beaches surrounding the Uyulanhulo/Teteto watershed overlook remarkable volcanic rock formations rising out of its coastal waters. These beaches are ideal for swimming and enjoying secluded sunsets and barbeques for which these waters fully support the *Aesthetic Enjoyment* DU.

Uyulanhulo/Teteto - Freshwater Streams

The Uyulanhulo/Teteto watershed has insufficient precipitation, topographical and geological features to support stream systems. Precipitation flows through subterranean transport from land to sea. Therefore, there are no streams present for assessment purposes.

Uyulanhulo/Teteto – CALM Categories

Uyulanhulo/Teteto coastal waters retain a CALM Category 5 due to low pH, and Enterococci exceedances of the CNMI WQS, which are unsupportive of the *Propagation of Aquatic Life* and *Recreational* DUs.

C.3.6.5. CHALIAT/TALO – Waterbody Segment 5

The Chaliat/Talo watershed contains the Rota Resort and Golf Course, which utilizes man-made ponding basins with a vegetative buffer for natural filtration of greywater before it is re-used to irrigate the golf course greens (Figure C-41., on the next page). These open pools attract native invertebrates, birds, and numerous introduced and invasive cane toads, "*Rhinella meriana".*

There is only one (1) long-term BEACH monitoring site, located at the Swimming Hole. The Swimming Hole is a natural tide pool with freshwater seeps. It is a popular tourist destination, as the nearby reef provides a protective barrier from hazardous surf. It is a safe location for less experienced bathers to enjoy a swim in the ocean, and observe marine life.

Chaliat/Talo - Coastal Marine Waters

The MMT found that the fore reef near the Swimming Hole BEACH site had a significant decrease in the benthic substrate health. In addition, the 2019 MMT Monitoring report stated that reefs in front of Rota Resort, "are characterized as having lower structural complexity...", and that macroalgae also dominates the substrate. "However, large populations of sea urchins also thrive in this area which account for some of the stability observed at these sites over the years.

However, continued exposure to stress events has had its affect.", (2019. Benavente, et.al.). At this time, BECQ lacks sufficient water quality data at these long-term fore reef monitoring sites to confirm whether or not there are water quality pollutant sources contributing to this decline. These findings result in the Chaliat/Talo's coastal waters retaining an overall ALUS ranking of "Poor" again this reporting cycle.

FIGURE C-41. Chaliat/Talo (Segment 5)

In FY 2019, there were low pH levels, recorded at the Swimming Hole. In addition, new nutrient water quality data exceeded the CNMI WQS for NO_3-N. The source of the low pH is unknown. However, the elevated nitrate levels may be from freshwater seeps carrying contaminants from the golf course or other upland land applications, but this is unproven. These findings resulted in Chaliat/Talo's coastal waters being added to the 303(d) list as impaired for pH and Nitrate, which is unsupportive of the *Propagation of Aquatic Life* and *Recreational* DU.

No fish tissue and/or biota contamination data is available on Chaliat/Talo coastal waters to assess the *Fish and Shellfish Consumption* DU.

Once again, the Swimming Hole was well within the CNMI WQS for Enterococci. However, there had been exceedances in FY 2015. Therefore, these waters cannot be removed from the 303(d) list at this time. Although, Enterococci levels are improving, the low pH levels do not support the *Recreational* DU.

Chaliat/Talo coastal waters are surrounded by grassy beaches equipped with covered "Pala Palas", and barbeque pits for visitors to relax after a swim, and enjoy sunrises or sunsets. It is for this reason that Chaliat/Talo's coastal waters fully support the *Aesthetic Enjoyment* DU.

Chaliat/Talo - Freshwater Streams

The Chaliat/Talo watershed has insufficient precipitation, topographical and geological features to support stream systems. Precipitation flows through subterranean transport from land to sea. Therefore, there are no streams present for assessment purposes.

Chaliat/Talo – CALM Categories

Chaliat/Talo coastal waters retain a CALM Category of 5 this reporting cycle, due to Low pH and elevated Nitrate levels, which does not support the *Propagation of Aquatic Life* and *Recreational* DUs.

C.3.7. Five-Part Categorization of Tinian's Surface Waters

The northern two thirds of the island of Tinian is leased by DoD for military training and exercises. There are no residents living in this zone, but free-range cattle sometimes are found roaming. Due to past WWII and present military activities, there is evidence of debris, unexploded ordinance, and other munition constituents detected in Tinian soils, which may present persistent adverse impacts to Tinian's waterbodies.

The 2010 CNMI Census listed Tinian as having only 3,136 residents. San Jose is the only village on Tinian. However, there are drastically fewer residents and foreign workers today for several reasons. This includes the closure of Tinian Dynasty in August 2015, followed by residents leaving the island due to infrastructure damage and power outages after Super Typhoon Soudelor and Yutu. Super Typhoon Yutu in particular, devastated Tinian with a direct hit in October 2018. Lastly, there has been a drastic reduction in foreign workers allowed into the CNMI as the result of the Federal government's cap on CW-1 visas. Unsurprisingly, most CW-1 workers are employed on Saipan, which offers the most job opportunities. In addition, there are also proportionally much fewer cattle now reared on Tinian for consumption, or for export to Guam. Tinian's population is not expected to increase in the foreseeable future.

Tinian is divided into six (6) watersheds, including the uninhabited island of Aguigan ("Goat Island") off the southwestern tip of Tinian (See Figure C-42., on the following page.

FIGURE C-42. Tinian BEACH Water Quality Sites and Aguigan Biological Monitoring Site

FIGURE C-43. Tinian Selected Reef Flat Biological Criteria Monitoring Sites

Tinian's few residents and tourists have a plethora of open spaces to enjoy isolated views and hidden beaches for swimming and fishing. There are several remote sandy beaches along Tinian's coastline. The exception is the Carolinas watershed, whose coastline is a sharp cliff face to the ocean waters below.

Makpo is the most developed and populated watershed on Tinian, which contains San Jose Village, and Tinian harbor; the latter is Tinian's only Class A designated waters.

As was stated for Rota, there are only limited water quality data for Tinian's coastal waters taken from 10 long-term BEACH monitoring sites, and one *Biological* site on Aguigan. (Figure C-38., and 39., on the previous pages).

Like Rota, Tinian does not have a municipal sewage treatment facility or landfill at this time. Residents rely on IWDS for wastewater collection and treatment, and an unlined dump for solid waste disposal, which is located in the Puntan Diaplolamanibot watershed.

TINIAN - COASTAL MARINE WATERS

All of Tinian's coastal waters fully support the *Aesthetic enjoyment* DU. The sandy beaches surrounding the Makpo watershed are calm and equipped with picnic areas. These beaches are the most frequented by tourists and residents. The beaches within the Masalok, Puntan Diaplolamanibot, and Puntan Tahgong watersheds are equally beautiful, but frequently have strong currents and high surf, which are appropriate for use by more advanced swimmers.

ALUS biological assessments of Tinian's coral reef assemblages and found many of the benthic habitats appeared to be degraded from the effects of climate related bleaching events, as were the reefs surrounding Aguigan, but there is insufficient data to make a final assessment. Only Masalok and the Carolinas reef systems received a passing rank of "Fair" this reporting period. Therefore, most of Tinian's coral reef systems do not support the *Propagation of Aquatic Life* DU.

New nutrient water quality data was available this reporting cycle on all of Tinian's coastal waters except for Aguigan and the Carolinas watersheds. All of Tinian's other coastal waters exceeded the CNMI WQS for either Orthophosphate or Nitrate or both. Therefore, they remain 303(d) listed as impaired for nutrients.

There were exceedances of the CNMI WQS for pH in all coastal waters except for Makpo Harbor, and Puntan Diaplolamanibot's coastal waters. However, most locations showed no obvious trends. Given the aging YSI probe, these data are suspect.

DO% levels in San Jose Harbor in the Makpo Harbor watershed (Segment 9H) continue to be diminished. The source of which is associated with runoff from boat maintenance in the marina, and nutrients from other impervious surfaces, causing increased aerobic microbial activity and depleted oxygen levels. The assessment results for Tinian's coastal waters are provided in Table C-37., on the following page.

TABLE C-37. Assessment of Tinian Waterbodies' DUs – Coastal Marine Waters

		Goat Island	Unai Masalok, Dangkolo		Tachogna, Taga, Kammer	Harbor	Leprosarium I & II	Unai Babui, Chulu
			T1-T2		T7-T10	T9	T5-T6	T3-T4
		Aguigan	**Tinian**					
WATER BODY SEGMENT ID		**6**	**7**	**8**	**9**	**9H**	**10**	**11**
	Designated Use	Aguigan	Masalok	Carolinas	Makpo	Makpo Harbor	Puntan Daiplolamanibot	Puntan Tahgong
Coastal Waters	Aquatic Life	***Insufficient Information***	***Fair Habitat, Orthophos, NO_3, & pH Exceed***	F	Poor Habitat, ***Orthophos***	Poor Habitat, ***Orthophos, &*** Low DO%	Poor Habitat, ***Orthophos, & NO_3***	Poor Habitat, ***Orthophos, NO_3*** **& pH Exceed**
	Fish Consumption	F	i	F	i	i	i	i
	Recreation	F	***pH Exceed***	F	Low pH	F	***Entero exceed***	***Entero & pH exceed***
	Aesthetic enjoyment/others	F	F	F	F		F	F
	CALM Assessment Category	***3***	5	1	5	5	5	5

Changes in bold italics
Fully Supporting
Insufficient information
Not Attaining DU

There has not been a fish tissue or biota study completed for the island of Tinian. Therefore, there is insufficient information to assess the *Fish and Shellfish Consumption* DU at the time of this writing.

This reporting cycle two BEACH sites, Leprosarium II and Unai Babui BEACH sites had water quality exceeding the CNMI WQS for Enterococci. Tinian's substantive bacteriological improvement elsewhere is associated with a drastic decrease in the island's resident population, and in the number of free-range cattle. In addition, Tinian's Mayors office has implemented a pet licensing program, and worked diligently with the non-profit, Saipan Cares for Animals, and DLNR

Quarantine office to provide affordable spay and neutering clinics to control the island's dog and cat populations.

TINIAN - FRESHWATER STREAMS

There are insufficient topographical and geological features on Tinian to support stream systems. Tinian is mostly flat and almost entirely of limestone geology. Precipitation flows through subterranean transport from land to sea, and surface runoff does not accumulate to support stream systems. Therefore, they are no streams present for assessment purposes.

TINIAN – WETLANDS AND LAKES

There are no lakes on Tinian. However, there is one large natural wetland, "Hagoi", and a few depressional wetlands (Bateha and Mahalang Complexes) together covering a total of 83.5 acres. There are also). Table C-38., provides the assessment results for the *Propagation of Aquatic Life* DU, and the wetland's CALM category for each watershed.

TABLE C-38. Assessment of Tinian Waterbodies' DUs – Wetlands

WATER BODY SEGMENT ID		6		8	9	9H	10	11
	Designated Use	Aguigan	Masalok	Carolinas	Makpo	Makpo Harbor	Puntan Daiplolamanibot	Puntan Tahgong
Wetlands	Propagation of Aquatic Life		i		i		F	F
	CALM Assessment Category		2		***4c***		1	1
	No wetland present		Fully		Insufficient		***Changes in bold italics***	

The Hagoi Wetland (39.4 acres) is a large natural wetland in the Puntan Tahgong watershed in the northern US military leased training area. Hagoi is considered the most "pristine" wetland of the southern inhabited islands and is used as the reference wetland for evaluating the status of other wetlands using the 2016 CNMI Wetland RAM. The RAM is discussed in detail in Section C.4. "Wetland Program" that follows this section.

There is a small wetland area in Masalok that has not been fully evaluated. There is also a protected wetland area near the water supply for San Jose village on the southern side of the island in the Makpo watershed, but these have not been fully assessed or delineated either.

The next watershed sub-sections, C.3.7.1. - C.3.7.6, provide further detail about Aguigan and each of Tinian's watersheds, coastal waters, and the fresh surface waterbodies contained therein.

C.3.7.1. AGUIGAN – Waterbody Segment 6

Aguigan, or "Goat Island", is a small uninhabited an undeveloped coralline island located southwest of Tinian (Figure C-44). Aguigan's coastal waters are designated as a conservation area by DLNR DFW. This provides the island with substantial protection from anthropogenic stressors.

FIGURE C-44. Aguigan (Segment 6)

During calm weather, Aguigan's coastal waters are enjoyed almost daily by dive enthusiasts. In addition, approximately twice per year, DFW receives permit requests from visiting researchers who wish to conduct marine mammal surveys in Aguigan's coastal waters. In addition, BECQ conducts biological ALUS assessments of the coral reef assemblages surrounding the island at least once per year, weather permitting.

CNMI residents wishing to visit the island to hunt coconut crabs or goats may only do so after obtaining a hunting permit from the Tinian Mayor's office. Therefore, the island's terrestrial habitat is not frequently visited, and is also greatly protected.

There is one long-term MMT biological monitoring site off the coast of Aguigan (AGU 2), but there are no BEACH monitoring sites. However, a water quality sample is collected from the MMT site whenever biological assessments are conducted there. Water quality data is extremely limited.

Aguigan - Coastal Marine Waters

An ALUS assessment of Aguigan's coral fore reef assemblages was conducted by the MMT this reporting cycle. The MMT found that there was a decrease in coral cover from 45% coverage in 2001, to just 16% in 2018. "This reduction in coral cover is the result of a decline in *Acropora* colonies.", (2019. Benavente, et.al.). Therefore, Aguigan's coastal waters ALUS ranking was downgraded to "Poor" this reporting cycle and are not supporting the *Propagation of Aquatic Life* DU. However, BECQ lacks sufficient water quality data at these long-term fore reef monitoring sites to confirm whether or not there are water quality pollutant sources causing this decline in coral health.

A microbiological water sample was collected by the MMT during their survey in June 2018. The nutrient and Enterococci levels were well within the CNMI WQS. This result, along with the fact that Aguigan is unpopulated, undeveloped, and difficult to access provides considerable protection from most anthropogenic stressors and pollutants. For this reason, Aguigan's coastal waters are considered to fully support the*, Fish and Shellfish Consumption*, *Recreational* and the *Aesthetic Enjoyment* DUs, based on water quality data and professional judgement.

Aguigan – CALM Categories

Aguigan's coastal waters were downgraded to a CALM Category of 4c this reporting cycle due to a decrease in coral coverage, that is unsupportive of the *Propagation of Aquatic Life* DU.

There are no streams, wetlands or lakes on Aguigan.

C.3.7.2. MASALOK – Waterbody Segment 7

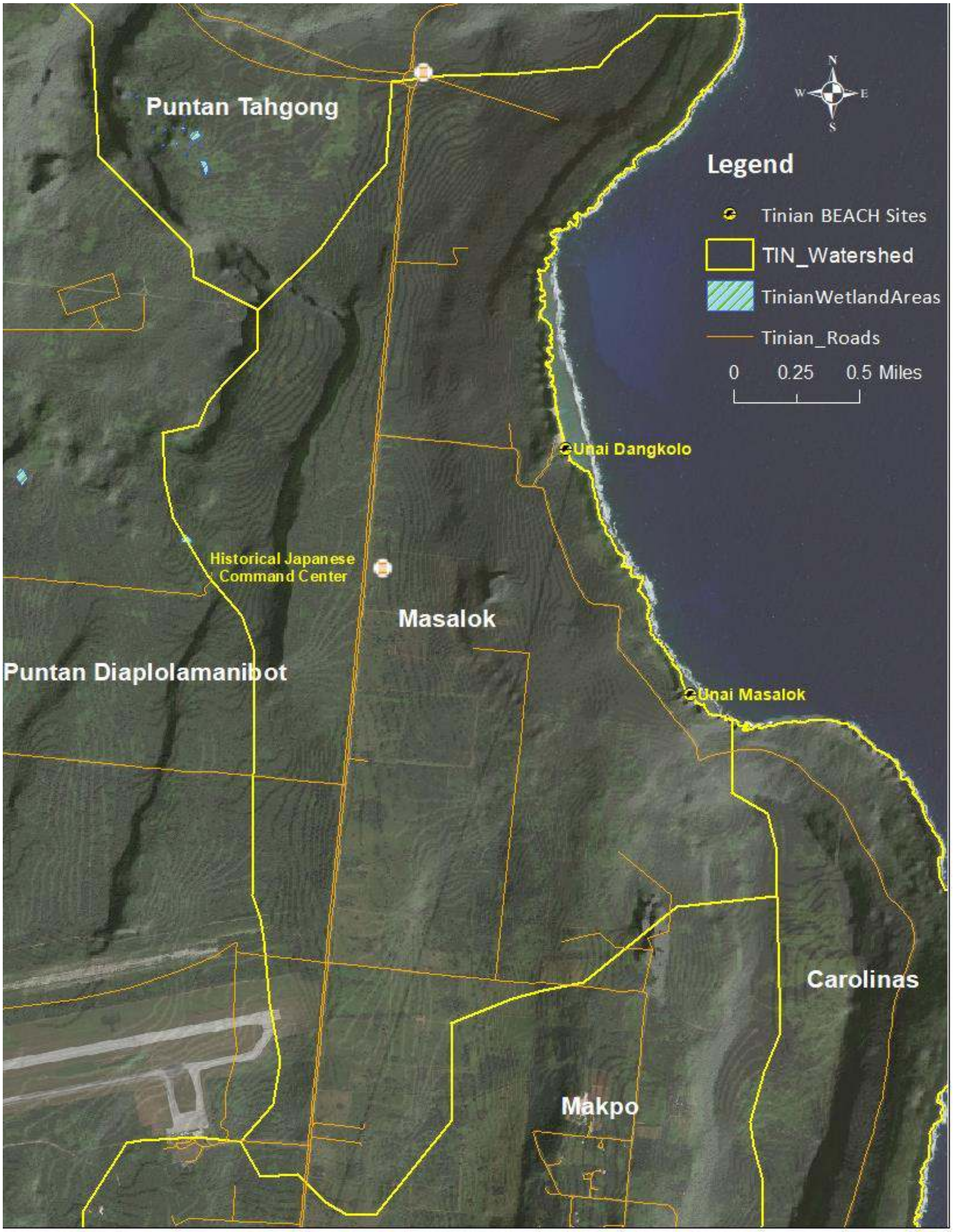
The Masalok watershed is a long drive from San Jose Village and other homesteads. It is located in the US Military leased land area. It contains two long-term BEACH water quality monitoring sites, Unai Masalok, and Unai Dangkolo ("Long Beach"), as shown in Figure C-45., on the following page.

The Unai Masalok watershed also has three small pocket beaches on the coast. These are white sandy beaches surrounded by a narrow and shallow lagoon. The two BEACH sites are the only easily accessible beaches on the east coast of Tinian. However, swimmers must take precautions here, as the reef line is relatively close to the sandy shore creating a dynamic surf that can have strong wave activity and rip tides throughout a large portion of the year.

Masalok - Coastal Marine Waters

The MMT conducted an ALUS biological assessment of the coral reef assemblages near Unai Dangkolo. It was ranked as "Fair"; downgraded from its previous "Good" rankings since FY 2014. Therefore, Masalok's coastal waters overall ALUS ranking was downgraded to "Fair" this reporting cycle. However, BECQ lacks sufficient water quality data at this long-term fore reef monitoring site to confirm whether or not there are indeed water quality pollutant sources causing this decline in coral health.

FIGURE C-45. Masalok (Segment 7)



Both Masalok's BEACH sites had pH levels that exceeded the CNMI WQS. There were no obvious trends at the Unai Dangkolo site, but Unai Masalok had low pH levels. In addition, new nutrient levels also exceeded the CNMI WQS for both Orthophosphate and Nitrate, the source of which is unknown. Therefore, Masalok's coastal waters were added to the 303(d) list as impaired for pH and Nitrate, and remain listed for Phosphate. These results are unsupportive of the *Propagation of Aquatic Life* DU.

There has been no data collected on fish tissue and/or biota contamination to assess the *Fish and Shellfish Consumption* DU. However, every effort should be made to collect baseline data. This is especially important given that the US military has indicated that Unai Dangkolo beach may be an alternative site for expanding training exercises on Tinian as stated in the CNMI Joint Military Training (CJMT) EIS.

Masalok watershed's coastal water quality remains well within the CNMI WQS for Enterococci. The improvement to water quality is associated with a drastic decrease in visitors and considerably less cattle roaming free to graze. However, these waters were not removed from the 303(d) list as there were Enterococci exceedances in FY 2015.

Although, microbial results are very good, the new pH exceedances are unsupportive of the *Recreational* DU.

Both Unai Dangkolo and Masalok Beaches are frequented by both residents and visitors for swimming, snorkeling, and to visit the ancient latte stone sites nearby, for which Masalok's coastal waters fully support the *Aesthetic Enjoyment* DU.

Masalok - Wetlands

The 2017 NHD, and Wetland and Streams GIS data layers for Tinian indicates that the Masalok watershed has depressional wetlands. At this time BECQ has not delineated or assessed these areas using the CNMI Wetland RAM. However, every effort should be made to gather baseline data on Masalok's wetlands given the US Military's interest in expanding training exercises on Tinian, and the large number of heavy metal contaminated sites found by Denton et.al, near WWII debris sites on Saipan.

Masalok – CALM Categories

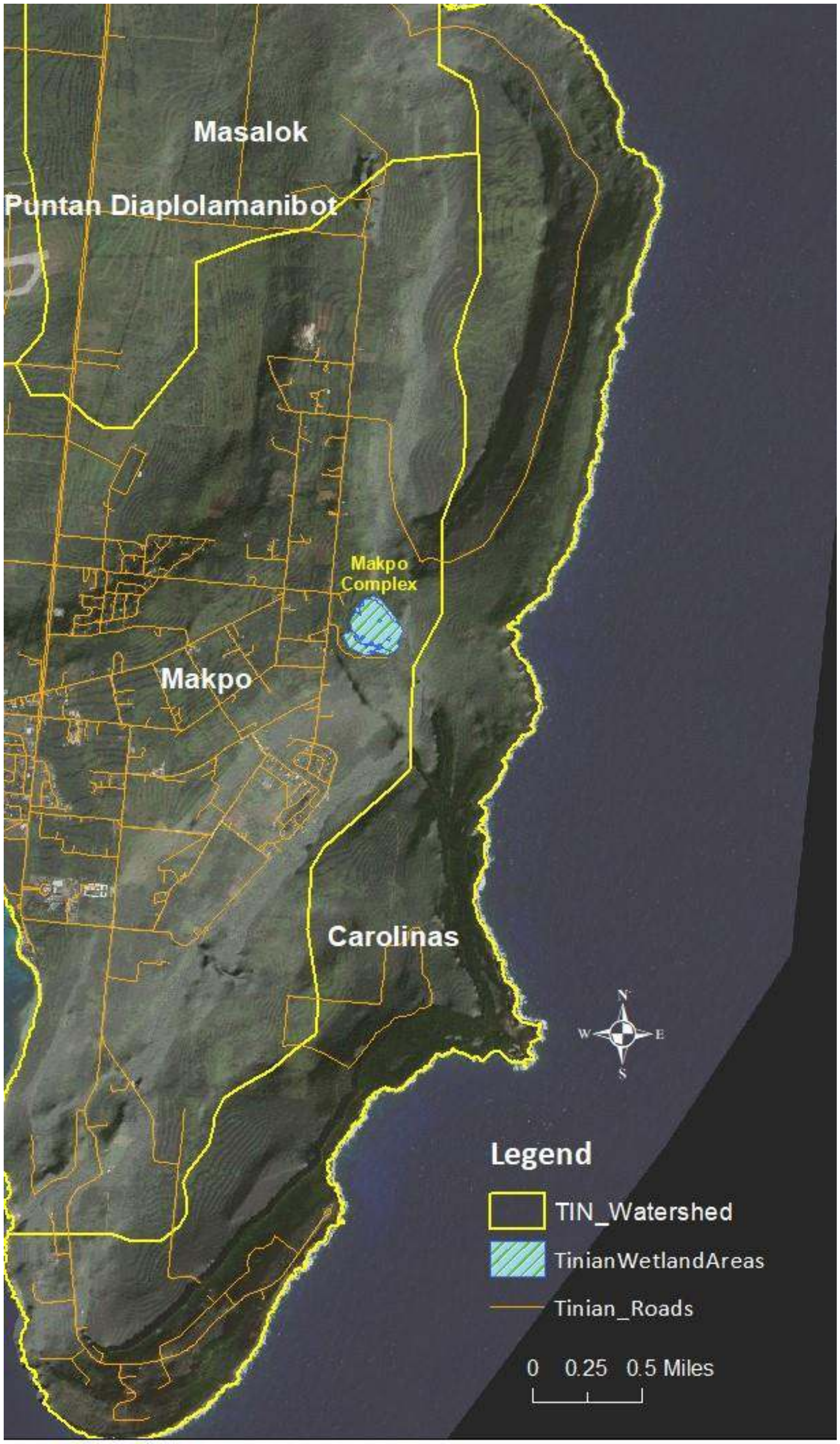
Masalok's coastal waters retain a CALM Category 5 this reporting cycle, due to nutrient, and pH levels, which are unsupportive of the *Propagation of Aquatic Life* or *Recreational* DUs.

Masalok's wetlands are assigned a CALM category of 2 for insufficient information about potential presence of heavy metal contamination from military exercises.

C.3.7.3. CAROLINAS – Waterbody Segment 8

The Carolinas watershed lies along the southern east coast of Tinian (Figure C-46., on the following page). The coast has steep cliff faces that drop to hazardous coastal waters below.

FIGURE C-46. Carolinas (Segment 8)



At present, there are no developments in this remote area. However, there is a proposal to create new homestead lots within the watershed called Makpo Heights III. The Major Siting Permit process began this reporting cycle. A public hearing is scheduled next reporting cycle to determine if this project will be permitted to proceed.

The Carolinas' watershed also contains the Tinian Marine Reserve that starts at the southernmost point of the watershed and continues northwest up to San Jose Harbor of the Makpo Harbor watershed.

There are no long-term BEACH water quality or biological monitoring sites in Carolinas coastal waters. This is due to the lack of roads or any well-maintained trails to readily access the beaches from the cliff line, and the hazards associated with accessing the shoreline by boat. Therefore, careful attention must be paid to weather conditions before scheduling any sampling or biomonitoring events.

Carolinas - Coastal Marine Waters

The Carolinas watershed's rough terrain, remote location, and hazardous coastline provides sustantial protection from potential pollutants and other anthropogenic stressors. Therefore, this watershed is considered to be fully supportive of the *Propagation of Aquatic Life, Fish and Shellfish Consumption*, *Recreational,* and the *Aesthetic Enjoyment* DUs. This is based on visual field assessments, and professional judgement.

Carolinas – CALM Categories

The Carolinas watershed's coastal waters retain a CALM Category 1 this reporting cycle.

There are no streams or wetlands present in the Carolinas watershed.

C.3.7.4. MAKPO – Waterbody Segments 9 and 9H

The Makpo watershed is subdivided into two segments. It contains four of Tinian's most popular beach sites, Tachogna, Taga, Kammer, and San Jose Harbor beaches.

The most densely populated areas on Tinian are San Jose Village, followed by Marpo Heights I, both of which lie within the Makpo sub-watershed (Segment 9). The Carolinas homestead area and the proposed Marpo Heights II is also located here.

Tinian's San Jose Harbor beach is Tinian's only designated Class A waters and lies within the Makpo Harbor sub-watershed (Segment 9H).

Tinian's largest resort and casino, the Tinian Dynasty, closed in FY 2015. The closure vastly decreased the number of guest workers residing in the Makpo watershed, and tourists visiting Tinian due to lack of accommodations. However, this reporting cycle a new two-story "shipping container" hotel was constructed next to Tachogna Beach named Ocean View Hotel. The hotel is small with only 14 rooms which is used primarily by the foreign tourists, and on occasion by local visitors from Saipan, Rota, or Guam.

<u>Makpo – Waterbody Segment 9</u>

Figure C-47., on the following page shows the three (3) long-term BEACH monitoring sites in Makpo's coastal waters, and the one BEACH site in Makpo Harbor's coastal waters.

Makpo - Coastal Marine Waters

The MMT conducted an ALUS biological assessment of the coral fore reef assemblages south of Tachogna Beach and in front of Taga Beach. They found no significant change from the "Poor" rankings in previous years. Therefore, the Makpo's coastal waters retain an overall ALUS ranking of "Poor". However, BECQ lacks sufficient water quality data at this long-term reef monitoring site to confirm whether or not there are water quality pollutant sources contributing to this decline in coral health.

Two of Makpo's BEACH sites had pH levels that exceeded the CNMI WQS. There were no obvious trends at Taga BEACH site, but Tachogna Beach had low pH levels. In addition, new nutrient levels also exceeded the CNMI WQS for Orthophosphate at all three sites. The source of these pollutants is unknown. These findings cause Makpo's coastal waters to remain on the 303(d) list as impaired for pH and Phosphate, and therefore, they are unsupportive of the *Propagation of Aquatic Life* DU.

To date, there has been no data collected on fish tissue and/or biota contamination in Makpo's coastal waters to assess the *Fish and Shellfish Consumption* DU.

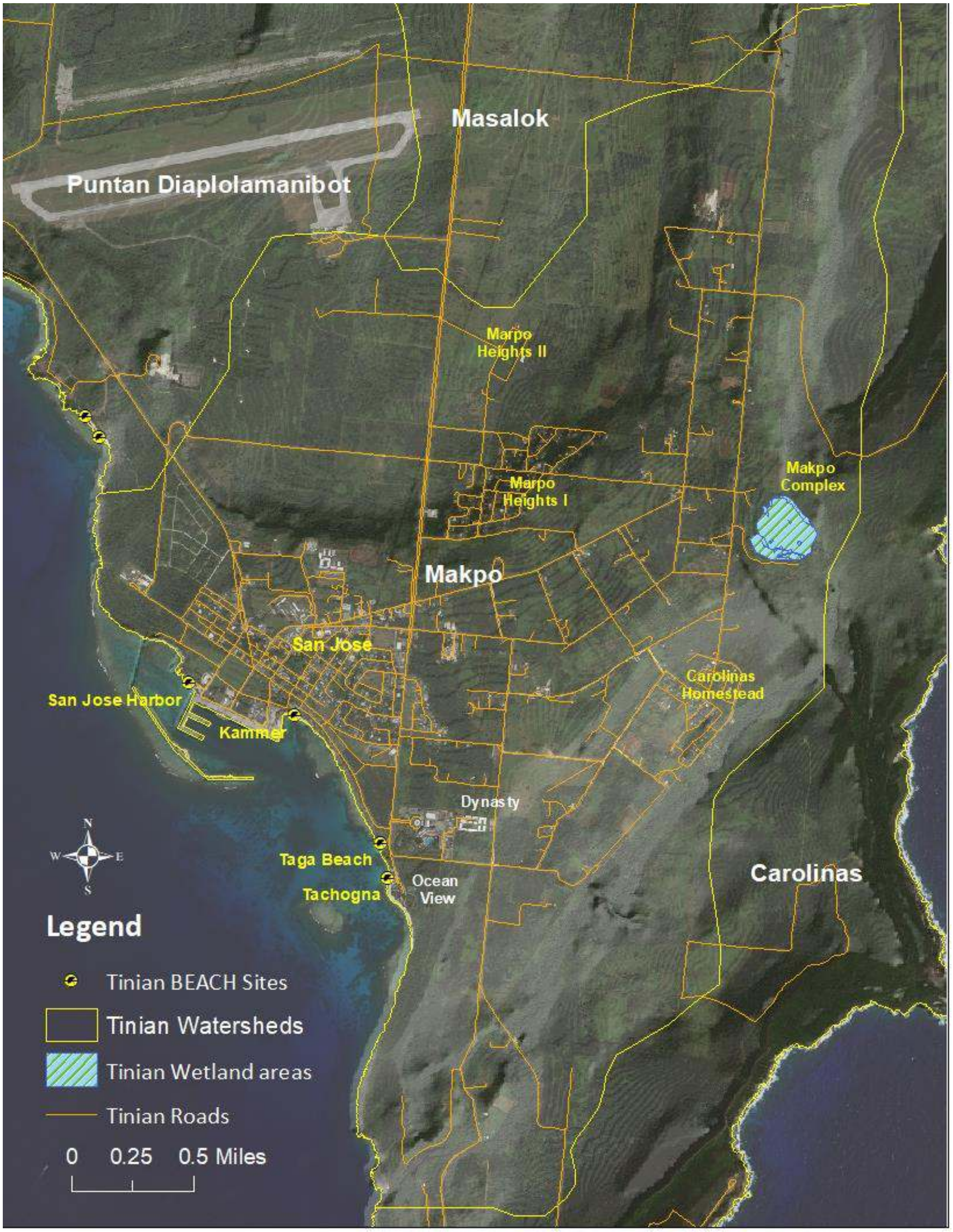
Makpo watershed's coastal waters were well within the CNMI WQS for Enterococci again this reporting cycle. This is thought to be associated with the closure of Tinian Dynasty, which was a suspected source of fecal contamination from freshwater seeps carrying wastewater from the hotel's failing IWDS and potentially other nearby on-site systems. However, exceedances of the WQS for pH requires that Makpo's coastal waters remain on the 303(d) list. Therefore, Makpo's coastal waters do not support the *Recreational* DU.

Taga's pocket beach is surrounded by a rock outcropping that is a popular place for residents and tourists to jump off into the ocean below. Makpo's other beaches offer picnic areas, Pala Palas, water sports, or just a place to relax and take in a sunset. The beaches also provide easy access for snorkeling and diving to explore Tinian's reefs, near shore shipwrecks, and to observe endangered Green Sea Turtles and other marine life. For this reason, Makpo fully supports the *Aesthetic Enjoyment* DU.

Makpo –Wetlands

The Makpo watershed contains the "Makpo Complex", a wetland in the upper watershed near the Carolinas' watershed boundary. This wetland is where the San Jose village's ground water supply is sourced. At the time of this writing, there is insufficient information to assess whether Makpo's wetlands support the *Propagation of Aquatic Life* DU. However, it is hoped that more information will be available before next reporting cycle, as efforts are currently underway to further delineate and assess Tinian's wetlands using the CNMI Wetland RAM.

FIGURE C-47. Makpo and Makpo's "San Jose" Harbor (Segment 9 and 9H)



Makpo – CALM Categories

Makpo coastal waters retain a CALM Category 5 due to pH, and elevated Orthophosphate levels, which is unsupportive of the *Propagation of Aquatic Life* and *Recreational* DUs.

Makpo's wetlands are assigned a CALM Category of 4c, due to insufficient information, and the potential presence of anthropogenic stressors from surrounding developments causing habitat alterations.

Makpo Harbor – Waterbody Segment 9H

Tinian's San Jose Harbor is located in the Makpo Harbor Sub-watershed (Segment 9H), and is Tinian's only designated Class A water (Figure C-48., on the following page).

There have been vastly less tourists visiting Tinian since 2015. However, Major Siting permits are now in place for a new development next to the harbor. If the plans are implemented, they will include construction of a small commercial building with retail office space, restaurants and a casino named Taga Casino. A ferry terminal has also been considered for providing additional means for residents to travel to and from Saipan.

Makpo Harbor - Coastal Marine Waters

An ALUS biological assessment of Makpo Harbor's coral fore reef assemblages was not conducted this reporting cycle. Therefore, the "Poor" ranking reported in the 2016 IR is carried over to this reporting cycle. However, BECQ lacks sufficient water quality data at this long-term reef monitoring site to confirm whether or not there are water quality pollutant sources contributing to this ranking. In addition, Makpo Harbor's BEACH site exceeded the CNMI WQS for Orthophosphate in FY 2019. Therefore, they remain on the 303(d) list as impaired for phosphate. The Harbor's coastal waters also had diminished DO% levels. Potential sources of diminished DO% is nutrient loading from on-site treatment systems, and run-off from the marina where boat maintenance is performed, which may increase aerobic microbial activity and cause oxygen depletion. Given the diminished DO% levels, and phosphate exceedances, Makpo Harbor coastal waters do not support the *Propagation of Aquatic Life* DU.

To date, there have been no data collected on fish tissue and/or biota contamination in Makpo Harbor's coastal waters to assess the *Fish and Shellfish Consumption* DU.

Once again, Makpo Harbor's coastal water had Enterococci levels well within the CNMI WQS, and are fully supportive of the *Recreation* DU.

Makpo's Harbor is the primary site where fisherman launch their boats, and swimmers and snorkelers can dive into the water. It also offers picnic areas to enjoy the scenic views, and sunsets. For this reason, Makpo Harbor fully supports the *Aesthetic Enjoyment* DU.

FIGURE C-48. San Jose Harbor (Segment 9H)

Makpo Harbor – CALM Categories

Makpo Harbor's coastal waters retain a CALM Category 5 due to diminished DO% levels, and elevated Orthophosphate, which are unsupportive of the *Propagation of Aquatic Life* DU.

