2022
Commonwealth of the Northern Mariana Islands
305(b) and 303(d)
Water Quality Assessment Integrated Report

Photo: Junji Takasago – Blow Hole, Tinian

Bureau of Environmental and Coastal Quality
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LIST OF ACRONYMS/ABBREVIATIONS

ALUS	Aquatic Life Use Support
APC	Area of Particular Concern
ACoE	Army Corps of Engineers
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 or Sea Stars)
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
EJ	Environmental Justice
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
NAVFAC	Naval Facilities Engineering Systems Command, and its subordinate organizations
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 2022 Commonwealth of the Northern Mariana Islands 305(b) and 303(d) Water Quality Assessment Integrated Report was prepared by a number of Bureau of Environmental and Coastal Quality (BECQ) staff and other government and non-government contributors. 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): Ana Agulto, Rodney Camacho, Seamus Harrison, John Iguel, Ian Iriarte, Joseph Ito, Shawn Masga, Larry Maurin, Angel Palacios, Denise Perez, John San Nicolas, Olivia Tenorio, Jovahna Taitingfong, and Kathy Yuknavage.

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EXECUTIVE SUMMARY

The 2022 Commonwealth of the Northern Mariana Islands' (CNMI) 305(b) and 303(d) Water Quality Assessment Integrated Report (henceforth referred to as the "IR") is based on pertinent research data collected during fiscal years 2020 through 2021 (October 1, 2019 through September 30, 2021). Government, non-government agencies and researchers were asked to provide biological criteria and water quality data for assessment purposes on November 1st, 2021. They were asked to submit their findings by December 2021.

Fortunately, there were only two severe weather events this reporting cycle, but these passed north of Saipan and did not cause a disruption in the Bureau of Environmental and Coastal Quality's (BECQ) regular water quality monitoring program. However, the COVID-19 pandemic did, but only for a two-week period between March and May 2020 when a government wide closure first took effect. BECQ being an essential public health agency, was allowed to continue the BEACH Act monitoring program immediately after. The collected data from this period through the end of this reporting cycle displayed interesting bacteriological quality trends due to the discontinuation of inbound flights and tourists visiting CNMI beaches, as well as reduction in use of public facilities and beaches by locals. Roaming livestock took advantage of their absence.

Commonwealth of the Northern Mariana Islands Coastal Waters

There are 240.5 coastal shoreline miles in the CNMI as listed in Table I-a through Table I-d, in Appendix I. During this reporting cycle, 82.5 coastal miles (34.3%) 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 158 coastal miles (65.7%) 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 Use Support Function (ALUS), alteration of hydrology, flow regime change, 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 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, 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, which 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 there 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 Bacteriological TMDL. The TMDL report was shared with policy makers to make informed decisions on where best to use funding for water quality protection infrastructure projects. The Bacteriological TMDL is also being implemented by BECQ and other CNMI natural resource agencies in ongoing efforts to improve Saipan's water quality.

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

TABLE I. 2022 Saipan and Mañagaha Coastal EPA 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 for this reporting cycle. Past impairments remain on the 303(d) list if they occurred less than 5 years ago. However, they are not shown on the map.

FIGURE I. 2022 Saipan Coastal CALM Categories and Causes of Impairment

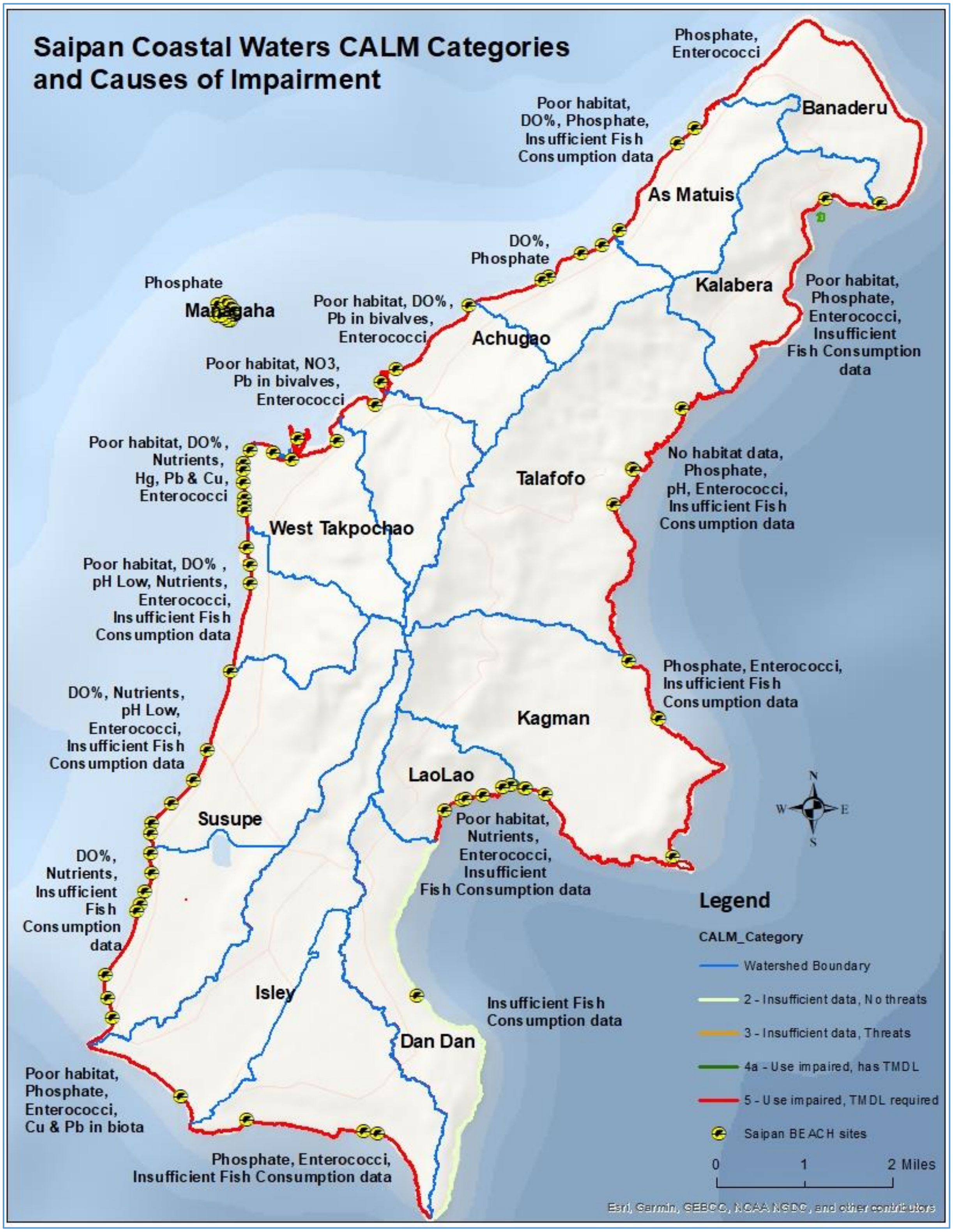


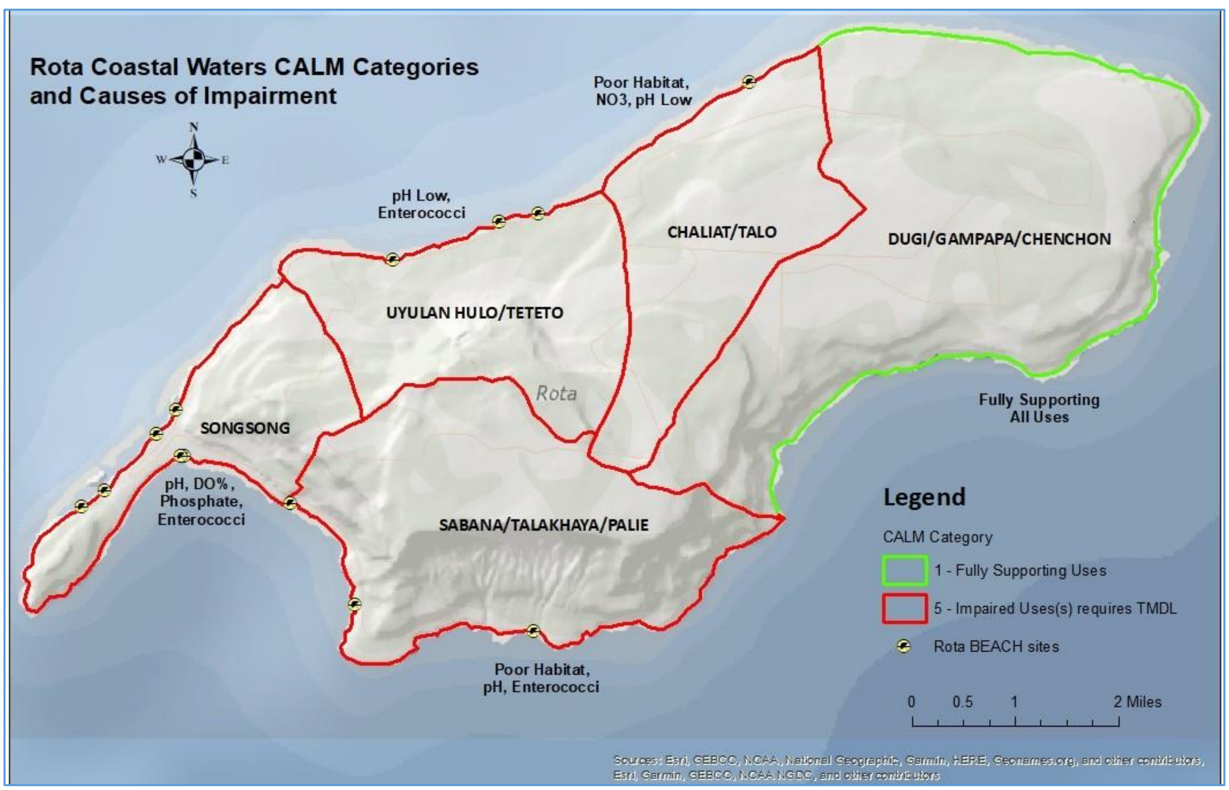
Table II., provides the CALM Categories for each of Rota's watersheds and their coastal miles.

TABLE II. Rota's Coastal CALM Categories

Watershed	Seg ID	Category							Total Assessed
		1	2	3	4a	4b	4c	5	
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., shows Rota watersheds' CALM Categories and causes this reporting cycle.

FIGURE II. 2022 Rota Coastal CALM Categories and Causes of Impairment



The increase in Tinian's violations of the CNMI Water Quality Standards (WQS) for Enterococci were associated with sample contamination and improperly disposed human wastewater. A review of sampling protocols was required of all responsible staff, and a reduction in violations were seen thereafter at all but two BEACH sites. The Tinian Program Manager investigated what may have caused contamination at the remaining sites and discovered in December 2020 that the private wastewater pumper truck company contracted by Department of Defense (DoD) for collecting and disposing of waste from the US Navy Construction battalion's "Seabees" camp was not always disposing of it in the permitted leaching field. Instead, the company was disposing the wastewater at the Tinian dump, upland and in close proximity to the sites. The company was notified of this violation, and percent violations dropped from a collective 33% in FY 2020, to 5% in FY 2021. The company continues to be closely monitored.

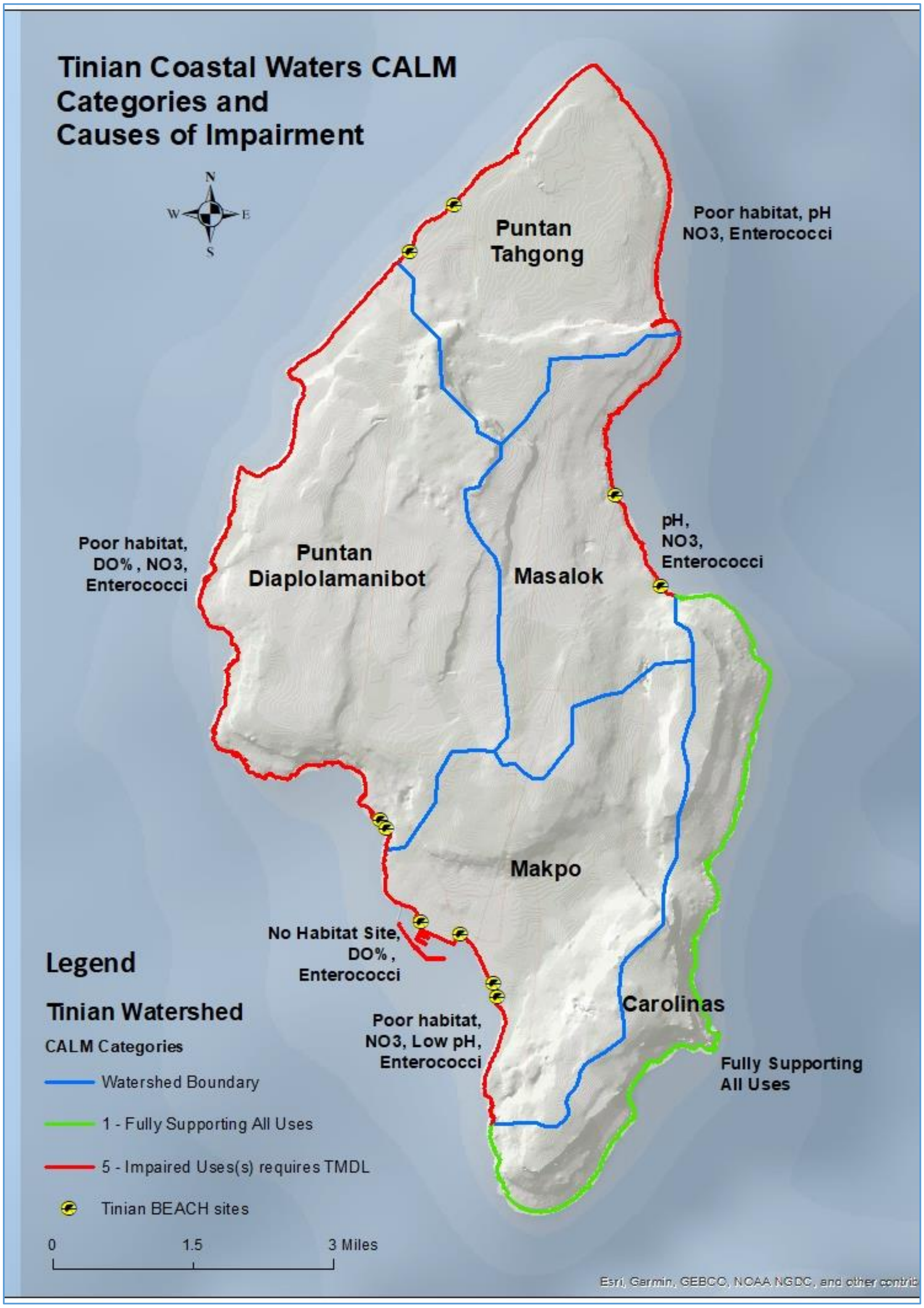
Table III., provides the CALM Categories for Aguigan and each of Tinian's watersheds and their coastal miles.