C.3.7.5. PUNTAN/DIAPLOLAMANIBOT – Waterbody Segment 10

The Puntan/Diaplolamanibot watershed contains Tinian's international airport, but little other development as most of the watershed is in the US Military leased land area. It also contains two long-term BEACH monitoring sites at Leprosarium I and II beaches. These beaches were used during the Spanish occupation to provide a distant location to quarantine a Leprosy colony (see Figure C-49., on the following page).

These calm shallow beach areas are protected by a shallow fringing reef. Cuts were made into the reef for supply boats to access the beach and to bring provisions to the colony. The cuts are still visible today, but are no longer used for boat landing. However, the beach sites may be easily reached by using a secondary coral road.

Tinian's only solid waste disposal site is an unlined dump located in the Puntan/Diaplolamanibot watershed, upland of the coral access road leading to Barcinas Bay, and Leprosarium Beach sites I and II. The dump is sometimes left exposed without day-cover. Thus, birds and other feral animals scavenge the waste creating further land-based sources of pollution; adding to picnic waste that is often left at these beach sites. The area around the dump also attracts illegal dumping of household hazardous wastes.

Puntan/Diaplolamanibot - Coastal Marine Waters

The sandy Leprosarium I and II beach areas in the Puntan/Diaplolamanibot watershed, are well shaded by native trees. Their remote location away from homes and businesses limit light pollution making them ideal turtle nesting sites. These beaches are enjoyed by island residents and the occasional tourist for picnics, sunsets, camping, and star gazing. For these reasons Puntan/Diaplolamanibot coastal waters fully support the *Aesthetic Enjoyment* DU.

An ALUS biological assessment of Makpo's coral fore reef assemblages was conducted on the reef between the two Leprosarium BEACH sites. The Team found no significant change in the benthic substrate from the previous "Poor" rankings. Therefore, Puntan/Diaplolamanibot coastal waters retain an overall "Poor" ALUS ranking. However, BECQ lacks sufficient water quality data at this long-term fore reef monitoring site to confirm whether or not there are water quality pollutant sources contributing to this decline in coral health.

This reporting cycle Puntan/Diaplolamanibot coastal waters were tested for nutrients. Both Orthophosphate and NO_3-N exceeded the CNMI WQS. Therefore, these coastal waters were added to the 303(d) list as impaired for Nitrates, and they remain listed for phosphate. Since these coastal waters are located down slope from Tinian's open dump, there is the potential for nutrient loading from leachate. Therefore, Puntan/Diaplolamanibot coastal waters do not support the *Propagation of Aquatic Life* DU.

FIGURE C-49. Puntan/Diaplolamanibot (Segment 10)

There is no available data on fish tissue and/or biota contamination on Puntan/Diaplolamanibot's coastal waters to assess the *Fish and Shellfish Consumption* DU.

Leprosarium II beach's coastal waters exceeded the CNMI WQS for Enterococci this reporting cycle. The source of fecal contamination is most likely from dogs roaming the beach and human waste from trash containing diapers. This has been noted by WQS/NPS staff at these remote beaches, which lack public toilet facilities. Therefore, the Puntan/Diaplolamanibot watershed is returned to the 303(d) listed as impaired for Enterococci*,* which is unsupportive of the *Recreational* DU. WQS/NPS hopes that qPCR/MST techniques can be used on Tinian to further assess the sources of Enterococci pollution.

Puntan/Diaplolamanibot – Wetlands

Last reporting cycle wetland delineations and assessments were conducted on a few locations on Tinian to field test the CNMI Wetland RAM. During the field test, the smaller remote wetlands in the Puntan/Diaplolamanibot watershed, named the Bateha I and II Complex were explored, but not fully delineated or assessed by BECQ.

However, a survey conducted for the US military states that these complexes are shallow depressional areas thought to be the result of anthropogenic activities (March 2015, *Survey Report of Potential Wetland Sites on Tinian in Support of the CJMT EIS/OEIS*). The survey cites the USFWS National Wetland Inventory that determined these areas to be palustrine, emergent, wetlands. The survey also states that the Bateha I and II Complexes have "suitable hydrology, wetland vegetation, and hydric soils…" Therefore, Bateha I (7.1 acres) and Bateha II (5.8 acres) are isolated wetlands, far from developmental anthropogenic stressors. They currently support the *Propagation of Aquatic Life* DU.

Puntan/Diaplolamanibot – CALM Categories

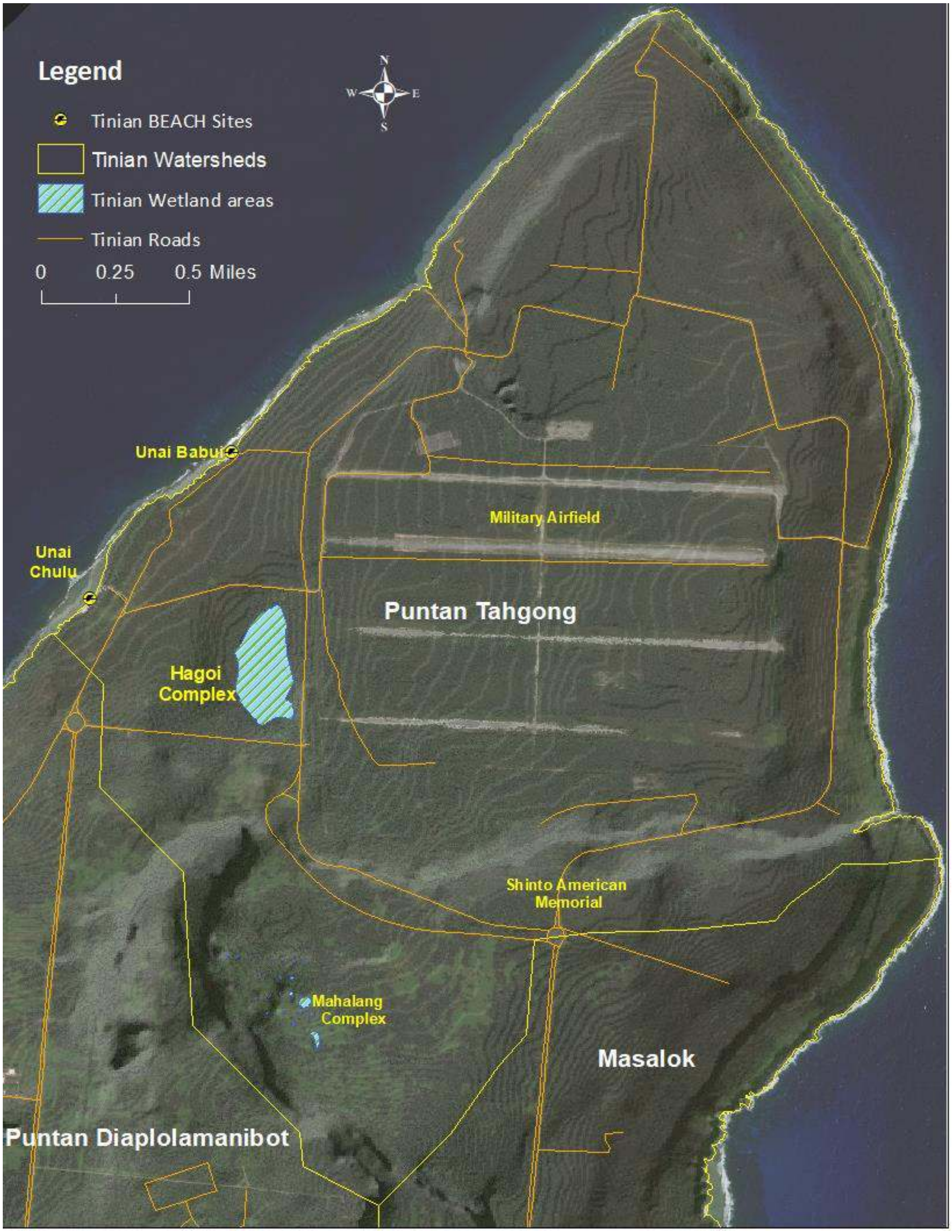
The Puntan/Diaplolamanibot watershed's coastal waters retain a CALM Category 5 due to elevated Orthophosphate, Nitrate-N, and Enterococci levels, which are unsupportive of the *Propagation of Aquatic Life,* and *Recreational* DU.

The Puntan/Diaplolamanibot wetlands, Bateha Complex, retain a CALM Category 1.

C.3.7.6. PUNTAN/TAHGONG – Waterbody Segment 11

The northern most watershed on Tinian is the Puntan/Tahgong watershed, which is contained in the US Military leased land area. It also contains two long-term BEACH monitoring sites, Unai Babui ("Pig Beach") and Unai Chulu beaches (see Figure C-50., on the following page). Both beaches have energetic shorelines that make them hazardous for swimmers. They are undeveloped, remote, and are not as frequented by tourists or residents as other Tinian beaches. This leaves them in a nearly pristine state with few anthropogenic stressors.

FIGURE C-50. Puntan/Tahgong (Segment 11)



Puntan/Tahgong - Coastal Marine Waters

An ALUS biological assessment of the coral fore reef assemblages near Unai Babui was conducted this reporting cycle. The MMT found no significant improvement in the benthic substrate from its previously reported "Poor" ranking. However, the "Poor" ranking is not due to anthropogenic impacts in this remote coastline, but more likely caused by high wave action that may limit the development of highly rugose coral reef structure. Additionally, ground water seeps, essential for some marine species, may also play a role in creating this unique marine habitat. However, BECQ lacks sufficient water quality data at this long-term fore reef monitoring site to confirm whether or not there are water quality pollutant sources contributing to this decline in coral health.

Therefore, continued efforts should be made to further evaluate Puntan/Tahgong's benthic habitat and coral assemblages to determine if this is their ambient "Good" condition, and to prevent any future anthropogenic stresses on this unique coral reef ecosystem. This is especially important given that the US military has listed Unai Babui and Chulu beaches as alternatives for expanding training exercises in the CJMT EIS.

Puntan/Tahgong coastal water exceeded the CNMI WQS for pH this reporting cycle, but with no apparent trend, or known source. In addition, new nutrient results from FY 2019 exceeded the CNMI WQS for both Orthophosphate and NO_3-N. The source of this nutrient loading is unknown, given that there is little evidence of potential anthropogenic nutrient loading into freshwater seeps. These findings result in Puntan/Tahgong's coastal waters being added to the 303(d) list as impaired for Nitrate, and remain listed for phosphate and pH, which is unsupportive of the *Propagation of Aquatic Life* and *Recreational* DUs.

There are no available data on fish tissue and/or biota contamination of the Puntan/Tahgong coastal waters to assess the *Fish and Shellfish Consumption* DU. However, every effort should be made to collect baseline data, as elevated heavy metals concentrations have been detected in sediment and biota near WWII debris and dump sites. Any exceedances of CNMI WQS caused by military exercises would require immediate action to restore Puntan/Tahgong's coastal waters to their ambient state.

Unai Babui's coastal waters exceeded the CNMI WQS for Enterococci in FY2019. Given the remote location of these beaches, the few number of free-roaming cattle in the area, and the lack of public toilet facilities, the source of contamination is suspected to be human. WQS/NPS hopes that qPCR/MST analysis can be conducted here to determine the sources of Enterococci.

Puntan/Tahgong – Wetlands

Puntan/Tahgong watershed contains the only significant open surface waterbody on Tinian, the Hagoi wetland which covers 39.4 acres. It also contains the Mahalang Complex with 20 depressional areas. The latter's largest two wetland features are estimated to cover 1.2 acres each (2015, CJMT EIS/OEIS survey).

Due to Hagoi's size, remote location, lack of nearby development and anthropogenic sources of pollution, it is considered "pristine" and is used as a "reference" wetland for CNMI wetland RAM assessments.

BECQ delineators describe the Mahalang complex as a series of depressional wetlands that occur in rows and appear to have been formed by large explosions. Several of these depressional areas exhibit wetland hydrology, vegetation, and in some cases, hydric soils. These findings are concurrent with that of the US Fish and Wildlife Service (US FWS), but do not align with that of the 2015 military survey, which states that, "Although the NWI classifies all the Mahalang wetlands as marshes (e.g., palustrine), based on recent field investigations, they appear to function more like ephemeral ponds (e.g., lacustrine)." Therefore, a full delineation and assessment of the entire Mahalang Complex should be completed by BECQ delineators using the CNMI Wetland RAM to resolve conflicting assessments.

However, since the Mahalang Complex, like Hagoi Wetland, are far removed from any anthropogenic stressors, these wetlands are currently considered pristine and to be fully attaining the *Propagation of Aquatic Life* DU.

Puntan/Tahgong – CALM Categories

The Puntan/Tahgong's coastal waters retain a CALM Category 5 due to lack of new nutrient data, and pH, and Enterococci exceedances of the CNMI WQS, which are unsupportive of the *Propagation of Aquatic Life* and *Recreational* DUs.

Puntan/Tahgong's wetlands are assigned a CALM Category of 1.

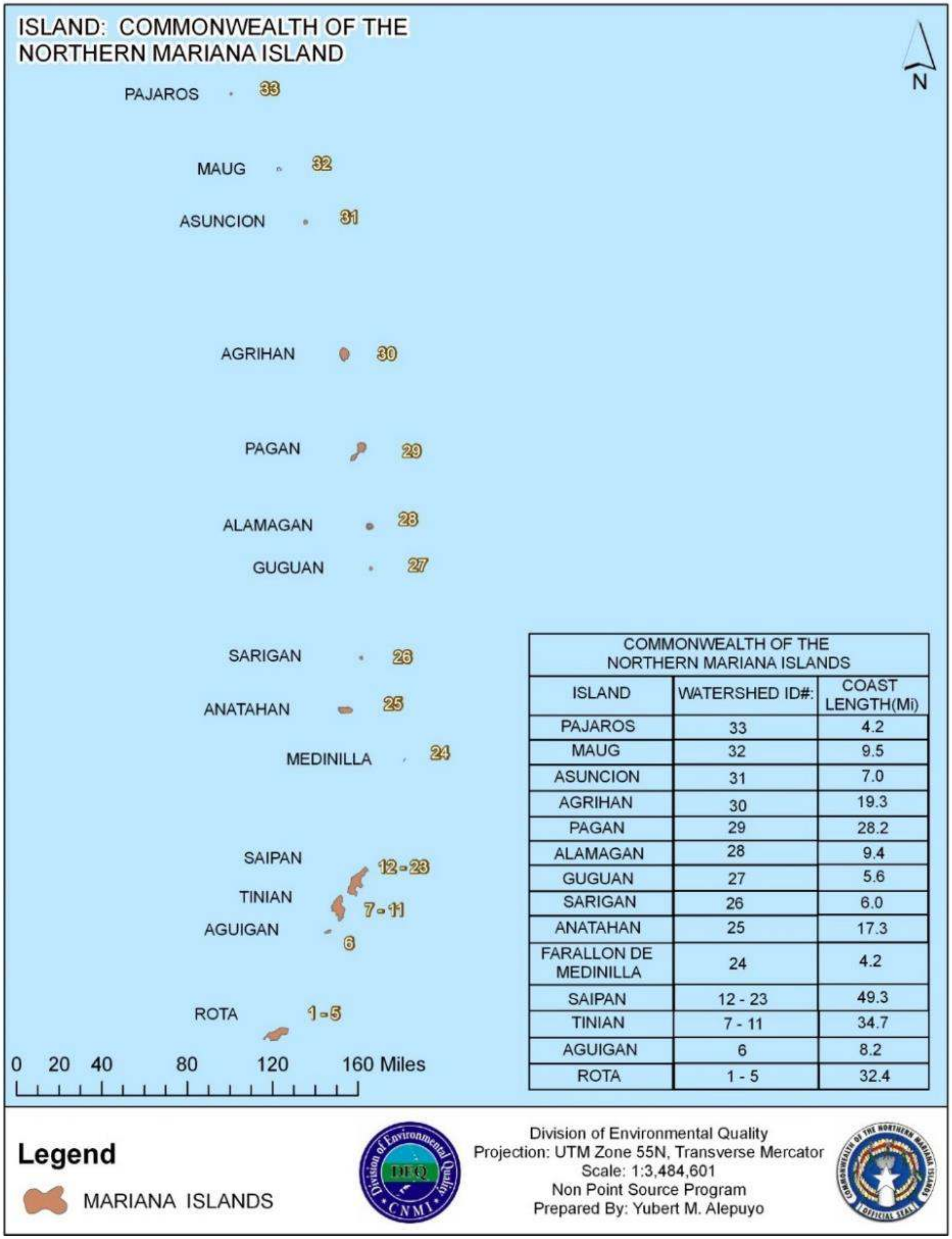
C.3.8. Five-Part Categorization of the Northern Islands' Surface Waters

The CNMI archipelago contains 10 Northern Islands as shown in Figure C-51., on the following page. They are from north to south: Farallon de Pajaros (also known as "Uracas"), Maug, Asuncion, Agrihan, Pagan, Alamagan, Guguan, Sarigan, Anatahan, and Farallon de Medinilla ("FDM" or No'os in Chamorro).

As stated in **PART B. BACKGROUND INFORMATION**, there is frequent seismic activity in the region due to the islands being formed on the still volcanically active Mariana Ridge. The Ridge overlies an active subduction zone where the Pacific Plate is passing beneath the Philippine Plate (Trusdell, F.A., 2006). "The youngest volcanoes include Uracas, Asuncion, Mount Pagan, South Pagan (Butkan Paliat), North Guguan, and the east crater of Anatahan.", as reported by Trusdell, F.A., in the 2009, "Marianas, Geology", (Gillespie, R.G., and Clague, D.A., eds., Encyclopedia of Islands: Encyclopedias of the Natural World. 2, University of California Press, 2009).

Marine waters surrounding the three northernmost islands were designated as the Marianas Trench Marine National Monument in 2009, by then President George W. Bush. It protects approximately 95,216 square miles of submerged lands and waters (https://www.fws.gov/nwrs/threecolumn.aspx?id=2147497737).

FIGURE C-51. The 10 Northern Islands and the Southern Inhabited Islands of the CNMI



COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS		
ISLAND	WATERSHED ID#:	COAST LENGTH(Mi)
PAJAROS	33	4.2
MAUG	32	9.5
ASUNCION	31	7.0
AGRIHAN	30	19.3
PAGAN	29	28.2
ALAMAGAN	28	9.4
GUGUAN	27	5.6
SARIGAN	26	6.0
ANATAHAN	25	17.3
FARALLON DE MEDINILLA	24	4.2
SAIPAN	12 - 23	49.3
TINIAN	7 - 11	34.7
AGUIGAN	6	8.2
ROTA	1 - 5	32.4

Only three of the four Northern Islands can be embarked upon by boat landing, and are currently populated. This includes Agrihan, Pagan, and Alamagan. There are currently six (6) individuals on Agrihan, four (4) on Pagan, and six (6) people on Alamagan (personal communication, Northern Islands Mayor, Vicente ("Ben") Santos, December 5th, 2019).

The fourth island that has been inhabited in the past is Anatahan. This was prior to the most recent eruption in 1990, when it was evacuated. It is now only visited seasonally during the summer.

Pagan contains an airstrip, but the other northern islands may only be accessed by boat or helicopter. Therefore, most of the military anthropogenic stressors are limited to Pagan, FDM and possibly Anatahan from Japanese residing there during WWII. However, testing has not been conducted in Pagan's or Anatahan's nearshore to determine whether or not residual contamination is present from munitions, or munition constituents. In contrast, FDM has had continued US military live bombing exercises since the early 1970s. Therefore, FDM's near shore environment, although not tested to date, has a great potential for contamination given that military bombing exercises provide an ongoing source of munition and munition consituents.

In the past, Sarigan and Anatahan had feral goats and pigs that were introduced for subsistence purposes by the island inhabitants, and other nearby islanders. A successful eradication program was conducted by CNMI DFW on Sarigan in 1997 to allow vegetation regrowth and a recolonization of native flora and fauna. DFW's report, "*Prioritization of invasive mammal eradications in the Northern Mariana Islands"*., (CNMI DFW 2018. V.09.30.2018), stated that it, "…remains the Mariana Islands' greatest terrestrial conservation success story.".

In 2002 through 2003, DFW carried out a similar feral animal control program on Anatahan in coordination with U.S. Fish and Wildlife Service and the Northern Islands Mayor's Office (2003. "*CNMI DFW Wildlife and Vegetation Surveys and Feral Animal Control ANATAHAN 2002-2003"*, Technical Report #10). In follow up surveys there, no goats were seen after 2005, and by 2013, it was concluded in the "*Final report Anatahan Feral Pig Assessment CNMI*", that all feral pigs had also been eradicated. However, there continued to be evidence of rats and cats (2013. Kessler, C., for the Department the Navy, report. No. N62742-13-P-1873).

However, it should be noted that expansion of US Military exercises within the Northern Islands, makes it possible for the introduction of other non-native invasive species in the future, and a heightened risk of adverse impacts from other activities.

Presently, there is very limited water quality data available for the Northern Islands, and to date, none of their watersheds have been mapped or delineated. Therefore, the following section will discuss the assessment of each of the Islands as a whole, rather than discussing each of island's watersheds, as was done for the delineated islands of Saipan, Rota and Tinian.

BECQ continues to explore potential funding sources that could be used to support the collection of water quality data and conduct ground-truthed visual field assessments on each of these islands. This baseline data is imperative to gather before any further development takes place, or military activities increase. Again, any exceedances of WQS would require immediate action to prevent impairment to the Northern Islands' valuable pristine, Tier 3 waters.

Northern Islands - Coastal Marine Waters

Due to the lack of development in the Northern Islands, the uninhabited, and three (3) sparingly inhabited Northern Islands, have had negligible anthropogenic impacts to coastal water quality from residents or visitors. However, all were affected by the 2014 and 2017 global bleaching events.

TABLE C-39. Assessment of the Northern Islands Waterbodies' DUs – Coastal Marine Waters

		Northern Islands									
	WATER BODY SEGMENT ID	24	25	26	27	28	29	30	31	32	33
	Designated Use	Farallon De Medinilla	Anatahan	Sarigan	Guguan	Alamagan	Pagan	Agrihan	Asuncion	Maug	Farallon De Pajaros
Coastal Waters	Aquatic Life	F	F	F	F	F	F	F	F	F	F
	Fish Consumption	*i*	F	F	F	F	*i*	F	F	F	F
	Recreation	F	F	F	F	F	F	F	F	F	F
	Aesthetic enjoyment/others	***N***	F	F	F	F	F	F	F	F	F
	CALM Assessment Category	***5***	1	1	1	1	***3***	1	1	1	1

F – Designated uses fully supported
I – Insufficient information
N – Designated uses not supported

These Islands' remoteness, lack of easy accessibility, and the recent establishment of the Marianas Trench Marine National Monument, make them fully supportive of almost all coastal water DUs based on visual assessments, available biological data, anecdotal reporting from visitors, and the Northern Islands Mayor, as well as professional judgment, as shown in Table C-39., above.

Northern Islands – Freshwater Streams

Little is known of the Northern Islands' stream systems, except for observations made by visitors. Northern Islands Mayor Vicente "Ben" Santos reported seeing waterfalls flowing off Agrihan's cliff line during a torrential rain event (Personal Communication, December 5th, 2019). It is therefore reasonable to assume that the rest of the islands also have ephemeral streams as well. Due to the remoteness of these islands most are protected from potential anthropogenic impacts, and they are assessed as fully supporting all DUs, except for Pagan, Anatahan, and FDM. The former were occupied during the WWII campaign, and all three have legacy military debris from these activities. FDM continues to accumulate munition debris. Therefore, the potential presence of heavy metals, and toxins from unexploded ordinance, and munition constituents that may impair the *Fish and Shellfish Consumption,* and *Potable Water Supply* DUs is in need of further study.

TABLE C-40. Assessment of the Northern Islands Waterbodies' DUs – Freshwater Streams

	WATER BODY SEGMENT ID	24	25	26	27	28	29	30	31	32	33
	Designated Use	Farallon De Medinilla	Anatahan	Sarigan	Guguan	Alamagan	Pagan	Agrihan	Asuncion	Maug	Farallon De Pajaros
Streams	Aquatic Life		F	F	F	F	F	F	F	F	F
	Fish Consumption		*i*	F	F	F	*i*	F	F	F	F
	Recreation		F	F	F	F	F	F	F	F	F
	Potable Water Supply		*i*	F	F	F	*i*	F	F	F	F
	Aesthetic enjoyment/others		F	F	F	F	F	F	F	F	F
	CALM Assessment Category		*3*	1	1	1	*3*	1	1	1	1

F – Designated uses fully supported
I – Insufficient information
N – Designated uses not supported

FDM's topographical and geological features do not appear to support stream systems (Table C-40.). Future stream visual field assessments using the CNMI SVAP, and development of an NHD data layer for the Northern Islands will lead to considerably more information for making assessments.

Northern Islands – Wetlands and Lakes

There are two lakes on Pagan, the largest of the Northern Islands. This reporting cycle an additional lake has been identified on Anatahan. The Northern Islands Mayor reported that after the 2003 volcanic eruption, a second open water lake appeared on the northwestern part of the island where a betelnut grove used to be.

BECQ does not have any recent lake or wetland water quality data for the Northern Islands. However, there are few new anthropogenic stressors that may cause impairment to these waterbodies, other than areas where past military exercises have been carried out, and are proposed in the present.

The two brackish lakes on Pagan are located west of Mt. Pagan in the northern half of the island. While there are limited data available on these water bodies, fish have been observed in both of

Pagan's lakes. BECQ plans to conduct further research to confirm these findings and collect additional water quality data in the future as funding allows.

Due to the remoteness of these islands, and the fact that only a few individuals reside on Pagan, and none on Anatahan, the most notable old and new anthropogenic stressors to these waterbodies would be the expansion of military exercises to the Northern Islands. Given the impacts of WWII debris and dump sites on waterbody on and around the island of Saipan, more water quality data is needed for Pagan's and Anatahan's surface waters to fully assess whether all DUs are supported (see Table C-41, below). There is also the possibility that volcanic activity may cause additional impairment to surface waters potability, by a natural process and not a pollutant.

TABLE C-41. Assessment of the Northern Islands Waterbodies' DUs –Wetlands and Lakes

WATER BODY SEGMENT ID		24	25B	25A	26	27	28	29B	29A	30	31	32	33
Waterbody Type	Designated Use	Farallon De Medinilla	Anatahan (Lagu "Western" Lake)	Anatahan (Haya "Eastern" Lake)	Sarigan	Guguan	Alamagan	Pagan (Sanhalom)	Pagan (Lagona Sanhiyong)	Agrihan	Asumcion	Maug	Farallon De Pajaros
Lakes	Aquatic Life		*i*	*i*				F	F				
	Fish Consumption		*i*	*i*				*i*	*i*				
	Recreation		*i*	*i*				F	F				
	Potable Water Supply		*i*	*i*				*i*	*i*				
	Aesthetic Enjoyment/others		*F*	F				F	F				
CALM Assessment Category			*2*	*3*				*3*	*3*				
Wetlands	Aquatic Life							*i*	*i*				
CALM Assessment Category								*3*	*3*				

F – Designated uses fully supported
I – Insufficient information
N – Designated uses not supported

It should be noted that any substantial development in the Northern Islands, or expansion of military exercises would pose serious risk to the lakes and wetland DUs due to the potential for hydrological alterations, sedimentation caused by erosion from heavy equipment, live fire from military exercises, and potential grass fires, as well as surface and ground water pollution from munitions. Depending on the extent and location of proposed agricultural activities on the island, eutrophication issues may be of concern in the future as well.

Northern Islands – CALM Categories

The Northern Islands' coastal waters retain CALM Category 1 for most of the islands due to lack of potential anthropogenic stressors. However, Pagan was downgraded to CALM Category 3 due to the potential presence of heavy metals and other toxins from WWII debris, and presently proposed military expansion there. FDM was downgraded to CALM Category 5, due to the ongoing live military bombing exercises that have left the island topography visibly altered (2020. Personal Communication, Capt. Tenorio); forever ruining its natural beauty. In addition, visitor's ability to visit the island is prohibited due to safety concerns, which is unsupportive of the *Aesthetic Enjoyment* DU.

Most of the Northern Islands' freshwater streams retain CALM Category 1 due to lack of potential anthropogenic stressors, except for the islands of Anatahan and Pagan, where there is insufficient fish tissue and biota studies to test for potential heavy metals or toxins from WWII military activities. These islands are assigned CALM Category 3.

Anatahan's and Pagan's wetlands and lakes are designated CALM Category 3 due to lack of information about potential anthropogenic stressors, and due to past WWII dumps, expended munitions, and other military debris.

C.3.8.1. FARALLON DE PAJAROS – Waterbody Segment 33

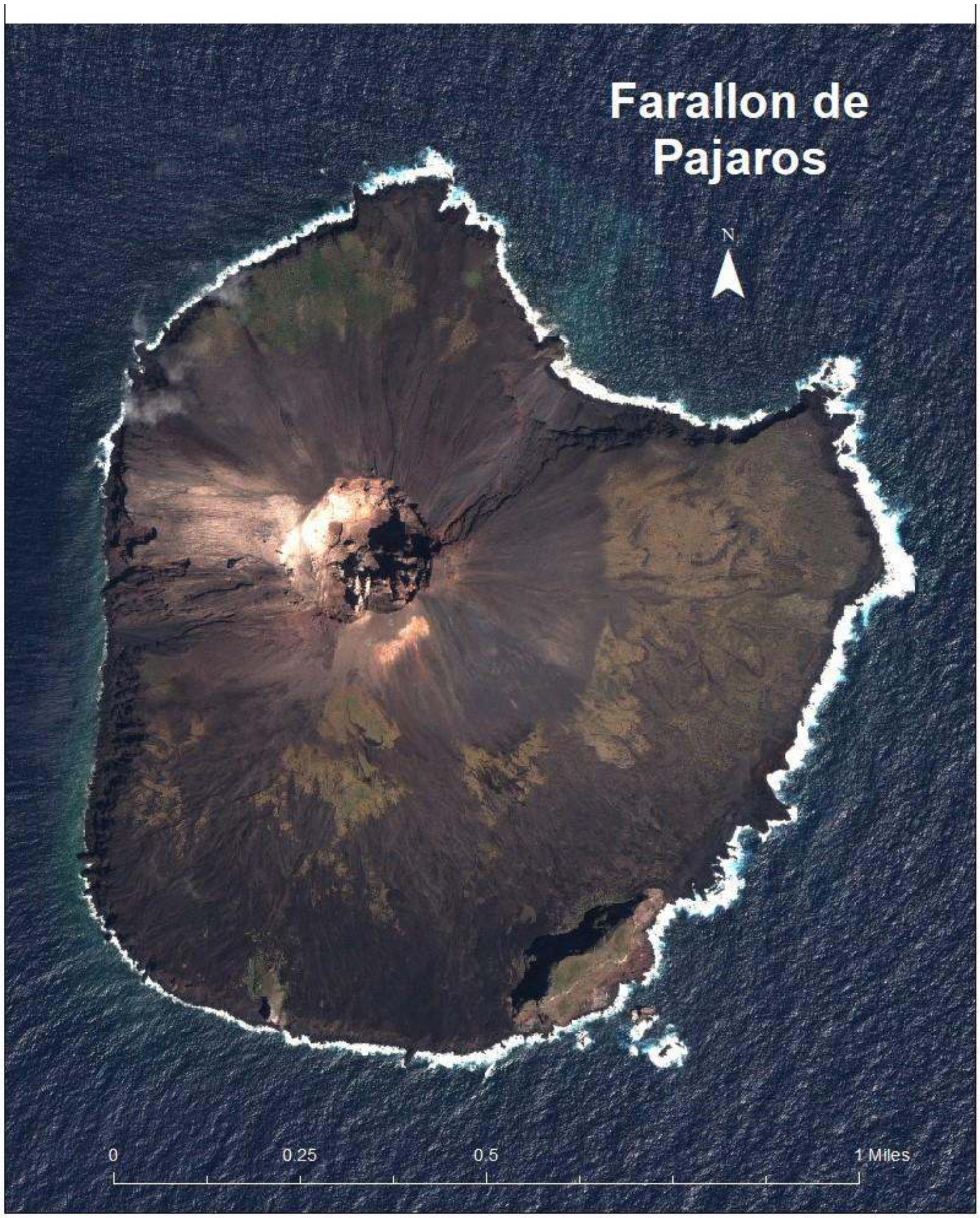
Farallon de Pajaros (FDP), which roughly translates to "Cliff of Birds", is also known as Uracas, which is Spanish for "Magpie" (Figure C-52., on the following page). It is the northern most island within the CNMI archipelago and is a single active stratovolcano. A stratovolcano is a volcanic cone island composed of built up hardened layers of lava and ash.

FDP is uninhabited with little vegetation and steep slopes. Its entire length of coast line is 7.2 miles. Trusdell reported in "*Marianas, Geology*", that, "The lack of vegetation indicates recurring volcanic activity on a 1-3 year frequency. The island's remote location makes an absolute determination of eruptive frequency difficult.", (2009. Gillespie).

Upon request by the CNMI government, the Smithsonian National Museum of Natural History Global Volcanism Program (GVP) sent a team of volcanologists from USGS to visit FDP, and other Northern Islands in May 1992. The team reported that, "When observed from an airplane, the volcano continued to fume vigorously, but no active lava was seen." The GVP website lists FDP's last eruption in 1967, (https://volcano.si.edu/database). However, more recent observations by passing boat crews have seen steam and volcanic gases escaping from the volcano. Therefore, passengers and crew do not disembark on the island, due to potential eruptions (March 3, 2020. Personal Communication with Captain Keli Tenorio, Master Class Certification 110 ton).

However, FDP is still home to many native birds. Boobies (*Sula spp.*) and terns (*Sternidae* spp.) are common, as stated in the, *"Intro to the Mariana Islands: Farallon de Pajaros (Uracas)",* UoG Sea Grant Guahan (youtube.com/watch?v=rBwPsWIVmkU)".

FIGURE C-52. Farallon de Pajaros "Uracas" (Segment 33)



Farallon de Pajaros - Coastal Marine Waters

FDPs pristine surrounding coastal waters were made part of the Marianas Trench Marine National Monument in 2009 and are highly protected and valued. These high quality waters constitute an outstanding Commonwealth resource and provide valuable marine ecosystems.

However, all reefs in the Northern Islands were affected by the 2014 and 2017 global bleaching events, which caused drastic declines in coral cover in the southern islands. However, because of their remoteness, it is expected that these reefs affected by global bleaching events, have greater potential for recovery.

For this reason, visual assessments, anecdotal evidence, and professional judgement, FDP's coastal waters fully support all DUs.

Farallon de Pajaros - Freshwater Streams

There have been no surveys completed on FDP to rule out any ephemeral stream systems. Regardless, due to their remote location, and lack of anthropogenic stressors, they remain in their natural pristine state. For this reason, FDP's stream systems attain all of their DUs.

Farallon de Pajaros – CALM Categories

Due to its remote location FDP's coastal waters and streams retain a CALM Category 1, which fully support all their DUs.