TABLE III. Aguigan and Tinian's Coastal CALM Categories

Watershed	Seg ID	Category 1	2	3	4a	4b	4c	5	Total Assessed
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**

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

FIGURE III. 2022 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), known as “No’os” in Chamorro. The island has been used as a live bombing range by the US military since October 1971, the lease for which ends in 2033.

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

TABLE IV. Northern Islands’ Coastal EPA CALM Categories

Watershed	Seg ID	Category							Total Assessed
		1	2	3	4a	4b	4c	5	
***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		**61**	**45.5**					**4.2**	**110.7**
TOTAL NORTHERN ISLANDS COASTAL MILES									**110.7**

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

FIGURE IV. UXO in Saddok Dogas Stream South Achugao

CNMI Stream Systems

Recording the Global Positioning System (GPS) location of stream systems on Saipan and Rota have been completed. Stream visual assessments on Saipan were completed in the Achugao, and LaoLao watersheds this reporting cycle. Assessments will begin in the West Takpochau watersheds next reporting cycle. Stream Calm Categories are listed in Table V., on the following page, along with stream miles.

Unexploded ordnance (UXO) are frequently discovered during field work. Their GPS coordinates are recorded and reported to BECQ's Site Assessment and Remediation (SAR) Branch.

TABLE V. CNMI's Streams' EPA CALM Categories

Watershed	Seg ID	Category							Total Assessed
		1	2	3	4a	4b	4c	5	
Saipan Watershed Stream (miles)									
Kalabera	**12STR**		7.8						
Talofofo	**13STR**							34.5	
Kagman	**14STR**		12.2						
Lao Lao	**15STR**		6.7						
Dan Dan	**16STR**		0.8						
Isley (West)	**17STRA**		3.5						
Isley (East)	**17STRB**		0.3						
Susupe (North)	**18STRA**		7.0						
Susupe (South)	**18STRB**		1.4						
W. Takpochao (North)	**19STRA**		4.7						
W. Takpochao (Central)	**196STRB**							3.2	
W. Takpochao (South)	**19STRC**		1.3						
Achugao (North)	**20STRA**		3.4						
Achugao (South)	**20STRB**							6.5	
As Matuis	**21STR**		1.1						
Total Saipan Category (miles)			**50.2**					**44.2**	**94.4**
Rota Watershed Stream (miles)									
Sabana/Talakhaya/Palie	**2STR**							6.1	
Total Rota Category (miles)								**6.1**	**6.1**
Northern Islands Watershed Stream (miles)									
Anatahan	**25STR**		?						
Sarigan	**26STR**	?							
Guguan	**27STR**	?							
Alamagan	**28STR**	?							
Pagan	**29STR**		?						
Agrihan	**30STR**	?							
Asuncion	**31STR**	?							
Maug	**32STR**	?							
Farallon de Pajaros	**33STR**	?							
Total N.I. Category (miles)		**?**	**?**						**?**
TOTAL CNMI STREAM (miles)			**50.2**					**50.3**	**100.5**

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

SAR works closely with CNMI Department of Fire and Emergency Medical Services to safely remove UXO.

Due to the COVID-19 Government closure, no stream assessments have been completed on Rota thus far. Tinian, Aguigan, and Mañagaha do not have stream systems. The streams on the Northern Islands have not been mapped. It is hoped that the new LiDAR data will be used for this purpose by next reporting cycle.

The National Hydrography Dataset (NHD) from the US Geological Survey (USGS) was updated in 2017 at a resolution of 1:24,000. This and the Wetland and Streams Geographical Information System (GIS) data layer for Saipan have provided more accurate delineation of intermittent (flowing in response to rainfall), and ephemeral (normally dry most of the year) streams.

In addition, the Stream Visual Assessment Protocol (SVAP) Version 2.0 was completed this reporting cycle has provided much more information about habitat suitability to supplement limited water quality data for assessing stream DUs, biological health, and CALM Categories.

To date, there are an estimated 100.5 stream miles within the CNMI, not including the Northern Islands. 50.2 stream miles have insufficient information to fully assess all DUs, and 50.3 stream miles do not support at least one DU. Of those streams that were assessed, the most frequent causes for 303(d) listing were exceedances of the WQS for Enterococci, Lead (Pb), Mercury (Hg), Orthophosphate (PO_4), Nitrate as Nitrogen (NO_3-N), and Dissolved Oxygen (DO%).

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 Best Management Practices (BMP) to capture waste from free roaming feral livestock; or 5) waste from free roaming domestic and feral dogs and cats, and birds.

<u>CNMI Wetlands</u>

CNMI wetlands have not been fully delineated or valuated using the CNMI Wetland Rapid Assessment Method (RAM). This is due to limited number of trained wetland specialists, logistical, and accessibility issues, especially to the Northern Islands. Table VI., on the following page provides the CALM Categories for each of CNMI Watersheds' Wetlands and their total approximated acreage from GIS calculation of their boundaries.

There are 716.2 wetland acres on the islands of Saipan, Tinian, Rota and Pagan. This acreage was determined using the most recent delineations, the most recent NHD and Wetland and Streams GIS data layer, and a 2015 Pilot study of the CNMI RAM on Tinian. The Tinian survey was conducted for the Pacific Naval Facilities Engineering Command as part of the CNMI Joint Military Training (CJMT) Draft Environmental Impact Statement (DEIS) in 2015.

There are insufficient water quality data available to establish quantitative wetland WQS for assessing CNMI wetlands and the *Propagation of Aquatic Life* DU. However, this reporting cycle the CNMI Wetland RAM was used to value and rate the functionality of 57 wetlands on the island of Saipan (Personal communication, DCRM Watershed Coordinator, Zachary Williams, March 2022). In addition, for the first time the CNMI took part in the EPA National Aquatic Resource Surveys - National Wetland Condition Assessment (NWCA) in 2021. Office table top assessments were carried out on over 60 random wetland sites on Saipan, and approximately 20 sites on Tinian using GIS, field studies, and local knowledge. Those randomly selected NWCA wetland sites that appeared to adhere to the protocols of the study were then visited on reconnaissance before the study season began. BECQ field staff were then able to successfully complete 11 NWCA site assessments; collecting extensive data on water quality, vegetation, alterations, and habitat quality.

TABLE VI. 2022 CNMI's Wetlands' EPA 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**			2.0					
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**		**33.8**			**568.4**		**607.3**
Tinian Watershed Wetland (acres)									
Makpo	**9WET**			28.4					
Puntan Diaplolamanibot	**10WET**	12.9							
Puntan Tahgong	**11WET**	40.6							
Total Tinian Category (miles)		**53.5**		**28.4**					**81.9**
Northern Islands Watershed Wetland (acres)									
Pagan	**29WET**			27.0					
Total N.I. Category (miles)				**27.0**					**27.0**
TOTAL CNMI WETLAND (acres)									**716.2**

This data, in addition to the Wetland RAM valuations, and water quality data collected for other wetland and coral reef restoration projects were used to assess several wetlands' attainment of the *Propagation of Aquatic Life* DU this reporting cycle.

The wetland impairments identified most often were from non-pollutants, i.e., habitat alterations due to fill, introduced non-native species, and flow regime changes. 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 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 VII., below provides the CALM Categories for each of CNMI's Lakes and their estimated total acreage of 267.4 acres.

TABLE VII. 2022 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**						**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 dump sites throughout the Pacific ("*Poisoning the Pacific*", Mitchell, J., 2020), 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 several people living on the Northern Islands. Some individuals do not live on the islands permanently, but are evacuated due to volcanic activity or to return to the more populated southern islands for supplies, or to receive medical treatment, (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 groundwater. In general, the quality of groundwater used for Public Water

Systems (PWS) meets EPA Primary Drinking Water Standards. Although there are isolated incidents of groundwater contamination from legacy Perfluorooctanoic Acid (PFOA) and Perfluorooctyl Sulfonate (PFOS) use, and underground or aboveground storage tanks. The CNMI Commonwealth Utility Corporation (CUC) minimizes the threat of these pollutants from entering the general PWS by taking contaminated wells off line, and employing a large number of production wells to decrease levels to PWS standards.

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 enforceable Drinking Water Standard, 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, are for 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 Bacteriological TMDL recommendations with societal Environmental Justice issues in mind.

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, 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 NPSs 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 and use the SVAP in impaired watersheds to identify other possible NPSs of contamination. WQS/NPS staff collaborate with the Division of Coastal Resources Management (DCRM) Watershed Coordinator, stakeholders, subsistence farmers, and fisherfolk to avail information and funding to improve watershed and waterbody 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 and goats from free-range grazing, and to construct appropriate animal wastewater treatment systems.

Immediately after taking office in January 2021, President Biden signed an Executive Order for *Advancing Racial Equity and Support for Underserved Communities through the Federal*

Government, E.O. 13985, 86 Fed. Reg. 7009 (Jan. 20, 2021), As a result, EPA has taken steps to encourage Environmental Justice (EJ) to be considered in its work. EPA defines EJ as "fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." The CNMI consists of a very diverse population of many races, people of color, and national origins, and has one of the lowest per capita incomes in the United States ($9,656/yr), and has a poverty rate of 55.7 percent (2010. Census). Therefore, many considerations for EJ apply in EPA's funding and regulatory oversight responsibilities in the CNMI.

BECQ continues to provide oversight of military plans to ensure that DoD EIS respects and upholds CNMI laws and provides for meaningful engagement with all people during their development. The people of the CNMI must be given the opportunity to discuss their concerns with military planners in an open atmosphere with respect to local customs and oral traditions. Each concern must be respectfully considered and addressed individually with a reasonable response.

BECQ will do its part to enforce local environmental laws, regulations, and policies. Island communities, like any other community on the continental US should not bear a disproportionate share of the negative environmental consequences resulting from military operations in the region. 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 and solid waste 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. Further details are provided about each waterbody segment (watershed) in the three southern 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 their pages of interest.

PART A. INTRODUCTION

BECQ is housed under the Executive Branch and is made up of the Division of Environmental Quality (DEQ) and the 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 A-1., on the following page contains the total size of CNMI water bodies.

The WQS/NPS branch within DEQ is primarily responsible for the BEACH monitoring Program, which includes collecting water quality samples, analyzing physical and chemical water quality parameters in the field, collecting coral reef biological monitoring data, and assisting with wetland delineations. In addition, the WQS/NPS branch conducts visual field assessments of streams and wetlands, and uses GPS sensing to record locations of causes of contamination, and to map the potential sources in CNMI watersheds. 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.

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

Topic	Value	Source
CNMI Population	47,329	2020 US Census (Oct. 2021)
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	716.2	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] Lake acreage includes Susupe on Saipan, two lakes on Pagan, and one on Anatahan. The newly formed Hagoi Lagu has not been delineated.

The CNMI waterbody DUs are defined in detail within the CNMI WQS, and Section C.2.2., of this IR. In short, DUs include: *Propagation and 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, as a *Potable Water Supply*. However, the CNMI does not use surface waters as a potable water supply source, only ground water.

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.

Water quality, and biological monitoring data, together with SVAP and Wetland RAM assessments that were made from October 1, 2019 through September 30, 2021 were analyzed, and compared to the previous three fiscal years (a total of five years) to assess each waterbody's health. A waterbody is "healthy" when all monitoring sites within the waterbody are 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 cause in the waterbody. The TMDL is used to focus natural resource management and restoration efforts to minimize or prevent 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

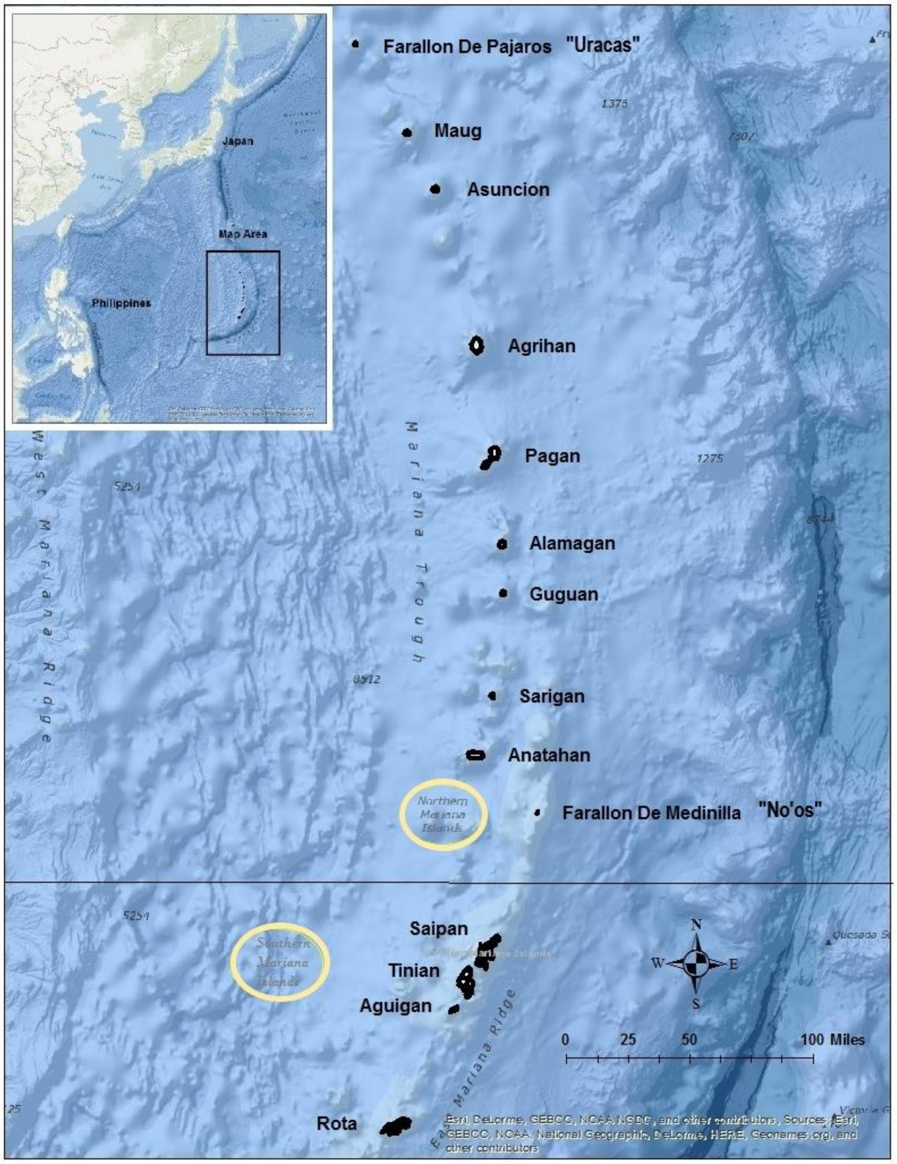
The CNMI consists of two geologically distinct island chains located at 145° E latitude, and between 14° – 21° N longitude (Figure B-1., on the following page). Archaeological findings by Carson in 2016, validate the earliest human cultural presence on the islands as being "slightly older than 1500 B.C.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

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 (90 %) of the CNMI population lives and recreates on Saipan (2020 US census data). The Northern Islands are also discussed, with more information provided about Pagan after two reconnaissance visits to the island in 2021 by private parties and government agencies. Since last reporting cycle homestead development has begun, and the DoD has recently earmarked funding to repair the WWII airstrip located near the Village, in preparation for proposed expansion of military training exercises and live fire ranges there.