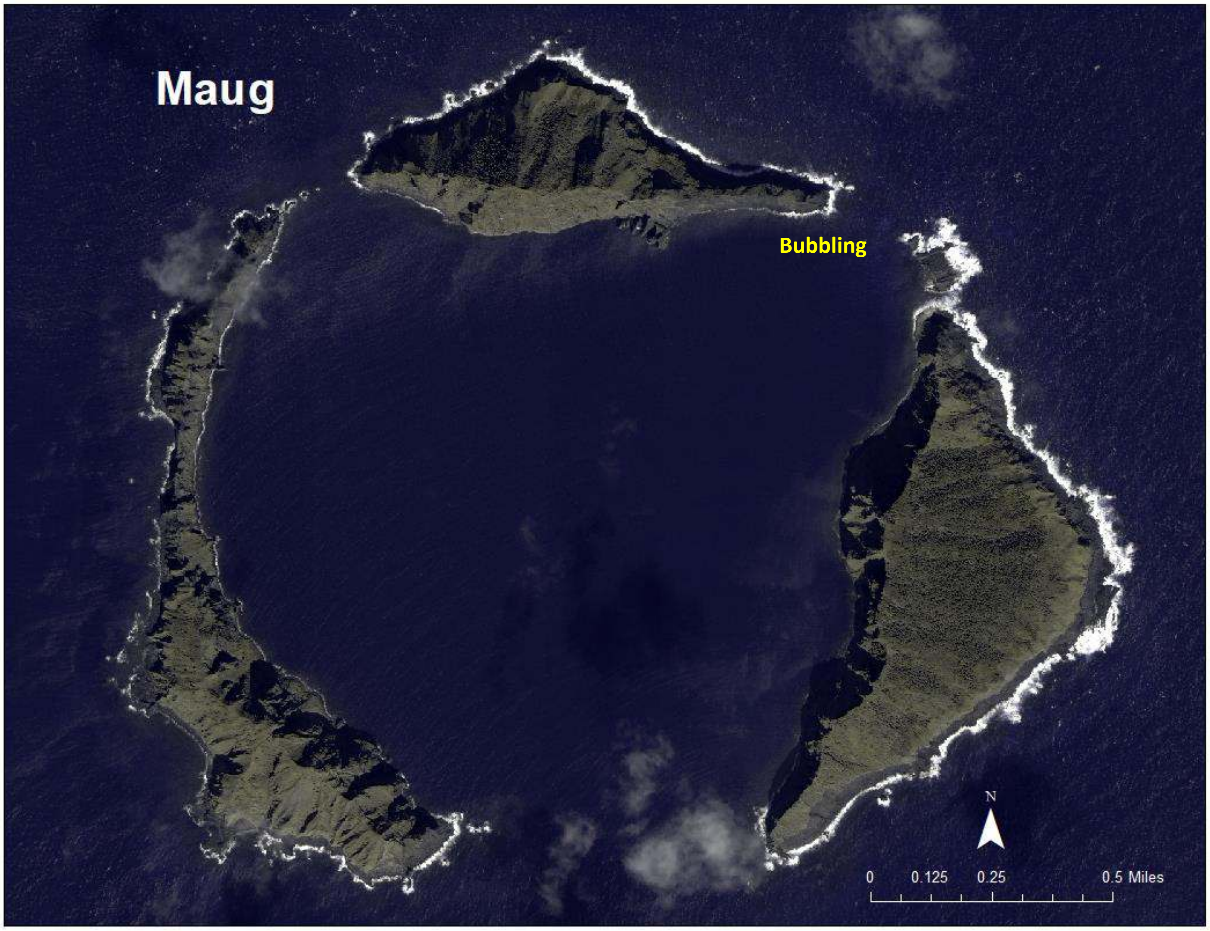
There are no lakes, or wetlands on FDP.

C.3.8.2. MAUG – Waterbody Segment 32

Maug is an uninhabited archipelago of three steeply sloped islands; the outer rim was once part of a stratovolcano (2009. Gillespie), as seen in Figure C-53., on the following page.

Its entire coast is 9.5 miles in length. The width of each island is no larger than approximately 0.5 miles. Trusdell noted that Maug's islands have only, "one or two pocket beaches" (2009. Gillepsie).

FIGURE C-53. Maug (Segment 32)

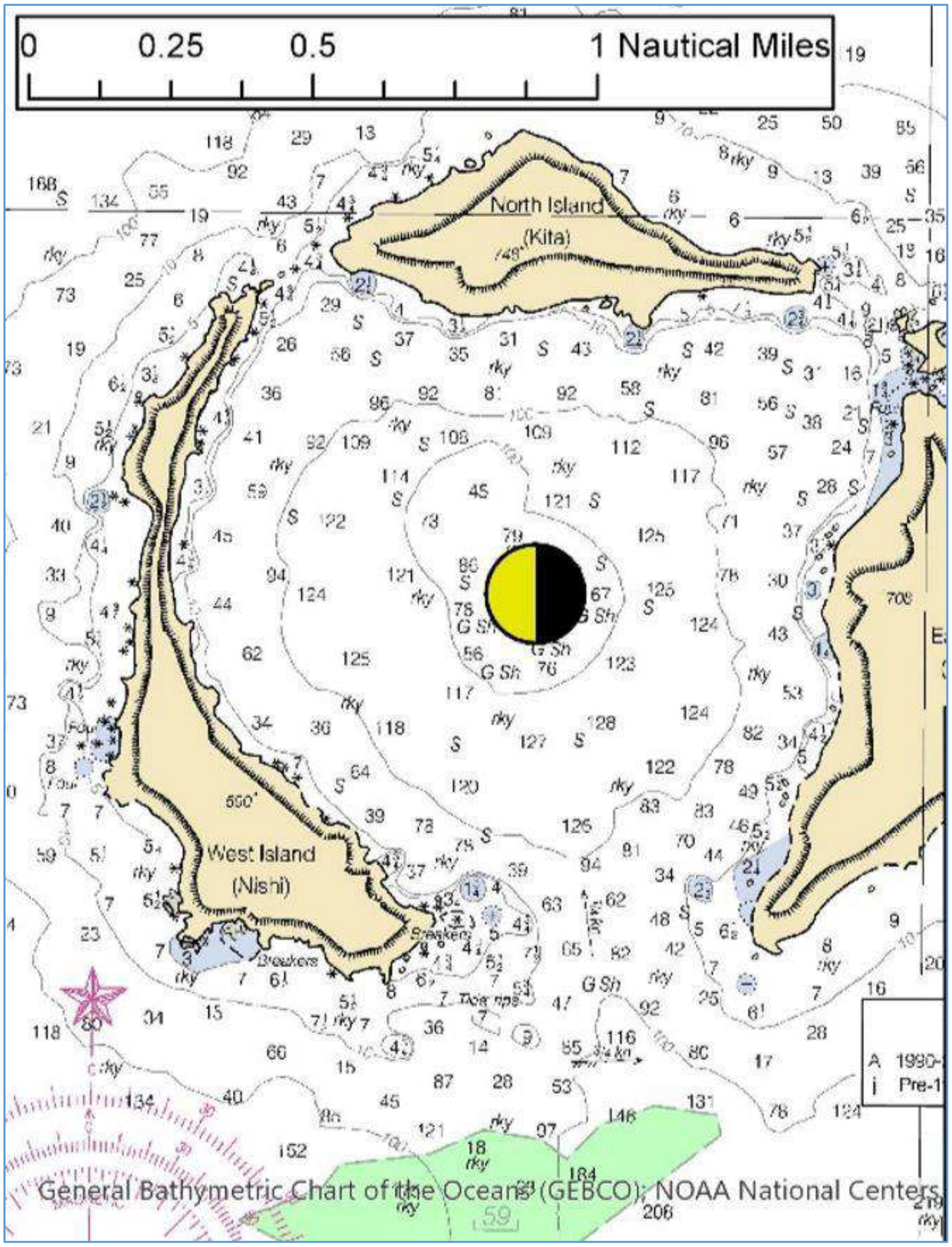


The Smithsonian GVP conducted an aerial observation of Maug, in May 1992. The team reported, "no signs of steaming or other evidence of recent volcanic activity". However, Trusdell stated that a bathymetric survey conducted by NOAA in 2004, showed, "…a resurgent cone within the lagoon between the islets." (2009. Gillespie).

Captain Keli Tenorio confirmed this. She stated that she has been unable to find anchorage for her ship further away from the islands' shores (2020. Personal Communication, Capt. Tenorio). On one occasion while anchored near the northern island on a very calm day, the crew observed volcanic gases bubbling near the eastern island (Shown in Figure C-53 above), after which a large wave was produced from the wall of the western island indicating seismic activity.

Figure C-54., on the following page shows the bathymetry of Maug's waters.

FIGURE C-54. NOAA Bathymetry map of Maug



Maug - Coastal Marine Waters

Maug's surrounding coastal waters Like FDP's, are also part of the Marianas Trench Marine National Monument and are highly protected and valued. These high quality waters constitute an outstanding Commonwealth resource and provide valuable marine ecosystems. As was stated previously, all reefs in the Northern Islands were affected by the 2014 and 2017 global bleaching events, which caused drastic declines in coral cover in the southern islands. However, because of their remoteness, it is expected that these reefs affected by global bleaching events, have greater potential for recovery.

For this reason, visual assessments, anecdotal evidence, and professional judgement, Maug's coastal waters fully support all its DUs.

Maug - Freshwater Streams

There have been no visual field assessments conducted on Maug's to determine whether or not there are ephemeral stream systems by BECQ. Regardless, due to their remote location, and lack of anthropogenic stressors, they remain in their natural pristine state. For this reason, Maug's stream systems support all of their DUs.

Maug – CALM Categories

Due to their remote location, Maug's three islands retain a CALM Category 1 for its surrounding coastal waters, and stream systems, which fully support all their DUs.

There are no lakes or wetlands on Maug.

C.3.8.3. ASUNCION – Waterbody Segment 31

Asuncion is an uninhabited stratovolcano (Smithsonian GVP) approximately 2 miles wide by 2 miles long, with 7 miles of coastline. Asuncion "is the steepest" of the Northern volcanic islands, as stated in the Pacific Islands Benthic Habitat Mapping Center (PIBHMC) in the School of Ocean and Earth Science and Technology at the University of Hawai'i at Manoa's website; www. http://www.soest.hawaii.edu/pibhmc/cms/data-by-location/cnmi-guam/asunction-island/).
The summit contains a "shallow crater with a spatter cone from the 1906 eruption.", (2009. Gillespie), which can be seen in Figure C-55., on the following page.

The Smithsonian GVP, reported "vigorous steaming was occurring from several locations in the summit crater…", on May 18th, 1992. However, GVP has reported no further eruptions to date.

Trusdell also reported that the southwest flank of the volcano has the gentlest slopes on Asuncion, ", …of less than 5°", (2009. Gillespie).

There are no introduced ungulates on island; only geckoes, coconut crabs, native birds, etc., making this island a natural terrestrial sanctuary (2020. Personal Communication, Capt. Tenorio).

Asuncion - Coastal Marine Waters

Asuncion is the southernmost island of the Marianas Trench Marine National Monument established in 2009. Its surrounding coastal waters are high quality waters and constitute an outstanding Commonwealth resource. Asuncion's coastal waters provide valuable marine ecosystems. However, all reefs in the Northern Islands were affected by the 2014 and 2017 global bleaching events, which caused drastic declines in coral cover in the southern islands. However, because of their remoteness, it is expected that these reefs affected by global bleaching events, have greater potential for recovery.

FIGURE C-55. Asuncion (Segment 31)

For this reason, visual assessments, anecdotal evidence, and professional judgement, Asuncion's coastal waters fully support all its DUs.

Asuncion's - Freshwater Streams

There have been no visual field assessments conducted by BECQ on Asuncion's to determine if there are ephemeral stream systems. Regardless, due to their remote location, and lack of anthropogenic stressors, they remain in their natural pristine state. For this reason, Asuncion's stream systems support all of their DUs.

Asuncion's – CALM Categories

Due to its remote location Asuncion retains a CALM Category 1 for its surrounding coastal waters and stream systems, which fully support all their DUs.

There are no lakes, or wetlands on Asuncion.

C.3.8.4. AGRIHAN – Waterbody Segment 30

Agrihan has steep slopes, and is "the highest-standing stratovolcano and largest (by subaerial volume) in the CNMI.", as reported by Trusdell, F. A., (2009. Gillespie). In 2018, the altitude of Mt. Agrihan was recorded at 3204 feet, by Mitchler, John D., and Larson, Reid, who reached its summit with difficulty during an expedition of the island (Frick-Wright, Peter (30 January 2019), "*The Obsessive Quest for High Pointers", Outside,* online magazine.

Its last known eruption was in 1917 (Smithsonian GVP). Trusdell stated that this eruption left a spatter cone and flows which cover approximately 50 percent of the large central crater floor. "This large crater implies a local edifice with shallow magma storage within the volcano. ", (2009. Gillespie).

Trusdell also described a large canyon in the north, "into which a recent, large flow advanced to form a delta on the coast.", and that the, "… southwest coast has several beaches composed of mineral sands; otherwise, the coast is rocky."

In the past the island was seasonally inhabited until 1990, when it was evacuated due to volcanic activity. At this writing six (6) people have returned to reside on Agrihan (personal communication, Northern Islands Mayor, Vicente "Ben" Santos, December 5th, 2019).

Figure C-56., on the following page shows a densely vegetated island with mixed forestation.

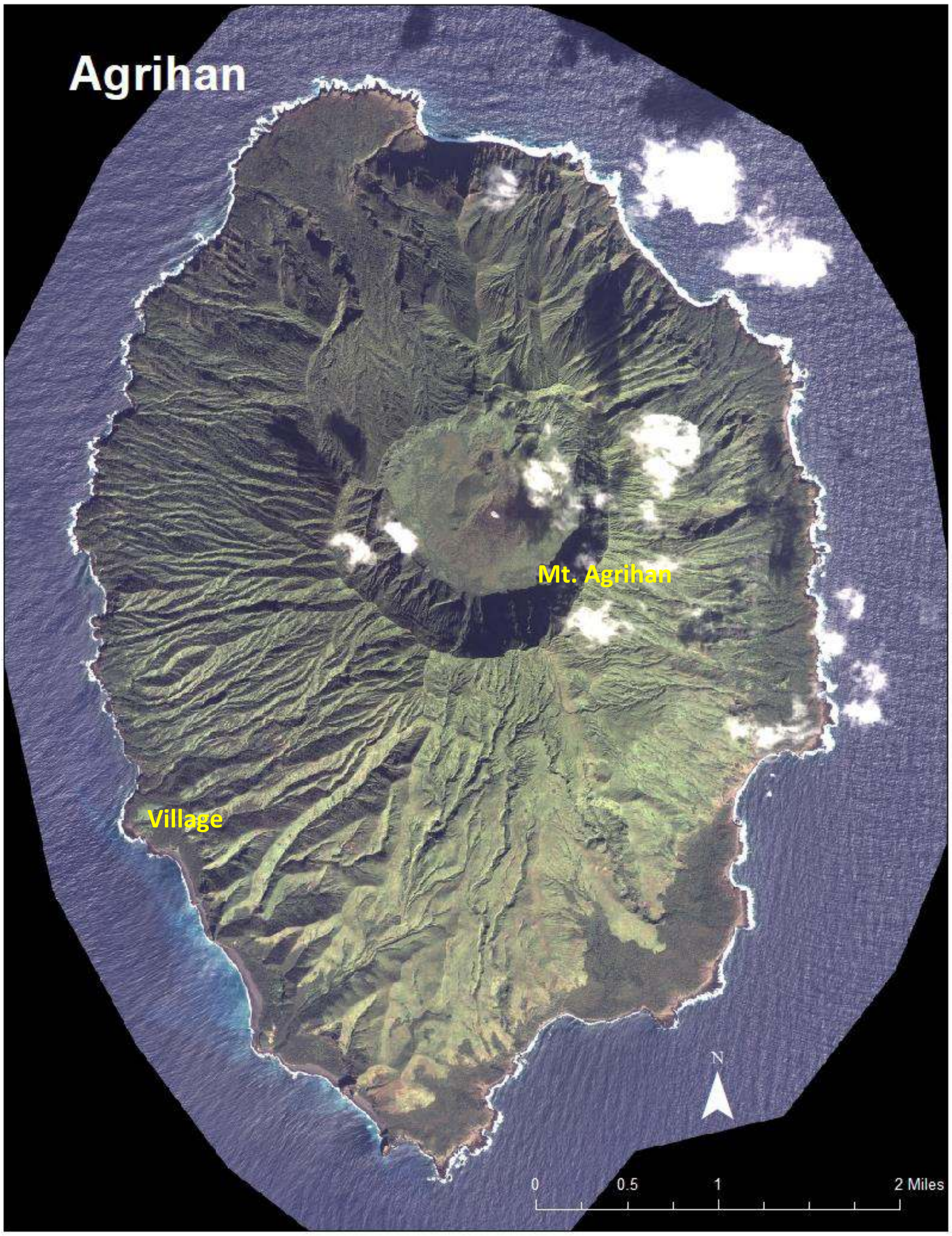
Agrihan - Coastal Marine Waters

Agrihan's is surrounded by deep blue waters home to sharks not seen in other parts of the Archipelago including Whale sharks and Thrasher sharks. For this reason, visitors are warned against swimming in Agrihan's coastal waters (2020. Personal Communication, Capt. Tenorio).

Agrihan's sparse population, remote location, and lack of development has provided its surrounding coastal waters with a great deal of protection from anthropogenic stressors. However, all reefs in the Northern Islands were affected by the 2014 and 2017 global bleaching events, which caused drastic declines in coral cover in the southern islands. However, because of

Agrihan's remoteness, it is expected that these reefs affected by global bleaching events have greater potential for recovery.

FIGURE C-56. Agrihan (Segment 30)



For this same reason, Agrihan's coastal waters fully support all its DUs based on visual field assessments, research, and professional judgement.

Agrihan - Freshwater Streams

Agrihan has several ephemeral stream systems, and is considered to be one of the wettest of the Northern Islands (2020. Personal Communication, Capt. Tenorio). The Northern Island Mayor, reported that upon a particularly heavy rain event in 2009, He and his party circumnavigated the island on Captain Tenorio's 12ft dinghy, and noted "plenty" of waterfalls flowing (personal communication Vicente ("Ben") Santos, December, 5, 2019). Due to their remote location, and lack of anthropogenic stressors, Agrihan's stream systems remain in their natural pristine state, and fully support all its DUs.

Agrihan – CALM Categories

Due to its remote location Agrihan's coastal waters and streams systems retain a CALM Category 1, which fully support all their DUs.

There are no lakes, or wetlands on Agrihan.

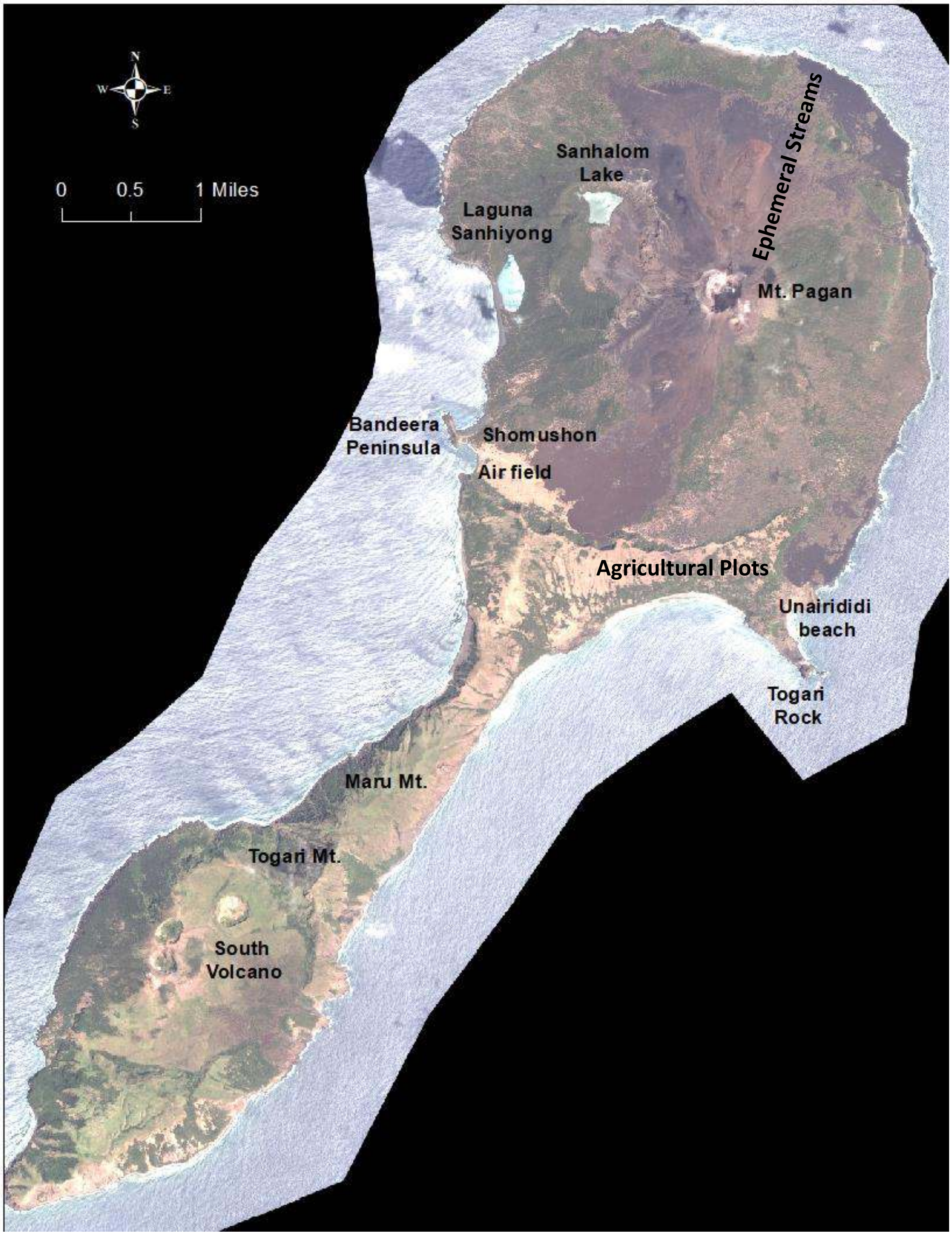
C.3.8.5. PAGAN – Waterbody Segment 29

According to the Smithsonian GVP, Pagan is one of the largest and most active of the Northern volcanic Islands, with 28.2 miles of coastline. Trusdell stated that it is the second most active after FDP and is "made up of a string of volcanoes originating from three volcanic centers…, distinguishing the island from the rest of the Mariana Islands.", (2009. Gillespie). See Figure C-57., on the following page.

Mt. Pagan, at 1,870 feet (Smithsonian VDP), lies within a caldera in the north. This volcano is separated by a narrow isthmus (a strip of land surrounded by marine waters on either side) from three volcanoes in a caldera in the south. The isthmus is also "composed of another volcanic center (the highest point is Togari Mountain...) at 579 m above sea level". These features can easily be distinguished in Figure C-57., on the following page.

Pagan is the only Northern Island that contains an operational airstrip, which was established prior to WWII. The other Northern Islands may only be accessed by boat or helicopter. Therefore, Pagan, has had the most anthropogenic stressors from present day residents and their livestock, and from past war time activities, including WWII debris, dumpsites, and unexploded ordinance. There were seven (7) Japanese "Zero" fighter planes observed on the island (2020. Personal Communication, Capt. Tenorio).

FIGURE C-57. Pagan (Segment 29)



Pagan's residents were evacuated to Saipan in 1981 after a large eruption occurred. However, families subsequently returned to the island after volcanic activity subsided in 1985. There are presently four (4) local island residents at the time of this writing (2019. Personal Communication, Northern Islands Mayor, Vicente "Ben" Santos).

The northern volcano, Mt. Pagan erupted once again in 2006. This was followed by another eruption of both Mt. Pagan and the southern volcanoes in 2012 (Smithsonian GVP). Figure C-58., is a photo taken from the International Space station at that time, showing a large steam plume from Mt. Pagan.

FIGURE C-58. 2012 Eruption as seen from the International Space Station

Just a year later, in 2013, the US Naval Command filed a proposal to acquire the island for new live-fire and maneuver training, for which a new EIS has been completed, and another is currently in the making.

This was at a time when the CNMI Emergency Management Office (EMO) and USGS Volcano Hazards Programs still had an Aviation Color Code and Volcano Alert Advisory in place. The Alert Advisory was only recently lowered in January 2016, after EMO and USGS determined that "Satellite data and ground-based observations from a field crew and local residents near Pagan indicated that steam-and-gas emissions have significantly decreased since March 2015"., (Smithsonian GVP).

Pagan - Coastal Marine Waters

Pagan's coastal waters are abundant with marine life. Pagan's western coast has beautiful black sand beaches, while the eastern and southern coasts have white sand beaches. Due to the small number of inhabitants on the island, there are few pressures exuded on Pagan's marine environment by subsistence fishing. These practices have yet to drastically affect the ecosystem. During the 2014 Sette Cruise, members of the BECQ MMT noted Pagan's coastal marine habitats included substrate made up of volcanic rock and boulders that provide habitat to coral and algae species, predominately Pocillopora sp., (2020. Personal email, Dr. Denise Perez). These habitats support a high density of reef fish, such as Naso lituratus. Shallow reef areas on Pagan also have high diversity of coral, algae, and macroinvertebrates including massive Porites, Acropora spp., and giant clams (Tridacna sp.,).

FIGURE C-59. Pagan's Reef in 2014

In 2014, the MMT noted that the reefs around Pagan, along with the rest of the Northern Islands experienced widespread bleaching due to increases in sea surface temperatures.

FIGURE C-60. 2014 Coral Bleaching on Pagan's Reef

The 2019 "*Long-Term Marine Monitoring Program Final Report*" stated that, "It is expected that reefs were affected by the 2017 global bleaching event as well, to what extent is unknown. If herbivore populations remain adequate recovery of these reefs should be relatively quick". For this reason, and professional judgement, Pagan's coastal waters fully support the *Propagation of Aquatic Life* DU.

To date, there have been no data collected on fish tissue and/or biota contamination in Pagan's coastal waters to assess the *Fish and Shellfish Consumption* DU. However, based on Denton's findings of heavy metal contamination in sediment and biota surrounding Saipan's WWII debris and dumpsites, there is a great potential for Pagan's marine habitat to be contaminated as well, (2018., 2016., 2009. Denton, et.al.). This underscores the importance of conducting toxicity studies on Pagan's near shore environment, as well as other islands where live fire has occurred, continues to occur, or is proposed to happen should military exercises be allowed there.

BECQ has no available water quality data on Pagan's coastal waters. However, due to the island's remoteness, sparse number of inhabitants, and lack of development, Pagan's coastal waters are considered in full support of the *Recreation* DU, based on professional judgement.

Pagan is the easiest of the Northern Islands to access by boat or air, hence it is a valuable resource for resettlement and for expanding the CNMI's adventure tourism economy. Local residents and tourists that have had the opportunity to spend time on Pagan remark on its natural beauty, and the abundance of marine life to enjoy and fish. For this same reason, Pagan's coastal waters fully support the *Aesthetic Enjoyment* DU, based on anecdotal assessment, and professional judgement.

Pagan - Freshwater Streams

Most precipitation on Pagan flows through subterranean transport from land to sea. However, the deep ravines on Mt. Pagan's northern slope may have ephemeral streams that flow over land to the coast (2020. Personal Communication, Capt. Tenorio). This conflicts with the 1957 US Navy report entitled, "Military Geology of Pagan, Mariana Islands" prepared by Corwin, G., et. Al., which states that, "There are no streams and practically no surface runoff even during moderately heavy rains," on Pagan. The report attributed this to "dense vegetation and to high infiltration rates into the surface deposits." However, to date, this has not been validated by BECQ using the CNMI SVAP.

Given that there is anecdotal evidence that Agrihan has ephemeral streams and waterfalls flowing during torrential rains (2019. Personal Communication, Northern Island's Mayor, Vicente "Ben" Santos and 2020. Personal Communication, Capt. Keli Tenorio), there is a strong possibility that ephemeral streams exist on other Northern Islands. Pagan's size, and the presence of wetlands and lakes on island, makes for a strong case that ephemeral streams exist here as well, and for the 1957 report to be inconclusive.

To date, there have been no data collected on fish tissue and/or biota contamination in Pagan's streams to assess the *Fish and Shellfish Consumption* and *Potable Water Supply* DUs. However, as was discussed about Pagan's coastal waters, Denton's findings of heavy metal contamination in sediment and biota surrounding Saipan's WWII debris and dumpsites (2018., 2016., 2009. Denton, et.al.), would suggest that there is a great potential for Pagan's streams to be contaminated as well.

Pagan – Wetlands and Lakes

Pagan contains no mangroves, but there are rather young undeveloped wetland marshes with emergent vegetation surrounding Pagan's lakes (CNMI DFW, Oceana, 1990). In previous years, the biggest threat to these wetlands were legacy WWII debris, grazing by free roaming ungulates; goats, pigs and cows, and from fallen ash due to volcanic eruptions. However, these impairments are not caused by pollutants.

Pagan also has two large brackish lakes located west of Mt. Pagan in the northern half of the island. One is named Sanhalom (CN 29LAK B), or "Inner Lake", which covers 27 acres and is warmed by natural hot springs. Captain Tenorio who lives on Pagan seasonally, has observed black and white tilapia in Sanhalom Lake (2020. Personal Communication, Capt. Tenorio).

The other lake is named Lagona Sanhiyong (CN 29LAK A), which covers 34 acres, and also contains tilapia. It is approximately 65 ft deep. During the Japanese occupation, sea planes would land here. However, this lake has decreased in size over the years due to ash fallout from Pagan's frequent eruptions. (2020. Personal Communication, Capt. Tenorio).

Lagona Sanhiyong is separated from Pagan's lagoon by a sandbar, as reported by Pacific Planning and Design Consultants in their 1978 "*Physical Development Master Plan for the Commonwealth* *of the Northern Mariana Islands"*. The report goes on to describe, "Storm driven waves occasionally over top the bar, and enter the lake."; adding to its salinity. It is also a drinking water source for the islands' ungulates (2020. Personal Communication, Capt. Tenorio). Given these facts and observations, both of Pagan's lakes fully support the *Propagation of Aquatic Life* DU.

There is insufficient data on fish tissue or biota contamination to assess the *Fish and Shellfish Consumption* DU. However, it is important to note given the amount of WWII debris and dump sites on Pagan, there may be heavy metal or other toxic contamination in the wetlands and lakes' sediment, just as there are in WWII dumpsites around Saipan. This emphasizes the need for collecting sediment and water quality data from pagan's wetlands and lakes to fully assess if these surface waters have been contaminated above FDA guidelines.

There is no bacteriological water quality data for Pagan's lakes. However, given that there are few people residing on the island at any one time, and that the lakes have been used for recreational purposes with no reports of water borne ailments, Pagan's Lakes are considered fully supportive of the *Recreational* DU based on anecdotal evidence and professional judgement.

FIGURE C-61. Pagan's Lagona Sanhiyong

BECQ has no water quality data to assess the lakes' support of the *Potable Water Supply* DUs, but given the potential presence of WWII debris, and munition constituents, every effort should be made to assess the quality of these waters for heavy metals and other toxic contaminants.

Lakes within the CNMI Archipelago are rare. They are few in number, but display great beauty as can be seen in Figure C- 61., on the previous page, of Pagan's Lagona Sanhiyong. For this reason, Pagan's Lakes fully support the *Aesthetic Enjoyment* DU.

Pagan – CALM Categories

Pagan's coastal waters and ephemeral stream systems were downgraded to CALM Category 3 this reporting cycle, due to insufficient information about the potential presence of heavy metal and other toxic contaminants from WWII debris, unexploded ordinance, and dumpsites. Dr. Denton's many heavy metal studies of Saipan's near shore environment indicate that similar contamination may be found on Pagan (2018, 2014, 2008, Denton, et.al.).

Pagan's lakes and wetlands are assigned a CALM Category 3 this reporting cycle due to insufficient water quality data, and the threat of potential expansion of military exercises.

C.3.8.6. ALAMAGAN – Waterbody Segment 28

In the 1960s, there were as many as 70 people residing on Alamagan during the island's copra production years, along with a school. However, the school was buried by volcanic ash from the 1981 eruption of neighboring Pagan, and the school was subsequently closed (2019. personal communication Vicente "Ben" Santos, Northern Islands' Mayor).

During this reporting cycle, seven (7) people were living on the island. However, Captain Tenorio stated that the residents were brought back to Saipan before Christmas 2019 (2020. Capt. Tenorio).

Alamagan's steep conical shape stands at 2,441 ft in elevation and "is the emergent summit of a large stratovolcano with a 350-m-deep summit crater east of the center of the island" (Smithsonian GVP). It is surrounded by 9.4 miles of coastline (See Figure C-62., on the following page).

In 2012, Brainard reported in the "*Coral reef ecosystem monitoring report of the Mariana Archipelago: 2003–2007 (PIFSC Special Publication*, SP-12-01, NOAA Fisheries, Pacific Islands Fisheries Science Center)", that Alamagan's steep slopes are prone to landslides and that, "There are three smaller cones to the north, northwest and south of the main crater.", (2012. Brainard). See Figure C-62., on the following page.

"Alamagan has had no eruptions during historical time.", according to Trusdell who radiocarbon dated the most recent eruption between, "1077 ± 87 and 1410 ± 80 years ago.", (2009. Gillespie). However, Trusdell did note that near the summit, "there are several steaming areas."

FIGURE C-62. Alamagan's Peak 2014

Alamagan - Coastal Marine Waters

Alamagan's sparse population, remote location, and lack of development has provided its surrounding coastal waters with a great deal of protection from anthropogenic stressors. However, all reefs in the Northern Islands were affected by the 2014 and 2017 global bleaching events, which caused drastic declines in coral cover in the southern islands. However, because of Alamagan's remoteness, it is expected that these reefs affected by global bleaching events, have greater potential for recovery.

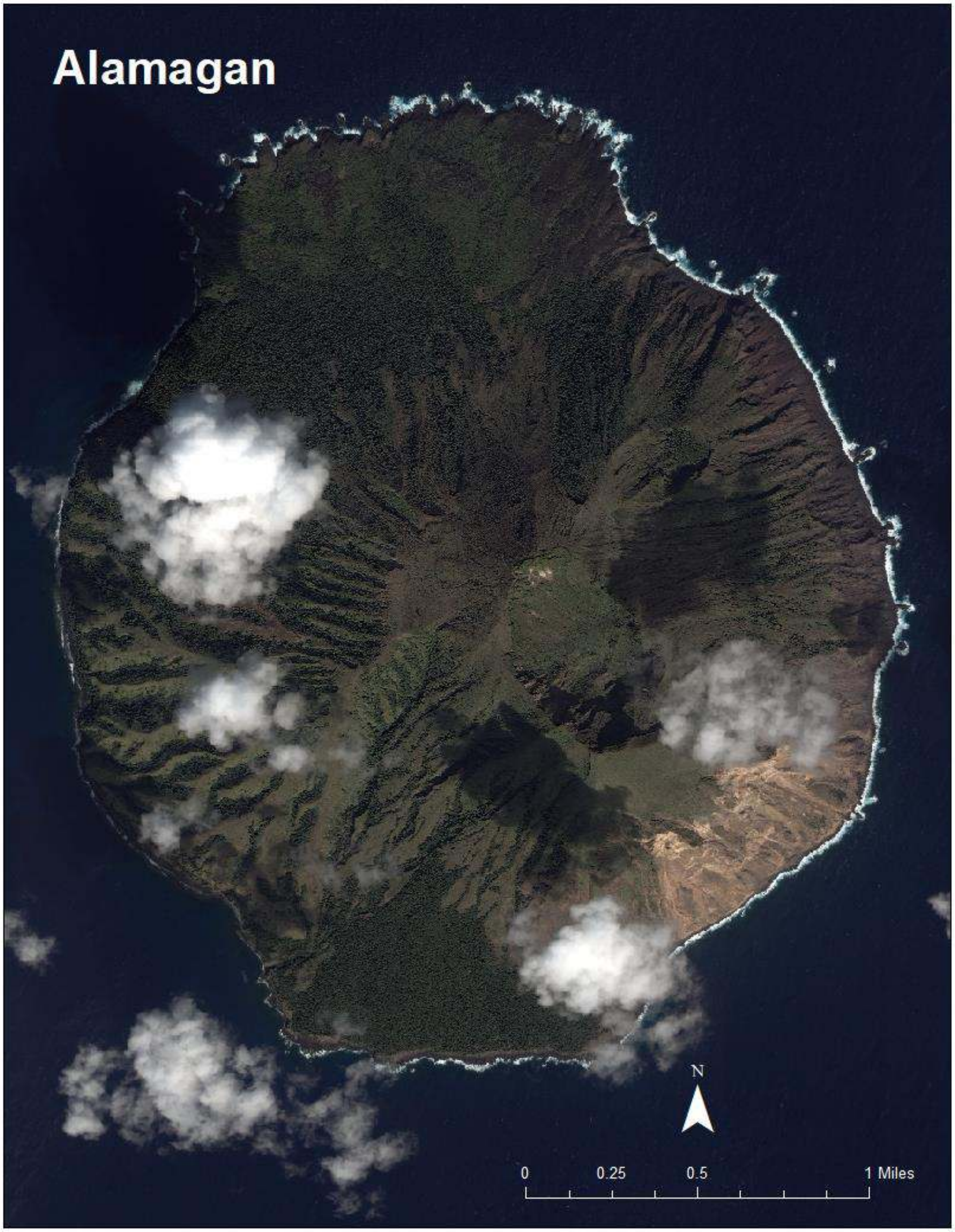
For this same reason, Alamagan's coastal waters fully support all its DUs based on visual field assessments, anecdotal evidence, available research, and professional judgement.

Alamagan - Freshwater Streams

There have been no visual assessments conducted by BECQ on Alamagan's stream systems. However, Brainard reported in his 2012 report that there were freshwater springs on the northern part of the west coast (2012. Brainard).

Due to Alamagan's remote location and small number of inhabitants, the streams are not considered threatened. For this reason, Alamagan's stream systems support all of its DUs.

FIGURE C-63. Alamagan (Segment 28)



Alamagan – CALM Categories

Due to its remote location Alamagan's coastal waters and streams systems retain a CALM Category 1 and support all DUs.

There are no lakes or wetlands on Alamagan.

C.3.8.7. GUGUAN – Waterbody Segment 27

The PIBHMC website states that Guguan is a dormant volcanic island and "has an eroded volcano on the south, a caldera with a post-caldera cone and a northern volcano, which has a breached summit crater that fed lava flows to the west". Trusdell dates its last eruption in 1883 and stated that it, "produced lava flows on the northern half of the island"., (2009. Gillepsie). Its highest elevation is at 942 ft on the southern stratovolcano (Smithsonian GVP) and is surrounded by 5.6 miles of coastline.

Guguan - Coastal Marine Waters

Guguan was designated as a wildlife sanctuary in 1985 and is managed by DLNR DFW. It is, "maintained as uninhabited for the preservation and protection of natural resources, including bird, wildlife and plant species.", (see Figure C-65., on the following page).

The island fauna include a variety of lizards, geckoes, and crabs. There are no ungulates on the island, but there are rats., (2020. Personal communication, Capt. Tenorio).

FIGURE C-64. Guguan Reef in 2014 (with *Acanthurus guttatus*)

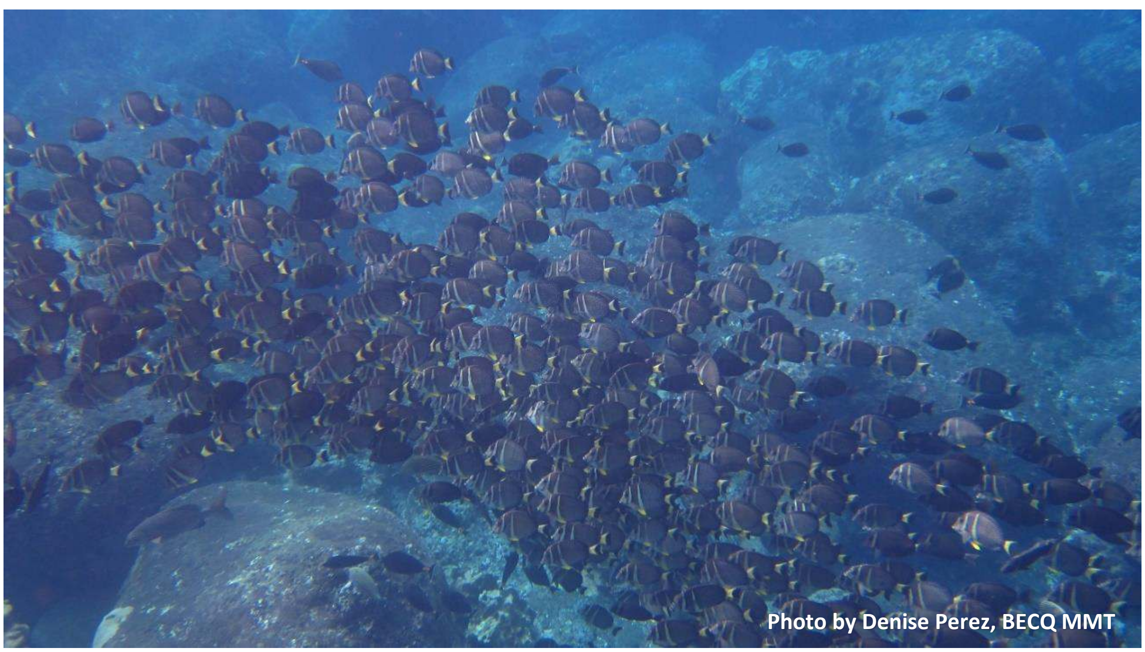


FIGURE C-65. Guguan (Segment 27)

Guguan's lack of inhabitants, remote location, and lack of development has provided its surrounding coastal waters with protection from anthropogenic stressors. However, all reefs in the Northern Islands were affected by the 2014 and 2017 global bleaching events, which caused drastic declines in coral cover in the southern islands. However, because of Guguan's remoteness, it is expected that these reefs affected by global bleaching events, have greater potential for recovery.

For this same reason, Guguan's coastal waters fully support all DUs based on anecdotal evidence, available research, and professional judgement.

Guguan - Freshwater Streams

There have been no visual assessments conducted by BECQ on Guguan's ephemeral stream systems. However, due to their remote location, and lack of anthropogenic stressors, they remain in their natural pristine state. For this reason, Guguan's stream systems support all DUs.

Guguan – CALM Categories

Due to its remote location Guguan's coastal waters and streams systems retain a CALM Category 1 for its support of all DUs.

There are no lakes or wetlands on Guguan.

C.3.8.8. SARIGAN – Waterbody Segment 26

Sarigan is an inactive stratovolcano with 6.0 miles of coastline. Its highest elevation is at 1,765 ft (Smithsonian GVP). There is a central caldera at the top of the volcano, "…with an ash cone and two lava domes...", (Brainard, 2012). "Landing on Sarigan is difficult because perpendicular cliffs surround much of the island. It has many ravines and valleys with dense tropical vegetation.

FIGURE C-66. Sarigan's Vegetated Slopes as seen in 2014

Sarigan was used as a fuel depot in past years. Ships would bring in large fuel tanks which were brought to the island by chopper. It was also a seasonal home for the Pangelinan family." (2020. Personal Communication, Capt. Tenorio).

FIGURE C-67. Sarigan (Segment 26)

In 2011, Kessler, C.C., reported in his US FWS report, "*Invasive Species Removal and Ecosystem Recovery in the Mariana Islands; challenges and outcomes on Sarigan and Anatahan*" that the feral pigs and goats that were once found on the island, were successfully removed in 1998 (2011. Kessler). Following their removal, native forest cover greatly increased, as did most species of flora and fauna. The eradication was so successful that this prompted a similar eradication program to be conducted by DFW on neighboring Anatahan.

Sarigan steep slopes on its southeast and southwest flanks are prone to erosion as seen in Figure C-67., on the previous page. This contrasts with the more gradual slopes on its northwestern side, which support more vegetative cover.

Sarigan - Coastal Marine Waters

Starmer, et.al., reported in the 2005 "*The state of coral reef ecosystems of the Commonwealth of the Northern Mariana Islands",* that, "Sarigan's lack of inhabitants and isolation, is believed to have resulted in minimal anthropogenic pressures on Sarigan's marine environment*" (In: Ed. Waddell (ed.). The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States: 2005.* NOAA Tech. Mem. NOS NCCOS 11, Silver Spring, MD).

During the 2014 Sette Cruise, members of the BECQ MMT noted Sarigan supported a diverse number of fish, coral, and macroinvertebrate species that inhabit the shallow reef areas. However, bleaching events were observed to have caused severe coral mortality for branching species that include *Acropora* and *Pocillopora* spp. A similar outcome is likely from the 2017 global bleaching event. However, given Sarigan's lack of inhabitants and remoteness, it is expected that these reefs have greater potential for recovery.

For this reason, Sarigan's coastal waters fully support all its DUs based on anecdotal evidence, available research, and professional judgement.

Sarigan - Freshwater Streams

There have been no visual assessments conducted by BECQ on Sarigan's ephemeral stream systems. However, due to their remote location, and lack of anthropogenic stressors, they remain in their natural pristine state. For this reason, Sarigan's stream systems support all DUs.

Sarigan – CALM Categories

Due to its remote location, and lack of anthropogenic stressors, Sarigan's coastal waters and ephemeral streams systems retain a CALM Category 1 and support all DUs.

There are no lakes or wetlands on Sarigan.

C.3.8.9. ANATAHAN – Waterbody Segment 25

Anatahan is an active stratovolcano surrounded by 17.3 miles of coastline (Smithsonian GVP). It is uninhabited due to recent eruptions, and the risk of future eruptions. During clear weather, Anatahan can be seen from Saipan's Mt. Takpochau.

Trusdell, stated that Anatahan has two peaks, the highest being approximately 2600 ft (787 m) above sea level (2009. Gillespie). Its central caldera contains a crater to the west, and a deeper crater to the east. Figure C-68., below shows an active vent emitting a white plume from the eastern crater.

FIGURE C-68. Anatahan (Segment 25) in 2005.

Anatahan, is scarcely vegetated due to frequent eruptions and lava flow, and until more recently, heavy grazing by feral goats and pigs. In 2002, CNMI DFW in coordination with US FWS and the Northern Islands Mayor's Office carried out a feral animal removal program with funding from the US Navy. As stated in their report, "*CNMI DFW Wildlife and Vegetation Surveys and Feral Animal Control ANATAHAN 2002-2003",* the program's goal was to, "remove all feral goats and pigs from the island to allow regrowth, translocation of bird species, and a recolonization of native flora and fauna (e.g., endangered Micronesian megapode, etc.)*"*, (2003. CNMI DFW Technical Report #10).

In May, 2003 Anatahan erupted causing further destruction of what scarce vegetation was present (PIBHMC website). The plume's ash fallout was observed on Saipan; darkening skies for several minutes. It also prohibited air traffic from Saipan's International airport. Volcanic activity continued through 2005. The most recent eruption occurred in 2007, "and lasted until 2008.", (GVP: Anatahan - Monthly Reports". Volcano.si.edu. Retrieved 12 October 2017. www. http://volcano.si.edu/world/volcano.cfm?vnum=0804-20=&volpage=var#bgvn_2804)

In follow up surveys for the eradication program, CNMI DFW reported that, "no goats were seen after 2005, and by 2013, it was concluded that all feral pigs had also been eradicated", (2014. "*Final report Anatahan Feral Pig Assessment CNMI"* CNMI DFW).

However, Kessler stated in his 2013 report for the "*Department of the Navy, No. N62742-13-P-1873",* that there continued to be evidence of rats and cats on Anatahan (2013. Kessler).

Anatahan - Coastal Marine Waters

The 2003 Anatahan eruption," …caused extensive damage to the nearshore reef habitats from falling ash, especially on the northern side", (PIBHMC website).

However, during the 2014 Sette Cruise, members of the BECQ MMT noted that the nearshore areas of Anatahan were characterized by unique structural features from the eruption. Volcanic boulders and rock walls provided habitat to a diverse number of fish, algae, and coral species (predominately *Pocillopora* sp.). However, the mass bleaching event had caused severe coral mortality for the shallow reef areas. The 2017 bleaching event would have also affected Anatahan's reefs. However, as this island remains uninhabited and undeveloped it is expected that there will be coral recovery as there was after the 2003 eruption.

For this reason, Anatahan's coastal waters fully support all DUs based on anecdotal evidence, visual assessments, available research, and professional judgement.

Anatahan - Freshwater Streams

There have been no visual assessments conducted on Anatahan's ephemeral stream systems by BECQ. However, due to their remote location, and lack of new anthropogenic stressors, these stream systems are considered in support of the *Propagation of Aquatic Life, Recreational,* and *Aesthetic Enjoyment* DUs. However, as was discussed previously, Denton's findings of heavy metal contamination in sediment and biota surrounding Saipan's WWII debris and dumpsites (2018., 2016., 2009. Denton, et.al.), would suggest that there is a potential for Anatahan's streams to be contaminated as well. Therefore, at present there is insufficient information to assess the *Fish* and *Shellfish Consumption, and Potable Water Supply* DUs.

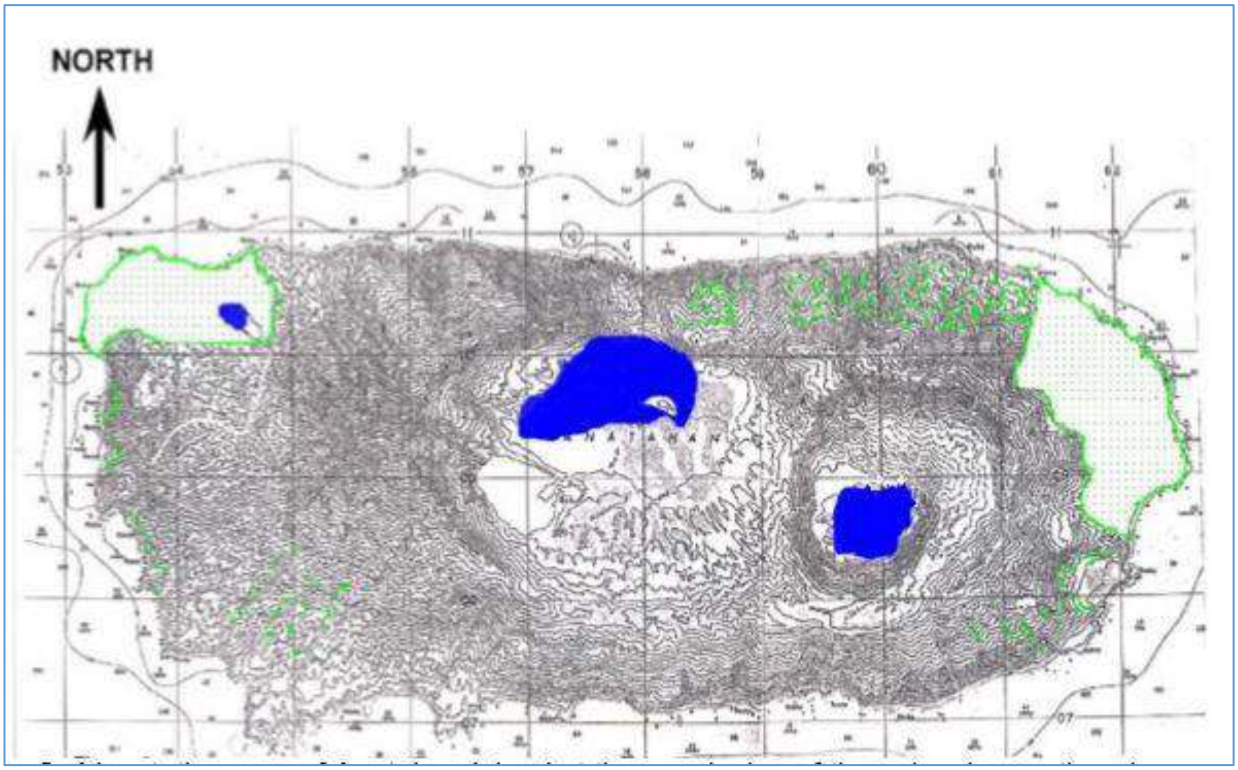
Anatahan – Lakes

Anatahan is the only other Northern Island besides Pagan that has lakes. In the past, CNMI IRs only reported one lake in the eastern caldera, now named Hagoi Haya "Eastern Lake" (Segment 25LAK A). However, more recent studies, images, and reports by volcanologists, researchers, and other visitors, confirm that new open water lakes form from time to time as the result of eruptions (2019. Personal Communication, Northern Island's Mayor, Santos, and Personal email, Frank Trusdell, December, 13th, 2019).

After the 2003-2005 eruption, the Northern Islands Mayor, Santos, stated that the marshy area in the caldera became larger with visible open water, and a small lake appeared on the western slope of the island, now named Hagoi Lagu "Western Lake" (Segment 25LAK B). The Mayor reported that the lake appeared where an old betelnut farm used to be located.

These lakes are also evident in the 2013 Vegetation Map taken from Kessler's 2013 Final report on Anatahan's feral pig eradication program for the Navy, as shown in Figure C-69. (2013. Kessler).

FIGURE C-69. 2013 Anatahan Vegetation Map (2013, No. N62742-13-P-1873, Kessler, C.)



Trusdell reported that Hagoi Haya, in the eastern crater, "is the result of a combination of processes to include: Subsidence due to magma evacuation/withdrawal, excise due to eruption of lava and ash and slumping due to faulting. One or more of these processes could be at work.", (Personal email, Frank Trusdell, December, 13th, 2019).

A more recent 2019 image provided by Trusdell is shown in Figure C-70., on the following page. The Lake at the base of the western crater no longer exists. Trusdell explained, that this lake is transient in nature, "… because meteoric water collects, in the rainy season, over a fine ash layer that is semi impervious to water. The fine volcanic ash works as an aquatard …" During the dry season, the meteoric water, "water derived from precipitation", then evaporates. (2019. Personal email, Trusdell)."

Trusdell also explained that the deeper pit in the eastern side of the crater formed what is now Hagoi Haya, and that it, "… is a combination of seawater and meteoric water. With the largest component being seawater. The green color is due to volcanic gases being dissolved or mixing with the water.", (2019. Personal email, Trusdell).

FIGURE C-70. Anatahan's Eastern Lake (Image by: 2019, Digital Globe)

To date, BECQ has not conducted water quality data or visual assessments of Anatahan's lakes. Therefore, there is insufficient information to assess the lakes' support of the *Propagation of Aquatic Life, Fish and Shellfish Consumption, Recreation*, or *Potable Water Supply* DUs. However, due to their remoteness, volcanic activity limiting the number of visitors to the island, and the successful removal of feral goats and pigs, Anatahan's lakes remain in their natural state and fully support the *Aesthetic Enjoyment* DU. See Section C.3.4. for further assessment of all CNMI lakes.

Anatahan – CALM Categories

Due to its remote location, and lack of anthropogenic stressors, and MMT's findings, Anatahan's coastal waters retain a CALM Category 1 and support all DUs.

Anatahan's ephemeral stream systems were downgraded to CALM Category 3 this reporting cycle, due to insufficient information about the potential presence of heavy metal or other toxic contaminants from WWII debris, unexploded ordinance, and dumpsites.

Given that Anatahan's Eastern Hagoi Haya Lake may contain dissolved gases from natural volcanic activity, that are not the result of anthropogenic pollutants, Hagaoi Haya (Segment LAK25A) is assigned a CALM Category 3. This is due to insufficient information and the reasonable assumption that at least one DU may not be supported. The emergent Hagoi Lagu (Segment LAK25B) on the western side of the island is assigned a CALM Category 2.

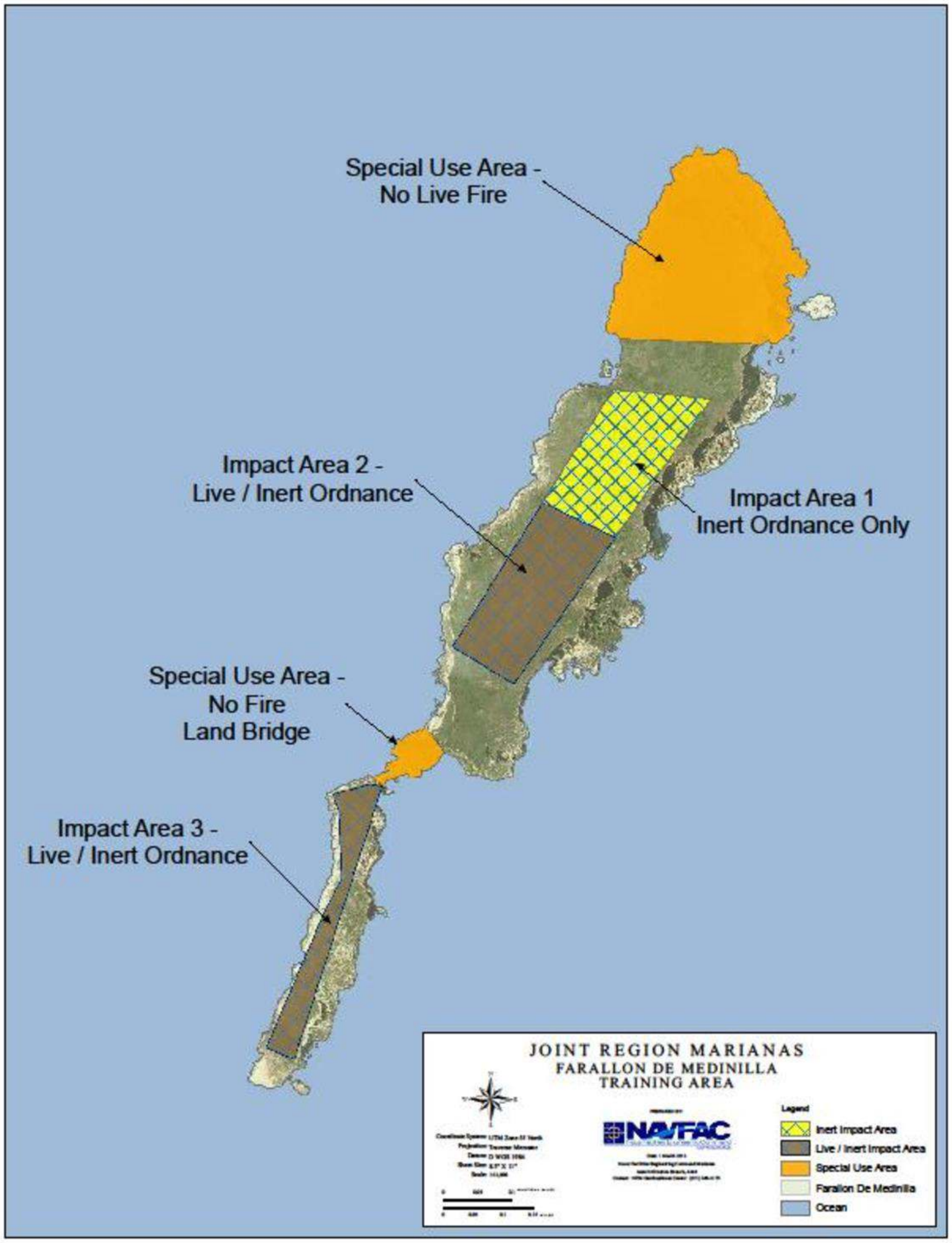
C.3.8.10. FARALLON DE MEDINILLA – Waterbody Segment 24

Farallon De Medinilla (FDM), or "No'os" in Chamorro, is of limestone geology similar to Saipan and Tinian rather than volcanic geology like the rest of the Northern Islands. This sets it apart as a unique part of the Northern Islands Chain. FDM is uninhabited with 4.2 miles of coastline.

FIGURE C-71. Farallon de Medinilla in 2016 (Segment 24)

It is leased to the US Navy for ongoing US military live bombing exercises on the northern half of the island that began in the early 1970s, and have just recently increased in frequency.

FIGURE C-72. FDM Live Bombing Range Areas (Source NAVFAC)



Therefore, it is the only Northern Island that's surrounding coastal waters are designated as Class A. This is the same class of waters as those surrounding ports and industrial areas on Saipan, Tinian and Rota. The ongoing bombing activity has heavily damaged FDM's topography.

FIGURE C-73. FDM Impact Area 2 – Live/Inert Ordinance (source Google Earth 2020)

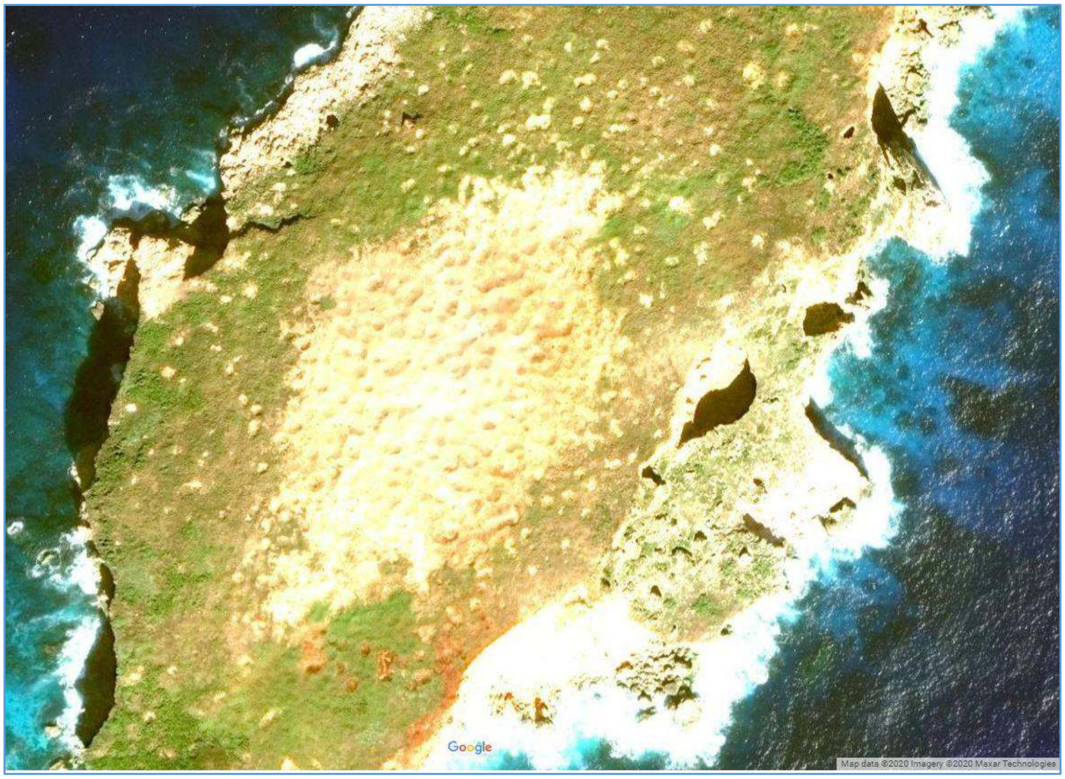


FIGURE C-74. FDM Northern Special Use Area – No Live Fire (source Google Earth 2020)

The military has also placed old cars and other debris/objects on the island to use as bombing targets (2020. Personal Communication, Capt. Tenorio). Capt. Tenorio stated that the very narrow raised plateau in the north is connected by a natural limestone land bridge to the southern half of the island. There are beautiful natural grottos under the land bridge, which would be "great for diving."

The island's steep cliffs drop sharply to the coastline below that would make it very difficult to access, if visitors were allowed during those times when military training exercises are not underway.

Although, FDMs topography has changed, it remains an important nesting site for migratory birds. Camp's 2016 Technical Study, "Farallon de Medinilla seabird and Tinian moorhen analyses", stated that FDM is home to Brown, Masked, and Red-footed boobies (http://hdl.handle.net/10790/2600). Terns and frigate birds may also be found there.

Farallon de Medinilla - Coastal Marine Waters

Smith's 2016 military report entitled "*De-facto marine protection from a Navy bombing range: Farallon De Medinilla, Mariana Archipelago, 1997 to 2012"*, (Marine Pollution Bulletin, Vol 102, Issue 1.), states, "The health, abundance and biomass of fishes, corals and other marine resources are comparable to or superior to those in similar habitats at other locations within the Mariana Archipelago ". For this reason, FDM's coastal waters are in support of its *Propagation of Aquatic Life* DU.

To date, there have been no data collected on fish tissue and/or biota contamination in FDM's coastal waters to assess the *Fish and Shellfish Consumption* DU. However, based on Denton's findings of heavy metal contamination in sediment and biota surrounding Saipan's WWII debris and dumpsites (2018., 2016., 2009. Denton, et.al.) there is great potential for FDM's marine habitat to be heavily contaminated as well, and at levels that may be unsafe for human consumption. This underscores the importance of conducting toxicity studies on FDM's near shore environment, as well as other islands where live fire and bombing exercises have occurred, continues to occur, or is proposed to occur in the future, as stated in DoD's CMJT EIS.

BECQ has no available water quality data on FDM's coastal waters. However, due to the island's remoteness and lack of potential for agricultural or human fecal contamination, FDM's coastal waters are considered in full support of the *Recreation* DU, based on professional judgement.

However, based on irreversible bombing impacts to the island's topography, left military debris, ordnance, and limited access due to military bombing exercises, FDM's coastal waters may not be enjoyed by locals or visiting tourists. For this reason, FDM's coastal waters do not support of the *Aesthetic Enjoyment* DU.

Farallon de Medinilla - Freshwater Streams

FDM has insufficient precipitation, topographical or geological features to support stream systems. Precipitation flows through subterranean transport from land to sea. Therefore, they are no streams present for assessment purposes.

Farallon de Medinilla – CALM Categories

FDM's coastal waters are assigned a CALM Category 5 due to the lack of opportunities for visitors to access these waters, and the destruction of the natural topography, which is unsupportive of the *Aesthetic Enjoyment* DU.

C.4. WETLANDS PROGRAM

Wetlands are only found on the islands of Saipan, Tinian, Rota, and Pagan. As with coastal and other surface waters, there is vastly more information available about wetlands on the southern inhabited islands than on any of the Northern Islands. Therefore, the following subsections will provide a more comprehensive picture of: impairments; enforced regulations; implemented management measures; and remediation and restorations efforts.

Although wetland water quality is not currently monitored, DCRM has been conducting wetland delineations, and limited assessments of wetlands since the early 1990's with the assistance of the US Army Corps of Engineers. In 1990, the CRM office adopted the *Saipan Comprehensive Wetlands Management Plan* (Plan). This Plan identified and classified wetlands on Saipan using the 1989 National Wetlands Inventory from the United States Fish and Wildlife Service, with limited ground-truthing of boundaries using color aerial photographs from 1987 and soil maps from the USDA Soil Conservation Service. The Plan assigned wetland values using an assessment matrix. The matrix weighed the value of the wetland based on its vegetative status, wildlife habitat, hydrological integrity, regional significance, and the degree of the wetland's isolation from development and other anthropogenic stressors. The Plan also included potential mitigation options for developments causing impacts to wetlands and recommended periodic Plan reevaluation and revisions.

In 1996, a *CNMI Wetlands Management Report* was written per request of, then Governor Froilan C. Tenorio. This interagency effort provided recommendations that would support ecosystem and habitat management, and improve the existing regulatory framework to minimize negative impacts from developments to nearby wetland systems.

In 1998, DEQ completed a *Unified Watershed Assessment for Saipan, Tinian, Rota, and the Northern Islands*. This assessment recommended rehabilitation of wetlands, mangroves, and streams as a feasible objective, and an important tool for appropriate watershed management.

Further wetland management efforts included drafting a *CNMI Hydrogeomorphic ("HGM") Functional Assessment Manual* in 2001. The draft proposed evaluating a wetland's "function" against a "high value" reference wetland which showed little impact from pollution or development. The "Hagoi complex" on Tinian was selected as the assessment's reference wetland. Functionality was measured by evaluating the presence of invasive species, quality of hydrologic function, soil integrity, etc. For example, a wetland overgrown with the reed *Phragmites,* as occurs throughout most CNMI wetlands, may rate a lower score in terms of plant community and wildlife habitat. Similarly, wetlands scoring as "impaired" for hydrological reasons are often scored that way due to construction of roads, easements, channelization, input from freshwater or sea level rise, or other development that has altered the hydrological function of the wetland. In 2004, a task force of wetland specialists attempted to finalize the HGM assessment, but it was agreed that further refinement was needed before it could be finalized.

In 2005, the CRM Office and the Wetland Task force prepared *the CNMI Wetlands Report: State of the Wetlands and Recommendations for New Wetlands.* The report's primary focus was to determine how the CNMI would address the Supreme Court's *2001 Solid Waste Agency of Northern Cook County (SWANCC) v. United States Army Corps of Engineers* (Slip Opinion No. 99-1178) decision. The decision stipulated that the Clean Water Act was to regulate "waters of the United States" and not other territorial waters outside of these waters. The 2005 report outlined regulatory options, noting that the CRM Office requirements for both major sightings and APCs are comprehensive, and do not limit a wetland to that defined as "waters of the United States.", and therefore regulation of CNMI territorial waters would not be affected by the SWANCC decision. The report went on to recommend the adoption of vegetative buffers around wetlands as identified in the 1990 Plan, as well as a much wider buffer for "high value wetlands". In addition, the 2005 report recommended implementation of a "no net loss" policy and renewed efforts to map and assess functions of CNMI wetlands.

By 2007, the HGM manual fell out of favor with EPA wetland experts and DCRM began developing a similar valuation tool. These efforts led to the development of a *CNMI Rapid Assessment Method (RAM) for Wetlands*. The RAM considered HGM and National Wetland Inventory classification systems and other applicable data across a wide array of wetland studies.

In 2014, CNMI wide wetland assessment and management efforts began in earnest and a collaborative *BECQ Wetlands Program* was established resulting in a finalized *CNMI Wetland RAM* in 2016. The RAM uses 13 reference wetlands of typical "high", "medium", and "low" valued wetland systems. 11 of the sites were HGM "depressional" systems and two (2) were "tidal fringe" systems. DCRM arranged for the Army Corps of Engineer to facilitate wetland delineation training in the CNMI, and taught attendees how to use the *CNMI Wetland RAM* for evaluating wetland function. Training is an ongoing effort for new BECQ employees and other interested agencies.

DCRM went on to adopt revised regulations in January 2018, which clarified the definition of CNMI "wetlands" to include all systems that exhibit hydric soils, vegetation, and hydrology. The revision also included the previously proposed minimum vegetative buffer requirements to support a "no net loss" policy for these wetlands, including seagrass and corals. In additional support of the "no net loss" policy, the regulations now also require a developer to implement a mitigation measure(s) from a hierarchy of options, for any development with unavoidable impacts to a wetland.

In conclusion, the *BECQ Wetlands Program* continues to provide innovative comprehensive management for the protection and restoration of CNMI's wetlands.

C.4.1. Extent of Wetland Resources

The 1990 "*Saipan Comprehensive Wetlands Management Plan*" states that only 36% of the original wetland acreage still exists. Based on current CNMI GIS data layers they cover less than 2% of the CNMI land mass. The CNMI's National Wetland Inventory document also states that wetlands comprise a total land area of approximately 600 acres (US Fish and Wildlife, 1989). Recent wetland measures using the 2017 NHD, and Wetland and Stream GIS data layers, support this finding.

Last reporting cycle DCRM completed GPS mapping of wetland boundaries on public lands on Saipan, Tinian, and Rota. Private properties were also ground-truthed as opportunities arose. Collected wetland geospatial data were used to update the BECQ GIS wetland data layer. Additional updates to the GIS data layer include identification of "lost wetlands", by subtracting building footprints from Saipan's National Wetland Inventory GIS data layer.

Wetland management trends are also reported in the DCRM "Section 309 Assessment and Strategy Report", which is produced every five years to evaluate present management efforts and to update program plans to better protect CNMI natural resources into the future.

DCRM Planners and Technical staff calculate acres of wetlands based on previous assessments and the most recently complied GIS data layers. The Section 309 Assessment lists the degree of potential risk to each of the islands' wetlands from low to high, based on perceived anthropogenic threats.

C.4.2. Wetland Water Quality Standards and Protection Activities.

CNMI wetlands are protected through: 1) permitting provisions of the Section 401 Water Quality Certification Program; 2) the WQS/NPS Program's Enforcement of the CNMI WQS anti-degradation policy; and 3) DCRM's enforcement of a "no net loss" wetlands policy, and APC Regulations.

The implementation rules for the WQS Anti-degradation policy state that, "point or non-point sources of pollution shall not cause destruction or impairment of wetlands" and that, "all wetlands are to remain in as near their natural state as possible and shall be protected to support the propagation of aquatic and terrestrial life". The rules also require demonstration of compliance with the CWA Section 404(b)(1) rules regarding placement of fill, i.e., wetlands may not be filled unless it can be shown that the proposed action is the "least environmentally damaging practicable alternative", and all current mitigation guidelines are applied.

In addition, the 2018 DCRM regulations adopted the "no net loss" policy for wetlands. This policy is reflected in DCRM's "Guidance on Using the Mitigation Hierarchy to Avoid Impacts of Projects and Activities", which extends this principle to not only wetlands, but also to seagrass and coral reef systems.

The Mitigation Hierarchy policy also provides guidelines for "offset" projects should impacts to wetland systems or other high value ecosystems, be unavoidable on the project site. However, the policy makes clear that avoidance and minimization should be implemented before mitigation is proposed.

In addition, DCRM 2018 Regulations included updated wetland and APC definitions and standards, as well as supporting policies and BMPs based on pertinent literature reviews, e.g., required vegetative buffer zones, guidance in delineation methods, and implementation of Hierarchal Mitigation. Buffer zones were based on minimum buffer recommendations contained in the 1990 Plan, as well as a literature review entitled "Guidance for Establishing Wetland Buffers in CNMI to Protect 'Environmentally Sensitive Areas' and Ensure 'No Net Loss". The 1990 Plan recommended and updated regulations to require at a minimum, a 50-foot vegetated buffer zone around all wetlands, and a 100-foot buffer for "high value" wetlands based on CNMI Wetland RAM assessments. These buffers are to ensure a "no net loss" of wetland systems and their ecosystem services from development.

At present, the CNMI WQS lack specific wetland water quality criteria. Instead, wetlands are assessed using the WQS criteria for fresh surface waters, i.e., lakes and streams.

Due to the lack of available resources, there are no regularly monitored wetlands in the CNMI other than annual to semi-annual monitoring of American Memorial Park's artificial wetland and mangroves on Saipan; conducted by the US National Park Service. Instead, the WQS/NPS program devotes most staff time towards monitoring marine shorelines, and streams systems, which comprise a vastly larger proportion of CNMI waterbodies. BECQ is planning to participate for the first time in the National Wetland Condition Assessment (NWCA), funded by US EPA, in the next reporting cycle. It is hoped that participation in this assessment can help build a regular wetland monitoring program within BECQ.

The 2016 *CNMI Wetland RAM* is also being used to determine existing wetland conditions on public lands on Saipan as well as Tinian's US Military leased land, and on Pagan. The latter is to establish present condition so impacts from expansion of US military exercises and live firing ranges proposed in the DoD's CJMT EIS, can be assessed and if exercises result in an exceedance of CRM regulations or DEQ WQS, mitigation will be required.