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



Although the marine waters surrounding the three northern most Islands of the archipelago, Farallon de Pajaros ("Uracas"), Maug, and Asuncion, were established as the Marianas Trench Marine National Monument by presidential proclamation in 2009, these protected waters lie within the Mariana Islands Range Complex (MIRC) Study area. Therefore, US military forces are allowed access through these waters for range management and MIRC-supported activities and training including personnel, tactics, munitions, explosives, and electronic combat systems (MIRC EIS, 2010). The 2015 Mariana Islands Training and Testing Study Area (MITT) doubled the MIRC study area to include just under 1 million square nautical miles. No'os or FDM has been used as an inert and live bombing range by the US DoD since 1971. The frequency of bombing activities has increased steadily with each EIS approval. The No'os lease includes three nautical miles of submerged lands, and will not expire until 2050. This has caused concerns by CNMI resource agencies over cumulative impacts to terrestrial flora and fauna (including the endangered Micronesian Megapode, and Mariana Fruit Bat) due to strike warfare training (CNMI CZMA Consistency Determination, 2014). Appropriate mitigation measures must be implemented by DoD and should be regularly monitored by CNMI resource agencies to ensure military activities will remain consistent with enforceable endangered species policies.

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 43,385 inhabitants (CNMI Census, 2020). Saipan has five Marine Protected Areas including: Mañagaha (Segment #23) Marine Conservation Area (MCA); Bird Island Marine Sanctuary (Kalabera, Segment #12); Forbidden Island Marine Sanctuary (Kagman, Segment #14); Lao Lao Bay Sea Cucumber Sanctuary (LaoLao, Segment #15); and the Lighthouse Reef Trochus Sanctuary (Susupe North, Segment #18A).

FIGURE B-2. Forbidden Island Marine Sanctuary

Due to the size of Saipan's population, ongoing developments, and the return of the tourism industry after reopening of air travel; anthropogenic stressors to Saipan's MPAs' water quality are significant. This and the fact that BECQ has only a few staff and limited logistical resources, most of the WQS/NPS time is dedicated to marine and surface water quality monitoring 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 water quality 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). However, given the scarcity of

Rota and Tinian's land and natural resources, and the increase in military exercises on and around these islands, every effort should be made to provide the CNMI with proportionate resources to establish baseline contaminate levels, and for monitoring these areas to ensure that DoD is held accountable for commensurate mitigation and restoration of impacted leased lands and water bodies.

B.1.3. Monitoring Water Quality of Northern Islands

The 10 other northernmost islands (see Figure B-1., on page 26), 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 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* that 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 2022 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 unlikely if they were left in their present state. 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, the significant increase in the frequency and expansion of military activities associated with the CJMT and MITT, now pose the predominant anthropogenic threat to these islands and their submerged lands from both a socio-economic and environmental justice concern.

Past military impacts and ongoing exercises have left their legacy of unexploded ordnance and other military debris, on the islands of Pagan, Anatahan, and No'os (FDM); the extent to which is yet to be fully assessed.

Given the scarcity of CNMI lands and resources, and the anthropogenic threats associated with DoD MITT exercises and activities on terrestrial and the surrounding water resources, every effort should be made to provide the CNMI with proportionate resources to establish baseline contaminate levels, and for monitoring these areas to ensure that DoD is held accountable for commensurate mitigation and restoration of impacted leased lands and water bodies.

B.1.4. CNMI Classification of Marine Coastal Water Uses

The CNMI also has two marine water classes, Class AA (highest quality) and Class A waters (waters surrounding ports or marinas, and industrial areas, and the leased land of No'os), as designated in the WQS. Table B-1, provides the reason for the various designations.

TABLE B-1. 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.1.4.1. 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." (2021. CNMI WQS). Waterbodies in industrial or harbor areas, and those surrounding No'os (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."

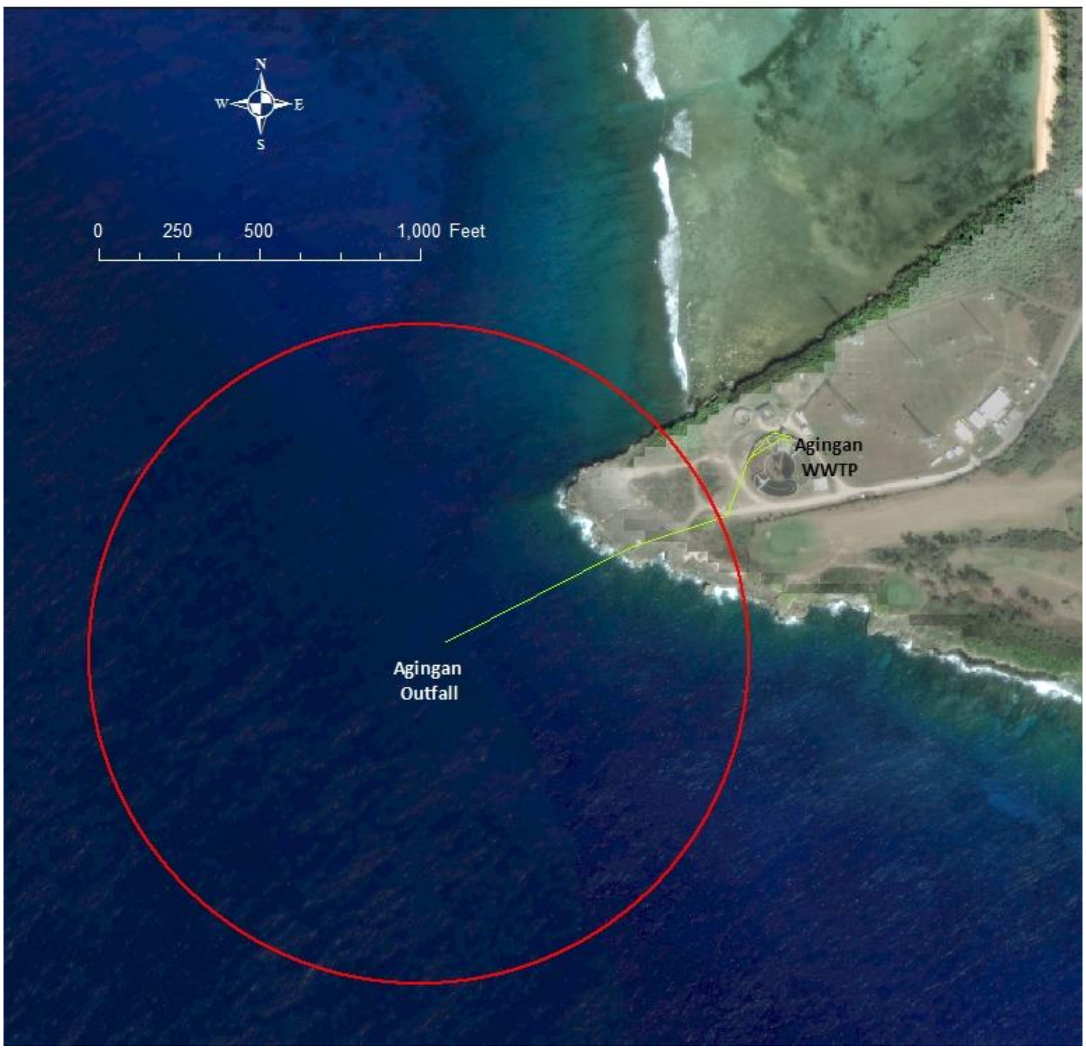
FIGURE B-3. Saipan Class A Waters within the Puerto Rico Industrial Zone

The DUs protected in both classes of waters are: the propagation and support 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, snorkeling, etc.); 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 include 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 (Class AA), which constitute an outstanding CNMI resource, where lowered water quality is *prohibited*. As stated in the 2021 CNMI WQS, where waters cannot be assessed to properly determine their state and Tier ranking for purposes of anti-degradation, those waters shall be assumed to be Tier 3. All of the Northern Islands' coastal waters have been designated as Tier 3.

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 than Tier I waters. 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 Wastewater Treatment Plants (WWTP) outfalls with EPA National Pollutant Discharge Elimination System (NPDES) permitted mixing zones and are within CNMI Class A waters (See Figures B-3 through B-6).

FIGURE B-4. Saipan Class A Waters Surrounding the Agingan Point WWTP Outfall



It is important to note that the CNMI eco-tourism industry is increasing visitor travel to the Northern Islands, and individuals of Northern Mariana Islands descent have started establishing residency on the islands of Alamagan and Pagan over the past year. This is in preparation for indigenous residents to be granted a homestead by the CNMI Department of Public Lands (DPL) so they may use these resources for traditional cultural fishing and farming practices. In contrast to the increasing population density in the Northern Islands, the MITT allows for more frequent and expansive US military training exercises and activities in the area. 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 causing less anthropogenic stresses therein.

FIGURE B-5. Tinian Class A Waters of San Jose Harbor

FIGURE B-6. Rota Class A Waters of East and West Harbor

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, Dan Dan, and Banaderu watersheds are also designated as Tier 3.

In comparison, Saipan's western shoreline has many easily accessed beaches, that are more densely used by residents and tourists. This underscores their value as an extremely important economic and environmental resource for the CNMI, upon which tourism greatly depends, but also leads to more anthropogenic impacts from development and poor land use practices. Therefore, they are designated as Tier 2.

B.1.4.2. Class A Coastal Waterbodies

Class A waters in the CNMI are located in Saipan's Puerto Rico "Industrial" zone, which encompasses the area 3000 feet from the shore. It contains the seaport, marinas, the Sadog Tasi municipal Wastewater Treatment Plant (WWTP) outfall, and Lower Base facilities.

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 other Class A waters are the harbors of Tinian and Rota. The only Class A water in the Northern Islands are the waters surrounding No’os (FDM), due to ongoing military bombing exercises.

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

There are a low abundance of streams, wetlands, 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).

The CNMI WQS defines two classes of fresh surface waters, 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.” (2021. CNMI WQS).

The uses to be protected in Class 2 waters, “…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 mixing zone 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, the CNMI WQS anti-degradation policy designates a Tier 3 status for those surface waters of high quality where lowered quality is prohibited. They constitute an outstanding resource and are listed in Table B-2., on the following page.

Streams

Streams are predominantly ephemeral in the CNMI and occur mostly in limited areas where less permeable volcanic materials have been exposed.

TABLE B-2. Classification of Surface Water Uses and Anti-Degradation Tier Designations

Island	Watershed Name	Segment and Type	Class	Tier	Reason for Designation
Saipan	Talofofo	13WET	1	3	Hydrological Function/Aquatic & Wildlife Habitat/Outstanding Resource
	Kagman	14WET	1	3	Hydrological Function/Aquatic & Wildlife Habitat/Outstanding Resource
	DanDan	16WET	1	3	Hydrological Function/Aquatic & Wildlife Habitat/Outstanding Resource
	Isley	17WET	1	3	Hydrological Function/Aquatic & Wildlife Habitat/Outstanding Resource
	Susupe	18WETB	1	3	Hydrological Function/Aquatic & Wildlife Habitat/Outstanding Resource
	West Takpochau	19WET	1	3	Hydrological Function/Aquatic & Wildlife Habitat/Outstanding Resource
	Achugao	20WET	1	3	Hydrological Function/Aquatic & Wildlife Habitat/Outstanding Resource
	Kalabera	12STR	1	TBD	
	Talofofo	13STR	1	3	Hydrological Function/Aquatic & Wildlife Habitat/Outstanding Resource
	Kagman	14STR	1	3	Hydrological Function/Aquatic & Wildlife Habitat/Outstanding Resource
	Lao Lao	15STR	1	2	Hydrological Function/Aquatic & Wildlife Habitat/sediment basins
	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 & Wildlife Habitat/ Legacy WWII debris
	Achugao (Dogas)	20STRB	1	2	Hydrological Function/Aquatic & Wildlife Habitat/ Legacy WWII debris
	Achugao (Agatan)	20STRC	1	2	Hydrological Function/Aquatic & Wildlife Habitat/ Legacy WWII debris
	As Matuis	21STR	1	TBD	
	Susupe (South)	18LAKB	1	TBD	
Rota	Sabana/Talakhaya/Palie	2STR	1	3	High Quality/Hydrological Function /Outstanding Resource
Tinian	Masalok	7WET	1	3	Hydrological Function/Aquatic & Wildlife Habitat/Outstanding Resource
	Makpo	9WET	1	3	Hydrological Function/Aquatic & Wildlife Habitat/Outstanding Resource
	Puntan Diaplolamanibot	10WET	1	3	Hydrological Function/Aquatic & Wildlife Habitat/Outstanding Resource
	Puntan Tahgong	11WET	1	3	Hydrological Function/Aquatic & Wildlife Habitat/Outstanding Resource
Northern Islands	Pagan	29WET	1	3	Hydrological Function/Aquatic & Wildlife Habitat/Outstanding Resource
	Anatahan (Hagoi Haya)	25WETA	1	TBD	Marshy area in caldera not yet delineated
	Anatahan (Hagoi Haya)	25LAKA	1	TBD	
	Anatahan (Hagoi Lagu)	25LAKB	1	TBD	Newly formed
	Pagan (Lagona Sanhiyong)	29LAKA	1	3	Hydrological Function/Aquatic & Wildlife Habitat/Outstanding Resource
	Pagan (Sanhalom)	29LAKB	1	3	Hydrological Function/Aquatic & Wildlife Habitat/Outstanding Resource

TBD – To be determined, limited data currently available

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 perennial base flow. The WQS/NPS branch has been able to grab only limited stream water quality data for the islands of Saipan and Rota.

A few sections of Saipan 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 underscores their aesthetic value. Freshwater shrimp and eels have been found in the more frequently flowing streams with perennial surface pools on Saipan and Rota. BECQ has increasingly identified riparian and aquatic organisms in and around streams, and conducted SVAPs to make informed stream valuations, and to prioritize restoration activities therein. SVAPs were completed in Saipan's high priority North and South Achugao, and LaoLao watersheds. The West Takpochau watershed will be assessed next reporting cycle. As more stream assessments and valuations are completed, streams will be given anti-degradation Tier designations, those of high value as Tier 3 waters due to their important hydrological function, and essential native aquatic and wildlife habitat.

Wetlands

Wetlands alone cover less than 1% of the CNMI land mass, the majority of which are patchily distributed around the islands of Saipan, Tinian, Pagan and Anatahan. The importance of wetlands as the primary treatment for polluted surface water runoff, and for their essential hydrological function, wildlife habitat, and marine nurseries, constitutes them as exceptional CNMI resources, for which they are designated as Tier 3 waters, Table B-2., on the previous page.

Lakes

None of Saipan's surface waters are used as a potable water supply. 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.

CNMI water resources require careful management, and as such are protected through several water pollution control programs, as discussed below.

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 implement and enforce the CNMI WQS, monitor the quality of marine and surface waters (streams, wetlands, and lake), and notify the public when waters exceed the Enterococci WQS. The program is also responsible for administering the Section 401 Water Quality Certification Program. These duties ensure that CNMI WQS are not violated and 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, 205(j) 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 2021. Revisions included:

- Increased clarity, including using consistent terminology and defined terms throughout;
- Increased consistency between federal programs and state regulations, including the Tier 2 anti-degradation policy, and the Section 401 Water Quality Certification process;
- Established a presumption that Tier 3 anti-degradation requirements apply where BECQ determines that insufficient data exists to reasonably determine existing water quality;
- Applied land disposal requirements to all areas regulated as groundwater management zones;
- Clarified certain water quality criteria for cases when ambient conditions exceed numeric criteria;
- Established water quality criteria for radioactivity in Commonwealth waters;
- Clarified stoppage periods for activities with potential to adversely affect coral reproduction;
- Revised procedural requirements for Water Quality Certifications;
- Expanded enforcement procedures; and
- Deleted outdated appendix information regarding history and other background information.

The frequency with which water samples exceed the WQS in conjunction with biological marine monitoring data, and information gathered from conducting SVAP and CNMI Wetland RAM are used to identify impaired waterbodies (those not supportive of at least one DU). The WQS/NPS branch compiles this information into the biennial CNMI 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. The past Conservation Action Plans (CAP) that were established for these areas, were revised and updated into Integrated Watershed Management Plans (IWMP). Currently, four IWMPs are completed or being finalized for Achugao, Garapan, and LaoLao on Saipan; and Talakhaya on Rota. They were drafted this reporting cycle through a collaborative process, utilizing the best available science and stakeholder input to make the best use of limited financial and available human resources to implement identified remediation and restoration projects.

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, staff conduct biological assessments of marine benthic, coral reef, and stream habitats, and collaborate with the DCRM Watershed Coordinator to conduct Wetland RAM, and delineations.

Marine waters, streams, wetlands, and lakes 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 Fecal Indicator Bacteria (Enterococci and *E. coli*). The lab provides water quality results to WQS/NPS, which are reviewed for exceedances of the CNMI WQS. Enterococci exceedances in coastal recreational 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 DCRM through visual field assessments of watersheds and source tracking studies. Potential point sources and NPS of pollution in watersheds are geo-referenced using GPS. This information is further analyzed with GIS software.

Since the WQS/NPS program began 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 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 for failures in the system, e.g., suspected compromised sewer lines, lift stations, manholes, etc., and immediately address the source(s) of contamination.

Should NPS be identified as the source 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 subsistence farmers to adopt sanitary agricultural practices and avail funding from their EQIP program to deter further contamination of surrounding waters.

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 (MS4); the two municipal CUC WWTP on Saipan; the package Membrane Bioreactor treatment plant on Mañagaha Island; one individual industrial stormwater permit, 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 most activities 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

Contact: Rodney Camacho at: RCamacho@dcrm.gov.mp

The Marine Monitoring Team (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 sites. The MMT have improved staff training, data collection techniques, data accuracy, and methods for analyzing coral health and resiliency, using GIS and 3D video mapping (Houk and Van Woesik, 2006, Houk and Starmer, 2008, https://dcrm.gov.mp/our-programs/marine-monitoring-program. 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 (NMC) and the UoG. Recent coral restoration initiatives in the CNMI have aligned BECQ and Department of Lands and Natural Resources' (DLNR) - Division of Fish and Wildlife (DFW) program goals.

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 parameters will also affect coral reef environments (Valiela, 1995).

At any particular time, the concentration of water quality parameters is affected by rainfall, 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

Contact: Merrill Ayuyu at: merrill.ayuyu@becq.gov.mp

The CWA Section 106 and Section 319 funds BECQ's WEEC Program, and produced the "*CNMI and Guam Stormwater Management Manuals", Volume I and II*. The manuals provide 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 stipulate how these systems are to be constructed when a municipal sewer collection system is not 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 prohibition of, livestock grazing near CNMI surface waters. The WTD regulations 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 that 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 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 stream beds. The WQS now define a waterbody to include water courses, "whether perennially or intermittently wet", 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.

One-Start Permits include approvals and conditions from three CNMI regulatory agencies, including BECQ's DEQ and DCRM, as well as from the 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, sedimentation, and stormwater quantity and quality are regulated within the CNMI. The EEC Regulations require that new development site designs and construction standards comply with construction and post-construction stormwater treatment BMPs described in the "*CNMI and Guam Stormwater Management Manuals"*. The manuals are also used in the EEC field training program provided to construction field staff and erosion control inspectors. These Manuals have proven so successful, that 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, incorporating new methods and technology for managing erosion and stormwater, and promoting rainwater reuse and recharge, and low impact development designs to protect CNMI waters.

B.2.4. Safe Drinking Water and Groundwater 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 groundwater monitoring has been required for years, especially for nitrates, chlorides, pH, hardness, temperature, and more recently for Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA).

Well owners are also required to test for organics, inorganics and radionuclides from entry points into their water distribution. In addition, a SDW Information System database is used to store and retrieve groundwater quality information. However, methods for analyzing the collected data, and actions to be taken based upon the data are still lacking, including a comprehensive groundwater 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 groundwater are required to monitor for contaminants that may be present in their raw groundwater, 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 located 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 groundwater management zones on Saipan.

B.2.4.3. Underground Injection Control Regulations

The SDW branch administers the CNMI Underground Injection (UIC) Control Regulations. These regulations only allow Class V UIC wells to be used 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

In 2020, the CNMI government shutdown as a result of the COVID-19 pandemic and a travel ban was put into place. This led to many agencies furloughing staff for much of that year except for essential personnel. Many infrastructure activities ceased until 2021 when the CNMI government received additional funding though the American Rescue Plan Act (ARPA). Much of this funding was used to recall employees back to work in 2021 and hire new personnel to complete the stalled Capital Improvement Projects, and operate and maintain municipal infrastructures.

The Department of Finance, CUC, and DPW were asked in November 2021 to submit a report of their expenditures for any projects that were carried out during Fiscal years 2020 and 2021 that would improve or protect ground, surface, and marine water quality in compliance with the CWA. They were given until January 14th, 2022 to submit their reports. The following cost/benefit assessment was compiled using information from the agencies' reports. The jump in capital investment expenditures in 2021 from ARPA funding is notable.

B.3.1. Costs

Capital investments in municipal facilities, and in NPS pollution BMPs is provided in Table B-3., on the following page.

TABLE B-3. CNMI Capital, Investments, and NPS BMPs

Expenditures	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Capital investments in Municipality (CUC and DPW Capital Improvement Projects)	$491,518	$1,705,701	$505,457	$2,688,425	$12,869,625
Investments in NPS Pollution Prevention (BMPs)	$4,600,903	$2,854,770	$2,834,704	$2,499,772	$1,346,741

The average annual costs for operations and maintenance of municipal facilities are contained in Table B-4. The average costs for Saipan, Rota, and Tinian during fiscal years 2020-2021 were $2,834,734.

TABLE B-4. CNMI Annual Operation and Maintenance Costs of Municipal Facilities

Expenditures	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021
Saipan	$3,192,001	$2,925,000	$3,129,000	$2,257,000	$1,995,000
Rota	$702,355	$675,141	$745,014	$508,519	$483,833
Tinian	$247,590	$299,725	$297,920	$243,852	$181,264
TOTAL	***$4,141,946***	***$3,899,866***	***$4,171,934***	***$3,009,371***	***$2,660,097***

The average annual costs for BECQ to administer CWA requirements, the BEACH Monitoring Program, and water pollution control activities are approximately $1.2 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 82.5 CNMI coastal miles (out of 240.5 miles) supporting all DUs.

This reporting cycle a total of 3.6 CNMI coastal miles were removed from the 303(d) Impaired list for TMDL development. This included Rota's Chaliat/Talo coastal waters that now meet WQS for Enterococci, and Saipan's North West Takpochau coastal waters that now meet the WQS for pH. 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, even during travel restrictions, the CNMI continued to entice visitors to enjoy area beaches and the surrounding waters. Teteto Beach on Rota was selected as the number one Readers' Choice for Best Beach Overseas at the Dive and Travel Awards of the annual Marine Diving Fair in Japan, in April 2020.

CNMI COVID-19 infection rates were kept exceptionally low from the onset of the pandemic through June 2021 due to Government-imposed restrictions and a high vaccination rate of CNMI residents. The New York times included the Northern Mariana Islands as one of the 52 best places to travel in 2021 (https://www.nytimes.com/interactive/2021/travel/places-to-visit-vacation.html). This led the CNMI Government to enter into a "travel bubble" agreement with South Korea for vaccinated travelers to enter the CNMI as a means for the tourism economy to recover. However, with the arrival of the Omicron variant in November 2021, the CNMI experienced a steep escalation in infection rates and a proportionate decrease in visitors thereafter (2022, CNMI COVID-19 Task Force communication).

Clean marine water is essential for supporting the livelihoods of subsistence fisherfolk during economic downturns as the CNMI experienced in the 1990's with the loss of the garment industry, and with government furloughs and the closure of many businesses during the pandemic.

Other benefits of CNMI expenditures are groundwater protection. This includes identifying high quality aquifers 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 operate and maintain municipal infrastructures, and enforce CNMI laws, regulations, and permit requirements to safeguard the Saipan lagoon, CNMI harbors, coral reefs and other benthic habitat. 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 developments 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 legacy 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 temporary hiking trails cut through vegetation or streambeds, are all of special concern as these can contribute to sediment loading, turbidity and other NPS pollution to surrounding waters. 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.

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 addresses 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 last reporting cycle. This significantly reduced sedimentation and resulted in some improvement of bacteriological water quality in the Dan Dan, Kagman and Talofofo watersheds. This reporting cycle DPW broke ground on Highway 36 to connect the paved road from Kingfisher golf course through the Talofofo watershed to Bird Island Look Out in the Kalabera watershed. When completed, Route 36 and the associated BMPs should significantly improve water quality at Hidden beach, Jeffrey's beach, and Old Man by the Sea. Off-road vehicles will no longer be able to drive in these stream systems to access the beaches, preventing erosion, and sediment loading from run-off.

DPW planned to begin reconstruction of Beach Road from Garapan Road in Central and South West Takpochau watersheds, south to Quarter Master Road in the Susupe watershed on Saipan's west coast. These latter two projects were delayed due to the COVID-19 government shut down (2020, 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 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 Nitrogen that may pollute nearshore waters. The study also found that groundwater inputs to the lagoon were highest during rainy season and that, “When surface and groundwater 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 West Takpochau 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”.

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 and the 2018 Bacteriological TMDL to guide responsible government agencies and policy makers to make informed decisions as to where fiduciary expenditures on wastewater infrastructure would be most beneficial.

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. They are listed in TABLE B-5., on the following page.

TABLE B-5. CUC Wastewater Treatment Upgrades for FY2020-2021

Wastewater Projects	Location	Cost	Year
Lift Station Renovation			
SR-2	As Matuis	$ 549,762.00	2021
S-5	W.Takpochao Central, Garapan	$ 541,990.00	2021
S-9	W.Takpochao Central, Garapan	$ 884,488.00	2021
New Lift Station			
Lower Base LB-1	W. Takpochao North	$ 754,337.10	2021
New Sewer Forcemain			
Lower Base (LB-1) Forcemain	W. Takpochao North	$ 434,340.00	2021
New Gravity Main			
SR-2 (E) Manhole to (N) Wet Well	As Matuis	$ 264,140.00	2021

Source 2022 report, Larry Manacop, CUC Engineer

The sewer line improvements completed this reporting cycle included rehabilitating existing sewer lift stations and installing a new lift station and forcemain in lower base. In addition, new gravity sewer mains were installed in the As Matuis watershed (2022. As reported by Larry Manacop, CUC engineer). This has reduced the number of Enterococci exceedances at Wing and Pau Pau BEACH sites.

The Northern most watershed, Banaderu (Segment 22) remains severely impaired due to Enterococci exceedances of the WQS at the Grotto Cave BEACH monitoring site. In the last reporting cycle, Human waste was identified as the primary source of Enterococci using a qPCR-MST human-marker (Sinigalliano, 2020). When restrooms were locked outside of regular visiting hours, tourists were resorting to using the surrounding jungle area out of necessity.

This reporting cycle the COVID-19 restrictions and travel ban resulted in an unsurprising decrease in Enterococci exceedances due to a lack of people visiting area beaches and the Grotto. The unexpected result of having fewer people visiting the Grotto, was that cows roamed away from their designated grazing lots in the area, and now frequented the deserted Grotto parking area. WQS/NPS samplers frequently observed cow manure there, which would wash down to the Grotto's coastal waters during rain events, thus a new source of Enterococci contamination. The DPL was contacted and they informed cattle owners to return their livestock to their designated agricultural grazing lots. 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

As illustrated above in Section B.4.2., the third source of water quality degradation is: fecal contamination from free roaming domesticated livestock and feral animals; and wastewater discharge from livestock enclosures. 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 waste to any waterbody, and provides for mandatory setbacks. This 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 subsistence 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 constructing designs to prevent further adverse impacts from inappropriate 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 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, cows and goats, 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 significant 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 old hospital incinerator, that has since been replaced (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 ordnance (UXO) (*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.). This included Agingan Point wastewater outfall, Central and North West Takpochau, South Achugao watersheds, and Banzai Cliff.

Given the myriad military waste and dumpsites left on Tinian, Rota, Pagan, and Anatahan islands after WWII, and continued bombing exercises on No'os (FDM), more information is needed about legacy and new contamination on land and in the surrounding waters. Next reporting cycle an in-depth stream sediment study will have been completed in the six priority watersheds (20B, 19A, 19B, 13, 14, and 15) of Saipan to gain further insight into the level of toxicity that may be found there. Sediments will be tested for PCBs, Organochlorine Pesticides, Petroleum residuals, and metals. The results from which will be reported in depth in the 2024 CNMI IR. However, this study's preliminary findings were considered when deciding whether or not to keep waterbodies listed as impaired for metals during this reporting cycle. Based on that study's findings, a tier 2 fish tissue and biota study is proposed in the near future to determine the safety of *Fish and Shellfish Consumption*, in these areas.

B.4.5. Climate Related Severe Storm Event Impacts

The MMT reported in their most recent "*CNMI State of the Reef Report",* that, "Since 2013, CNMI's reefs have been exposed to above average sea surface temperatures almost annually, with the largest bleaching event occurring in 2017." Typhoon Mangkhut did most of its damage to the island of Rota, which was followed by a Category – 5, Super Typhoon Yutu the following month that passed directly over the island of Tinian, which, "devastated Saipan and Tinian, damaging nearshore reefs with surge and debris crushing or overturning coral colonies. Additionally, there have been an increase in sightings of Acanthaster planci, crown-of-thorns starfish (COTS), throughout the CNMI." (Perez, D.I., et.al., (2021). CNMI State of the Reef Report 2020-2021. DCRM, BECQ, CNMI).