C.4.3. Integrity of CNMI Wetlands

In 2015, BECQ DCRM held two strategic planning meetings with government and nonprofit agencies, and marine service operators, to obtain stakeholder feedback regarding challenges and opportunities for setting coastal priority enhancement areas. This was to support the development of the *2016-2020 DCRM Section 309 Assessment Strategy and Report*. The nine survey respondents represented the non-profit MINA, Hotel Association of the Northern Mariana Islands, MVA, Saipan Zoning Office, DPL, DLNR DFW, and the Historical Preservation Office. Respondents ranked the top high-priority enhancement areas as wetlands. This was followed by coastal hazards, public access, and cumulative and secondary impacts. Based on this and input from resource management experts, the following impairments to CNMI wetland systems were listed in the *2016-2020 DCRM Section 309 Assessment Report*: 1) development/fill due to limited land availability; 2) alteration of hydrology; 3) lack of education about the value of wetlands; and 4) inadequate tools to support permitting requirements and enforcement of DCRM APC regulations for protecting wetlands.

Heightened development is the leading threat to wetland quality and functions in the CNMI, especially on Saipan and Tinian, which are experiencing a rapid resurgence of development proposals. Risk of further loss remains high due to public demand for homesteads, land for private businesses, business expansions, and public easements associated with each. Wetland stressors or threats of impairment, and their geographic scope are reported in Table C-42.

TABLE C-42. Wetland Stressors/Threats in the CNMI

Stressor	Threat	Geographic Scope - (throughout coastal zone or specific areas most threatened)
1	Development	Primarily Saipan and Tinian
2	Pollution	Primarily Saipan and Tinian, but also some watershed management challenges in Rota as well as current concerns due to proposed land use activities in Pagan
3	Invasive species	Saipan, Tinian, and to some degree in Rota and the Northern Islands

These threats are similar to those reported in previous *DCRM Section 309 Assessment Reports*. Although, an assessment of the *Propagation of Aquatic Life* DU has not been completed for every wetland, cumulative findings from the previous HGM assessments, the *Section 309 Reports*, and the current CNMI Wetland RAM assessments were used for assessing the Wetland 303(d) listing.

TABLE C-43. Wetland Assessment Method (HGM, Section 309 Report, and RAM findings)

EPA CALM CATEGORY:	DESCRIPTION	Assessment of Wetland Functional Values
1	Propagation of Aquatic Life DU is supported, not threatened	All Functions ≥ 0.7
2	Attains some DUs, no DU is threatened, and there is insufficient information to determine if remaining DUs are attained/or impaired	lacking other pertinent data, no potential threats
3	There is insufficient data and/or information to assess all DUs, Potential stressors may cause impairment	lacking other pertinent data, potential threats
4c	Propagation of Aquatic Life not supported, but not by a pollutant, for example hydrological modification, invasive species, low vegetative diversity, etc.	Some functions < 0.7, due to non-pollutant causes
5	Available data/information indicates that the Propagation of Aquatic Life DU is not supported or is threatened, because of a pollutant, and a TMDL is needed	At least 1 function < 0.7 due to a pollutant

Refer back to Section C.3.3. of this IR to learn which wetlands support the *Propagation of Aquatic Life* DU (Table C-23), and the causes (Table C-24) and sources (Table C-25) of impairment.

C.5. TREND ANALYSIS FOR SURFACE WATERS

At present there is insufficient data on other CNMI surface waters, i.e., streams, to perform a trend analysis. However, with the finalization of the CNMI SVAP and staff training, WQS/NPS in collaboration with DCRM staff have begun systematic valuation of streams starting with Dogas stream in the South Achugao watershed this reporting cycle.

Lake water quality trends are reported in Section C.3.4., Table C-30., on page 93 of this report.

C.6. PUBLIC HEALTH ISSUES

C.6.1. Beach Water Quality Issues

<u>Microbiological Contamination:</u>

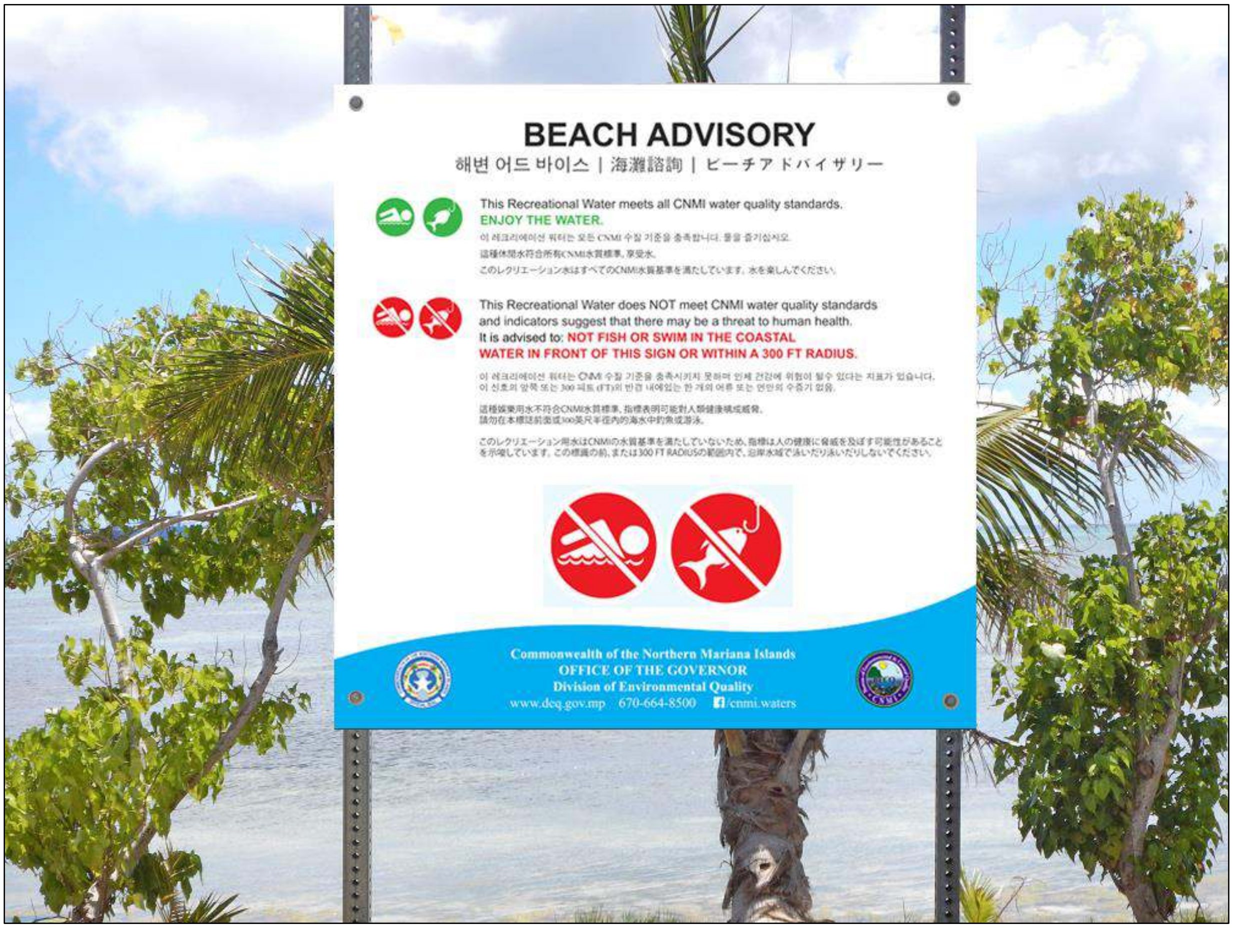
One of the primary purposes of the BECQ Surface Water Monitoring Program is to evaluate compliance with the CNMI WQS for Enterococci. Beach Advisories are published and posted for the general public specifying not to swim within 300 feet of a contaminated sampling site for the next 48 hours whenever:

> A single sample result exceeds the **Enterococci STV of 130 MPN/100ml** for any Class of marine waters; ***OR*** when the **GM exceeds 35 MPN/100ml** based on samples taken within any 30-day interval, **UNLESS** the **Single Sample** Result is **<35 MPN/100ml**.

Due to extensive damage in the aftermath of Super Typhoon Yutu, there are only three (3) remaining Beach Advisory signboards posted at Grotto Cave, Laly District #4, and Pau Pau BEACH sites. New signboards were designed this reporting cycle with internationally recognizable symbols indicating “no swimming” and “no fishing”, with Chinese, Korean and Japanese translations as shown in Figure C-75., on the following page. Each sign will have replaceable green or red placards displaying the appropriate symbol based on water quality results.

10 new signs in addition to the three remaining signs are scheduled to be fabricated and installed at the most frequently used and most impaired BEACH monitoring sites by next reporting cycle. Signs will be made of materials to better withstand strong storm events, as part of BECQ’s ongoing climate adaptation efforts.

FIGURE C-75. 2020 BEACH Advisory Signboard Design



Due to the frequency with which some beaches exceed the CNMI WQS for Enterococci, an elevated risk to public health exists for several beaches surrounding the more developed areas of Saipan, Tinian and Rota. Many of BECQ's programs are aimed at reducing this risk. Along Saipan's western shoreline most of the Enterococci contamination occurs in densely populated areas. These sites are suspected of being contaminated with human or waste from feral dogs and cats. Known sources of the bacterial contamination are overflows and leaks from sewage collection systems, and runoff from densely populated areas. Sample sites are commonly placed in areas frequently used by the public, which have been listed as impaired for the *Recreational* DU.

Enterococci contamination observed on some of Saipan's remote western and eastern beaches are likely due to livestock, birds, and sediment-laden runoff containing naturally occurring Enterococci*,* rather than human waste.

However, unrestricted cattle grazing and feral pigs have been observed in several of Saipan's eastern watersheds resulting in moderate to severe erosion and the likely transport of fecal matter into the coastal waters where these streams discharge. The continued observance of

Enterococci exceedances on the eastern shoreline, along with a handful of suspected and highly publicized leptospirosis infections resulted in at least one death in 2000.

It is likely that restrictions on grazing in these watersheds could significantly reduce the problem, although leptospirosis carried by feral wildlife in addition to livestock, remains an issue. Therefore, BECQ has already begun implementing recommendations contained in the 2018 TMDL to reduce bacteriological contaminant levels on Saipan.

Mercury and Heavy Metals in Sediment, Fish Tissue and Biota

The discovery of elevated levels of Hg and other heavy metals in fish tissue and biota harvested from WWII debris dumpsites around the island of Saipan, has underscored the need for additional fish tissue and biota testing here and on all of the islands. At present most sites have levels below what would trigger a consumption advisory. However, The West Takpochao North, Central, and Achugao South watersheds had Pb levels in bivalves that exceeded the US FDA consumption guidelines. In additions there was wide spread copper contamination of the beach sediment in the West Takpochau Central watershed, which is of a human health concern.

In addition, Denton, et.al., stated in his 2018 study that shoreline sediments taken between the Hyatt Hotel and Smiling Cove Marina (West Takpochao Central) had elevated copper levels, "… at least an order of magnitude above those typically found in clean bioclastic deposits examined further south in the lagoon (2018. Denton et.al.)." Denton concluded that the copper levels at American Memorial Park, while well below acute toxicological thresholds, may potentially have, long-term, sub-lethal effects on sensitive marine species, "…at concentrations several orders of magnitude below those that cause death.", (2018. Denton, et.al.).

This emphasizes the need for continued collaboration with UoG's WERI Lab, DoD, and other institutions to carry out further testing in biota and fish tissue around the islands as resources permit.

C.6.2. Public Water Supply/Drinking Water Use Issues

The 2016 *Guidelines for Preparation of the Comprehensive State Water Quality Assessments 305(b) Reports* recommends reporting three tables containing use of surface water in public drinking water supplies including:

1. A list of waterbodies used as surface water sources and a list of contaminants assessed;
2. A summary of drinking water use assessments for rivers and streams; and
3. A summary of drinking water use assessments for lakes and reservoirs.

In general, no surface waterbodies are officially designated as water supplies for PWSs in the CNMI, so the three recommended tables would contain no data if they were presented here. However, if one queried the Safe Drinking Water (SDW) Branch one would find two PWSs listed in the Safe Drinking Water Information System (SDWIS) as having a surface water source. A brief discussion of these two PWSs, and their sources are provided below.

The first system is the CUC PWS on the island of Rota. The source of water for this system is a spring emerging from within the main Water Cave. This cave collects spring water in a pool at the mouth of the cave which is open to the atmosphere and potentially subject to contamination from local fauna visiting or living in the cave. Therefore, the cave is classified as a surface water source. In June 2015, CUC finalized a *Drinking Water and Wastewater Master Plan* for the island of Rota. As part of that Master Plan, a Ground water Under the Direct Influence of Surface Water (GWUDI) study was conducted on the water from the main Water Cave from September 2012 through January 2014. In October 2014, EPA and BECQ agreed with CUC's findings, that the main Water Cave on Rota is not GWUDI, based on the results from Micro-Particulate Analysis (MPA) of on-line water quality for turbidity, conductivity, and bacteria. The MPA results for the main Cave demonstrated low risk for potential contamination associated with surface water.

The second system is the Saipan CUC PWS, which has numerous ground water sources and one rain water source. Rainwater runoff is collected from the Saipan International Airport runway rainwater catchment system and stored in a concrete reservoir. Since the rainwater travels across the surface of the ground the source water is considered "surface water" as defined in the CNMI Safe Drinking Water Regulations. However, no surface water in the CNMI PWS is considered "navigable water".

To date, there has not been an assessment of the water in the Saipan airport's runway rainwater catchment system. However, the system has not been in use during this reporting cycle.

PART D. GROUND WATER MONITORING AND ASSESSMENT

This section describes known or suspected sources of ground water contamination, existing ground water protection programs, and summarizes the quality of ground water in the CNMI.

D.1. OVERVIEW OF GROUNDWATER CONTAMINATION CAUSES & SOURCES

There are very few incidents of ground water contamination in the CNMI, as shown in Table D-1., on the following page. There are only eight confirmed or highly suspected sources in the CNMI based on professional judgements. They are "X" 'd in the table's second column, and the factors considered in selecting the contaminant sources, and the actual contaminants are subsequently identified. Contaminants/classes were selected based on data indicating that certain chemicals or classes of chemicals may be originating from an identified source. A more detailed discussion of contamination sources is provided in section D.3 that follows.

There are no known ground water contamination problems on the island of Rota. There was one documented leaking above ground fuel storage tank on the island of Tinian, which has since been addressed.

TABLE D-1. Major Sources of Ground Water Contamination

Contaminant Source	Suspected Sources	Factors Considered in Selecting Contaminant Source A. Human Health and/or environmental risk (Toxicity) B. Size of population at risk C. Location of the sources relative to drinking water sources D. Number and/or size of contaminant sources E. Hydrogeological sensitivity F. CNMI findings, other findings G. Documented from mandatory reporting H. Geographic distribution/occurrence I. Other criteria	Contaminants A. Inorganic pesticides B. Organic pesticides C. Halogenated solvents D. Petroleum compounds E. Nitrate F. Fluoride G. Salinity/brine H. Metals I. Radionuclides J. Bacteria K. Protozoa L. Viruses M. Other
Agricultural Activities			
Agricultural chemical facilities			
Animal feedlots			
Drainage wells			
Fertilizer applications	X	A,C,D	A,B,E
Irrigation practices			
Pesticide applications	X	A,C,D	A,B,E
On-farm mixing and loading procedures			
Land application of manure unregulated			
Storage and Treatment Activities			
Land application (regulated/permitted)			
Material stockpiles			
Storage tanks (above ground)			
Storage tanks (underground)	X	A, B, C, D, E, F, G	D
Surface impoundments			
Waste piles			
Waste tailings			
Disposal Activities			
Deep injection wells			
Landfills	X	A, E	A, B, C, D, E, H, J, K, L
Septic tanks	X	A, B, C, D, E, H	E, J, K, L
Shallow injections wells			
Other			
Hazardous waste generators			
Hazardous waste sites			
Large industrial facilities			
Material transfer operations			
Mining and mine drainage			
Pipelines and sewer lines	X	A, B, C, D, E, H	E, J, K, L
Salt storage and road salting			
Salt water intrusion	X	B, C, D, E, F, G, H	G
Spills			
Transportation of materials			
Urban runoff			
Small-scale manufacturing/repair shops	X	A, C, D, E, H	C, D, H

D.2. OVERVIEW OF STATE GROUND WATER PROTECTION PROGRAMS

DEQ is the agency whose primary responsibility is to protect and manage ground water resources for the CNMI. Several DEQ Programs administer and enforce several sets of regulations including: 1) Well Drilling and Well Operation; 2) Wastewater Disposal; 3) Underground Storage Tank; 4) Underground Injection Control; and 5) Safe Drinking Water Regulations. Table D-2, summarizes the status of Program implementation.

TABLE D-2. Summary of State Ground Water Protection Programs

Programs or Activities	Applicable to the CNMI	Implementation Status	Responsible DEQ Branch
Active SARA Title III Program			
Ambient ground water monitoring system			
Aquifer vulnerability assessment			
Aquifer mapping			
Aquifer characterization			
Comprehensive data management system	X	continuing efforts	SDW
EPA-endorsed Core Comprehensive State Ground Water Protection Program			
Ground water discharge permits			
Ground water Best Management Practices	X	fully established	SDW
Ground water legislation	X	fully established	SDW
Ground water classification	X	continuing efforts	SDW
Ground water quality standards	X	fully established	SDW
Interagency coordination for ground water protection activities	X	continuing efforts	SDW
Nonpoint source controls	X	fully established	WQS/NPS
Pesticide State Management Plan	X	continuing efforts	PEST
Pollution Prevention Program	X	continuing efforts	All DEQ
Public Water System Supervision Program	X	fully established	SDW
Resource Conservation and Recovery Act (RCRA) Primacy	X	For RCRA-D (only solid waste)	TWM
Source Water Assessment Program	X	continuing efforts	SDW
State Superfund			
State RCRA Program with more stringent requirements than RCRA Primacy			
State septic system regulations	X	fully established	WEEC
Underground storage tank installation requirements	X	fully established	STAR
Underground storage tank remediation fund			
Underground Storage Tank Permit Program	X	fully established	STAR
Underground Injection Control Program	X	fully established	SDW
Vulnerability assessment for drinking water/wellhead protection	X	continuing efforts	SDW
Well abandonment regulations	X	fully established	SDW
Wellhead Protection Program (EPA-approved)	X	fully established	SDW
Well installation regulations	X	fully established	SDW

PEST – Pesticide Management Program, SDW – Safe Drinking Water Program, STAR – Storage Tanks, Assessment, and Remediation Program, TWM – Toxic Waste Management Program, WEEC – Wastewater, Earthmoving, and Erosion Control Program, WQS/NPS – Water Quality Surveillance / Non-Point Source Program

D.2.1. Well Drilling and Well Operation Regulations

The SDW branch enforces the Well Drilling and Well Operation Regulations, which defines the qualifications individuals and firms must possess to be allowed to drills wells. The regulations designate: 1) setbacks from potential sources of contamination; 2) allows DEQ to set maximum pump withdrawal rates to minimize salt water intrusion; and 3) requires semi-annual water quality analysis of all active wells.

A revision to the regulations in 2005, added Ground Water Management Zones for Saipan which are used in other BECQ regulations to set additional restrictions on activities that may contaminate ground water including wastewater disposal systems, land disposal of waste, and above ground and underground storage tanks.

In addition, the SDW Program maintains a database on all wells in the CNMI. As of December 2019, the program has documented the locations of 725 in the CNMI (627 on Saipan, 75 on Tinian, 22 on Rota, and 1 on Pagan). The majority of these wells are used for drinking water sources 349, while some are used for irrigation 26. There are also monitoring wells (138), exploratory wells (38), which have not been designated for another use yet, injections wells (25), wells where the water is used for industrial purposes (9), geotechnical wells (8) and wells that have been destroyed (132).

D.2.2. Underground Storage Tank Regulations

The Storage Tanks, Assessment, and Remediation (STAR) Program is responsible for administering and enforcing the Underground Storage Tank Regulations. These regulations stipulate how underground storage tanks are to be constructed and monitored for integrity to prevent leaks and spills from contaminating land, surface waters, and ground water aquifers.

D.2.3. Underground Injection Control Regulations

The SDW program administers and enforces the Underground Injection Control Regulations, which define under what conditions the injection of wastewater, reverse osmosis brine, or other substances may be injected into the ground.

D.2.4. Other Monitoring Events/Programs

In addition to the regulatory Ground water Protection Programs, there have been other ground water monitoring activities in the CNMI, most notably on the island of Saipan. In May 2000, EPA Region 9 and DEQ conducted an island-wide ground water study of Saipan. A total of 178 ground water samples were collected from 160 private drinking water supply wells. This included private wells that do not serve as public water supplies. The objective of the study was to determine the extent of Volatile Organic Compound (VOC) contamination of ground water. 156 samples were analyzed and of these, 34 detected VOCs. 11 of the 34 had VOC concentrations exceeding the MCL for Trichloroethylene (TCE), Vinyl Chloride (VC), Dichloroethylene (DCE), and Perchloroethylene (PCE) also known as Tetrachloroethylene. The remaining 23 were below the MCL for a certain VOC. The samples containing concentrations over the MCL were localized to four areas of Saipan including: San Antonio, As Lito, Lower Base, and Puerto Rico.

In 2004, DEQ generated an inventory list of other potential facilities requiring further assessment and site investigations, as they were associated with the 34 samples exceeding an MCL for a VOC. The list consisted of 28 facilities, the owners of which were issued a joint Superfund Information Request letter from DEQ and EPA pursuant to Section 104(e) of CERCLA. Based on the results of the May 2000 sampling event, and information provided by the 28 facilities, DEQ recommended that six (6) facilities be added to the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) database for future cleanup consideration, which is maintained by EPA as part of the Superfund Program.

In 2009, DEQ conducted a follow up ground water study of 64 privately operated wells, and 12 publicly operated wells, all within a 1-mile radius of the respective contaminated areas of San Antonio, As Lito, Lower Base, and Puerto Rico. The primary objective was to collect the current concentration levels on contaminants detected in 2000. Most of the well operators that still had VOC levels exceeding the SDW standards discontinued their operations. The wells that remained in operation now treat water with granular activated carbon to remove VOC contaminants. Their production water now meets primary SDW standards and are safe for consumption. These well operators are required to monitoring these wells for VOCs once every three years as part of their permit requirements.

In April 2008 through April 2009, DEQ and CUC conducted a joint study of spatial and temporal nitrate concentrations in ground water from the southern part of Saipan. Samples were collected from 20 wells every week and analyzed for combined nitrate-nitrite, *E. coli*, turbidity, temperature, conductivity, pH, and hardness. Rainwater data was also collected from four (4) rain gauges in the study area to compare variations in ground water quality to rainfall events. The study found that the concentration of nitrates varied spatially across southern Saipan from an average of 10.6 mg/l at one well, to an average of 0.66 mg/l at another. However, nitrate concentrations did not vary much temporally, or with the rates of rainfall.

In 2010 through 2011, DEQ conducted a baseline ground water quality study in areas of Saipan that had high concentrations of homes without access to municipal sewer collection systems. Ground water samples were collected quarterly from 16 wells in Kagman homestead, and 30 wells near DanDan homestead for one year. While the quality of the ground water varied spatially across each of the two well fields, the quality of the ground water at each particular well did not change much temporally. The bacterial quality was good throughout both homesteads with few to no detections, and the nitrate-nitrite concentrations were below 10 mg/L for all but one of the wells. The study's findings were provided to CNMI Government planners, regulators, and decision makers for consideration when earmarking resources for infrastructure improvements.

Between August 2012 and November 2013, CUC conducted a study to determine if well fields on Saipan, Tinian and Rota were GWUDI. 11 sites were selected on Saipan, and one each on Tinian, and Rota respectively. Ground water at each of the sites was monitored continuously for turbidity, temperature, pH, and conductivity. Rainfall data was also collected at each site. Samples from each site were collected after large rain events and evaluated for bacterial contamination and multi-particulates. As a result of the study, one well on Saipan was determined to be GWUDI, and the well was removed from service. The other sites did not have obvious influences from surface water.

D.2.5. PFOA and PFOS Advisory

On May 19, 2016 US EPA issued new nationwide drinking water health advisories regarding two chemical contaminants: perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). These health advisories are based on the latest science available and help local water systems and regulatory agencies take appropriate steps to address PFOA and PFOS if needed.

PFOS and PFOA are human-made substances and are not naturally found in the environment. They have been used extensively in commercial goods (carpets, clothing, furniture, paper packaging for food) and in materials that are resistant to water, grease or stains such as cookware. They are also used in firefighting foams at airfields and in a number of industrial processes. Between 2000 and 2002, PFOS was voluntarily phased out of production in the U.S. by its primary manufacturer.

While consumer products are a large source of human exposure to these chemicals, drinking water can be an additional source of exposure in communities where these chemicals have entered and contaminated water supplies. Such contamination is typically localized and associated with a specific facility, for example, an airfield at which they were used for firefighting.

EPA has established lifetime health advisories of 70 parts per trillion for combined concentrations of PFOA and PFOS in drinking water. EPA health advisories include a margin of protection from adverse health effects when consumed at these levels over a lifetime.

Studies indicate that exposure to PFOA and PFOS over certain levels may result in adverse health effects, including developmental effects to fetuses during pregnancy or to breastfed infants (e.g., low birth weight, accelerated puberty, skeletal variations), cancer (e.g., testicular, kidney), liver effects (e.g., tissue damage), immune effects (e.g., antibody production and immunity), thyroid effects and other effects (e.g., cholesterol changes).

In compliance with US EPA and CNMI BECQ requirements, CUC began monitoring its drinking water supplies for *unregulated* contaminants in 2015. This included testing for PFOA and PFOS levels. In May 2016, EPA and BECQ requested that CUC conduct follow-up monitoring for PFOS and PFOA. In June, CUC ran additional tests which resulted in CUC removing eight (8) wells near the Saipan International Airport in the Isley and Obyan well fields from service.

To date, CUC continues monitoring entry points that are in areas with suspected sources of PFOS and PFOA contamination. The most recent round of monitoring was conducted on December 2, 2019. CUC received the test results on December 31, 2019 and found that the concentration of PFOS and PFOA from the As Terlaje Tank, in the Isley Well field was 105 parts per trillion (ppt), exceeding the EPA health advisory of 70 parts per trillion (ppt). Currently, this is the only watershed with ground water levels exceeding the EPA health advisory (Figure D-1). CUC plans to address this issue before the next IR reporting cycle.

D.3. SUMMARY OF CNMI GROUND WATER CONTAMINATION SOURCES

Rota and the Northern Islands have no known ground water contamination issues. However, some exist on the island of Saipan and Tinian. They are listed in Table D-3., below.

TABLE D-3. Summary of State Ground Water Contamination

Source Type	Total Sites (n =)	Listed and/or confirmed releases (n =)	Confirmed ground water contaminates (n =)	Contaminants	Investigations (n =)	Stabilized or source removed (n =)	Corrective action plans (n =)	Active remediation (n =)	Cleanup completed (n=)
NPL	0								
CERCLIS	1	1	1	PCB					
DOD/DOE	13	13	2	SVOCs, VOCs, Metals, UXO	13	3	0	0	3
LUST*	0								
LAST**	0								
RCRA Corrective action	2	2	0	Petroleum products	0	2	2	0	2
Underground Injection	19	0	0						
State Sites	0								
NPS	0								

* No new leaking underground storage tank sites (LUST). There have been LUST sites in previous periods, but all sites have been cleaned up.

** For this reporting period there are no new leaking above ground storage tank (LAST) sites.

Agricultural activity on Saipan is somewhat limited in scope except for in central Kagman watershed. However, there are no large-scale feed lots or land application of manure, but there are many free grazing cattle as well as feral pigs in As Matuis and Banaderu Watersheds in the west, and in the eastern watersheds.

There have been no inorganic or organic pesticides levels detected in ground water samples that are tested as required by the CNMI Safe Drinking Water regulations.

Saipan has 19 underground injection wells used to dispose of reverse-osmosis (reject) brine. The injection wells belong primarily to tourist hotels located along the coast line of West Takpochau.

The wells terminate below the freshwater/saltwater interface, and therefore do not pose a contamination risk to ground water withdrawn for consumption.

There are also 22 shallow wastewater disposal leaching fields on Saipan that serve more than 20 people. Therefore, they are considered underground injection wells. There have been no known contamination events from these sources.

D.4. SUMMARY OF GROUND WATER QUALITY

Table D-4., summarizes ground water quality monitoring results for untreated well water on the islands of Saipan, Rota and Tinian.

TABLE D-4. Aquifer Monitoring Data for Saipan, Tinian and Rota (FY 2009 to 2019)

Monitoring Results from Untreated Water From Wells Used in Assessment (n =)	Parameter Groups	Number of Wells						
		No detections of parameters above MDLs or background levels (ND)	Nitrate concentrations ranges from background levels to ≤5 mg/l No detections of parameters other than nitrate > MDLs or background levels	Nitrate ranges from > 5 to ≤10 mg/l Other parameters are detected at concentrations exceeding MDL but ≤ MCLs	Parameters are detected at concentrations > MCLs	Wells removed from service	Wells requiring special treatment	Background parameters > MCLs.
Saipan								
0	VOC							
0	SOC							
2456	NO_3	0	1594	827	35	0	0	0
0	Other							
Rota								
0	VOC							
0	SOC							
42	NO_3	0	42	0	0	0	0	0
0	Other							
Tinian								
0	VOC							
0	SOC							
20	NO_3	0	9	11	0	0	0	0
0	Other							

Monitoring is required under The SDW Well Drilling and Well Operation, and The SDW Regulations. In addition, the SDW Program requires annual monitoring of private wells as part of their permit requirements, and periodic monitoring for regulated contaminants. SDW also requires special water quality studies be conducted on public wells of interest.

30 PWSs in the CNMI (28 on Saipan, one on Rota, and one on Tinian) were tested for VOCs and Synthetic Organic Carbons (SOC) during this reporting cycle.

PWSs are not required to monitor their raw untreated well water for VOCs and SOCs. They are only required to monitor treated well water that is sold commercially. These systems collect the sample at the point of entry to the distribution system, which may or may not combine water from many different sources including: ground water, rain water, or filtered sea water. For this reason, detection of VOCs in well water from the entry point does not necessarily indicate contamination of the ground water supply. The 1997 EPA Guidance recommends that constituents should only be considered if they are known to be representative of the source water. For this reason, the VOC and SOC results detected by the PWSs are not reported in Table D-4.

Ground water from 142 wells in the CNMI, 138 in Saipan, 3 Rota, and 1 on Tinian were analyzed for nitrates during this reporting period. Two (2) wells had water that exceeded the MCL of 10 mg/l, but they were not removed from service because their water is blended with water from wells with lower concentrations of nitrates.

D.5. SUMMARY OF GROUND WATER-SURFACE WATER INTERACTIONS

Ground water to surface water interactions, as well as surface to ground water interactions exist in the CNMI, but the effects of one contaminating the other are not well documented; that is with the exception of salt water intrusion affecting the basal lens aquifers on Saipan. Nutrient-laden ground water emerging from near shore underwater seeps in the Saipan lagoon is suspected of contributing to periodic algal blooms and DO% deficits.

Salt water intrusion is arguably the most significant ground water contamination issue on Saipan, and the CNMI as a whole. Even though the water supplied by CUC's municipal public utility on Saipan complies with all EPA regulated contaminants, and is considered safe for human consumption, it is unpalatable due to the high chloride concentration (an unregulated contaminant). Therefore, most people on Saipan do not drink the water provided by the public utility. Instead they rely on treated bottled water produced locally or rain water. There are several reasons for the high chloride concentration in the water from these aquifers. Older wells in these areas were completed and screened into the freshwater/saltwater transition zone, or near the bottom of the freshwater layer. They are spaced relatively close together and/or are pumped at relatively high rates. Due to these practices the underlying salt water is drawn upward in the vicinity of these wells and mixes with the fresher water at the ground water surface. Therefore, chloride concentrations in these well range from just beyond the Secondary MCL of 250 mg/l, to as high as 2,000 mg/l and above [Carruth, 2003].

The salt water intrusion issue is being addressed primarily by CUC which owns and operates most of the affected wells. In years past the demand for water has been so great that the utility could not produce enough to provide 24-hour service to all utility customers on Saipan. A vigorous leak detection and repair program over the past reporting period has reduced the demand significantly such that nearly every CUC customer has 24-hour water. CUC is now beginning the process of developing a ground water management plan, which will guide them in taking high chloride concentration wells and/or high pump rate wells off-line; reducing the overall chloride concentration of the water delivered to customers. In addition, the utility has given careful consideration to well depths relative to sea level, well spacing, and pumping rates for newer wells constructed after the year 2000.

In August 2018, CUC finally was able to start providing 24-hour water to all its' customers in Saipan. The improved service has allowed them to pump less water for the most part but they still need to further develop their ground water management plan moving forward, to continue to improve the quality of the water system.

As mentioned above in Section D.2.4., CUC conducted a study to determine if well fields on Saipan, Tinian and Rota were Ground Water Under the Direct Influence (GWUDI) of Surface Water. One well on Saipan was determined to be GWUDI. CUC discontinued use of this well when it was discovered. Water quality analysis of the ground water from this well showed changes in turbidity and conductivity immediately following rain events.

PART E. PUBLIC PARTICIPATION

The draft 2020 CNMI IR was posted to request for Public Comments on DEQ's website and on the cnmi.waterquality@gmail.com email list serve on September 8th, 2020. In addition, Press Releases requesting for public comment were published in both local newspapers on September 11th, 2020 (Please refer to Appendix IV, to view public notice documentation). To increase accessibility to relevant information, the WQS/NPS Branch also produced a Fact Sheet and a standalone version of the CWA 303(d) Impaired Waters List for posting on DEQ's website along with the Integrated Report.

The last date for public comment submission was October 16th, 2020. BECQ received several substantive comments from government agencies, which improved this IR's content, and a letter of support from the CNMI Office of Planning and Development (see Section E.1 that follows).

E-1. SUMMARY OF PUBLIC COMMENTS AND BECQ RESPONSES

Comment #1 – CNMI Bureau of Environmental and Coastal Quality – Division of Coastal Resources Management – Planning Section

2020 IR Comments

Mary Fem Urena

To: cnmi.waterquality@gmail.com

Attachments: 2020 IR Comments - DCRM Planning.pdf

Sent: 10/16/2020 2:19 PM

Hafa Adai,

Attached are DCRM Planning's comments for the 2020 Integrated Water Quality Report.

With gratitude,

--

Mary Fem Urena
Coastal Resource Planner I
Bureau of Environmental and Coastal Quality
Division of Coastal Resources Management
Phone: (670) 664-8308

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Comments provided by Division of Coastal Resource Management (DCRM) Planning.

Thank you, Ms. Urena, for DCRM comments on the 2020 CNMI IR. Please find our Responses in Blue Font below.

Table B-1: Surface Waters Assigned to Reporting Categories.

- CNMI Population is an unrelated topic under this title, is this an appropriate place for it to be placed?
    - **Response**: The Table B-1, as comprised showing CNMI Population, is requested for inclusion in this particular section of the report by EPA in their 2006 IR Guidance Document (https://www.epa.gov/sites/production/files/2015-10/documents/2006irg-report.pdf).

B.3.2. Benefits:

- It may be helpful for the reader to identify which watersheds consisted of the 15.8 CNMI coastal miles removed from the impaired list.
  - **Response**: So noted. The following was added to the referenced section B.3.2, "This included Rota's Sabana/Talakhaya/Palie, Uyulanhulo/Teteto, and Chaliat/Talo watersheds that now meet WQS for phosphate, and Saipan's Susupe North watershed that now meets the WQS for Enterococci."

B.4.2. Failing Septic Systems, and Illicit, and Permitted Wastewater Discharges:

- Are there efforts to monitor or address residential septic systems?
  - **Response**: Section B.2.3 describes the BECQ Wastewater, Earthmoving and Erosion Control Program that oversees the design and permitting of IWDS (residential septic systems). In addition, WEEC staff conduct household surveys on a village by village basis to identify IWDS that require upgrades or are in need of a pump out in order to properly collect and treat wastewater. In addition, CUC has regulations that require for households to hookup to existing sewer lines where available. This information was added to the referenced section.
- May be helpful to include SOCs and VOCs into the acronym list
  - **Response**: Synthetic Organic Compounds and Volatile Organic Compounds were added to the Acronym List.