The general trends suggest that reef health has declined for most sites as a result of such climate related disturbances. In response, BECQ continues to collect water quality and biological monitoring data at these long-term monitoring sites.

Given these cumulative climate related impacts, and the expected increase in the intensity of storms, 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, and expanding wetland areas to lessen storm surge impacts, flooding, and shoreline loss 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; Biological Criteria; Wetland RAM, and SVAP Monitoring Programs. Findings from these programs are used to holistically evaluate waterbody health. Each BECQ branch is asked to submit their findings for the IR. At the same time BECQ requests that fellow CNMI natural resources agencies and the public share any research or surveys completed over the past two fiscal years in a published "call for research studies and data" in local papers and through social media.

In addition, 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 were given until December 31st (in this case December 31, 2021) to submit their data for inclusion in the analysis for this IR.

Due to the COVID-19 restrictions limiting community outreach activities and BECQ's wish to connect with more local and indigenous community members, the call for water quality information to "provide information on potential impacts to surface water quality, including coastal marine water, lakes, streams, and wetlands of the CNMI archipelago" was announced again on February 17, 2022 through BECQ's cnmi.waterquality@gmail.com email listserv. Community members have signed up to this listserv for water quality-related public notices and to learn which CNMI water bodies are currently under a beach advisory. The contribution period was extended to March 11, 2022, to allow for better community outreach, education, and engagement.

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 coral reef and seagrass 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 quality monitoring, or "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. These sites, with the exception of the Grotto Cave, are monitored using an 8-week rotational schedule coupled with the island of Rota (n = 12). The Grotto is now monitored every week, as this site has substantially more visitors per month than the other five.

When Saipan's east coast 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 beaches 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 analysis 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 ensure that proper quality control practices are implemented in day-to-day laboratory operations; and 2) to ensure that the reported data are valid, of known precision and accuracy, and therefore, scientifically defensible.

The bacteriological, chemical and physical parameters include: Enterococci and *E. coli* (MPN/100ml); salinity (‰), Dissolved Oxygen (DO%); Temperature (°C), pH, Turbidity (NTU), Orthophosphate (PO_4), Nitrate (NO_3-N), and Total Suspended Solids (TSS).

PO_4 and NO_3-N levels are tested in drinking water and surface water by BECQ laboratory using a Flow Injection Analyzer (FIA) EPA Method 353.2. Ammonia (un-iodized), Total Phosphorus, and Total Nitrogen is expected to be certified by EPA for lab testing by next reporting cycle.

There was substantially more nutrient monitoring completed this reporting cycle than last. However, there are still less than 30 data points annually for each BEACH and biological monitoring sites surrounding the islands of Saipan, Mañagaha, Rota and Tinian. 2021 was the first year that nutrient data was collected from Pagan's marine and surface waters. There are no nutrient data for the other 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 assistance from NOAA's Atlantic Oceanographic and Meteorological Laboratory (NOAA AOML), one of the leading national labs that is providing technology transfer training in conducting 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 an 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 FY2020 – 2021 were used to assess whether CNMI waterbodies support the *Propagation of Aquatic Life*, *Fish and Shellfish Consumption, Recreational Use,* and *Aesthetic Enjoyment* DUs for this IR, as well as determine the source(s) of fecal contamination during investigations.

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 (EMAP) 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, and 2020 National Aquatic Resources Surveys (NARS) National Coastal Condition Assessment (NCCA) conducted this reporting cycle.

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 biological monitoring analyses from FY20 through FY21, 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* (SWQMP) was completed in 2013, Saipan streams and those in the Talakhaya watershed on Rota are 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 SVAP. This reporting cycle WQS/NPS has refined the protocol creating Version 2 of the SVAP in 2020. BECQ updated data sheets to also allow for evaluation of dry stream beds when there is no flow, as well as additional biological habitat indicators. This is a work in progress, as WQS/NPS continues training staff, and updating the methodology to reflect the newest available science, 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, data from the WEEC, and Safe Drinking Water Programs, MMT biological monitoring data, and 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 a pilot Radio Isotope study by Kim of American University (2020, Knapp); a qPCR 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. The latter 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 West 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 were 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 forereef 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 Tier II 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 over 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. In FY2021, BECQ began quarterly surveys of benthic habitat and invertebrates at these reef flat locations to supplement water quality data. 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.

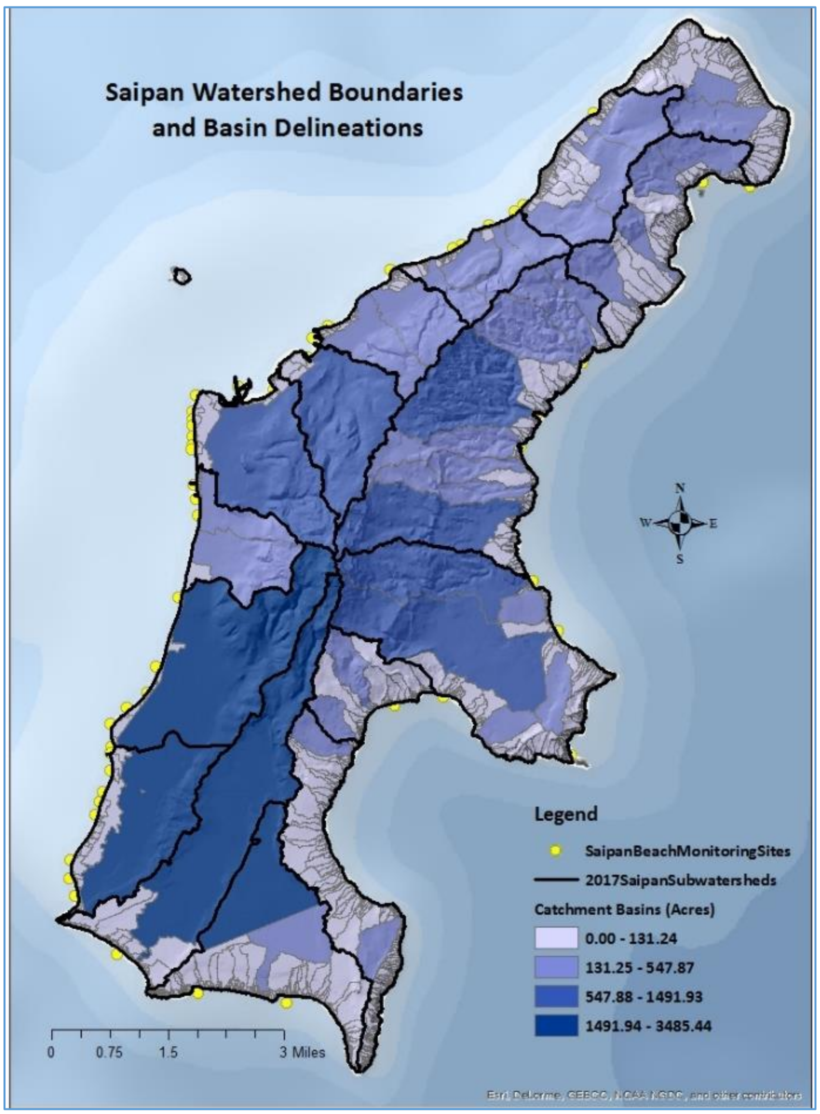
C.2. ASSESSMENT METHODOLOGY

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

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 identify the causes and sources of pollution, using the greater amounts of data available from these densely populated areas on Saipan.

FIGURE C-1. Saipan Watershed Delineation and BEACH sites



However, those waterbodies with less available information continue to be assigned in 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 segments were refined in 2017 using higher resolution data. Watershed segments are shown as black outlines in FIGURE C-1., on the previous page. They were established using Light detection and ranging (LiDAR) topographic data (2.67 m. resolution) collected by the U.S. Army Corps of Engineers (ACoE) in 2007.

These data were 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 refine the watershed boundaries.

The updated delineation resulted in some long-term BEACH monitoring sites being moved into a different watershed unit last reporting cycle. The basins, historic watershed units, and new watershed boundaries were finalized, and CNMI ocean shoreline miles were recalculated by the GIS Specialist by converting the watershed polygons to polylines and smoothing the polylines’ “zig zags”. These catchment basins better reflect water accumulation, and flow to Saipan’s coastline.

In addition to BEACH monitoring sites, BECQ has forereef and reef flat biological monitoring sites, around the islands, and seagrass assemblage biological monitoring sites around the island of Saipan. These are used to determine if DUs are supported. Detailed watershed maps showing the long-term 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 to ensure that CNMI waters remain “fishable and swimmable”. TABLE C-1., on the following page, provides a comparison of the terminology.

TABLE C-2., on page 49, provides the WQS used to assess criteria for each Class of waters.

TABLE C-1. CWA vs. CNMI WQS Designated Use Terminology

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)

TABLE C-2. Criteria for Assessing CNMI Coastal and Surface Water Quality

Parameter	2021 CNMI Water Quality Standards Marine Class AA waters	Marine Class A waters	Fresh Class 1 waters
MICROBIOLOGICAL			
Enterococci *STV	130 MPN/100 ml	130 MPN/100 ml	
Enterococci **GM	35 MPN/100 ml	35 MPN/100 ml	
E. Coli STV			410 MPN/100 ml
E. Coli GM			126 MPN/100 ml
PHYSICAL			
Temperature C	<± 1.0 C from ambient	<± 1.0 C from ambient	<± 1.0 C from ambient
Salinity (ppt)	No alterations of the marine environment shall occur that would alter the salinity of marine or estuarine waters more than 10% from ambient conditions or which would otherwise adversely affect the indigenous biota and sedimentary patterns.	No alterations of the marine environment shall occur that would alter the salinity of marine or estuarine waters more than 10% from ambient conditions or which would otherwise adversely affect the indigenous biota and sedimentary patterns.	The salinity of fresh water sources and wetlands shall not be increased by more than 20% from ambient. When ambient conditions exceed this criteria , there shall be no worsening of water quality from ambient conditions.
Dissolved Oxygen (DO%)	≥ 75%, When ambient conditions are <75%, there shall be no worsening of water quality from ambient conditions.	≥ 75%, When ambient conditions are <75%, there shall be no worsening of water quality from ambient conditions.	≥ 75%, When ambient conditions are <75%, there shall be no worsening of water quality from ambient conditions.
pH	7.6 - 8.6, When ambient conditions have a pH outside of this range, there shall be no worsening of water quality from ambient conditions.	7.6 - 8.6, When ambient conditions have a pH outside of this range, there shall be no worsening of water quality from ambient conditions.	6.5 - 8.5, When ambient conditions have a pH outside of this range, there shall be no worsening of water quality from ambient conditions.
Turbidity (NTU)	≤0.5 NTU over ambient	≤1.0 NTU over ambient	≤0.5 NTU over ambient
Total filterable Suspended Solids (TSS)	≤5 mg/l, When ambient conditions exceed this criteria, there shall be no worsening of water quality from ambient condtions.	≤40 mg/l, When ambient conditions exceed this criteria, there shall be no worsening of water quality from ambient condtions.	≤5 mg/l, When ambient conditions exceed this criteria, there shall be no worsening of water quality from ambient condtions.
Total Dissolved Solids (TDS)			≤ 500 mg/L, When ambient conditions exceed this criteria, there shall be no worsening of water quality from ambient condtions.
Radioactive material	≤ values listed in CFR, Title 10, Part 20, Appendix B, Effluent concentrations, column 2, When ambient conditions exceed this criteria, there shall be no worsening of water quality from ambient condtions.	≤ values listed in CFR, Title 10, Part 20, Appendix B, Effluent concentrations, column 2, When ambient conditions exceed this criteria, there shall be no worsening of water quality from ambient condtions.	≤ values listed in CFR, Title 10, Part 20, Appendix B, Effluent concentrations, column 2, When ambient conditions exceed this criteria, there shall be no worsening of water quality from ambient condtions.
CHEMICAL			
Orthophosphate (PO_4)	0.025 mg/L	0.05 mg/L	0.10 mg/L
Total Phosphorus	0.025 mg/L	0.05 mg/L	0.10 mg/L
Nitrate-Nitrogen (NO_3 - N)	0.2 mg/L	0.5 mg/L	0.2 mg/L
Total Nitrogen	0.4 mg/L	0.75 mg/L	0.75 mg/L
Ammonia (un-iodized)	0.02 mg/L	0.02 mg/L	0.02 mg/L
Chlorides (mg/L)			≤250 mg/L, When ambient conditions exceed this criteria, there shall be no worsening of water quality from ambient condtions.
Sulfates (mg/L)			≤250 mg/L, When ambient conditions exceed this criteria, there shall be no worsening of water quality from ambient condtions.
Oil and Petroleum	No visible sheen or deposits, objectionable odor or taste, or injurious to aquatic life	No visible sheen or deposits, objectionable odor or taste, or injurious to aquatic life	No visible sheen or deposits, objectionable odor or taste, or injurious to aquatic life
Toxins	***2018 NRWQC	2018 NRWQC	2018 NRWQC

* Statistical Threshold Value for a single sample.

** Geometric mean over a 30-day period.

*** 2018 US EPA NRWQC.

EPA Region 9 reviewed the CNMI WQS language and determined that the CWA fish consumption criteria are captured in the list of Priority Toxic Pollutants' Maximum Contaminant Level (MCL) concentrations detailed in § 65-130-450 of the CNMI WQS, and that the general criteria for assessing attainment of the *Fish and Shellfish Consumption* DU is consistent with other coastal states' criteria. These criteria include the CNMI WQS that were revised in 2021.

It should be noted that in order to derive a meaningful inference, there must be enough data points available so that one annual exceedance of a WQS would not cause the waterbody to be considered impaired (greater than 10 percent exceedances annually). Therefore, BECQ strives to collect at least 30 data points per year for each parameter to provide enough statistical power to make a defensible inference as to a watershed's water quality. However, as a consequence of the COVID-19 Government closures during this reporting cycle, 30 sampling events was not always possible.

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

A coastal waterbody's support of each DU was determined based on water quality data, percent exceedances of the CNMI WQS, field surveys, biological monitoring data, DPW and CUC activities, and other available studies. Table C-3., lists the criteria used to assess a coastal water's attainment of its DUs.

TABLE C-3. Criteria used to Assess if Coastal Marine Water DUs are Supported

Designated Use	Criteria to Assess Attainment of Designated Uses
Support and Propagation of Aquatic Life	Habitat Suitability: biomonitoring criteria (ALUS) rating of "fair" or "good" for all sites within the segment and other study results
	DO%, PO_4 mg/l, NO_3-N mg/L: No more than 10% of samples exceeding WQS for all sites within the segment
	Ambient water quality criteria is 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 and Shellfish Consumption	Fish tissue/biota collected within the segment are to be free of contaminant concentrations exceeding USEPA standards; or very low likelihood ot tissue contamination due to current or historic land use patterns in adjacent watersheds; or lack of edible fish species present.
Recreational Enjoyment	Enterococci or *E. coli* MPN/100ml: No more than 10% of samples result in exceedance of WQS 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 the segment, no radioactive substances
Aesthetic Enjoyment and Other Uses	No floating/settleable solids
	Empirical evidence: Research, documentation, tourist surveys, studies, etc., rating of "fair" or "good"

At present, Saipan's coastal marine waters receive by far the greatest attention from the monitoring programs and have the most annual data. The rotational schedule for Saipan's east beaches and the islands of Mañagaha, Rota, and Tinian provide enough data to capture seasonal variations. Therefore, BECQ has high confidence in these assessments, and is gaining a clearer understanding of the Northern Islands as more data is gathered, and research is shared from the NOAA Research Cruises.

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

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

Habitat Suitability

The CNMI WQS incorporates numeric marine biological monitoring criteria 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 promulgated in FY2014. This is a working document and is revised as needed to keep in pace with new research findings.

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 and the WQS/NPS branches. 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 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 are evaluated annually by determining the ratio of seagrass coverage, to turf and macroalgae coverage in replicated benthic assessment transects. Only *H. uninervis* seagrass habitats are 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), and thereby successfully out-compete the seagrass for sunlight, 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 are high, even in the face of tainted water quality.

Biological Assessment of Seagrass Assemblages

In accordance with these findings, ***Seagrass Assemblages*** surveyed between October 2019 and September 2021 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 are evaluated by calculating the 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 favorable coral assemblages, are coral species richness per unit area. This metric is supported by work of 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 2019 and September 2021 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 there are no significant impacts from natural disturbances then metrics were evaluated relative to those expected from the last 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 there are no significant impacts from natural disturbances then metrics were evaluated relatively to those expected from the last 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 there are no significant impacts from natural disturbances then metrics were evaluated relatively to those expected from the last reporting cycle and *found to be lower than the mean average.*

The ALUS assessment metrics presented above are used to analyze the long-term monitoring dataset of the southern islands. 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 V.

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

<u>Dissolved Oxygen</u>

Dissolved Oxygen (DO%) concentrations are not to be less than 75%, more than 10% of the time in order to support the *Support and Propagation of Aquatic Life* DU. BECQ measures DO% in-situ with a portable YSI™ meter. 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 that was found to be frequently malfunctioning, was phased out of use. BECQ purchased the newer YSI™ Pro DSS model this reporting cycle, which has provided reliable results to date.

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

<u>Nutrients</u>

The Orthophosphate (PO_4) concentration exceedances reported in 2004 were erroneous, in that DEQ laboratory was using the Hach PhosVer3 (Ascorbic Acid) Method 8048, which is not approved by EPA for marine water. Therefore, the Orthophosphate results from 2004 IR should not have been used for assessments or 303(d) listing purposes. The use of this data resulted in several waterbodies being reported as impaired and unsupportive of the *Support and Propagation of Aquatic Life* DU, when they may not have been.

DEQ Laboratory now uses the EPA approved FIA Method 353.2 to test marine waters for PO_4, Nitrates as Nitrogen (NO_3-N), Nitrites and Nitrogen. By next reporting cycle the laboratory is expected to have certified testing for Total Phosphorus, Total Nitrogen, and Ammonia.

It is important to note that at present, BECQ does not have enough data to make a correlation between water quality nutrient levels and seagrass and coral reef assemblages that represent natural healthy conditions in CNMI Waters. Therefore, the nutrient WQS adopted from other states and jurisdictions may not be protective of CNMI coastal waters. Last reporting cycle WQS/NPS program requested technical assistance to refine the adopted nutrient WQS criteria through the EPA N-STEPS program. However, the COVID-19 pandemic has stalled further progress in addressing the request.

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, floating or settleable solids are physically harmful to the *Propagation of Aquatic Life* DU due to entanglement, strangulation, affixation, smothering, diminished 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 revised 2021 WQS require that radioactivity levels comply with levels in CFR, Title 10, Part 20, Appendix B, Effluent concentrations, column 2.

The narrow range of pH levels 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 measuring erroneous pH levels and was phased out of use. The new YSI™ Pro DSS has provided reliable pH results this reporting cycle.

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 heavy metal studies conducted by Denton, et.al, 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 legacy military equipment, UXO 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 *Fish and Shellfish Consumption*.

Therefore, BECQ contracted a stream sediment study to be conducted in accordance with the 2013 Surface Water Quality Monitoring Plan for six impaired watersheds on Saipan. The study tested sediments for a range of heavy metals, Polychlorinated byphenyls (PCBs), volatile constituents of petroleum gasoline range organics (carbon chain 6-12), benzene, toluene, ethylbenzene, and zylene or (BTEX), diesel range organics (carbon chain 9-25), and residual range organics (carbon chain 24-40). The study will be completed before next reporting cycle.

BECQ also plans to conduct future Tier II fish tissue and biota contamination research to assess potential human health risks from consuming harvested aquatic life from streams and the near shore environment, as part of the CNMI TMDL development for Heavy Metals.

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 engaged in primary skin contact recreational activities such as 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 2012 US EPA Recreational Water Quality Criteria (RWQC) were adopted by the CNMI in 2014. These WQS are used to determine when a Public Beach Advisory or “Red Flag” should be posted, 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 posting 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 may be 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 should be noted that many studies have found that re-suspended sediment carrying naturally occurring Enterococci may result in false 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 (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.).

Regardless, Enterococci exceedances are used for posting Public Beach Advisories. An entire waterbody segment is listed as unsupportive of the *Recreational* DU when there is more than 10% Public Beach Advisories annually, for any single monitoring site within the segment.

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., on page 54 for details).

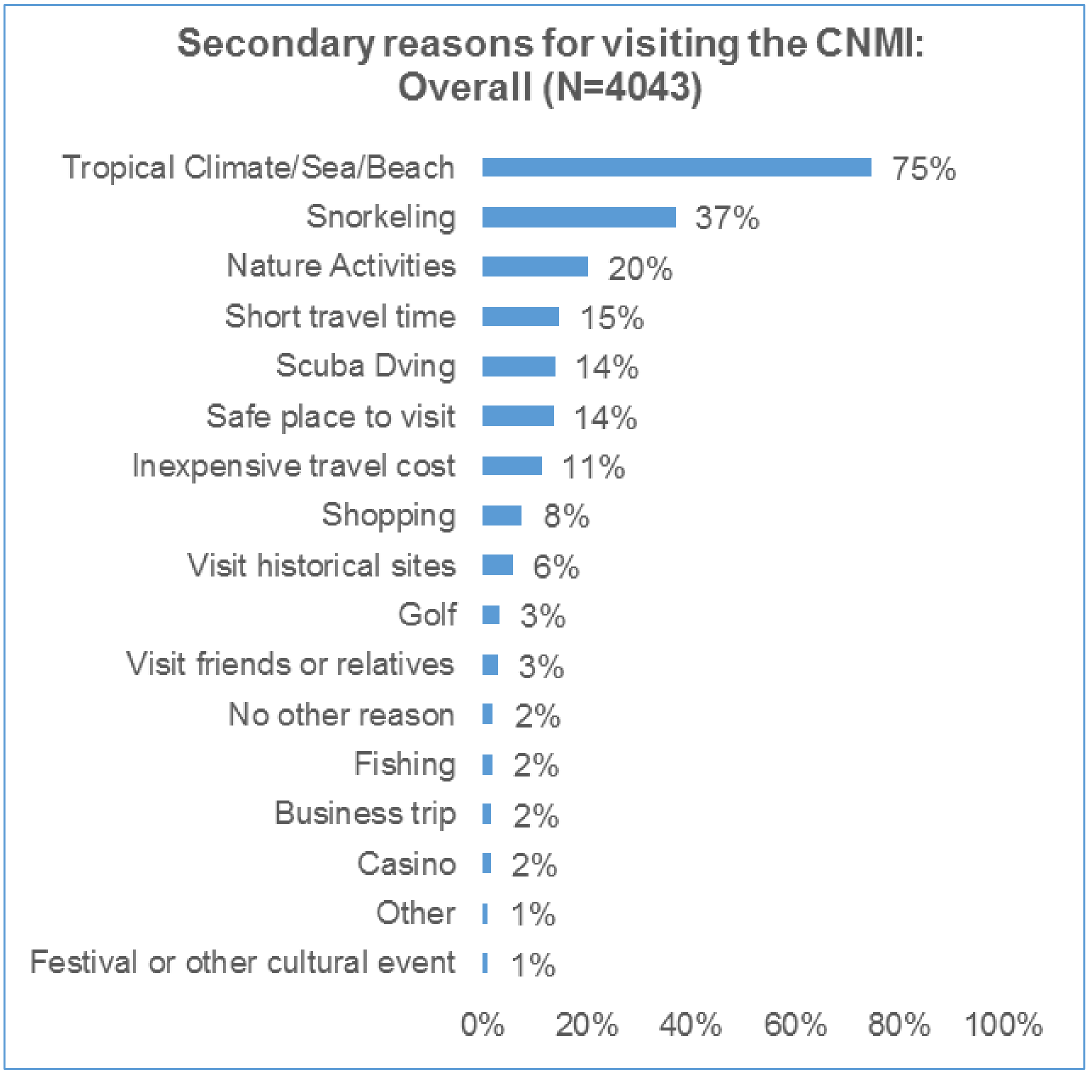
C.2.3.4. Coastal Marine Waters Aesthetic Enjoyment and Other Uses Criteria

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 coastal waters.

The MVA with the assistance of Market Research and Development, Inc., began conducting tourist satisfaction exit surveys in 2011, which continued through last reporting cycle. However, due to the COVID-19 Government closures, and lack of tourists due to the travel ban, this survey was not conducted for FY2020-2021. Exiting visitors are asked to report their satisfaction with their time in CNMI based on a 7-point scale ranging from “very dissatisfied/strongly disagree” to “very satisfied/strongly agree”. These past data, and other diver surveys, along with anecdotal information, and professional judgement were used to assess the *Aesthetic Enjoyment* DU, as the CNMI continued to attract small numbers of tourists during the COVID pandemic. The CNMI entered into a travel bubble with South Korean while the pandemic was spiking in other regions.

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

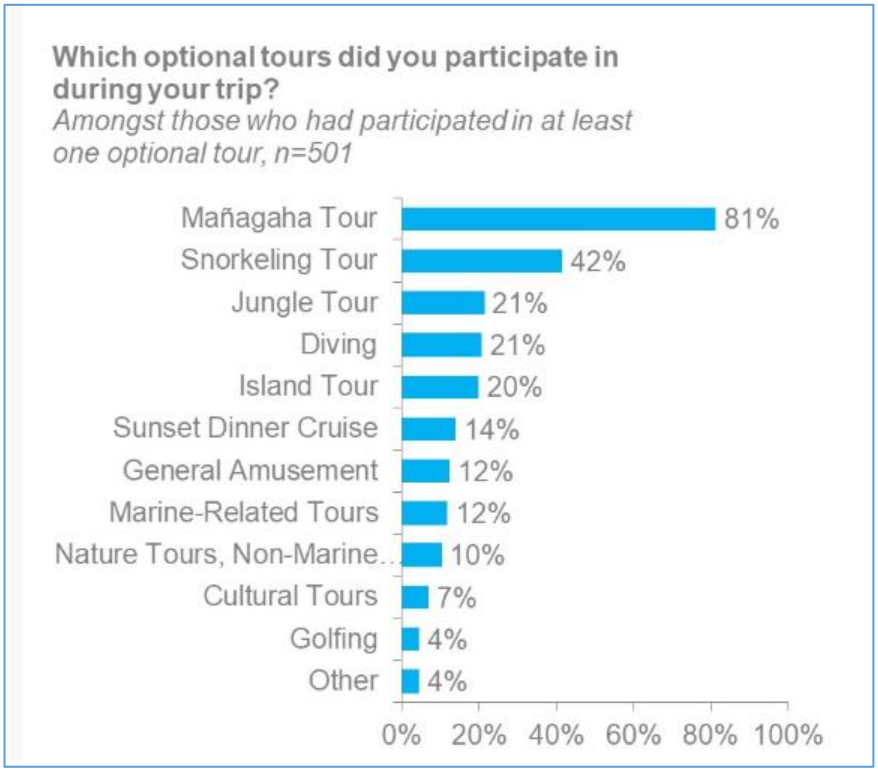
FIGURE C-2. 2015 MVA Tourist Exit Survey Results for Secondary Reasons to Visit the CNMI



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.

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., that follows 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 stated 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.

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 No'os (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*".

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

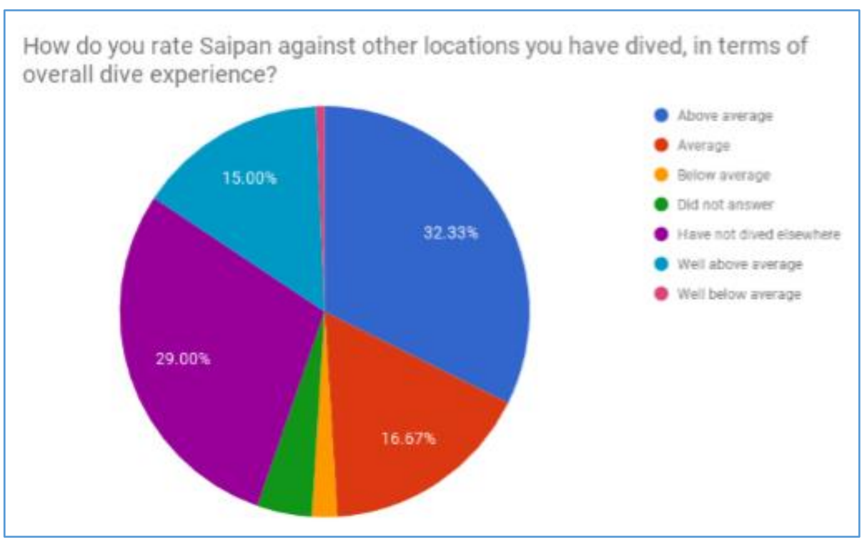
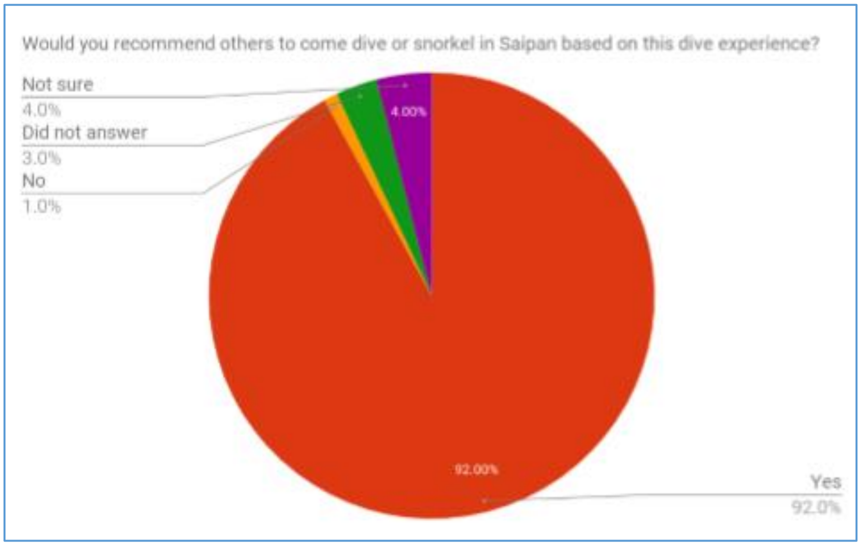


FIGURE C-5. 2017 Tourist Divers' Appreciation and Recommending Saipan to Others, cont.