B.4.5. Climate Related Severe Storm Event Impacts:

- What are water quality findings from the impacts of these severe storm events?
  - **Response**: The effects of climate change related disturbances on aquatic life and associated habitats are discussed at length in section B.4.5. To clarify, damage to coral reefs from storm action, sediment loading, and increased ocean temperatures resulting in coral bleaching, were used to determine whether the *Support and Propagation of Aquatic Life* Designated Use was attained as part of the IR assessment of water quality. Indeed, many of the watershed's surrounding coastal waters were adversely impacted this reporting cycle from typhoons. Benavente, et.al. stated in the 2019 MMT report, that Super Typhoon Yutu, "… further affected near-shore marine habitats within the CNMI.", and, "Storm surge pummeled reefs and pulled storm debris (trees, shipping containers, and roofing tin) into the water and scraped, smashed or upturned coral colonies. The effects of these events naturally vary between each type of reef; however, general trends suggest that reef health has declined for most sites as a result of such disturbances." (2019. Benavente, et.al.).

- The report also found a general decline in coral cover at long-term monitoring sites related to climate related disturbances. However, BECQ lacks sufficient water quality data at these long-term monitoring sites to confirm whether or not there are water quality pollutant sources contributing to this decline in coral health.

C.2.1. Waterbody Segmentation - Watershed Approach:

- DCRM is expecting a new digital elevation model from the incoming LiDAR expected to arrive by the end of this year.
    - **Response**: Yes, WQS/NPS staff requested that the NOAA CZM coordinator request that this new LiDAR data be collected during one of our collaborative Watershed Working Group discussions. This will allow BECQ to differentiate watersheds throughout the archipelago and to create detailed maps of watersheds and streams documenting survey data. We are very happy to note that NOAA plans to provide this new data in time for the next reporting cycle.

C.4. WETLANDS PROGRAM

- DCRM continues to have wetlands as a CZMA Section 309 priority. The strategy developed for the 2021-2025 cycle is to update the Wetlands APC boundaries by an updated wetland field assessment using delineation methodology based on the adopted Rapid Assessment Methodology (RAM) and the Stream Visual Assessment Protocol (SVAP).
    - **Response**: We look forward to using DCRM’s updated Wetlands APC boundaries as they become available for mapping and assessments in upcoming IRs. We also look forward to providing to DCRM the data gathered during the Stream Visual Assessments conducted by the WQS/NPS Branch.

Comment #2 – CNMI Office of Planning and Development

Comment on 2020 CNMI Draft Integrated Water Quality Assessment Report
Erin Derrington
To: cnmi.waterquality@gmail.com
CC: Eli Cabrera; Jonathan I. Arriola; A. Kodep Ogumoro-Uludong
Attachments: 2020_10_15_DEQ_WQcomment.pdf
Sent: 10/15/2020 6:08 PM

Good evening,

Please find a comment from OPD regarding the 2020 CNMI Draft Integrated Water Quality Assessment Report. Thank you for this opportunity to provide feedback.

Best wishes,

Erin

~

Erin M. Derrington
Lead Planner
CNMI Office of Planning and Development

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OFFICE OF PLANNING & DEVELOPMENT

A. KODEP OGUMORO-ULUDONG
DIRECTOR

CHRISTOPHER A. CONCEPCION
DEPUTY DIRECTOR

October 16, 2020

Eli D. Cabrera
Administrator, Bureau of Environmental and Coastal Quality
Gualo Rai Center, P.O. Box 501304
Saipan, MP 96950
Sent via email to cnmi.waterquality@gmail.com

Re: 2020 CNMI Draft Integrated Water Quality Assessment Report

Dear Administrator Cabrera,

This letter is to provide a comment from the Office of Planning and Development (OPD) on the 2020 CNMI Draft Integrated Water Quality Assessment Report (IWQAR). OPD relied heavily on the 2018 IWQAR for discussion of land management and water quality trends in the development of the 2019 Resources Report, and I would like to commend you and your team for the impressive data collection and analysis that continues to inform these biennial publications. Overall, this comprehensive water quality report provides incredibly valuable information to support long-term planning discussions that are also supported through your ongoing partnership and participation in our Planning and Development Advisory Council, and OPD is grateful to you and your staff for your support.

The content of this 2020 IWQAR continues the valuable tend data BECQ's Division of Environmental Quality (DEQ) has been compiling through these reports for decades. The separation of the Northern Islands into a separate section in this update is especially informative and helpful for long-term planning purposes. Supporting clean water and sanitation management practices to ensure a healthy environment on land and in our waters is a sustainable development vision that is reflected in the draft Comprehensive Sustainable Development Plan (see Goals 6, 14, and 15 and supporting objectives and action items). While the 2020 IWQAR identifies numerous challenges in the 303(d) list of impaired waters, the new data it highlights will support targeted resource management planning that can support delisting of impaired waters, reflecting the achievement of our shared sustainability goals to ensure wise use and resource stewardship. It is the data, the total maximum daily loads, and the water quality standards that BECQ-DEQ establishes through this IWQAR that will help us make these sustainability visions and objectives a reality.

Thank you for your time, consideration and ongoing support.

Sincerely,

A. Kodep Ogumoro-Uludong
Director, Office of Planning and Development

CC: Jonathan Arriola, DEQ Director

CNMI Office of the Governor | Juan A. Sablan Memorial Building | Capitol Hill, Saipan
Caller Box 10007 | Saipan, MP 96950 | Telephone: (670) 664-2287 | Facsimile: (670) 664-2211 | www.opd.gov.mp

Thank you, Mr. Ogumoro-Uludong for your letter of support for the 2020 CNMI IR. BECQ is grateful for OPD's important collaborative partnership in implementing Sustainable Development for water quality improvement.

Comment #3 – CNMI Bureau of Environmental and Coastal Quality – Division of Coastal Resources Management – Watershed Coordinator

Water Quality Report comment

Zachary Williams
To: cnmi.waterquality@gmail.com
Sent: 10/16/2020 1:31 PM

I wanted to address this statement in the report (and reiterated for various specific streams):

> "Likewise, there has been no systematic survey to measure visitor or residents' Aesthetic Enjoyment of streams. However, many residents and visiting tri-athletes hike within Saipan's streambeds for training, athletic competitions, or general recreation in the tradition of the "Hash House Harriers". Since 1984, Saipan residents have set a "Hash" trail every Saturday, for a noncompetitive hiking/running event. Trails are made through various pristine forested areas so "hashers" may enjoy the beauty of these remote locations. Tourists and visiting tri-athletes have also been known to take part in the "Hash". Based solely on this anecdotal evidence, the Aesthetic Enjoyment DU is supported for all of Saipan's streams except for the concrete conveyances within the Central West Takpochau watershed."

While outdoor recreation should be supported, I do think it is worth mentioning the impacts this can have, particularly the sorts of short term trails through "pristine" forest as are described above. Many of these trails — from my experience (e.g. in upper W. Takpochao) — are partially or almost entirely within a stream bed, and quite possibly contribute to erosion and sedimentation. Additionally, many of these facilitate littering through creation of access to pristine areas, or even leaving plastic trail flagging laid out during trail clearing.

Likewise "offroad" vehicles have eroded large areas in the upper watershed areas (e.g. Wireless Ridge), contributing to erosion and sedimentation.

Point being, while they are all worth noting as support for "Recreational & Aesthetic Enjoyment", they are also worth noting under "Special State Concerns and Recommendations", particularly B.4.1 "Erosion and Sedimentation". For example, creating and maintaining more "sanctioned" trails that take riparian buffers into consideration.

Thank you!

Zachary B. Williams
Watershed Coordinator, Division of Coastal Resources Management (DCRM)
CNMI Bureau of Environmental and Coastal Quality (BECQ)
P.O. Box 501304 | Saipan, MP 96950

Phone: (670) 664-8303
Email: ZWilliams@dcrm.gov.mp

To learn more about local watershed projects, please visit the Watershed Working Group (WWG) page.

Thank you, Mr. Williams, for your comment. WQS/NPS **Response** in Blue font follows:

Response: So noted. BECQ has included the following in Section B.4.1., "Erosion of, and sedimentation from, improperly designed secondary coral roads, off-road vehicle recreational activities, and short-term hiking trails cut through vegetation or through streambeds, are all of special concern as these can contribute to sediment loading to surrounding waters, turbidity and other NPS pollution. While hiking trails, and off-road recreational vehicles provide support for the *Aesthetic Enjoyment* DU, every effort should be made on the part of CNMI regulatory agencies to oversee creating, maintaining, and permitting more "sanctioned" trails and off-road areas that can support these activities, while protecting riparian buffer zones and other Areas of Particular Concern (APC) from harm, and preventing erosion and sediment from loading into surrounding waters."

PART F. CHANGES IN THIS INTEGRATED REPORT

F.1. Northern Islands Assessments

This reporting cycle each of the Northern Islands was assessed and reported in a separate subsection of this report. In addition, more information was gathered on each island by reviewing various studies by volcanologist, other researches, the Mayor of the Northern Islands, and frequent visitors. However, the lack of any baseline water quality data or visual field assessments on these islands is a notable shortfall for assessment purposes.

Over the past two decades, DLNR, DEQ and DCRM, have provided comments on potential environmental impacts from military exercises, and recommendations to the DoD, clearly stating that this data is necessary. The CNMI government has asked for collaboration with DoD, so all collected data may be shared. To date, DoD has not been forthcoming with their findings. Without baseline information, the CNMI cannot ensure that military exercises in the region do not cause adverse impacts to these waters. Having baseline water quality data for the Northern Islands will help CNMI hold DoD accountable for any adverse impacts that they cause to these waters.

F.2. ATTAINS database

This reporting cycle all the 2020 CNMI assessments were added to the ATTAINS database by BECQ WQS/NPS staff. This is the first time that BECQ was able to readily produce reports and tables on the miles of coastline effected by the various causes and sources directly from ATTAINS, as opposed to the arduous task of calculating total coastal miles using the ADB excel spreadsheet.

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APPENDIX I: Dimensions of Aquatic Resources in Each Watershed Segment

TABLE I - a. 2020 Dimensions of Aquatic Resources for Rota, Aguigan, and Tinian Watershed Segments

Watershed	Seg	WQ Sampling Stations	Ocean Shoreline Miles	Stream ID	Stream Miles	Wetland ID	Wetland Acres	Wetland Type	Lake ID	Lakes Acres	Latitude	Longitude
ROTA:												
Dugi/Gampapa/Chenchon	1	none	11.1	none	0	none	0		none	0	14°11'57.65"N	145°15'25.29"E
Sabana/Talakaya/Palie	2	R1,R2, R13	7.3	2STR	6.1	none	0		none	0	14° 6'55.71"N	145°11'18.38"E
Songsong	3	R3, R4, R5, R6, R7, R8,R14	7.9	none	0	none	0		none	0	14° 8'16.98"N	145° 8'12.31"E
Uyulanhulo/Teteto	4	R9,R10, R11,R13	3.5	none	0	none	0		none	0	14°10'4.67"N	145°10'1.89"E
Chaliat/Talo	5	R12	2.6	none	0	none	0		none	0	14°11'33.80"N	145°13'32.69"E
Rota Total:			***32.4***		***6.1***		***0.0***			***0.0***		
AGUIGAN:												
Aguigan	6	AGU1,2	8.2	none	0	none	0		none	0	14°51'7.07"N	145°33'31.41"E
Aguigan Total:			***8.2***		***0.0***		***0.0***			***0.0***		
TINIAN:												
Masalok	7	T1, T2	3.5	none	0	7WET	1.6		none	0	15° 2'4.71"N	145°38'55.28"E
Carolinas	8	none	10.4	none	0	none	0		none	0	14°56'18.83"N	145°39'8.49"E
Makpo	*9*				*0*					*0.0*		
Makpo	9	T7, 8, 9, 10	3	none		9WET	28.4		none	0	* 14°56'10.57"N	145°37'46.5"E
Makpo Harbor	9H	9H	1.5		0	none	0		none	0	14°57'54.54"N	145°37'30.23"E
Puntan Diaplolamanibot	10	T5, T6	9.9	none	0	10WET	12.9		none	0	14°58'56.89"N	145°36'44.43"E
Puntan Tahgong	11	T3, T4	6.4	none	0	11WET	40.6	Marsh/Pond	none	0	15° 4'18.30"N	145°36'55.59"E
Tinian Total:			***34.7***		***0.0***		***83.5***			***0.0***		

TABLE I - b. 2020 Dimensions of Aquatic Resources for Saipan Watershed Segments

Watershed	Seg	WQ Sampling Stations	Ocean Shoreline Miles	Stream ID	Stream Miles	Wetland ID	Wetland Acres	Wetland Type	Lake ID	Lakes Acres	Latitude	Longitude
SAIPAN:												
Kalabera	12	NEB02	4.1	12STR	7.8		0		none	0	15°15'33.43"N	145°49'22.18"E
Talofofo	13	NEB 03, NEB04, NEB07	5.4	13STR	34.5	13WET	2.6	Riparian	none	0	15°13'42.86"N	145°47'50.11"E
Kagman	14	NEB05, NEB06,	6.7	14STR	12.2	14WET	5.1	Marsh	none	0	15° 11'6.09"N	145°46'49.95"E
Lao Lao	15	SEB02, SEB03	1.4	15STR	6.7	none	0		none	0	15° 9'47.58"N	145°45'45.42"E
Dan Dan	16	CNMI-72	6.3	16STR	0.8	16WET	2.8	Riparian	none	0	15° 9'14.68"N	145°44'54.7"E
Isley	*17*						28.4					
Isley (West)	17A	SEB06	1.7	17STRA	3.5	17WETA	3.4	Constructed	none	0	15° 6'25.95"N	145°42'25.66"E
							23.0	Marsh				
Isley (East)	17B	SEB4-5, SEB08	4.2	17STRB	0.3	17WETB	2.0	Marsh	none	0	15° 5'31.13"N	145°44'53.4"E
Susupe	*18*						489.7			*57.4*		
Susupe (North)	18A	WB25 - WB29	2.4	18STRA	7.0	18WETA	194.6	Marsh	none	0	15° 9'9.43"N	145°42'1.91"E
							2.7	Pot Holes				
Susupe (South)	18B	WB30 - WB37	2.8	18STRB	1.4	18WETB	292.4	Marsh /Pot holes	18LAKB	57.4	15° 7'12.32"N	145°41'22.67"E
West Takpochau	*19*						40.7					
W. Takpochau (North)	19A	WB9-WB13	1	19STRA	4.7	19WETA	18.0	Marsh	none	0	15°13'26.77"N	145°43'55.64"E
							2.2	Pond				
W. Takpochau (Central)	19B	WB14 - WB23	4.4	19STRB	3.2	19WETB	20.5	Marsh	none	0	15°12'18.38"N	145°42'58.7"E
W. Takpochau (South)	19C	WB24	1.9	19STRC	1.3	none	0		none	0	15°10'56.16."N	145°42'49.25"E
Achugao	*20*						38.0					
Achugao (North)	20A	WB3-6	1.9	20STRA	3.4	20WETA	0.8	Constructed	none	0	15°14'35.26"N	145°45'16.66"E
							12.1	Marsh				
Achugao (South)	20B	WB7-8	2.4	20STRB, 20STRC	6.5	20WETB	24.4	Marsh	none	0	15°13'42.13"N	145°44'21.53"E
							0.7	Pond				
As Matuis	21	WB1, WB2	2.2	21STR	1.1	none	0		none	0	15°15'15.07"N	145°46'42.88"E
Banaderu	22	NEB01	5.1	none	0	none	0		none	0	15°16'36.29"N	145°47'47.03"E
Saipan Total:			***83.5***		***94.4***		***304.9***			***0.0***		

TABLE I - c. 2020 Dimensions of Aquatic Resources for Mañagaha's Segment

Watershed	Seg	WQ Sampling Stations	Ocean Shoreline Miles	Stream ID	Stream Miles	Wetland ID	Wetland Acres	Wetland Type	Lake ID	Lakes Acres	Latitude	Longitude
MANAGAHA:												
Managaha	23	MG01 - MG11	0.6	none	0	none	0		none	0	15°14'28.59"N	145°42'44.64"E
Managaha Total:			***0.6***		***0.0***		***0.0***			***0.0***		

TABLE I - d. 2020 Dimensions of Aquatic Resources for the Northern Islands Watershed Segments and Grand Totals

Watershed	Seg	WQ Sampling Stations	Ocean Shoreline Miles	Stream ID	Stream Miles	Wetland ID	Wetland Acres	Wetland Type	Lake ID	Lakes Acres	Latitude	Longitude
NORTHERN ISLANDS:												
Farallon De Medinilla	24	none	4.2	none	0	none			none	0	16° 1'10.96"N	146° 3'34.61"E
Anatahan	25	none	17.3	none	0	none			25LAK **A** **25LAK B**	149 149	16°21'5.04"N	145°41'3.42"E
Sarigan	26	none	6.0	26STR		none			none	0	16°42'12.38"N	145°46'46.90"
Guguan	27	none	5.6	27STR		none			none	0	17°18'32.51"N	145°50'33.47"E
Alamagan	28	none	9.4	28STR		none			none	0	17°35'54.81"N	145°50'3.59"E
Pagan	29	none	28.2	29STR		29WET	27.0		29LAKA 29LAKB	34 27	*18° 7'16.62"N*	*145°45'49.20"E*
Agrihan	30	none	19.3	none	0	none			none	0	18°46'2.86"N	145°40'18.73"E
Asuncion	31	none	7.0	31STR		none			none	0	19°41'26.38"N	145°24'13.47"E
Maug	32	none	9.5	32STR		none			none	0	20° 1'13.95"N	145°13'59.72"E
Farallon De Pajaros	33	none	4.2	33STR		none			none	0	20°32'42.64"N	144°53'34.04"E
Northern Islands Totals:			**110.7**				**27.0**			**359.0**		
CNMI Grand Total:			***186.6***		***6.1***		***110.5***			***416.4***		

RED BOLD – New Segment ID, due to new Lake formation, Hagoi Lagu

APPENDIX II: Surface Water Quality Criteria Data Used in 2020 Waterbody Assessments

NOTES:

1. "% violation" means percent of samples which triggered Beach Advisory. Advisories are triggered if a sample exceeds either the STV, or GM over 30 day period.
2. "GM" means geometric mean of the most recent 30 day period including the single sampling event.
3. * - Means not sampled, ** - Means newly established long-term sites without sufficient data for statistical inference for that year.
4. COLOR LEGEND: = impaired (>10-20); = severely impaired (>20); = Not sampled, or dangerous access

TABLE II - a. Rota Coastal Enterococci Exceedances of CNMI WQS

		Enterococci % Violations																
Sample Station ID	Sampling Station Name	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Segment Class
SEGMENT 1: DUGI/GAMPAPA/CHENCHON																		
*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	AA
SEGMENT 2: SABANA/TALAKAYA/PALIE																		
R1	Coral Garden	8	4	0	5	17	19	26	0	*	*	*	*	*	*	*	*	AA
R2	Kokomo Beach Club	0	3	7	5	20	8	19	10	15	21	0	13	0	0	2	0	AA
R13	Talakhaya	*	*	*	*	*	*	*	*	*	*	**	**	10	24	33	24	AA
SEGMENT 3: SONGSONG																		
R3	Mobil Storm Drain	0	10	0	0	7	12	19	5	19	50	38	43	9	0	5	0	A
R4	East Harbor Dock	4	4	0	0	0	5	4	0	7	21	14	26	13	0	5	0	A
R5	Tweksberry Beach	12	0	0	0	0	4	4	5	7	0	5	4	0	0	5	0	AA
R6	W. Harbor Marina	12	10	0	0	7	12	0	14	15	29	29	9	13	32	14	12	A
R7	Dist #2 Storm Drain	42	17	4	14	27	12	4	4	19	43	45	35	4	20	5	12	AA
R8	Dist #1 Storm Drain	4	3	0	9	10	0	7	10	11	7	5	0	0	8	1	0	AA
SEGMENT 4: UYULANHULO/TETETO																		
R9	Veterans Memorial	0	0	4	0	0	0	4	5	4	0	5	0	0	0	5	4	AA
R10	Teteto Beach	0	0	0	0	0	0	4	5	0	0	0	9	0	0	0	12	AA
R11	Guata Beach	19	14	4	5	0	0	4	14	7	0	0	0	0	0	0	4	AA
SEGMENT 5: CHALIAT/TALO																		
R12	Swimming Hole	19	7	7	0	0	0	0	9	7	29	5	13	0	0	0	0	AA

TABLE II - b. Tinian Coastal Enterococci Exceedances of CNMI WQS

		Enterococci % Violations																
Sample Station ID	Sampling Station Name	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Segment Class
SEGMENT 6: AGUIGAN																		
AGU 2	Goat Island	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	*	AA
SEGMENT 7: MASALOK																		
T1	Unai Masalok	4	0	0	8	7	7	9	0	18	17	13	16	8	0	7	0	AA
T2	Unai Dangkolo	4	15	4	4	4	3	9	7	18	7	13	11	4	4	4	9	AA
SEGMENT 9: MAKPO																		
T7	Tachogna	8	4	4	0	4	0	0	11	11	10	4	5	8	0	0	4	AA
T8	Taga Beach	8	0	0	0	0	0	14	7	4	3	5	5	4	0	0	0	AA
T10	Kammer	4	4	0	4	0	0	14	0	4	0	9	5	0	4	4	4	AA
SEGMENT 9H: MAKPO HARBOR																		
T9A	Harbor	4	19	7	0	7	0	0	4	0	17	13	20	8	0	0	0	A
SEGMENT 10: PUNTAN DIAPLOMANIBOT																		
T5	Leprosarium I	4	4	0	12	7	7	10	4	11	21	13	11	8	0	7	4	AA
T6	Leprosarium II	0	12	0	15	4	7	20	7	4	7	17	20	4	4	11	0	AA
SEGMENT 11: PUNTAN TAHGONG																		
T3	Unai Babui	4	15	7	4	18	7	0	4	11	3	9	16	4	0	0	14	AA
T4	Unai Chulu	4	19	0	0	7	0	0	7	14	3	9	11	4	4	0	4	AA

TABLE II - c. Saipan Coastal Enterococci Exceedances of CNMI WQS

Sample Station ID	Sampling Station Name	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Segment Class
		Enterococci % Violations																
SEGMENT 12: KALABERA																		
NEB 02	Bird Island	23	30	34	10	3	7	7	14	7	21	23	23	15	38	27	6	AA
SEGMENT 13: TALOFOFO																		
NEB 07	Hidden	38	30	31	24	30	22	18	24	13	50	17	32	11	31	32	22	AA
NEB 03	Jeffrey's	15	50	38	29	37	26	21	38	20	29	9	18	7	17	35	15	AA
CNMI-104	Jeffrey's Beach Reef flat	*	*	*	*	*	*	*	*	*	*	*	*	0	0	0	0	AA
NEB 04	Old Man By the Sea	20	50	24	24	10	19	7	24	7	31	18	41	19	31	21	5	AA
SEGMENT 14: KAGMAN																		
NEB 05	Marine Beach	15	15	3	14	13	11	11	0	10	29	8	0	4	7	8	0	AA
CNMI-29	Tank Beach Reef flat	*	*	*	*	*	*	*	*	*	*	*	*	0	0	0	0	AA
NEB 06	Tank Beach	23	5	3	19	10	4	7	10	3	13	4	5	4	0	0	8	AA
SEB 01	Forbidden Island	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	AA
SEB 02	North LaoLao Beach	19	30	14	19	13	19	7	10	23	16	8	9	4	0	8	0	AA
ARRA B2	North Laolao Reef Flat	*	*	*	*	*	*	*	*	*	*	*	*	0	8	22	0	AA
ARRA B5	North Laolao Reef Flat	*	*	*	*	*	*	*	*	*	*	*	*	8	0	0	13	AA
ARRA B8	North Laolao Reef Flat	*	*	*	*	*	*	*	*	*	*	*	*	8	0	0	13	AA

TABLE II - c. Saipan Coastal Enterococci Exceedances of CNMI WQS Continued

Sample Station ID	Sampling Station Name	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Segment Class
		Enterococci % Violations																
SEGMENT 15: LAO LAO																		
CNMI-21	Central LaoLao Beach reef flat	*	*	*	*	*	*	0	*	*	0	*	0	0	0	0	0	AA
SEB 03	South Laolao	19	25	10	33	37	15	25	14	23	16	0	5	15	0	0	4	AA
ARRA C2	South Laolao Reef Flat	*	*	*	*	*	*	*	*	*	*	*	*	8	15	11	0	AA
ARRA C5	South Laolao Reef Flat	*	*	*	*	*	*	*	*	*	*	*	*	0	8	0	0	AA
ARRA C8	South Laolao Reef Flat	*	*	*	*	*	*	*	*	*	*	*	*	0	0	0	0	AA
SEGMENT 16: DAN DAN																		
CNMI-72	DanDan Reef Flat	*	*	*	*	*	*	0	*	*	0	0	*	0	0	0	0	AA
SEGMENT 17A: ISLEY (WEST)																		
SEB 06	Unai Dangkolo	46	35	14	33	13	37	43	19	37	16	33	5	4	3	12	0	AA
SEGMENT 17B: ISLEY (EAST)																		
SEB 04	Obyan Beach	27	15	0	10	3	15	7	5	20	10	8	5	4	7	0	4	AA
CNMI-30	Obyan Beach Reef Flat	*	*	*	*	*	*	*	*	*	*	*	*	0	0	0	0	AA
SEB 05	Ladder Beach	12	20	10	5	0	7	21	33	17	10	22	0	11	7	12	0	AA
SEGMENT 18A: SUSUPE (NORTH)																		
WB 24	Chalan Laulau	17	4	6	6	2	4	0	6	2	6	13	8	0	4	0	8	AA
WB 25	San Jose	6	2	6	9	0	8	8	12	2	0	12	8	0	0	2	4	AA
WB 26	Civic Center	4	0	4	11	4	2	4	6	2	6	12	10	2	2	4	10	AA
WB 27	Saipan World Resort (Diamond Hotel)	6	6	8	9	2	6	12	15	4	2	11	0	0	0	6	2	AA
WB 28	Kanoa Resort (Grand Hotel)	4	4	8	4	2	6	12	8	0	8	4	4	0	0	6	2	AA
WB 29	Community School	8	8	8	6	2	4	8	2	0	10	3	4	0	0	0	6	AA

TABLE II - c. Saipan Coastal Enterococci Exceedances of CNMI WQS Continued

Sample Station ID	Sampling Station Name	Enterococci % Violations																Segment Class
		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
	SEGMENT 18B: SUSUPE (SOUTH)																	
WB 30	Sugar Dock	52	14	19	19	66	37	19	29	21	29	32	18	6	15	24	31	AA
WB 31	CK Dist #2 Drain	17	10	8	21	32	25	12	25	15	25	29	14	10	13	25	10	AA
WB 32	CK Dist #4 Lally	10	6	6	6	6	6	8	19	11	12	13	10	8	4	4	10	AA
WB 33	Chalan Piao	10	6	6	13	4	8	17	6	8	8	0	6	0	4	4	8	AA
WB 34	Hopwood School	21	6	13	21	6	2	15	10	8	10	14	16	8	6	8	8	AA
WB 35	San Antonio	19	6	6	0	4	6	8	6	4	6	3	0	6	4	2	8	AA
WB 36	PIC	6	4	2	6	6	6	8	6	6	4	4	0	0	2	4	6	AA
WB 37	San Antonio Lift Stn.	33	6	4	13	22	10	12	10	6	4	23	12	4	2	4	4	AA
	SEGMENT 19A: WEST TAKPOCHAU (NORTH)																	
WB 10	DPW Channel Bridge	33	67	77	66	86	79	75	88	69	67	64	47	38	44	52	16	A
	SEGMENT 19B: WEST TAKPOCHAU (CENTRAL)																	
WB 11.2	Inos Peace Park (Puerto Rico Dump)	42	76	56	68	70	50	42	33	33	39	24	33	17	27	18	13	A
WB 13	Outer Cove Marina	10	21	4	13	0	2	2	8	4	0	14	6	2	2	0	6	A
WB 12	Smiling Cove Marina	6	14	4	19	2	12	13	21	11	4	19	14	13	2	2	10	A
WB 12.1	American Memorial Park Drainage	25	39	29	32	40	50	27	48	20	21	6	15	10	28	24	28	A
WB 14	Micro Beach	8	17	13	21	12	8	13	12	21	18	4	14	2	2	6	8	AA
WB 15	Hyatt Hotel	10	21	13	15	2	4	10	17	8	12	4	12	2	6	18	6	AA
WB 16	Fiesta Resort (Dai-Ichi Hotel)	17	25	17	17	0	8	12	4	6	8	13	15	11	4	15	10	AA
WB 17	Drainage #1	54	37	31	36	20	10	25	17	8	12	14	10	32	2	0	10	AA
WB 18	Imperial Pacific Resort (Samoa Housing)	17	17	12	15	8	2	2	12	8	10	19	18	4	4	6	6	AA
WB 19	GrandVrio Hotel (Hafa-Adai Hotel)	31	25	29	26	40	19	19	38	17	14	29	23	9	18	6	22	AA
WB 20	Drainage #2	33	31	38	32	46	17	25	29	13	24	32	20	13	23	8	6	AA

TABLE II - c. Saipan Coastal Enterococci Exceedances of CNMI WQS Continued

		Enterococci % Violations																
Sample Station ID	Sampling Station Name	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Segment Class
	SEGMENT 19C: WEST TAKPOCHAU (SOUTH)																	
WB 21	Garapan Fishing Dock	56	35	33	36	50	63	56	69	55	31	54	47	49	40	76	51	AA
WB 23	Drainage #3	13	10	17	43	48	33	27	56	10	14	14	16	12	15	8	8	AA
WB 22	Garapan Beach	21	17	12	23	6	10	21	31	17	16	27	20	4	12	12	10	AA
	SEGMENT 20A: ACHUGAO (NORTH)																	
WB 03	Kensington Hotel (Nikko Hotel)	21	8	6	19	4	6	0	10	8	8	7	16	0	0	6	0	AA
WB 04	San Roque School	35	14	13	17	14	10	4	8	6	10	18	14	4	2	4	2	AA
WB 05	Plumeria Hotel	10	12	6	13	4	0	4	19	4	2	18	12	4	6	8	4	AA
WB 06	Aqua Resort Hotel	8	14	12	13	2	4	6	8	2	4	28	12	2	4	7	4	AA
	SEGMENT 20B: ACHUGAO (SOUTH)																	
WB 07	Tanapag Meeting Hall	44	35	50	32	36	38	37	35	26	40	44	42	15	31	20	20	AA
WB 08	Central Repair Shop	33	35	35	34	34	56	23	38	39	37	26	39	6	23	29	35	A
WB 09	Sea Plane Ramp	0	4	2	15	0	0	0	2	2	2	3	2	4	6	8	2	A
	SEGMENT 21: AS MATUIS																	
WB 01	Wing Beach	11	14	10	13	4	6	4	4	4	2	4	14	2	10	10	4	AA
CNMI-19	Wing Beach Reef Flat	*	*	*	*	*	*	0	*	*	0	0	0	0	0	0	0	AA
WB 02	Pau-Pau Beach	25	6	6	15	2	10	0	0	4	10	10	18	4	0	16	4	AA
	SEGMENT 22: BANADERU																	
NEB 01	Grotto Cave	27	10	0	5	0	4	7	0	3	10	0	18	33	24	31	22	AA

TABLE II - d. Mañagaha Coastal Enterococci Exceedances of CNMI WQS

Sample Station ID	Sampling Station Name	Enterococci % Violations																Segment Class
		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	
	SEGMENT 23: MANAGAHA																	
MG 01	Dock	0	4	8	0	0	0	0	0	4	0	9	5	0	0	0	0	AA
MG 02	Swimming Area A	0	7	4	4	0	0	5	4	7	0	5	0	4	0	3	0	AA
MG 03	Swimming Area A	8	4	4	0	4	0	5	0	0	0	0	8	0	0	3	0	AA
MG 04	Swimming Area B	4	4	0	0	0	4	***19	0	***15	0	5	4	0	7	3	4	AA
MG 05	Managaha Beach	4	4	0	0	0	0	5	4	***11	0	0	0	4	0	3	0	AA
MG 06	Managaha Beach	8	0	4	4	0	0	5	7	7	3	***18	4	4	0	0	0	AA
MG 07	Managaha Beach	0	4	7	0	0	7	5	4	4	0	0	4	0	0	3	0	AA
MG 08	Beach Near Statue	0	4	0	0	0	4	5	0	7	7	5	4	0	0	3	0	AA
MG 09	Managaha Beach	0	4	0	0	0	0	5	0	4	7	9	4	0	0	0	0	AA
MG 10	Managaha Beach	0	0	4	4	4	0	5	0	4	7	0	4	0	0	3	0	AA
MG 11	Next to Dock	***15	4	4	0	4	0	10	0	7	3	9	***13	4	0	3	0	AA

*** Very few exceedances. Given that Mañagaha has such a strong historical record of meeting all bacteriological, chemical and physical WQS, and again meets all WQS. The limited number of exceedances are thought to be associated with extreme storm events resuspending naturally occurring Enterococci.