Tables containing each Island's assessment of DU support and the cumulative CALM categories for coastal waters are provided in the Assessment Results Sub-Sections, C.3.5., through C.3.8., of this report.

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

The criteria used to assess the support of wetland's DUs are detailed in Section C.4., WETLANDS PROGRAM, in this report. Table C-4., on the following page summarizes the criteria used to assess a lake or stream's support of each DU.

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

Habitat Suitability

The CNMI WQS incorporates narrative criteria to assess habitat health and resiliency of fresh surface waters for the *Support and Propagation of Aquatic Life* DU. The WQS state that fresh surface waters, "…remain in their natural state as nearly as possible …", and, "to the extent possible, the wilderness character of such areas shall be protected."

Research studies of fresh water lakes and streams are used to assess habitat suitability. There have been several studies conducted on Lake Susupe. However, there is only limited information on the lakes in the Northern Islands.

Findings from a 2008 DLNR DFW study by McKagan, et al, was used for assessing stream habitats in eight different watersheds on Saipan. Samples were taken to assess abundance of native and introduced species.

In addition, the CNMI SVAP, an adaptation of Hawaii's, US EPA rapid bio-assessment, NRCS, and Ohio EPA's stream protocols, is now routinely used by field crews to measure elements of the physical and biological characteristics of instream and riparian environments. Each element is given a numerical score relative to reference conditions to calculate an overall score for each stream reach. Water samples of stream reaches are taken for testing whenever there is flow. Coordinates of potential sources of pollution, location of freshwater pools, and other attributes of interest are also mapped within each reach to evaluate the type and diversity of aquatic life therein. The SVAP will be conducted on other islands as funding and resources are made available.

TABLE C-4. Criteria used to Assess if Fresh Surface Water DUs are Supported

Designated Use	Criteria to Assess Attainment of Designated Uses
Support and Propagation of Aquatic Life	Habitat Suitability: SVAP or Wetland RAM rating of "fair" or "good" for all sites within the segment and other study results
	Ambient water quality criteria is met (where data is available)
	DO%, PO_4 mg/l, NO_3-N mg/L: No more than 10% of samples exceeding WQS 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 the segment, no radioactive substances
Fish and Shellfish Consumption	Fish tissue/biota collected within the segment are to be free of contaminant concentrations exceeding USEPA standards; or very low likelihood ot tissue contamination due to current or historic land use patterns in adjacent watersheds; or lack of edible fish species present.
Recreational Enjoyment	Enterococci or *E. coli* MPN/100ml: No more than 10% of samples result in exceedance of WQS 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 the segment, no radioactive substances
Potable Water Supply	*E. coli* MPN/100ml: No more than 10% of samples result in exceedance of WQS 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 the segment, no radioactive substances
Aesthetic Enjoyment and Other Uses	No floating/settleable solids
	Empirical evidence: Research, documentation, tourist surveys, studies, etc., rating of "fair" or "good"

Dissolved Oxygen, Nutrients, and General Provisions.

DO%, nutrients, and "general provisions" water quality criteria are measured in fresh surface waters 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 fresh and brackish water. See each of the water quality criteria sub-sections for Dissolved Oxygen, Nutrients, and General Provisions, above in C.2.3.1 "Coastal Water Propagation of Aquatic Life Criteria", for details. The same criteria is used for surface waters.

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

<u>Fish Tissue - Biota</u>

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, Anatahan, and No'os (FDM), which have been more impacted by current military exercises and past activities will be discussed in further detail in Sections C.3.8.5. and C.3.8.9. and C.3.8.10., respectively.

C.2.4.3. Fresh Surface Water Recreational Use Criteria

<u>Fecal Indicator Bacteria – Enterococci or E. coli</u>

Lake Susupe is tested for E. coli every two weeks. Stream reaches are tested for Enterococci whenever flow is encountered while conducting a SVAP. This data is used to assess the *Recreational* DU of fresh surface waters. Exceedances of the WQS for *E. coli*, and Enterococci 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.**

When stream water quality data is lacking, assessment of the support of the *Recreational* DU is based on professional judgment, anecdotal information, and SVAP findings.

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 Sub-section 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 Chalan Kanoa potholes, or the lakes on Anatahan or Pagan. However, Susupe Lake could potentially be used with appropriate treatment. Presently, rainwater catchment and groundwater are the more economically feasible sources of potable water in the CNMI. All groundwater supplies 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

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-5., on the following page.

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.

TABLE C-5. EPA CALM Reporting Categories

EPA CALM CATEGORY	DESCRIPTION
1	All designated uses are supported, no use is threatened
2	Attains some designated uses, no use is threatened, and there is insufficient information to determine if the other uses are attained/or impaired
3	There is insufficient available data and/or information to determine if designated uses are supported or impaired. Potential presence of stressors that may cause impairment
4a	A Total Maximum Daily Load limit has been established to reduce the amount of a pollutant from exceeding water quality standards, and it has been approved by EPA
4b	A designated use is impaired by a pollutant, but it is being addressed by the state through other pollution control, other than a Total Maximum Daily Load limit
4c[1]	A designated use impaired, but the impairment is not caused by a pollutant[1]
5	Available information indicates that at least one designated use is threatened, or not attained. The waterbody is added to the 303(d) list as impaired and ***a Total Maximum Daily Load limit is required*** to reduce the pollutant.
5-alt	An alternative restoration approach is being pursued to meet water quality standards, in the interim while a Total Maximum Daily Load limit is being developed.

[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))

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 17 years (2004 through 2021) of monitoring data were reviewed in the preparation of this 2022 IR (see Appendix II), with the most recent five years used to determine whether listing or delisting a pollutant is required. Based on these data, other studies, and professional judgment CNMI waterbodies were assessed and categorized as shown in the Table C-6.

TABLE C-6. Size of All CNMI Waters EPA 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)	82.5	51.8				8.2	98.0	240.5	240.5
Wetland (Acres)	58.6		89.2			568.4		716.2	716.2

* Northern Islands' lakes and stream systems have not been mapped or measured. Miles and 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 for impairment. These are contained in the 303(d) lists in Tables C-7 through C-11.

TABLE C-7. 2022 Rota Waterbody Segment/Pollutant Combinations on 303(d) 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	
				Groundwater loading		
				On-site Treatment Systems Septic		
				Wet Weather Discharges (NPS)		
			pH	Source unknown	2020	No trend, Aging pH meter is suspect
2STR	Sabana/Talakaya/ Palie Stream	6.1 miles	Enterococci (215)	On-site Treatment Systems Septic	2020	
				Grazing in Riparian or Shoreline zones		
				Wet Weather Discharges		
3	Songsong	7.9 miles	Enterococci (215)	On-site Treatment Systems Septic	2004	
				Wastes from pets		
				Groundwater loading	**2022**	**In narrative but not ATTAINS in 2020 IR**
			phosphate (340)	Marina Boat Maintenance	2004	In FY2019
			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	Cannot delist < five years
			pH, Low (490)	Source unknown	2020	Aging pH meter is suspect
5	Chaliat/Talo	2.6 miles	Nitrate (302)	Golf Courses	2020	
				Groundwater loading		
			pH, Low (490)	Source unknown	2020	Aging pH meter is suspect

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

A TMDL for Saipan's Coastal Waters Impaired by Bacteria was approved by EPA in 2018, which allowed several of Saipan's watersheds to be delisted for Enterococci last reporting cycle.

TABLE C-8. 2022 Tinian Waterbody Segment/Pollutant Combinations on 303(d) List

Seg ID	Segment Name	Size	Cause Name	Source	Cycle First Listed	Comments
TINIAN:						
7	Masalok	3.5 miles	phosphate (340)	Source unknown	2004	
			Nitrate (302)	Source unknown	2020	
			pH	Source unknown	2020	No trend. Aging probe suspect.
			Enterococci (215)	Grazing in riparia/shoreline zones	2014	and sample contamination
9	Makpo	3.0 miles	phosphate (340)	Groundwater seeps	2004	New source listed
				On-site Treatment Systems		New source listed
			Nitrate (302)	Groundwater seeps	2020	Few sampling events
				On-site Treatment Systems		Few sampling events
			pH, Low (490)	Source unknown	2018	Aging probe suspected.
			Enterococci (215)	**Groundwater seeps**	**2022**	**and sample contamination**
				On-site Treatment Systems		**and sample contamination**
9H	Makpo (Harbor)	1.5 miles	phosphate (340)	Marina Boat Maintenance	2004	
			DO% (205)	Marina Boat Maintenance	2010	
				Groundwater seeps		
				On-site Treatment Systems Septic		**New Source listed**
			Enterococci (215)	Groundwater seeps	2014	and sample contamination
				On-site Treatment Systems		and sample contamination
				Animal Holding Management Areas		and sample contamination
10	Puntan Diaplolamanibot	9.9 miles	phosphate (340)	Illegal dumps or disposal	2004	
			Nitrate (302)	Illegal dumps or disposal	2020	
			DO% (205)	**Illegal dumps or disposal**	**2022**	**Microbial aerobic activity**
			Enterococci (215)	**Illegal dumps or disposal**	2020	**Waste from pumper truck**
				Waste from pets		Roaming dogs
11	Puntan Tahgong	6.4 miles	Enterococci (215)	Source unknown	2020	Few sampling events
			phosphate (340)	Source unknown	2004	
			Nitrate (302)	Source unknown	2020	
			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-9. 2022 Saipan Waterbody Segment/Pollutant Combinations on 303(d) List

Seg ID	Segment Name	Class	Pollutant/ Combination	Priority	Status	Year first listed	Projected TMDL Submittal or Removal Date
SAIPAN:							
12	Kalabera	AA	Enterococci		Completed 2018	2004	**DONE**
			phosphate	Med	Continue FIA monitoring	2004	2030
			Nitrate	Med	Continue FIA monitoring	2020	2030
13	Talofofo	AA	Enterococci		Completed 2018	2004	**DONE**
			phosphate	Med	Continue FIA monitoring	2004	2030
			Nitrate	Med	Continue FIA monitoring	2020	2030
			pH	Low	Use new pH probe	2020	2035
13STR	Talofofo Stream	1	Enterococci	Low	Continue monitoring	2018	2035
14	Kagman	AA	Enterococci		RELISTED 2020	2006	**DONE**
			phosphate	Med	Continue FIA monitoring	2004	2030
			Nitrate	Med	Continue FIA monitoring	2020	2030
			pH	Low	Use new pH probe	2020	2035
15	Lao Lao	AA	Enterococci		Completed 2018	2004	**DONE**
			phosphate	Med	Continue FIA monitoring	2004	2030
			Nitrate	Med	Continue FIA monitoring	2020	2030
17A	Isley (West)	A	Enterococci		Completed 2018	2006	**DONE**
			copper	High	Invitation to bid for TMDL 2027	2014	2025
			lead	High	Invitation to bid for TMDL 2027	2014	2025
			phosphate	Med	Continue FIA monitoring	2004	2030
			pH, Low	Low	Use new pH probe	2020	2035
17B	Isley (East)	AA	Enterococci		Completed 2018	2004	**DONE**
			phosphate	Med	Continue FIA monitoring	2004	2030
			pH	Low	Use new pH probe	2020	2035
18A	Susupe (North)	AA	Enterococci		Impaired, but TMDL approved	2006	**DONE**
			DO%	Med	Continue monitoring	2010	2030
			pH, Low	Low	Use new pH probe	2020	2035
			phosphate	Med	Continue FIA monitoring	2004	2030
			Nitrate	Med	Continue FIA monitoring	2020	2030
18B	Susupe (South)	AA	Enterococci		Completed 2018	2004	**DONE**
			DO%	Med	Continue monitoring	2010	2025
			pH	Low	Use new pH probe	2020	2030
			phosphate	Med	Continue FIA monitoring	2004	2030
			Nitrate	Med	Continue FIA monitoring	2020	2030
18LAK	Susupe (South) Lake	1	E. coli		Completed 2018	2012	**DONE**
			DO%	Low	Continue monitoring	2010	2035
			ph, High	Low	Continue monitoring	2014	2035

TABLE C-9. 2022 Saipan Waterbody Segment/Pollutant Combinations on 303(d) List, cont.

Seg ID	Segment Name	Class	Pollutant/ Combination	Priority	Status	Year first listed	Projected TMDL Submittal or Removal Date
SAIPAN:							
19A	W. Takpochau (North)	A	Enterococci		Completed 2018	2004	**DONE**
			lead	High	Invitation to bid for TMDL 2020	2018	2025
			phosphate	Med	Continue FIA monitoring	2004	2030
			Nitrate	Med	Continue FIA monitoring	2020	2030
19B	W. Takpochau (Central)	AA	Enterococci		Completed 2018	1998	**DONE**
			pH, Low	Low	Use new pH probe	2018	2035
			DO%	Med	Continue monitoring	2010	2030
			phosphate	Med	Continue FIA monitoring	2004	2030
			Nitrate	Med	Continue FIA monitoring	2020	2030
			copper	High	Invitation to bid for TMDL 2020	2020	2025
			lead	High	Invitation to bid for TMDL 2021	2020	2025
			Hg in fish/Sed	High	Invitation to bid for TMDL 2022	2010	2025
19C	W. Takpochau (South)	AA	Enterococci		Completed 2018	2004	**DONE**
			DO%	Med	Continue monitoring	2008	2030
			pH, Low	Low	Use new pH probe	2016	2035
			Nitrate	Med	Continue FIA monitoring	2018	2030
			phosphate	**Med**	**Continue monitoring**	**2022**	**2030**
19STRB	W. Takpochau (Central) Stream	1	Hg in fish	High	Invitation to bid for TMDL 2020	2014	2025
			Enterococci	Low	Invitation to bid for TMDL 2032	2018	2035
20A	Achugao (North)		DO%	Med	Continue monitoring	2010	2030
			phosphate	Med	Continue FIA monitoring	2004	2030
20B	Achugao (South)	AA	Enterococci		Completed 2018	2004	**DONE**
			DO%	Med	Continue monitoring	2010	2025
			lead	High	Invitation to bid for TMDL 2020	2018	2025
20B	Achugao (South) Stream	1	Enterococci	Low	Invitation to bid for TMDL 2020	2018	2035
			lead	High	Invitation to bid for TMDL 2020	2018	2025
21	As Matuis	AA	Enterococci	Low	DELISTED 2018/RELISTED 2020	2006	2033
			DO%	Low	Continue monitoring	2010	2035
			pH, Low	Low	Use new pH probe	2018	2035
			phosphate	Med	Continue FIA monitoring	2004	2030
			Nitrate	Med	Continue FIA monitoring	2020	2030
22	Banaderu	AA	Enterococci		Completed 2018	2016	**DONE**
			phosphate	Med	Continue FIA monitoring	2004	2030

TABLE C-10. 2022 Mañagaha Waterbody Segment/Pollutant Combinations on 303(d) 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**	**2018**	**Failed to list in ATTAINs 2020 IR**
			Phosphate (340)	Source Unknown	2020	
			Nitrates (302)	Source Unknown	2020	Meets WQS 2022

TABLE C-11. 2022 Northern Islands Waterbody Segment/Pollutant Combinations on 303(d) List

Seg ID	Segment Name	Size	Cause Name	Source	Cycle First Listed	Comments
NORTHERN ISLANDS:						
24	No' os (FDM)	4.2 miles	Other	NPS pollution from military exercises	2020	No access for Aesthetic Enjoyment due to safety concerns. Permanently altered topography from bombing exercises.