TABLE II - e. Rota Coastal Dissolved Oxygen (DO%) Exceedances of CNMI WQS

		DO % Exceedences												
Sampling Station ID	Sampling Station Name	*2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Segment Class
SEGMENT 2: SABANA/TALAKAYA/PALIE														
R1	Coral Garden	36	19	0	0	**	**	**	**	**	**	**	**	AA
R2	Kokomo Beach Club	36	20	0	0	0	0	5	5	0	0	0	10	AA
R13	Talakhaya	**	**	**	**	**	**	***	***	0	0	0	10	AA
SEGMENT 3: SONGSONG														
R3	Mobil Storm Drainage	0	14	0	0	0	0	0	5	0	0	0	5	A
R4	East Harbor Dock	0	0	0	0	0	0	0	10	0	0	0	5	A
R5	Teweksberry Beach	32	24	0	0	0	0	0	5	0	4	0	30	AA
R6	West Harbor Marina	36	14	0	0	0	0	5	11	0	4	0	29	A
R7	Dist #2 Storm Drain	36	19	0	0	0	0	0	5	0	0	0	14	AA
R8	Dist #1 Storm Drain	32	19	0	0	0	0	0	5	0	4	5	24	AA
SEGMENT 4: UYULANHULO/TETETO														
R9	Veterans Memorial	32	5	0	0	0	0	0	5	0	0	0	5	AA
R10	Teteto Beach	36	10	0	0	0	0	0	10	0	0	0	5	AA
R11	Guata Beach	36	10	0	0	0	0	0	5	0	0	5	10	AA
SEGMENT 5: CHALIAT/TALO														
R12	Swimming Hole	0	0	0	0	0	0	0	5	0	0	0	5	AA

TABLE II - f. Tinian Coastal Dissolved Oxygen (DO%) Exceedances of CNMI WQS

		DO % Exceedences													
Sampling Station ID	Sampling Station Name	*2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Segment Class	Comments
SEGMENT 7: MASALOK															
T01	Unai Masalok Beach	30	0	0	0	0	7	0	0	0	4	0	0	AA	
T02	Unai Dangkolo	30	0	0	0	0	7	0	0	0	0	0	0	AA	
SEGMENT 9: MAKPO															
T07	Tachogna Beach	30	0	0	0	0	7	0	0	4	8	0	0	AA	
T08	Taga Beach	33	5	0	0	0	11	0	0	4	8	0	0	AA	Dynasty closed, Soudelor & Yutu
T10	Kammer Beach	30	0	0	0	0	4	0	5	4	4	0	0	AA	
SEGMENT 9H: MAKPO HARBOR															
T09	Harbor	33	35	0	0	4	25	0	10	32	35	28	21	A	
SEGMENT 10: PUNTAN DIAPLOMANIBOT															
T05	Leprosarium I	30	0	0	0	0	4	0	0	4	0	0	5	AA	
T06	Leprosarium II	30	0	0	0	0	7	0	0	0	0	0	6	AA	
SEGMENT 11: PUNTAN TAHGONG															
T03	Unai Babui	30	0	0	4	0	7	0	0	0	0	0	0	AA	
T04	Unai Chulu	30	0	0	4	0	4	0	0	0	4	4	6	AA	

TABLE II - g. Saipan Coastal Dissolved Oxygen (DO%) Exceedances of CNMI WQS

% DO Exceedences														
Sampling Station ID	Sampling Station Name	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Segment Class
	SEGMENT 12: KALABERA													
NEB 02	Bird Island Beach	0	8	0	0	0	0	0	0	4	0	0	0	AA
	SEGMENT 13: TALOFOFO													
NEB 07	Hidden Beach	0	4	0	0	0	0	0	0	0	0	0	0	AA
NEB 03	Jeffrey's Beach	0	4	0	0	0	0	0	0	0	0	0	0	AA
CNMI-104	Jeffrey's Beach Reef Flat	*	*	*	*	*	*	*	*	*	0	0	0	AA
NEB 04	Old Man By the Sea	0	4	0	0	0	0	0	0	0	0	0	0	AA
	SEGMENT 14: KAGMAN													
NEB 05	Marine Beach	0	0	0	0	0	0	0	0	0	0	4	0	AA
CNMI-29	Tank Beach Reef Flat	*	*	0	*	0	*	0	0	0	0	0	0	AA
NEB 06	Tank Beach	0	0	0	0	0	0	0	0	0	0	0	0	AA
SEB 01	Forbidden Island	*	*	*	*	*	*	*	*	*	*	*	*	AA
SEB 02	North Laolao Beach	7	0	0	0	0	0	0	0	0	0	0	0	AA
ARRA B2	North Laolao Reef Flat	*	*	*	0	0	0	0	0	8	0	0	0	AA
ARRA B5	North Laolao Reef Flat	*	*	*	0	0	0	0	0	0	0	0	0	AA
ARRA B8	North Laolao Reef Flat	*	*	*	0	0	0	0	0	0	0	0	0	AA
	SEGMENT 15: LAO LAO													
CNMI-21	Central Laolao Reef flat	*	*	0	*	0	*	*	0	0	0	0	0	AA
SEB 03	South Laolao Beach	0	4	0	0	3	0	0	0	0	0	0	0	AA
ARRA C2	South Laolao Reef Flat	*	*	*	0	0	0	0	0	0	0	0	0	AA
ARRA C5	South Laolao Reef Flat	*	*	*	0	0	0	0	0	8	0	0	0	AA
ARRA C8	South Laolao Reef Flat	*	*	*	0	0	0	0	0	8	0	0	0	AA
	SEGMENT 16: DAN DAN													
CNMI 72	DanDan Reef Flat	*	*	0	*	0	*	0	0	0	0	0	0	AA
	SEGMENT 17A: ISLEY (WEST)													
SEB 06	Unai Dangkolo	0	0	0	0	0	0	0	0	0	0	0	0	AA
	SEGMENT 17B: ISLEY (EAST)													
SEB 04	Obyan Beach	0	0	0	0	0	0	0	0	4	0	0	0	AA
CNMI-30	Obyan Beach Reef Flat	*	*	0	*	0	*	0	0	0	0	0	0	AA
SEB 05	Ladder Beach	0	0	0	0	0	0	0	0	0	0	0	0	AA

TABLE II - g. Saipan Coastal Dissolved Oxygen (DO%) Exceedances of CNMI WQS Continued

% DO Exceedences														
Sampling Station ID	Sampling Station Name	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Segment Class
SEGMENT 18A: SUSUPE (NORTH)														
WB 24	Chalan Laulau Beach	13	33	27	33	34	35	22	73	50	42	30	18	AA
WB 25	San Jose Beach	7	15	10	19	13	8	10	53	25	27	13	5	AA
WB 26	Civic Center Beach	7	19	12	15	8	4	8	35	23	27	15	9	AA
WB 27	Saipan World Resort (Diamond Hotel Beach)	3	15	6	15	6	2	8	33	19	12	11	5	AA
WB 28	Kanoa Resort (Grand Hotel)	4	8	2	17	0	2	6	29	12	10	9	5	AA
WB 29	Community School Beach	4	13	4	13	2	0	6	29	15	17	9	2	AA
SEGMENT 18B: SUSUPE (SOUTH)														
WB 30	Sugar Dock	7	15	4	13	15	2	17	39	25	40	23	9	AA
WB 31	CK Dist #2 Drainage	2	8	2	6	4	0	6	15	21	25	6	5	AA
WB 32	CK Dist #4 Lally Beach	2	8	4	4	0	0	6	17	19	10	6	7	AA
WB 33	Chalan Piao Beach	2	4	4	4	0	0	3	27	23	10	11	5	AA
WB 34	Hopwood School Beach	7	6	4	4	0	0	6	24	27	19	6	3	AA
WB 35	San Antonio Beach	4	8	5	6	0	0	6	7	17	13	6	5	AA
WB 36	PIC Beach	4	4	0	6	0	0	2	4	21	19	4	0	AA
WB 37	San Antonio Lift Stn.	4	6	0	10	0	0	4	9	19	21	4	0	AA
SEGMENT 19A: WEST TAKPOCHAU (NORTH)														
WB 10	DPW Channel Bridge	4	8	6	6	10	0	0	8	8	4	4	2	A
SEGMENT 19B: WEST TAKPOCHAU (CENTRAL)														
WB 11.2	Inos Peace Park (Puerto Rico Dump)	8	18	12	10	14	10	11	28	22	18	23	10	A
WB 13	Outer Cove Marina	0	2	6	2	4	0	0	0	2	0	0	7	A
WB 12	Smiling Cove Marina	4	18	6	12	10	2	11	12	29	17	11	16	A
WB 12.1	American Memorial Park Drainage	2	10	6	10	8	0	4	9	26	15	10	2	A
WB 14	Micro Beach	0	2	2	2	4	2	0	2	4	2	2	2	AA
WB 15	Hyatt Hotel	2	6	2	2	4	0	2	0	6	8	2	2	AA
WB 16	Fiesta Resort (Dai-Ichi Hotel)	0	6	2	0	4	0	0	2	2	8	0	0	AA
WB 17	Drainage #1	0	10	6	4	4	0	0	2	13	6	4	0	AA
WB 18	Imperial Pacific Resort (Samoa Housing)	2	4	4	6	4	0	0	2	4	0	0	0	AA
WB 19	GrandVrio Hotel (Hafa-Adai Hotel)	11	19	15	29	30	21	6	55	38	45	17	12	AA
WB 20	Drainage #2	9	13	19	29	31	19	23	59	37	40	29	9	AA

TABLE II - g. Saipan Coastal Dissolved Oxygen (DO%) Exceedances of CNMI WQS Continued

% DO Exceedences														
Sampling Station ID	Sampling Station Name	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Segment Class
SEGMENT 19C: WEST TAKPOCHAU (SOUTH)														
WB 21	Garapan Fishing Dock	18	31	35	33	34	31	15	50	45	37	30	19	AA
WB 23	Drainage #3	13	21	12	25	21	17	11	33	23	35	41	11	AA
WB 22	Garapan Beach	11	29	17	19	28	25	18	67	40	52	45	16	AA
SEGMENT 20A: ACHUGAO (NORTH)														
WB 03	Kensington Hotel (Nikko Hotel)	2	12	2	4	12	4	8	4	19	21	6	9	AA
WB 04	San Roque School Beach	2	6	8	4	10	2	6	2	13	8	9	0	AA
WB 05	Plumeria Hotel	10	8	6	2	6	0	0	4	4	4	7	0	AA
WB 06	Aqua Resort Hotel	2	6	4	4	8	0	0	2	4	8	7	0	AA
SEGMENT 20B: ACHUGAO (SOUTH)														
WB 07	Tanapag Meeting Hall	2	8	8	10	6	0	4	8	15	10	9	5	AA
WB 08	Central Repair Shop	4	16	13	21	19	16	10	16	16	27	13	7	A
WB 09	Sea Plane Ramp	2	8	6	4	4	0	3	2	4	0	2	5	A
SEGMENT 21: AS MATUIS														
WB 01	Wing Beach	0	2	0	0	0	0	0	2	2	10	2	5	AA
CNMI-19	Wing Beach Reef Flat	*	*	0	*	*	0	*	0	0	0	0	0	AA
WB 02	Pau-Pau Beach	6	18	10	10	10	8	6	12	35	37	11	10	AA
SEGMENT 22: BANADERU														
NEB 01	Grotto Cave	0	8	0	0	0	0	0	5	0	0	0	0	AA

TABLE II – h. Mañagaha Coastal Dissolved Oxygen (DO%) Exceedances of CNMI WQS

% DO Exceedences														
Sampling Station ID	Sampling Station Name	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Segment Class
SEGMENT 23: MANAGAHA														
MG 01	Dock	0	4	5	7	0	11	0	0	4	0	3	5	AA
MG 02	Swimming Area A	0	4	0	0	0	4	0	0	4	0	0	5	AA
MG 03	Swimming Area A	0	8	5	0	0	4	0	0	8	7	0	0	AA
MG 04	Swimming Area B	0	0	0	0	0	4	0	0	0	0	0	0	AA
MG 05	Managaha Beach	0	0	0	0	0	0	0	0	4	0	0	0	AA
MG 06	Managaha Beach	0	0	0	4	0	0	0	0	0	4	3	0	AA
MG 07	Managaha Beach	0	0	0	0	0	0	0	0	4	4	0	0	AA
MG 08	Beach Near Statue	0	0	0	4	0	4	0	0	4	0	0	0	AA
MG 09	Managaha Beach	0	0	0	0	0	0	0	0	4	0	0	5	AA
MG 10	Managaha Beach	0	0	0	0	0	0	0	0	4	0	0	9	AA
MG 11	Next to Dock	0	4	0	0	0	0	0	0	4	4	3	0	AA

TABLE II – i. Rota Coastal pH Exceedances of CNMI WQS

pH % Exceedences									
Sampling Station ID	Sampling Station Name	***2014	2015	2016	2017	2018	2019	Segment Class	Comments
SEGMENT 2: SABANA/TALAKAYA/PALIE									
R1	Coral Garden	*	*	*	*	*	*	AA	
R2	Kokomo Beach Club	33	0	0	0	0	17	AA	no pattern
R13	Talakhaya	*	*	0	0	5	8	AA	
SEGMENT 3: SONGSONG									
R3	Mobil Storm Drainage	30	0	0	0	5	13	A	no pattern
R4	East Harbor Dock	30	0	0	0	5	0	A	
R5	Teweksberry Beach	38	5	0	0	0	0	AA	
R6	West Harbor Marina	33	0	0	0	0	4	A	
R7	Dist #2 Storm Drain	19	0	0	0	5	4	AA	
R8	Dist #1 Storm Drain	33	0	0	0	0	0	AA	
SEGMENT 4: UYULANHULO/TETETO									
R9	Veterans Memorial	38	0	0	0	5	0	AA	
R10	Teteto Beach	43	0	0	0	5	8	AA	
R11	Guata Beach	29	0	0	0	5	17	AA	Low pH
SEGMENT 5: CHALIAT/TALO									
R12	Swimming Hole	39	0	4	0	0	30	AA	Low pH

* Unable to sample due to hazardous conditions or newly site in FY2016.
Aging pH probe giving erroneous results. New probe to be purchased in 2020.

TABLE II – j. Tinian Coastal pH Exceedances of CNMI WQS

pH % Exceedences									
Sampling Station ID	Sampling Station Name	2014	2015	2016	2017	2018	2019	Segment Class	Comments
SEGMENT 7: MASALOK									
T1	Unai Masalok Beach	0	0	0	0	4	13	AA	Low pH
T2	Unai Dangkolo	0	0	0	4	12	14	AA	no pattern
SEGMENT 9: MAKPO									
T7	Tachogna Beach	0	0	8	12	19	8	AA	Low pH
T8	Taga Beach	5	0	0	8	11	9	AA	no pattern
T10	Kammer Beach	0	0	0	0	4	8	AA	
SEGMENT 9H: MAKPO HARBOR									
T9A	Harbor	0	0	0	0	0	8	A	
SEGMENT 10: PUNTAN DIAPLOMANIBOT									
T5	Leprosarium I	0	0	0	0	4	8	AA	
T6	Leprosarium II	0	0	0	0	4	8	AA	
SEGMENT 11: PUNTAN TAHGONG									
T3	Unai Babui	0	0	0	0	16	0	AA	no pattern
T4	Unai Chulu	0	0	0	0	7	14	AA	no pattern

TABLE II – k. Saipan Coastal pH Exceedances of CNMI WQS

		% pH Exceedences							
Sampling Station ID	Sampling Station Name	2014	2015	2016	2017	2018	2019	Segment Class	Comments
	SEGMENT 12: KALABERA								
NEB 02	Bird Island Beach	0	7	4	7	5	0	AA	
	SEGMENT 13: TALOFOFO								
NEB 07	Hidden Beach	0	13	4	3	13	0	AA	
NEB 03	Jeffrey's Beach	0	7	0	3	0	0	AA	
CNMI-104	Jeffrey's Beach Reef flat	*	*	0	0	0	0	AA	
NEB 04	Old Man By the Sea	0	7	4	3	8	5	AA	
	SEGMENT 14: KAGMAN								
NEB 05	Marine Beach	0	0	4	0	12	0	AA	
CNMI-29	Tank Beach Reef flat	*	*	0	0	0	0	AA	
NEB 06	Tank Beach	0	0	4	3	8	0	AA	
SEB 01	Forbidden Island	*	*	*	*	*	*	AA	
SEB 02	North Laolao Beach	0	0	0	0	4	0	AA	
ARRA B2	North Laolao Beach	0	0	8	0	0	0	AA	
ARRA B5	North Laolao Beach	0	0	0	0	0	13	AA	
ARRA B8	North Laolao Beach	0	11	0	0	0	13	AA	
	SEGMENT 15: LAO LAO								
CNMI-21	Central LaoLao Beach reef flat	*	0	0	0	0	0	AA	
SEB 03	South Laolao Beach	0	0	0	0	4	0	AA	
ARRA C2	South Laolao Beach	0	0	0	0	0	0	AA	
ARRA C5	South Laolao Beach	0	0	0	0	0	0	AA	
ARRA C8	South Laolao Beach	0	0	0	0	0	0	AA	
	SEGMENT 16: DAN DAN								
CNMI-72	DanDan Reef Flat	0	*	0	0	0	0	AA	
	SEGMENT 17A: ISLEY (WEST)								
SEB 06	Unai Dangkolo	0	0	4	3	23	0	AA	pH Low
	SEGMENT 17B: ISLEY (EAST)								
SEB 04	Obyan Beach	0	0	0	3	12	0	AA	pH Low
CNMI-30	Obyan Beach Reef Flat	*	*	0	0	50	0	AA	
SEB 05	Ladder Beach	0	0	0	0	23	0	AA	
	SEGMENT 18A: SUSUPE (NORTH)								
WB 24	Chalan Laulau Beach	2	14	6	8	20	26	AA	pH Low
WB 25	San Jose Beach	2	2	0	6	8	7	AA	
WB 26	Civic Center Beach	2	2	0	6	4	5	AA	
WB 27	Saipan World Resort (Diamond Hotel)	0	0	0	4	6	10	AA	
WB 28	Kanoa Resort (Grand Hotel)	2	0	0	4	2	5	AA	
WB 29	Community School Beach	0	0	0	4	2	7	AA	

TABLE II – k. Saipan Coastal pH Exceedances of CNMI WQS Continued

% pH Exceedences									
Sampling Station ID	Sampling Station Name	2014	2015	2016	2017	2018	2019	Segment Class	Comments
	SEGMENT 18B: SUSUPE (SOUTH)								
WB 30	Sugar Dock	0	2	0	4	4	12	AA	
WB 31	CK Dist #2 Drainage	2	6	0	4	6	7	AA	
WB 32	CK Dist #4 Lally Beach	2	6	0	2	4	7	AA	
WB 33	Chalan Piao Beach	0	0	2	0	4	7	AA	
WB 34	Hopwood School Beach	0	2	0	4	4	5	AA	
WB 35	San Antonio Beach	0	0	0	2	6	2	AA	
WB 36	Pacific Island Club (PIC) Beach	2	2	0	8	4	2	AA	
WB 37	San Antonio Lift Station	2	2	2	4	6	5	A	
	SEGMENT 19A: WEST TAKPOCHAU (NORTH)								
WB 10	DPW Channel Bridge	6	15	8	10	4	5	A	
	SEGMENT 19B: WEST TAKPOCHAU (CENTRAL)								
WB 11.2	Inos Peace Park (Puerto Rico Dump)	7	3	7	2	11	12	A	pH Low
WB 13	Outer Cove Marina	3	2	2	2	8	7	A	
WB 12	Smiling Cove Marina	3	6	4	2	2	5	A	
WB 12.1	American Memorial Park Drainage	4	0	3	2	4	5	A	
WB 14	Micro Beach	10	0	6	0	4	2	AA	
WB 15	Hyatt Hotel	8	2	4	2	0	5	AA	
WB 16	Fiesta Resort (Dai-Ichi Hotel)	6	2	4	2	8	2	AA	
WB 17	Drainage #1	0	4	8	0	0	0	AA	
WB 18	Imperial Pacific Resort (Samoa Housing)	6	4	6	0	0	0	AA	
WB 19	GrandVrio Hotel (Hafa-Adai Hotel)	2	2	8	23	23	18	AA	pH Low
WB 20	Drainage #2	0	2	0	12	20	9	AA	pH Low
	SEGMENT 19C: WEST TAKPOCHAU (SOUTH)								
WB 21	Garapan Fishing Dock	0	6	4	19	12	17	AA	pH Low
WB 23	Drainage #3	3	10	10	13	17	21	AA	pH Low
WB 22	Garapan Beach	4	21	6	21	22	19	AA	pH Low
	SEGMENT 20A: ACHUGAO (NORTH)								
WB 03	Kensington Hotel (Nikko Hotel)	10	2	4	4	0	7	AA	
WB 04	San Roque School Beach	3	2	4	0	0	5	AA	
WB 05	Plumeria Hotel	0	2	4	0	0	2	AA	
WB 06	Aqua Resort Hotel	6	2	4	2	0	2	AA	

TABLE II – k. Saipan Coastal pH Exceedances of CNMI WQS Continued

% pH Exceedences									
Sampling Station ID	Sampling Station Name	2014	2015	2016	2017	2018	2019	Segment Class	Comments
	SEGMENT 20B: ACHUGAO (SOUTH)								
WB 07	Tanapag Meeting Hall	6	0	2	10	4	5	AA	
WB 08	Central Repair Shop	3	3	4	3	4	5	A	
WB 09	Sea Plane Ramp	3	2	4	2	2	2	A	
	SEGMENT 21: AS MATUIS								
WB 01	Wing Beach	2	0	8	12	8	9	AA	
CNMI-19	Wing Beach Reef Flat	*	*	0	0	0	0	AA	
WB 02	Pau-Pau Beach	6	0	2	6	6	9	AA	
	SEGMENT 22: BANADERU								
NEB 01	Grotto Cave	0	7	4	10	8	6	AA	

TABLE II – l. Mañagaha Coastal pH Exceedances of CNMI WQS

% pH Exceedences									
Sampling Station ID	Sampling Station Name	2014	2015	2016	2017	2018	2019	Segment Class	Comments
	SEGMENT 23: MANAGAHA								
MG 01	Dock	0	0	4	15	10.3	0	AA	
MG 02	Swimming Area A	0	0	8	4	0	0	AA	
MG 03	Swimming Area A	0	0	8	0	0	0	AA	
MG 04	Swimming Area B	0	0	4	0	3	0	AA	
MG 05	Managaha Beach	0	0	4	0	3	0	AA	
MG 06	Managaha Beach	0	0	8	0	0	0	AA	
MG 07	Managaha Beach	0	0	8	0	0	0	AA	
MG 08	Beach Near Statue	0	0	8	0	0	0	AA	
MG 09	Managaha Beach	0	0	8	0	0	0	AA	
MG 10	Managaha Beach	0	0	4	0	0	0	AA	
MG 11	Next to Dock	0	0	4	0	0	0	AA	

TABLE II – m. **Saipan Coastal Nutrient Exceedances of CNMI WQS**

Coastal Marine Waters % Nutrient Exceedences										
		2016		2017		2018		2019		
Sampling Station ID	Sampling Station Name	PO4	NO3	PO4	NO3	PO4	NO3	PO4	NO3	Segment Class
SEGMENT 12: KALABERA										
NEB 02	Bird Island Beach	*	*	0	0	0	17	33	0	AA
SEGMENT 13: TALOFOFO										
NEB 07	Hidden Beach	*	*	0	0	0	17	17	0	AA
NEB 03	Jeffrey's Beach	*	*	0	0	0	0	17	0	AA
CNMI-104	Jeffrey's Beach Reef Flat	0	0	*	*	0	0	0	0	AA
NEB 04	Old Man By the Sea	*	*	0	0	0	17	33	0	AA
SEGMENT 14: KAGMAN										
NEB 05	Marine Beach	*	*	0	0	0	17	33	0	AA
CNMI-29	Tank Beach Reef flat	0	0	*	*	0	0	0	0	AA
NEB 06	Tank Beach	*	*	0	0	0	0	33	0	AA
SEB 01	Forbidden Island	*	*	*	*	*	*	*	*	AA
SEB 02	North Laolao Beach	*	*	0	0	0	0	17	0	AA
ARRA B2	North Laolao Beach	9	0	0	0	0	0	14	14	AA
ARRA B5	North Laolao Beach	0	0	0	0	0	0	14	14	AA
ARRA B8	North Laolao Beach	0	0	0	0	0	0	14	0	AA
SEGMENT 15: LAO LAO										
CNMI-21	Central Laolao Beach Reef flat	0	0	0	0	0	0	0	0	AA
SEB 03	South Laolao Beach	*	*	0	0	0	17	33	0	AA
ARRA C2	South Laolao Beach	9	0	0	0	0	0	0	0	AA
ARRA C5	South Laolao Beach	9	0	0	0	0	0	17	0	AA
ARRA C8	South Laolao Beach	0	0	0	0	0	11	14	0	AA
SEGMENT 16: DAN DAN										
CNMI 72	DanDan Reef Flat	0	0	0	0	0	0	0	0	AA
SEGMENT 17A: ISLEY (WEST)										
SEB 06	Unai Dangkolo	*	*	0	0	0	0	17	0	AA
SEGMENT 17B: ISLEY (EAST)										
SEB 04	Obyan Beach	*	*	0	0	0	0	17	0	AA
SEB 05	Ladder Beach	*	*	0	0	0	0	17	0	AA
CNMI-30	Ladder Reef Flat	0	0	0	0	0	0	0	0	AA
SEGMENT 18A: SUSUPE (NORTH)										
WB 24	Chalan Laulau Beach	*	*	0	0	0	0	0	0	AA
WB 25	San Jose Beach	*	*	0	0	0	0	0	0	AA
WB 26	Civic Center Beach	*	*	0	0	0	0	17	0	AA
WB 27	Saipan World Resort (Diamond Hotel)	*	*	0	0	0	0	17	17	AA
WB 28	Kanoa Resort (Grand Hotel)	*	*	0	0	0	0	0	0	AA
WB 29	Community School Beach	*	*	0	0	0	0	17	17	AA

TABLE II – m. Saipan Coastal Nutrient Exceedances of CNMI WQS Continued

Sampling Station ID	Sampling Station Name	2016 PO4	2016 NO3	2017 PO4	2017 NO3	2018 PO4	2018 NO3	2019 PO4	2019 NO3	Segment Class
Coastal Marine Waters % Nutrient Exceedences										
SEGMENT 18B: SUSUPE (SOUTH)										
WB 30	Sugar Dock	*	*	0	0	0	0	17	0	AA
WB 31	CK Dist #2 Drainage	*	*	0	0	0	0	17	0	AA
WB 32	CK Dist #4 Lally Beach	*	*	0	0	0	17	17	0	AA
WB 33	Chalan Piao Beach	*	*	0	0	17	17	0	17	AA
WB 34	Hopwood School Beach	*	*	0	0	0	0	17	17	AA
WB 35	San Antonio Beach	*	*	0	0	0	0	17	0	AA
WB 36	PIC Beach	*	*	0	0	0	0	33	17	AA
WB 37	San Antonio Lift Station	*	*	0	0	0	33	17	33	AA
SEGMENT 19A: WEST TAKPOCHAU (NORTH)										
WB 10	DPW Channel Bridge	*	*	0	0	0	80	17	17	A
SEGMENT 19B: WEST TAKPOCHAU (CENTRAL)										
WB 11.2	Eloy Inos Peace Park (S. Puerto Rico)	*	*	0	0	0	0	0	17	A
WB 13	Outer Cove Marina	*	*	0	0	0	0	0	0	A
WB 12	Smiling Cove Marina	*	*	0	0	0	0	0	0	A
WB 12.1	American Memorial Park Drainage	*	*	0	0	0	0	0	0	A
WB 14	Micro Beach	*	*	0	0	0	0	0	0	AA
WB 15	Hyatt Hotel	*	*	0	0	0	0	17	0	AA
WB 16	Fiesta Resort (Dai-Ichi Hotel)	*	*	0	0	0	0	17	0	AA
WB 17	Drainage #1 (Dai-ichi drainage)	*	*	0	0	0	0	17	0	AA
WB 18	Imperial Pacific Resort (Samoa Housing)	*	*	0	0	0	0	0	17	AA
WB 19	GrandVrio Hotel (Hafa-Adai Hotel)	*	*	0	0	0	0	17	0	AA
WB 20	Drainage #2 (Hafa-Adai Hotel drainage)	*	*	0	0	0	20	0	0	AA
SEGMENT 19C: WEST TAKPOCHAU (SOUTH)										
WB 21	Garapan Fishing Dock	*	*	0	*	0	80	0	33	AA
WB 23	Drainage #3 (Garapan Beach Drainage)	*	*	0	100	0	83	0	50	AA
WB 22	Garapan Beach	*	*	0	50	0	50	0	50	AA
SEGMENT 20A: ACHUGAO (NORTH)										
WB 03	Kensington Hotel (Nikko Hotel)	*	*	0	0	0	0	17	0	AA
WB 04	San Roque School Beach	*	*	0	0	0	0	33	0	AA
WB 05	Plumeria Hotel	*	*	0	0	0	0	17	0	AA
WB 06	Aqua Resort Hotel	*	*	0	0	20	0	17	0	AA
SEGMENT 20B: ACHUGAO (SOUTH)										
WB 07	Tanapag Meeting Hall	*	*	0	0	0	0	0	0	AA
WB 08	Central Repair Shop	*	*	0	0	0	0	0	0	A
WB 09	Sea Plane Ramp	*	*	0	0	0	0	0	0	A
SEGMENT 21: AS MATUIS										
WB 01	Wing Beach	*	*	0	0	0	0	0	0	AA
CNMI-19	Wing Beach Reef Flat	0	0	0	0	0	0	0	0	AA
WB 02	Pau-Pau Beach	*	*	0	0	20	20	0	0	AA
SEGMENT 22: BANADERU										
NEB 01	Grotto Cave	*	*	0	0	0	0	33	0	AA

TABLE II – n. **Mañagaha Coastal Nutrient Exceedances of CNMI WQS**

Coastal Marine Waters % Nutrient Exceedences											
Sampling Station ID	Sampling Station Name	2016		2017		2018		2019		Segment Class
		PO4	NO3	PO4	NO3	PO4	NO3	PO4	NO3	
SEGMENT 23: MANAGAHA										
MG 01	Dock	*	*	0	0	0	0	0	0	AA
MG 02	Swimming Area A	*	*	0	0	0	20	0	0	AA
MG 03	Swimming Area A	*	*	0	0	0	0	0	0	AA
MG 04	Swimming Area B	*	*	0	0	0	0	0	0	AA
MG 05	Managaha Beach	*	*	0	0	0	0	0	0	AA
MG 06	Managaha Beach	*	*	0	0	0	0	0	0	AA
MG 07	Managaha Beach	*	*	0	0	0	20	20	0	AA
MG 08	Beach Near Statue	*	*	0	0	0	0	0	0	AA
MG 09	Managaha Beach	*	*	0	0	0	0	0	0	AA
MG 10	Managaha Beach	*	*	0	0	0	0	0	20	AA
MG 11	Next to Dock	*	*	0	0	0	0	0	0	AA

STREAM DATA

TABLE II – o. **Rota Talakhaya Stream Enterococci Exceedances of CNMI WQS**

Enterococci % Violations				
Sample Station ID	2017	2018	2019	Segment Class
SEGMENT 20B: TALAKHAYA				
TK0	*	100	71	1
TK1	*	100	81	1
TK2	*	91	88	1
TK3	*	100	76	1
TK4	*	100	65	1

TABLE II – p. **Saipan Stream Enterococci Exceedances of CNMI WQS**

Enterococci % Violations									
Sample Station ID	Sampling Station Name	2013	2014	2015	2016	2017	2018	2019	Segment Class
SEGMENT 13: TALOFOFO									
TAL03_L	Lower 3 Stream	**	100	100	50	*	*	*	1
TAL01_L	Lower 1 Stream	**	100	100	100	*	*	*	1
TAL02_L	Lower 2 Stream	**	100	67	100	*	*	*	1
TAL02_U	Upper 2 Stream	**	80	67	100	*	*	*	1
SEGMENT 14: KAGMAN									
KAG01_L	Lower 1 Stream	**	50	100	*	*	*	*	1
KAG01_U	Upper 1 Stream	**	100	100	*	*	*	*	1
KAG02_L	Lower 2 Stream	**	100	*	*	*	*	*	1
KAG02_M	Middle 2 Stream	**	100	*	*	*	*	*	1
KAG02_UK1	Upper 2 Stream	**	50	*	*	*	*	*	1
SEGMENT 15: LAO LAO									
LAO03_U	Upper 3 Stream	**	33	*	*	*	*	*	1
LAO04_U	Upper 4 Stream	**	66	*	*	*	*	*	1
LAO04_M	Middle 4 Stream	**	66	*	*	*	*	*	1
LAO03_M	Middle 3 Stream	**	66	*	*	*	*	*	1
LAO01_U	Upper 1 Stream	**	*	*	*	*	*	*	1
LAO01_UA	Upper 1A Stream	**	33	*	*	*	*	*	1
LAO01_L	Lower 1 Stream	**	100	*	*	*	*	*	1
LAO02_L	Lower 2 Stream	**	100	*	*	*	*	*	1
LAO03_L	Lower 3 Stream	**	66	*	*	*	*	*	1
LAO04_L	Lower 4 Stream	**	66	*	*	*	*	*	1
LAO05_L	Lower 5 Stream	**	66	*	*	*	*	*	1
SEGMENT 19A: WEST TAKPOCHAU (NORTH)									
WTN_UB1	Upper 1B Stream	**	*	100	100	*	*	*	1
WTN01_MB	Middle 1B Stream	**	100	100	100	*	*	*	1
WTN01_UB2	Upper 1B Stream	**	100	100	*	*	*	*	1
WTN01_L	Lower 1 Stream	**	100	100	100	*	*	*	1

TABLE II – p. **Saipan Stream Enterococci Exceedances of CNMI WQS Continued**

Enterococci % Violations									
Sample Station ID	Sampling Station Name	2013	2014	2015	2016	2017	2018	2019	Segment Class
SEGMENT 19B: WEST TAKPOCHAU (CENTRAL)									
WTC03_UA	Upper 3A Stream	**	66	*	100	*	*	*	1
WTC03_MA	Middle 3A Stream	**	100	100	100	*	*	*	1
WTC01_L	Lower 1 Stream	**	100	100	100	*	*	*	1
WTC02_L	Lower 2 Stream	**	100	100	100	*	*	*	1
WTC03_L	Lower 3 Stream	**	100	100	100	*	*	*	1
WTRC03_UC	Upper 3C Stream	**	100	100	100	*	*	*	1
WTC03_MC	Middle 3C Stream	**	100	100	100	*	*	*	1
WTC03_MB	Middle 3B Stream	**	100	100	100	*	*	*	1
WTC03_UB	Upper 3B Stream	**	100	100	100	*	*	*	1
SEGMENT 20A: ACHUGAO (NORTH)									
ACH01_L	Lower 1 Stream	**	100	*	*	*	*	*	1
ACH01_M	Middle 1 Stream	**	67	*	*	*	*	*	1
ACH01_U	Upper 1 Stream	**	100	*	*	*	*	*	1
SEGMENT 20B: ACHUGAO (SOUTH)									
WTN01_MA	Middle 1 Stream	**	*	*	*	*	*	*	1
ACH02_L	Lower 2 Stream	**	67	*	*	*	*	*	1
ACH02L_Site 1	Lower 2 Stream Lagoon outlet	**	*	100	78	94	*	*	1
ACH02L_Site 2	Lower 2 Stream Culvert side	**	*	86	67	100	*	*	1
AGATAN	Agatan Stream	**	*	*	*	100	*	*	1

LAKE DATA

TABLE II – q. **Susupe Lake *E. Coli* Exceedances of CNMI WQS**

Lake Susupe E. Coli % Violations			
Fiscal Year	Number of Samples (n =)	Number of Exceedences (n =)	Percent Exceedences (%)
2010	20	2	10
2011	19	3	16
2012	19	1	5
2013	16	3	19
2014	19	2	11
2015	23	2	9
2016	16	7	44
2017	28	8	29
2018	22	8	36
2019	21	4	19

TABLE II – r. **Susupe Lake Dissolved Oxygen (DO%) Exceedances of CNMI WQS**

Lake Susupe Annual Percent DO% Exceedances			
Fiscal Year	Number of Samples (n =)	Number of Exceedences (n =)	Percent Exceedences (%)
2010	20	11	55
2011	18	12	67
2012	18	15	83
2013	18	8	50
2014	19	11	58
2015	19	14	74
2016	16	5	31
2017	28	10	36
2018	22	7	32
2019	19	5	26

TABLE II – s. **Susupe Lake pH Exceedances of CNMI WQS**

Lake Susupe Annual Percent pH Exceedances			
Fiscal Year	Number of Samples (n =)	Number of Exceedences (n =)	Percent Exceedences (%)
2012	19	3	16
2013	14	0	0
2014	19	2	11
2015	18	3	17
2016	15	9	60
2017	27	3	11
2018	22	10	45
2019	18	2	11

APPENDIX III: CNMI Coastal Biological Monitoring Criteria Data Used in 2018 Waterbody Assessments

TABLE III – a. Rota Aquatic Life Use Support Values for Benthic Substrate and Coral Diversity/Seagrass Trends

Rota ALUS Ranking for FY2018-2019								Aquatic Life Use Support Values							
MMT Site No.	Beach location	Seg ID	Watershed Segment Name	Benthic Substrate Ratio Trends		Coral Diversity / Seagrass Trends		2008 IR FY06-07	2010 IR FY08-09	2012 IR FY10-11	2014 IR FY12-13	2016 IR FY14-15	2018 IR FY16-17	2020 IR FY18-19	*2020 IR Overal Ranking*
Rota															
22	ROT 1	1	Dugi/Gampapa/Chenchon	Non-significant change	↔	No New Data	*	No ranking	No ranking	No ranking	Fair	Fair	Fair	Fair	Fair
23	Talakhaya	2	Sabana/Talakhaya/Palie	Significant Change	↓	No New Data	*	Fair	Fair	Fair	Fair	Fair	Fair	Poor	Fair
24	Talakhaya Stream	2	Sabana/Talakhaya/Palie	Non-Significant Change	↓	No New Data	*	Fair	Fair	Fair	Fair	Fair	Poor	Poor	
25	Coral Garden	2	Sabana/Talakhaya/Palie	Non-significant change	↔	No New Data	*	Good	Good	Good	Good	Good	Good	Good	
26	East Harbor	3	Songsong	Significant Change	↓	No New Data	*	Fair	Fair	Good	Good	Good	No New Data	Poor	Fair
27	West Harbor	3	Songsong	Non-Significant Change	↔	No New Data	*	Poor	Poor	Fair	Fair	Fair	Fair	Fair	
28	Rota Dump	3	Uyulanhulo/Teteto	Non-Significant Change	↔	No New Data	*	No ranking	Fair	Fair	Good	Fair	No New Data	Fair	Fair
29	Sunset Villa	4	Uyulanhulo/Teteto	Non-Significant Change	↔	No New Data	*	No ranking	No ranking	No ranking	Good	Good	No New Data	Fair	
30	Swimming Hole	4	Chaliat/Talo	Signifcant Change	↓	No New Data	*	Fair	Fair	Good	Fair	No New Data	Fair	Poor	Poor
31	Rota Resort	5	Chaliat/Talo	Non-Significant Change	↔	No New Data	*	No ranking	No ranking	No ranking	Poor	Fair	Poor	Poor	

TABLE III – b. Aguigan and Tinian Aquatic Life Use Support Values for Benthic Substrate and Coral Diversity/Seagrass Trends

Tinian ALUS Ranking for FY2018-2019								Aquatic Life Use Support Values							
MMT Site No.	Beach location	Seg ID	Watershed Segment Name	Benthic Substrate Ratio Trends		Coral Diversity / Seagrass Trends		2008 IR FY06-07	2010 IR FY08-09	2012 IR FY10-11	2014 IR FY12-13	2016 IR FY14-15	2018 IR FY16-17	2020 IR FY18-19	***2020 IR Overal Ranking***
Aguigan															
21	Aguigan	6	Aguigan	Significant Change	↓	No New Data	*	Good	Good	No New Data	Fair	No New Data	No New Data	Poor	***Insufficient***
Tinian															
16	Unai Dangkolo	7	Masalok	Significant Change	↓	No New Data	*	Fair	Good	Good	No New Data	Good	No New Data	Fair	***Fair***
17	South of Tachogna	9	Makpo	Non-Significant Change	↔	No New Data	*	No ranking	Fair	Poor	Poor	No New Data	No New Data	Poor	Poor
18	Taga Beach	9	Makpo	Non-Significant Change	↔	No New Data	*	Poor	Poor	No New Data	Poor	Poor	No New Data	Poor	
19	Leprosarium Beaches	9	Puntan Diaplomanibot	Non-Significant Change	↔	No New Data	*	Fair	Fair	No New Data	Fair	Poor	No New Data	Poor	Poor
20	Unai Babui	11	Puntan Tahgong	Non-Significant Change	↔	No New Data	*	Poor	Poor	Poor	No New Data	No New Data	No New Data	Poor	Poor

TABLE III – c. Saipan Aquatic Life Use Support Values for Benthic Substrate and Coral Diversity/Seagrass Trends

Saipan ALUS Ranking for FY2018-2019								Aquatic Life Use Support Values							
MMT Site No.	Beach location	Seg ID	Watershed Segment Name	Benthic Substrate Ratio Trends		Coral Diversity / Seagrass Trends		2008 IR FY06-07	2010 IR FY08-09	2012 IR FY10-11	2014 IR FY12-13	2016 IR FY14-15	2018 IR FY16-17	2020 IR FY18-19	***2020 IR Overal Ranking***
Saipan															
1	Bird Island	12	Kalabera	Significant Change	↓	No New Data	*	Fair	Fair	Good	Fair	Fair	Fair	Poor	***Poor***
2	Tank Beach	14	Kagman	Significant Change	↓	Non-Significant Change in Seagrass	↔	No Ranking	No Ranking	No Ranking	Good	No New Data	Good	Poor	***Fair***
3	LaoLao Dive Site	15	Laolao	Non-Significant Change	↔	Non-Significant Change	↔	Fair	Fair	Fair	Fair	No New Data	Fair	Fair	Poor
4	LaoLao South	15	Laolao	Non-Significant Change	↔	Non-Significant Change	↔	Poor1,2	Poor1,2	Poor1,2	Poor1,2	Poor1,2	Poor1,2	Poor1,2	
6	Obyan Beach	17b	Isley (East)	Significant Change	↓	Significant Decrease in coral diversity	↓	Fair	Fair	Good	Good	Good	Good	Poor	***Poor***
5	Boy scout Beach	17a	Isley (East)	Non-Significant Change	↔	Non-Significant Change in coral diversity	*	Fair	Poor1,2	Fair	No New Data	Fair	Fair	Fair	
7	Unai Dangkolu	17b	Isley (West)	Significant Change	↓	No New Data	*	Good	Poor2	Poor2	Poor2	Poor2	No New Data	Poor	Poor
55	Sugar Dock	18b	Susupe (South)	No New Data	*	No New Data	*	No Ranking	No Ranking	No Ranking	Fair	Good	Poor	No New Data	Fair
56	San Antonio Beach	18b	Susupe (South)	Non-Significant Change	↔	No New Data	*	Good	No New Data	No New Data	Fair	Fair	Good	Good	
57	San Antonio Beach	18b	Susupe (South)	Non-Significant Change	↔	Non-Significant Change	↔	Good	No New Data	Good	Fair	No New Data	No New Data	Fair	
8	Kanoa Resort	18a	Susupe (North)	No New Data	*	No New Data	*	Good	Good	Good	Good	No New Data	Good	No New Data	Good
53	Civic Center Beach	18a	Susupe (North)	No Significant Change	↔	No New Data	*	No Ranking	Fair	Fair	Fair	Good	No New Data	Good	
46	Garapan Beach	19c	West Takpochao (South)	Signifcant Change	↓	No New Data	*	Poor1	Poor1	Poor1	No New Data	Fair	Fair	Poor	Poor
49	Chalan Laulau Beach	19c	West Takpochao (South)	Non-Significant Change	↓	No New Dataq	*	Good	Good	No New Data	Poor1	No New Data	No New Data	Poor	

TABLE III – c. Saipan Aquatic Life Use Support Values for Benthic Substrate and Coral Diversity/Seagrass Trends Continued

Saipan ALUS Ranking for FY2018-2019 Continued								Aquatic Life Use Support Values							
MMT Site No.	**Beach location**	**Seg ID**	**Watershed Segment Name**	**Benthic Substrate Ratio Trends**		**Coral Diversity / Seagrass Trends**		**2008 IR FY06-07**	**2010 IR FY08-09**	**2012 IR FY10-11**	**2014 IR FY12-13**	**2016 IR FY14-15**	**2018 IR FY16-17**	**2020 IR FY18-19**	***2020 IR Overal Ranking***
Saipan															
9	Garapan Beach	19b	West Takpochao (Central)	Non-Significant Change	↔	No New Data	*	No Ranking	Poor1	Fair	No New Data	Fair	Fair	Fair	***Poor***
42	Fiesta Resort	19b	West Takpochao (Central)	Signifcant Change	↓	No New Data	*	No Ranking	No Ranking	No Ranking	Good	Good	No New Data	Poor	
43	Drainage #3	19b	West Takpochao (Central)	Significant Change	↓	No New Data	*	No Ranking	No Ranking	No Ranking	Fair	Fair	No New Data	Poor	
None	DPW Channel Bridge	19a	West Takpochao (North)	No New Data	*	No New Data	*	Poor1	No New Data	No New Data	No New Data	No New Data	No New Data	No New Data	Poor
41	Tanapag Meeting Hall	20b	Achugao (South)	No New Data	*	No New Data	*	Poor1	Poor1	Poor1	No New Data	Poor1	No New Data	No New Data	Poor
36	San Roque School	20a	Achugao (North)	Non-Significant Change	↔	No New Data	*	Poor1	Fair	Good	Good	No New Data	No New Data	Good	Fair
37	Plumeria Hotel	20a	Achugao (North)	No New Data	*	No New Data	*	No Ranking	No Ranking	No Ranking	Fair	Fair	No New Data	No New Data	
38	Aqua Resort	20a	Achugao (North)	No New Data	*	No New Data	*	Poor1	No New Data	Poor1	Fair	No New Data	No New Data	No New Data	
39	Aqua Resort	20a	Achugao (North)	No New Data	*	No New Data	*	No Ranking	No Ranking	No Ranking	Fair	No New Data	No New Data	No New Data	
15	Wing Beach	21	As Matuis	Significant Change	↓	No New Data	*	Good	Good	Good	Good	No New Data	Good	Poor	***Poor***
34	Pau Pau Beach	21	As Matuis	No New Data	*	No New Data	*	Good	No New Data	Good	Poor1	Poor1	No New Data	No New Data	
11	Managaha Patch Reef	19b	West Takpochao (Central)	Significant Change	↓	No New Data	*	No Ranking	No Ranking	No Ranking	Good	Good	No New Data	Poor	***Fair***
12	Managaha MPA	23	Managaha	Non-Significant Change	↔	No New Data	*	Good	Good	Good	Good	Good	No New Data	Good	
13	Outside Managaha	23	Managaha	Non-Significant Change	↔	No New Data	*	No Ranking	Good	Good	No New Data	Fair	No New Data	Fair	

APPENDIX IV: CNMI Coastal Waterbodys Reported by Assigned CALM Categories

TABLE IV-a. Category 1: Coastal Waters Attaining All DUs

Coastal Miles CALM Category 1				
Segment ID	Segment Name	Segment Class	Segment Size (Miles)	Comments
Rota				
1	Dugi/Gampapa/Chenchon	AA	11.1	
Tinian and Aguigan				
8	Carolinas	AA	10.4	
Saipan				
	N/A			
Northern Islands				
25	Anatahan	AA	17.3	
26	Sarigan	AA	6.0	
27	Guguan	AA	5.6	
28	Alamagan	AA	9.4	
30	Agrihan	AA	19.3	
31	Asuncion	AA	7.0	
32	Maug	AA	9.5	
33	Farllon De Pajaros	AA	4.2	
			99.8	**TOTAL**

TABLE IV-b. Category 2: Coastal Waters Attaining Some DUs, Insufficient Information about Remaining DUs

Coastal Miles CALM Category 2				
Segment ID	Segment Name	Segment Class	Segment Size (Miles)	Comments
Rota				
	N/A			
Tinian and Aguigan				
	N/A			
Saipan and Managaha				
16	Dan Dan	AA	6.3	No fish tissue data, excellent water quality, very remote.
Northern Islands				
	N/A			
		TOTAL	**6.3**	**Miles**

Table IV-c. Category 3: Coastal Waters with Insufficient Information to Assess All DUs

Coastal Miles CALM Category 3				
Segment ID	Segment Name	Segment Class	Segment Size (Miles)	Comments
Rota				
	N/A			
Tinian and Aguigan				
6	Aguigan	AA	8.2	Biological decline in ALUS ranking, insufficient data to make a final assessment
Saipan and Managaha				
	N/A			
Northern Islands				
29	Pagan	AA	28.2	Potential WWII debris and munitions contamination
		TOTAL	**36.4**	**Miles**

Table IV-d. Category 5: Coastal Waters with Impaired DUs by Pollutants, TMDL Required

Segment ID	Segment Name	Segment Class	Segment Size (Miles)	Coastal Miles CALM Category 5 Comments
Rota				
2	Sabana/Talakhaya/Palie	AA	7.3	*Enterococci,* pH no trend
3	Songsong	A	7.9	*Enterococci,* pH no trend, DO%, PO_4
4	Uyulan hulo/Teteto	AA	3.5	*Enterococci,* pH Low, PO_4
5	Chaliat/Talo	AA	2.6	*Enterococci,* pH Low, PO_4, NO_3
Aguigan			**21.3**	
	N/A			
Tinian			**0**	
7	Masalok	AA	3.5	*Enterococci,* pH no trend, PO_4, NO_3
9	Makpo	AA	3	*Enterococci,* pH Low, PO_4
9H	Makpo Harbor	A	1.5	*Enterococci*, DO%, PO_4
10	Puntan Diaplolamanibot	AA	9.9	*Enterococci,* PO_4, NO_3
11	Puntan Tahgong	AA	6.4	*Enterococci,* pH no trend, PO_4, NO_3
Saipan			**24.3**	
12	Kalabera	AA	4.1	*Enterococci,* PO_4, NO_3
13	Talofofo	AA	5.4	*Enterococci,* pH no trend, PO_4, NO_3
14	Kagman	AA	6.7	*Enterococci,* pH no trend, PO_4, NO_3
15	LaoLao	AA	1.4	*Enterococci,* PO_4, NO_3
17A	Isley (West)	A	1.7	*Enterococci,* pH Low, PO_4, Cu & Pb in biota
17B	Isley (East)	A	4.2	*Enterococci,* , pH no trend, PO_4
18A	Susupe (North)	AA	2.4	DO% and pH Low, PO_4, NO_3
18B	Susupe (South)	AA	2.8	*Enterococci,* , DO%, pH no trend, PO_4, NO_3
19A	W. Takpochau (North)	AA	1	*Enterococci,* pH no trend, PO_4, NO_3, Pb in bivalves
19B	W. Takpochau (Central)	A	4.4	*Enterococci,* DO% and pH Low, Hg in Fish, Pb & Cu in bivalves, PO_4, NO_3
19C	W. Takpochau (South)	AA	1.9	*Enterococci,* DO% and pH Low, NO_3
20A	Achugao (North)	AA	1.9	*Enterococci,* DO%, PO_4
20B	Achugao (South)	AA	2.4	*Enterococci,* DO%, Pb in bivalves
21	As Matuis	AA	2.2	*Enterococci,* DO% and pH Low, PO_4, NO_3
22	Banaderu	AA	5.1	*Enterococci,* PO_4
Managaha			**47.6**	
23	Managaha	AA	0.6	pH, Low, PO4, NO3
Northern Islands			**0.6**	
24	Farallon de Medinilla	AA	4.2	Live fire bombing range, lack of access, topagraphy forever altered
			4.2	
		TOTAL	**98.0**	**Miles**

APPENDIX V: CNMI Freshwater Streams Reported by Assigned CALM Categories

Table V-a. Category 1: Streams Attaining All DUs

Segment ID	Segment Name	Segment Class	Segment Size (Miles)	Comments
		Stream Miles CALM Category 1		
Rota				
	N/A			
Saipan				
	N/A			
Northern Islands				
26STR	Sarigan	1	Unknown	Lacking Fish tissue, Water Quality data, but very remote, lack of anthropogenic stressors.
27STR	Guguan	1	Unknown	Lacking Fish tissue, Water Quality data, but very remote, lack of anthropogenic stressors.
28STR	Alamagan	1	Unknown	Lacking Fish tissue, Water Quality data, but very remote, lack of anthropogenic stressors.
30STR	Agrihan	1	Unknown	Lacking Fish tissue, Water Quality data, but very remote, lack of anthropogenic stressors.
31STR	Asuncion	1	Unknown	Lacking Fish tissue, Water Quality data, but very remote, lack of anthropogenic stressors.
32STR	Maug	1	Unknown	Lacking Fish tissue, Water Quality data, but very remote, lack of anthropogenic stressors.
33STR	Farallon De Pajaros	1	Unknown	Lacking Fish tissue, Water Quality data, but very remote, lack of anthropogenic stressors.
		Total Miles	**Unknown**	

Table V-b. Category 2: Streams Attaining Some DUs, Insufficient Information about Remaining DUs

Segment ID	Segment Name	Segment Class	Segment Size (Miles)	Comments
		Stream Miles CALM Category 2		
Rota				
	N/A			
Saipan				
12STR	Kalabera	1	7.8	No monitoring data
16STR	Dan Dan	1	0.8	No monitoring data
18STRA	Susupe (North)	1	7	Fish tissue data not available, very limited monitoring data
19STRA	W. Takpochau (North)	1	4.7	Fish tissue data not available, very limited monitoring data
20STRA	Achugao (North)	1	3.4	Fish tissue data not available, very limited monitoring data
21STR	As Matuis	1	1.1	Fish tissue data not available, very limited monitoring data
Northern Islands				
	N/A			
		Total Miles	**24.8**	

Table V-c. Category 3: Streams with Insufficient Information to Assess All DUs

Segment ID	Segment Name	Segment Class	Segment Size (Miles)	Comments
		Stream Miles CALM Category 3		
Rota				
	N/A			
Saipan				
12STR	Kagman	1	12.2	Fish tissue data not available, very limited monitoring data
15STR	Lao Lao	1	6.7	Very limited monitoring data
17STRA	Isley (West)	1	3.5	Fish tissue data not available, very limited water quality data, WWII debris
17STRB	Isley (East)	1	0.3	Fish tissue data not available, very limited water quality data, WWII debris
18STRB	Susupe (South)	1	1.4	Fish tissue data not available, very limited water quality data, WWII debris
19STRC	W. Takpochao (South)	1	1.3	Ground water seeps carrying nutrient contaminants
Northern Islands				
25STR	Anatahan	1	?	Fish tissue data not available, WWII debris
29STR	Pagan	1	?	Fish tissue data not available, WWII debris
		Total Miles	**25.4**	

Northern Island streams have not been measured.

Table V-d. Category 5: Streams with Impaired DUs by Pollutant(s), TMDL Required

Segment ID	Segment Name	Segment Class	Segment Size (Miles)	Comments
		Stream Miles CALM Category 5		
Rota				
2STR	Sabana/Talakhaya/Palie	1	6.1	*Enterococci*
Saipan				
13STR	Talofofo	1	34.5	*Enterococci*
19STRB	W. Takpochau (Central)	1	3.2	*Enterococci,* Hg in biota
20STRB	Achugao (South)	1	6.5	*Enterococci,* Hg in biota
Northern Islands				
	N/A			
		Total Miles	**50.3**	

APPENDIX VI: CNMI Lakes Reported by Assigned CALM Categories

Table VI-a. Category 2: Lakes Attaining Some DUs, Insufficient Information about Remaining DUs

Lakes Acres CALM Category 2				
Segment ID	Segment Name	Segment Class	Segment Size (Acres)	Comments
Saipan				
	N/A			
Northern Islands				
25LAK B	Anatahan (Hagoi Lagu)	1	?	newly formed, lacking fish tissue and water quality data
	Total Miles		**?**	

Table VI-b. Category 3: Lake with Insufficient Information to Assess All DUs

Lakes Acres CALM Category 3				
Segment ID	Segment Name	Segment Class	Segment Size (Acres)	Comments
Saipan				
	N/A			
Northern Islands				
29LAK A	Anatahan older lake (Hagoi Haya)	1	149	Lacking fish tissue and water quality data, WWII debris potential pollutant
29LAKA	Pagan (Sanhiyong, "Laguna Lake")	1	34	Lacking fish tissue and water quality data, WWII debris potential pollutant
29LAKB	Pagan (Sanhalom, "Inner Lake")	1	27	Lacking fish tissue and water quality data, WWII debris potential pollutant
	Total Miles		**210.0**	

Table VI-c. Category 5: Lake with Impaired DUs by Pollutant(s), TMDL Required

Lakes Acres CALM Category 5				
Segment ID	Segment Name	Segment Class	Segment Size (Acres)	Comments
Saipan				
18LAKB	Susupe (South)	1	57.4	E. coli exceedances, limited biota data indicating heavy metal contamination
Northern Islands				
	N/A			
	Total Miles		**57.4**	

APPENDIX VII: CNMI Wetlands Reported by Assigned CALM Categories

Table VII-a. Category 1: Wetlands Attaining All Designated Uses

Segment ID	Segment Name	Segment Class	Segment Size (Acres)	Comments
		Wetland Acres CALM Category 1		
Rota				
	N/A			
Tinian				
10WET	Puntan Diaplolamanibot	1	12.9	Limited data available. However, remote, lack of anthropogenic sources of pollution and stressors
11WET	Puntan Tahgong	1	40.6	Hagoi Wetland is considered pristine and is used as the high quality reference wetland for the Saipan Wetland RAM
Saipan				
14WET	Kagman (Education Island)	1	5.1	Deliniation completed, Limited data available. However, wetland maintained by USDA NRCS staff.
Northern Islands				
	N/A			
		Total Miles	**58.6**	

Table VII-b. Category 2: Wetlands Attaining Some DUs, Insufficient Information about Remaining DUS, No Threats

Segment ID	Segment Name	Segment Class	Segment Size (Acres)	Comments
		Wetland Acres CALM Category 2		
Rota				
	N/A			
Tinian				
7WET	Masalok	1	1.6	Limited data available. Remote, lack of anthropogenic stressors
Saipan				
	N/A			
Northern Islands				
	N/A			
		Total Miles	**1.6**	

Table VII-c. Category 3: Wetlands with Insufficient Information to Determine Attainment of Designated Uses

Segment ID	Segment Name	Segment Class	Segment Size (Acres)	Comments
		Wetland Acres CALM Category 3		
Rota				
	N/A			
Tinian				
	N/A			
Saipan				
17WETB	Isley (East)	1		Difficult to access. Remote wetlands, have not been delineated
Northern Islands				
29WET	Pagan	1	27	Insufficient water quality data, threats from WWII activities, potential expansion of military exercises.
		Total Miles	**27.0**	

Table VII-d. Category 4c: Wetlands with Impairment, not Caused by a Pollutant (TMDL) Not Required

Segment ID	Segment Name	Segment Class	Segment Size (Acres)	Comments
		Wetland Acres CALM Category 4c		
Tinian				
9WET	Makpo Complex	1	28.4	Anthropogenic stressors from surrounding developments may alter habitat
Saipan				
13WETA	Talofofo	1	2.6	Habitat Alterations
16WET	Dan Dan	1	2.8	Habitat Alterations
17WETA	Isley (West)	1	26.4	Habitat Alterations
18WETA	Susupe (North)	1	197.3	Flow regime modification, Habitat Alterations, Non-native Aquatic Plants
18WETB	Susupe (South)	1	292.4	Flow regime modification, Habitat Alterations, Non-native Aquatic Plants
19WETA	W. Takpochao (North)	1	20.2	Flow regime modification, Habitat Alterations, Non-native Aquatic Plants
19WETB	W. Takpochao (Central)	1	20.5	Flow regime modification, Habitat Alterations, Non-native Aquatic Plants
20WETA	Achugao (North)	1	12.9	Flow regime modification, Habitat Alterations, Non-native Aquatic Plants
20WETB	Achugao (South)	2	25.1	Alteration in wetland habitats, Non-native Aquatic Plants, Other flow regime alterations
Northern Islands				
	N/A			
		Total Miles	**628.6**	

APPENDIX IV: Public Comment Period Announcements

Press Release of Public Notice of Comment Period

Commonwealth of the Northern Mariana Islands
OFFICE OF THE GOVERNOR
Bureau of Environmental and Coastal Quality

Eli D. Cabrera
Administrator

Jonathan I. Arriola
DEQ Director

PRESS RELEASE

PUBLIC NOTICE

BECQ RELEASES CNMI 2020 DRAFT 305(b) and 303(d)
WATER QUALITY ASSESSMENT INTEGRATED REPORT

The CNMI Bureau of Environmental and Coastal Quality (BECQ), Division of Environmental Quality (DEQ), under the Office of the Governor, hereby notifies the public that the Draft 2020 305(b) and 303(d) Water Quality Assessment Integrated Report and supporting documents have been made available for public review on DEQ'sweb page www.deq.gov.mp.
URL: http://www.deq.gov.mp/sec.asp?secID=71.

Sections 303(d) and 305(b) of the U.S. Clean Water Act require that all states and territories, including the CNMI, monitor and assess all waters within the state and report the results to the public, the United States Environmental Protection Agency (USEPA), and the U.S. Congress every two years. Prior to final submittal to USEPA and the U.S. Congress, public review is required and BECQ must address comments received by the public.

BECQ invites the public to review and provide comment on the 2020 Integrated Report, by submitting written comments in person to the BECQ office at the Gualo Rai Center on Middle Road (across from the Subway restaurant), by mail, or email.

Mailed comments should be addressed to Mr. Eli D. Cabrera, Administrator, Bureau of Environmental and Coastal Quality, P.O. Box 501304, Saipan, MP, 95950. Emailed comments should be written to: cnmi.waterquality@gmail.com.

Comments should contain the subject line "2020 IR Comments" or similar. All comments must be received by BECQ no later than **October 16th, 2020**, in order for the comments to be considered by BECQ in the preparation of the final Integrated Report.

REPORTED BY: ______________________ DATE: 09/08/2020

Larry Maurin
WQS/NPS Manager

APPROVED BY: ______________________ DATE: 09/08/2020

Jonathan I. Arriola
DEQ Director

Public Notice of Draft 220 IR Posted on DEQ Website on September 8, 2020

CNMI Bureau of Environmental and Coastal Quality

Home | About BECQ | DEQ Branches | Permits & Regulations | Activities & Information | Contact Us

Search

Return to Water Quality Surveillance & Non-Point Source

Reports

CNMI 305(b) and 303(d) Water Quality Assessment Integrated Report

Every two years BECQ evaluates the health of CNMI Waters by analyzing water quality monitoring data, the biological health of coral reefs and seagrass beds, and interpreting the impacts of mapped pollution sources caused by natural events, development, and other human activities. Each CNMI water body is evaluated and the findings are discussed in detail in the biennial CNMI 305(b) and 303(d) Water Quality Assessment Integrated Report. Those waters that do not meet the "Fishable and Swimmable" use designations are designated as impaired in the 303(d) listing. The CWA (40 C.F.R. §130.7(b) (5)) requires that a Total Maximum Daily Load (TMDL) be calculated for impaired waterbodies as a part of restoration efforts. A TMDL is the maximum amount of a pollutant allowed to enter a waterbody such that the waterbody continues to meet water quality standards for that pollutant. A TMDL also determines pollutant reduction targets and allocates those reductions necessary to meet that target.

The WQS/NPS staff, or "Stream Dream Team" is tasked with identifying the causes and sources of impairment so Total Maximum Daily Loads (TMDL) may be established for addressing the identified pollutants. This may include the use of BMPs, engagement of, and action by, the watershed's community members, and other projects outlined in the watershed "Report Cards" and in community vetted Conservation Action Plans (CAP) .

Read about your favorite watershed and beaches in the:

Draft 2020 Integrated Report for Public Comment - FACT SHEET - 303 (d) List of Impaired Waters List and Delisted Waters - Public Notice

Public Notice of Draft 220 IR Posted on cnmi.waterquality@gmail.com Email List Serve on September 8, 2020

2 of 2

2020 CNMI Draft Integrated Water Quality Assessment Report - Public Comments Due October 16th

becq waterquality <cnmi.waterquality@gmail.com> Tue, 8 Sep, 15:36

to Becq_staff, bcc: Kevin, bcc: Carusoe, bcc: Mary, bcc: James, bcc: Quitano, bcc: VM, bcc: Aileen, bcc: Butter, bcc: CG, bcc: FMI, bcc: jeannette.rocher, bcc: cil.kaipatselepeo, bcc: Arisa, bcc: Cil, bcc: EKB, bcc: Dede, bcc: Tyce, bcc: Chamorro, bcc: Eri

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3 Attachments

Press Release Inte...

CNMI 2020 IR.Fact...

CNMI 2020 303(d) ...

Public Notice of Draft 220 IR Posted in Marianas Variety Newspaper September 11, 2020

CW-1 employers seek Philippine consulate's help

Philippine Honorary Consul to the CNMI Glicerio "Eli" Arago, seated, right, and his office's legal consultant Ariel Mariano, standing center, meet on Wednesday with employers of CWs at the Minatchon Atdao Pavilion. PhilHonCon photo

(PhilHonCon) — With the Sept. 30 deadline looming, employers of workers on CW-1 permits have asked the Philippine Honorary Consulate to the CNMI to appeal to the U.S. Department of Labor and U.S. Citizenship and Immigration Services.

There are only 20 days left to file CW-1 petitions — the processing for which can take months. If no extension is granted, the affected workers will have to leave the island. Employers fear that this will result in a further disruption of their business operations that are already reeling from the impact of the Covid-19 pandemic.

True picture

On Wednesday, 18 employers met with Philippine Honorary Consul Glicerio "Eli" Arago to discuss the filing period for CW-1 petitions. They said CWs should be allowed to legally remain in the CNMI while their petitions are being processed.

"I have to admit that we are faced with an impending work-force crisis," Arago said. "My meeting with several of our employers gave us a true picture of their struggles and challenges in meeting the federal immigration guidelines."

He added, "Time is not on their side right now. They do not have any other remedy in sight.... [T]he only way is for our federal agency partners, USDOL and USCIS, to hear their plight and grant a reprieve by way of a time extension."

The employers who met with Arago and his team represent over 300 workers who are CW-1 visa holders. The employers are engaged in various business operations, ranging from food and restaurants, manpower, finance, transportation, rentals, printing operations and educational institutions.

They expressed concern about the delay in the response time, processing and other critical administrative requirements and procedures mandated by USDOL and USCIS.

They also noted that the prevailing wage determination issued by the U.S. Department of Labor's Office of Foreign Labor Certification reflected Guam's wage rates. The CNMI wage survey report remains uncertified.

They said the Covid-19 pandemic has further exacerbated the situation, limiting the government's business operations. It resulted in considerable delays in processing the Temporary Employment Certification and Form ETA-9142C with the OFLC, the issuance of the Notice of Acceptance for the employers to start online posting of job vacancy announcement with the CNMI Department of Labor, as well as the final issuance of the Temporary Labor Certification or TLC after filing the Recruitment Report.

The employers said they have sent emails and made several telephone calls to USDOL-OFLC, but the significant processing delays are already beyond the employers' control and will eventually affect the timely filing of immigration petitions with USCIS before the CW-1 status expiration date of Sept. 30, 2020.

The affected foreign workers will have no valid status in the CNMI beginning Oct. 1.

Unprecedented crisis

On Thursday, Arago wrote separate letters to U.S. Congressman Gregorio Kilili Camacho Sablan and Gov. Ralph DLG Torres.

"At this time of unprecedented crisis, we seek your assistance to address these concerns with our federal agency partners," Arago said in his letters.

He noted that the congressman and the governor have been long-standing partners of the business community. "They have been with us over the years, supporting the backbone of our islands' economic development: its workers."

Lack of information

"There are hundreds if not over a thousand employers in the CNMI pleading for extension," said employer Eden Guillo-Ordas. "We are praying for an extension in filing CW-1 petitions."

She said there is a lack of information that will allow employers to understand the process of renewal and other USDOL requirements/guidelines.

"We ended up repeating and restarting the process once we received a denial. For TLC alone, the process takes about five months," she said.

There are also other employers who are hesitant to "re-do" the process because the prevailing wage determination was based on Guam's.

"How we wished that the U.S. Labor Department will give us some consideration," another employer said.

D'Elegance Enterprises Inc. representative Irene Santiago said her company is still waiting for an

CONTINUED ON PAGE 16

COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS
OFFICE OF THE GOVERNOR
BUREAU OF ENVIRONMENTAL AND COASTAL QUALITY

Division of Coastal Resources Management
P.O. Box 501304, Saipan, MP 96950
Tel.: (670) 664-8300; Fax: (670) 664-8315
www.dcrm.gov.mp

Eli D. Cabrera
Administrator

Jonathan I. Arriola
DEQ Director

PUBLIC NOTICE

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/s/ Jonathan I. Arriola
DEQ Director

September 8, 2020
Date

Public Notice of Draft 220 IR Posted in Saipan Tribune Newspaper September 11, 2020

Business

CONTRIBUTED PHOTO

The newly opened PHI Pharmacy Garapan is located in the 1st floor of the BRI Building in Garapan, behind the Horiguchi Building and across the Kristo Rai Church.

CONTRIBUTED PHOTO

Like other PHI Pharmacy branches on Saipan, the new Garapan location has over-the-counter medications, health and beauty products, vitamins, and workout supplements available.

PHI Pharmacy opens new location in Garapan

By MARK RABAGO
mark_rabago@saipantribune.com
ASSOCIATE EDITOR

PHI Pharmacy has opened a new branch in Garapan this week. The new branch is in the 1st floor of the BRI Building in Garapan, which is behind the Horiguchi Building and across the Kristo Rai Church.

Joshua Wise, PHI Pharmacy general manager, said the new location between Middle Road and Beach Road on Kopa Di Oru Street provides easy access whether you are heading north or south.

"PHI Pharmacy in Garapan provides an additional location for our customers' convenience. Our Garapan, Kagman, and Dandan locations all share a real-time pharmacy database so transferring prescriptions from one store to another is simple. Our Dandan store is open 365 days a year. Due to our linked database, we can transfer your prescription to our Dandan location if the Kagman or Garapan locations are closed that day," he said.

Wise added that a licensed pharmacist is available on location to help answer your prescription and healthcare questions at PHI Pharmacy Garapan. They also have over-the-counter medications, health and beauty products, vitamins, and workout supplements available in store.

Serving the CNMI since 1996, PHI Pharmacy has been striving to provide the best quality pharmacy services for the local community.

"We are always incorporating innovative services that provide the most prescription cost savings through manufacturer discounts and compliance programs. PHI Pharmacy is a contract pharmacy for the 340B program that has been helping hundreds of people gain access to medications at little to no cost through the Care Card (sliding fee) program at the Kagman Community Health Center," said Wise.

For the latest information on sales and health information, visit PHI Pharmacy on their Facebook page at www.facebook.com/phipharmacy. You can also reach them at 323-5000/1/2. PHI Pharmacy Garapan is located at Suite 105 in the BRI Building and is open Monday through Friday from 8am to 6pm, Saturdays from 8am to 1pm and closed on Sundays and most holidays.

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Eli D. Cabrera, Administrator, BECQ — Janice E. Castro, Director, DCRM

NOTICE OF PUBLIC HEARING

LOTUS HOMES
PERMIT APPLICATION NO. SMS-2020-X-065

The Division of Coastal Resources Management (DCRM) will be holding a public hearing for the proposed Lotus Homes project.

Lotus Homes, LLC is proposing to construct a multi-family, 4-story apartment building with 44 units consisting of three bedrooms, and 4 units consisting of two bedrooms. The proposed development will include a 1-story office building, a 1-story generator facility, a children's playground, 16 light posts throughout the parking lot area, 104 parking stalls, a 6-feet chain-link fence and landscaping. Lotus Homes will be located on Japone Drive and Bokung Lane, specifically identified as Lot No. 22642-NEW, in Gualo Rai, Saipan.

The public hearing for this project is scheduled for **Monday, September 28, 2020, at 3PM.**

Due to the ongoing threat of COVID-19 and to ensure the health and safety of all, *this public hearing will be conducted via video conferencing through Google Meet* (meeting code meet.google.com/unn-mboh-ezr or join via telephone by dialing (US) +1 336-914-1170 PIN: 256 857 615#).

Written comments can be submitted by mail to the Division of Coastal Resources Management, P.O. Box 501304, sent by fax to 664-8315, or emailed to permitting@dcrm.gov.mp. The project files are open and can be reviewed by scheduling an appointment with DCRM. All written and oral comments received by DCRM will be included as part of the permit application records and will be considered in any decisions concerning the proposed projects. Please contact the DCRM at 664-8300/1 if you have any questions or would like to learn more about the Lotus Homes project.

/s/ Janice E. Castro
Director
Division of Coastal Resources Management

Commonwealth of the Northern Mariana Islands
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Eli D. Cabrera, Administrator, BECQ — Janice E. Castro, Director, DCRM

NOTICE OF PUBLIC HEARING

TINIAN OCEAN RESORT CONDOMINIUM
PERMIT APPLICATION NO. TMS-2020-X-067

The Division of Coastal Resources Management (DCRM) will be holding a public hearing for the major siting project for the proposed Tinian Ocean Resort Condominium.

The Tinian Real Estate Development, LLC (TRED) is proposing to construct a mixed-used, prefabricated condominiums on 1.17 acres of privately leased properties situated on the corner of Wall Street and Park Row identified as Lot No. 031 T 01 in Carolinas, Tinian. The proposed development includes 6 buildings with 377 units and a mezzanine floor, 183 parking spaces with an additional 10 ADA compliance parking spaces.

The public hearing for this project is scheduled for **Friday, October 02, 2020, at 2:00PM, in San Jose, Tinian. The public hearing will be conducted at the Tinian Elementary School Cafeteria.**

Written comments can be submitted by mail to the Division of Coastal Resources Management, P.O. Box 501304, sent by fax to 664-8315, or emailed to permitting@dcrm.gov.mp. The project files are open and can be reviewed by scheduling an appointment with DCRM. All written and oral comments received by DCRM will be included as part of the permit application records and will be considered in any decisions concerning the proposed projects. Please contact the DCRM at 664-8300/1 if you have any questions or would like to learn more about the Tinian Ocean Resort Condominium projects.

/s/ Janice E. Castro
Director
Division of Coastal Resources Management

Commonwealth of the Northern Mariana Islands
OFFICE OF THE GOVERNOR
Bureau of Environmental and Coastal Quality

PRESS RELEASE
PUBLIC NOTICE

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Comments should contain the subject line "2020 IR Comments" or similar. All comments must be received by BECQ no later than October 16th, 2020, in order for the comments to be considered by BECQ in the preparation of the final Integrated Report.

REPORTED BY: /s/ Larry Maurin, WQS/NPS Manager — DATE: 9/8/2020

APPROVED BY: /s/ Jonathan I. Arriola, DEQ Director — DATE: 9/8/2020

DEPARTMENT OF PUBLIC WORKS
CNMI GOVERNMENT

INVITATION TO BID
DPW/SWMD20-RFP-007

SUBMISSION DATE: October 20, 2020 TIME: 10:00 A.M.

"Material Recovery and Recycling Operations Saipan"

COPIES OF THE SPECIFICATIONS MAY BE OBTAINED AT THE TECHNICAL SERVICES DIVISION, DEPARTMENT OF PUBLIC WORKS, LOCATED ON SECOND FLOOR, OLEAI JOETEN COMMERCIAL CENTER, SAN JOSE, SAIPAN, DURING REGULAR WORKING HOURS.

A PRE-PROPOSAL Conference is scheduled on **September 29, 2020 AT 9:00 A.M., LOCAL TIME** AT THE Solid Waste Transfer Station Conference Room Lower Base.

QUESTIONS MUST BE MADE IN WRITING TO Blas T. Mafnas, Acting Director of Solid Waste Management Division **NO LATER THAN THE CLOSE OF BUSINESS October 8, 2020**. THESE QUESTIONS WILL BE ANSWERED WITHIN THREE (3) BUSINESS DAYS AND WILL BE SHARED WITH ALL PROPOSERS.

THE PROVISIONS OF THE CNMI PROCUREMENT REGULATIONS, NMIAC SECTION 70-30.3-725 AND 70-30.3-730 PROHIBITING GRATUITIES, KICKBACKS AND CONTINGENT FEES SHALL APPLY.

THE CNMI GOVERNMENT RESERVES THE RIGHT TO REJECT ANY OR ALL BIDS, OR PORTIONS THEREOF, AND WAIVE IMMATERIAL DEFECTS IF TO DO SO WOULD BE IN THE BEST INTEREST OF THE CNMI GOVERNMENT.

/S/ PETER P. CAMACHO
ACTING SECRETARY OF PUBLIC WORKS

/S/ FRANCISCO C. AGUON
ACTING DIRECTOR, P&S