Table C-12., 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 that a TMDL be established.

TABLE C-12. Size of Each CNMI Waterbody Type Impaired and the Causes (including Non-pollutants)

Coastal Waters	Miles	Streams	Miles	Wetlands	Acres	Lakes	Acres
Enterococcus	88.7	Enterococcus	50.3	Habitat alterations	568.4	E. coli	57.4
Phosphate	78.0	Lead (Pb)	6.5	Non-native aquatic plants	568.4	Habitat Bioassessment	57.4
Habitat Bioassessment	60.0	Other	3.2	Flow regme modifications	568.4	pH, High	57.4
Nitrate	58.3	Habitat Bioassessment	3.2			DO%	57.4
pH	44.2	Mercury (Hg)	3.2			Non-native fish/shellfish	57.4
DO%	37.3	Flow regime modification	3.2				
pH, Low	22.3	Habitat alterations	3.2				
Lead (Pb)	9.5						
Copper (Cu)	6.1						
Mercury (Hg)	4.4						
Other	4.2						

Bacteria and nutrient exceedances of the CNMI WQS were the most frequently listed cause of impairment for CNMI waters. It should be noted that Enterococci impairment of Saipan's coastal waters is being addressed by implementing the 2018 Bacteriological TMDL.

Last reporting cycle, there was an increase in waterbodies 303(d) listed as impaired for heavy metals. The studies by Denton, et.al, of WERI, indicated that heavy metals are transported into sediment and biota from nearby WWII debris dumpsites. This is of significance given DoD's interest in expanding and increasing the frequency of military training exercises in the CNMI. Tier II studies on heavy metal accumulation in fish tissue and biota will provide valuable information on possible human health risks associated with their consumption and may inform TMDL development 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 WQS.
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

This reporting cycle two watersheds were delisted, one on Rota and one on Saipan.

TABLE C-13. Segment/Pollutant Combinations Removed from CNMI's FY 2022 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 NPS conrols expected to meet WQS.	
					4. Impairment due to non-pollutant.	
					5. EPA approval of TMDL.	
					6. Waterbody not in state's jurisdiction.	
					7. Other.	
Seg ID	**Segment Name**	**Pollutant**	**Segment Size**	**First Listed**	**Reason**	**Comments**
ROTA:						
5	Chaliat/Talo	Enterococci	2.6 miles	2004	1	Access difficult, drastic decrease in users
SAIPAN:						
19A	North W. Takpochau	pH	1.0 miles	2016	1	Reason for improvement is unknown
		TOTAL Coastal Miles Delisted	**3.6 Miles**			
		TOTAL Stream Miles Delisted	**0**			
		TOTAL Lake Acres Delisted	**0**			
		TOTAL Wetland Acres Delisted	**0**			

Rota’s Chaliat/Talo coastal waters, which contain the Swimming Hole BEACH site were delisted for Enterococci. The reason for this recovery is associated with a drastic decrease in visitor numbers to the site. This is due to: trees blocking the regular access road in the aftermath of Typhoon Mangkhut; the economic downturn on Rota leading to an exodus of Rota's population; and a drastic decrease in tourist numbers due to the COVID-19 travel restrictions.

Saipan’s North West Takpochau coastal waters in front of DPW Channel Bridge have met pH WQS for over five years. The reason for this improved trend is unclear, but may be related to sewer system repairs completed by CUC, and a new YSI meter replacing the older model.

Another watershed on Saipan, North Achugao has met the WQS for Enterococci at all four sites between San Roque School and Aqua Resort for over five years. This improvement is associated with municipal sewer line repairs and upgrades to two lift stations. However, it retains a CALM Category of 4a, as a Bacteriological TMDL was approved in 2018, which will continue to be implemented to prevent future impairment.

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:

- 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:

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

LOW Priority:

- 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, especially those with known legacy military debris, and dumpsites, or where current exercises are underway by DoD.

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, BMPs, IWMPs implementation, etc.

Tables C-14. through C-18, on the next pages list the status of TMDL development for impaired waterbody segments and the schedule for TMDL submission, or pollutant removal from the 303(d) list, based on their priority. New listings have bold **RED** font.

TABLE C-14. TMDL Development Status for the Northern Islands

Seg ID	Segment Name	Class	Pollutant/ Combination	Priority	Status	Year first listed	Projected TMDL Submittal or Removal Date
NORTHERN ISLANDS:							
24	Farallon de Medinilla	A	Other	Low	Residents may not enjoy aesthetically due to safety issues - bombing exercises	2020	2033

TABLE C-15. TMDL Development Status for Rota

Seg ID	Segment Name	Class	Pollutant/ Combination	Priority	Status	Year first listed	Projected TMDL Submittal or Removal Date
ROTA:							
2	Sabana/Talakaya/ Palie	AA	Enterococci	Low	Continue monitoring	2008	2033
			pH	Low	Use new pH probe	2020	2033
2STR	Sabana/Talakaya/ Palie Stream	1	Enterococci	Low	Continue monitoring	2020	2035
3	Songsong	A	Enterococci	Low	Continue monitoring	2004	2033
			phosphate	Low	Continue FIA testing	2004	2033
			DO%	Low	Continue monitoring	2020	2033
			pH	Low	Use new pH probe	2020	2033
4	Uyulanhulo/Teteto	AA	Enterococci	Low	Continue monitoring	2020	2033
			pH, Low	Low	Use new pH probe	2020	2033
5	Chaliat/Talo		pH, Low	Low	Use new pH probe	2020	2033
			Nitrate	Low	Continue FIA testing	2020	2033

TABLE C-16. TMDL Development Status for Tinian

Seg ID	Segment Name	Class	Pollutant/ Combination	Priority	Status	Year first listed	Projected TMDL Submittal or Removal Date
TINIAN:							
7	Masalok	AA	phosphate	Low	Continue FIA monitoring	2004	2033
			Nitrate	Low	Continue FIA monitoring	2020	2033
			pH	Low	Use new pH probe	2020	2033
			Enterococci	Low	Continue monitoring	2014	2035
9	Makpo	AA	phosphate	Low	Continue FIA monitoring	2004	2033
			pH, Low	Low	Use new pH probe	2018	2033
			Nitrate	Low	Continue FIA monitoring	2020	2035
			Enterococci	**Low**	**Continue monitoring**	**2022**	2035
9H	Makpo (Harbor)	A	phosphate	Low	Continue FIA monitoring	2004	2033
			DO%	Low	Continue monitoring	2010	2033
			Enterococci	Low	Continue monitoring	2014	2035
10	Puntan Diaplolamanibot	AA	phosphate	Low	Continue FIA monitoring	2004	2033
			Nitrate	Low	Continue FIA monitoring	2020	2033
			Enterococci	Low	Continue monitoring	2006	2033
			DO%	**Low**	**Continue monitoring**	**2022**	**2035**
11	Puntan Tahgong	AA	phosphate	Low	Continue FIA monitoring	2004	2033
			Nitrate	Low	Continue monitoring	2020	2033
			pH	Low	Continue monitoring	2020	2033
			Enterococci	Low	Continue monitoring	2020	2033

TABLE C-17. TMDL Development Status for Saipan

Seg ID	Segment Name	Class	Pollutant/ Combination	Priority	Status	Year first listed	Projected TMDL Submittal or Removal Date
SAIPAN:							
12	Kalabera	AA	Enterococci		Completed 2018	2004	**DONE**
			phosphate	Med	Continue FIA monitoring	2004	2030
			Nitrate	Med	Continue FIA monitoring	2020	2030
13	Talofofo	AA	Enterococci		Completed 2018	2004	DONE
			phosphate	Med	Continue FIA monitoring	2004	2030
			Nitrate	Med	Continue FIA monitoring	2020	2030
			pH	Low	Use new pH probe	2020	2035
13STR	Talofofo Stream	1	Enterococci	Low	Continue monitoring	2018	2035
14	Kagman	AA	Enterococci		RELISTED 2020	2006	**DONE**
			phosphate	Med	Continue FIA monitoring	2004	2030
			Nitrate	Med	Continue FIA monitoring	2020	2030
			pH	Low	Use new pH probe	2020	2035
15	Lao Lao	AA	Enterococci		Completed 2018	2004	DONE
			phosphate	Med	Continue FIA monitoring	2004	2030
			Nitrate	Med	Continue FIA monitoring	2020	2030
17A	Isley (West)	A	Enterococci		Completed 2018	2006	**DONE**
			copper	High	Invitation to bid for TMDL 2027	2014	2025
			lead	High	Invitation to bid for TMDL 2027	2014	2025
			phosphate	Med	Continue FIA monitoring	2004	2030
			pH, Low	Low	Use new pH probe	2020	2035
17B	Isley (East)	AA	Enterococci		Completed 2018	2004	DONE
			phosphate	Med	Continue FIA monitoring	2004	2030
			pH	Low	Use new pH probe	2020	2035
18A	Susupe (North)	AA	Enterococci		Impaired, but TMDL approved	2006	**DONE**
			DO%	Med	Continue monitoring	2010	2030
			pH, Low	Low	Use new pH probe	2020	2035
			phosphate	Med	Continue FIA monitoring	2004	2030
			Nitrate	Med	Continue FIA monitoring	2020	2030
18B	Susupe (South)	AA	Enterococci		Completed 2018	2004	**DONE**
			DO%	Med	Continue monitoring	2010	2025
			pH	Low	Use new pH probe	2020	2030
			phosphate	Med	Continue FIA monitoring	2004	2030
			Nitrate	Med	Continue FIA monitoring	2020	2030
18LAK	Susupe (South) Lake	1	E. coli		Completed 2018	2012	**DONE**
			DO%	Low	Continue monitoring	2010	2035
			ph, High	Low	Continue monitoring	2014	2035

TABLE C-17. TMDL Development Status for Saipan, Continued

Seg ID	Segment Name	Class	Pollutant/ Combination	Priority	Status	Year first listed	Projected TMDL Submittal or Removal Date
SAIPAN:							
19A	W. Takpochau (North)	A	Enterococci		Completed 2018	2004	**DONE**
			lead	High	Invitation to bid for TMDL 2020	2018	2025
			phosphate	Med	Continue FIA monitoring	2004	2030
			Nitrate	Med	Continue FIA monitoring	2020	2030
19B	W. Takpochau (Central)	AA	Enterococci		Completed 2018	1998	**DONE**
			pH, Low	Low	Use new pH probe	2018	2035
			DO%	Med	Continue monitoring	2010	2030
			phosphate	Med	Continue FIA monitoring	2004	2030
			Nitrate	Med	Continue FIA monitoring	2020	2030
			copper	High	Invitation to bid for TMDL 2020	2020	2025
			lead	High	Invitation to bid for TMDL 2021	2020	2025
			Hg in fish/Sed	High	Invitation to bid for TMDL 2022	2010	2025
19C	W. Takpochau (South)	AA	Enterococci		Completed 2018	2004	**DONE**
			DO%	Med	Continue monitoring	2008	2030
			pH, Low	Low	Use new pH probe	2016	2035
			Nitrate	Med	Continue FIA monitoring	2018	2030
			phosphate	Med	Continue monitoring	2022	2030
19STRB	W. Takpochau (Central) Stream	1	Hg in fish	High	Invitation to bid for TMDL 2020	2014	2025
			Enterococci	Low	Invitation to bid for TMDL 2032	2018	2035
20A	Achugao (North)		DO%	Med	Continue monitoring	2010	2030
			phosphate	Med	Continue FIA monitoring	2004	2030
20B	Achugao (South)	AA	Enterococci		Completed 2018	2004	**DONE**
			DO%	Med	Continue monitoring	2010	2025
			lead	High	Invitation to bid for TMDL 2020	2018	2025
20B	Achugao (South) Stream	1	Enterococci	Low	Invitation to bid for TMDL 2020	2018	2035
			lead	High	Invitation to bid for TMDL 2020	2018	2025
21	As Matuis	AA	Enterococci	Low	DELISTED 2018/RELISTED 2020	2006	2033
			DO%	Low	Continue monitoring	2010	2035
			pH, Low	Low	Use new pH probe	2018	2035
			phosphate	Med	Continue FIA monitoring	2004	2030
			Nitrate	Med	Continue FIA monitoring	2020	2030
22	Banaderu	AA	Enterococci		Completed 2018	2016	**DONE**
			phosphate	Med	Continue FIA monitoring	2004	2030

TABLE C-18. TMDL Development Status for Mañagaha

Seg ID	Segment Name	Class	Pollutant/ Combination	Priority	Status	Year first listed	Projected TMDL Submittal or Removal Date
MANAGAHA:							
23	Managaha		pH, Low	Low	Use new pH probe	2018	2033
			Nitrate	Med	Suspect erroneous, monitor	2020	2030
			phosphate	Med	Suspect erroneous, monitor	2020	2030

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 and shellfish Consumption, Recreational, Potable Water Supply* (for surface waters), and *Aesthetic enjoyment/other uses.* Each waterbody's assigned CALM categories are discussed in each island's sub-section 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 coastal waters of No'os (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. However, the remote Northern Islands of Sarigan, Guguan, Alamagan, Agrihan, Asuncion, Maug, and Farallon de Pajaros; the Carolinas on Tinian; and the Dugi/Gampapa/Chenchon on Rota; fully support all coastal DUs. Coastal waters of Pagan and Anatahan have insufficient information to assess the *Fish and Shellfish* Consumption DU. These coastal waters are undeveloped and, in many cases, too difficult for people to regularly visit. Based on this and professional judgement, there are 82.5 coastal miles fully support *ALL* their DUs. However, the remaining 158 miles of Commonwealth coastline were found to be impaired for at least one cause, whether by a pollutant or non-pollutant.

Table C-19, on the following page summarizes the ATTAINS database assessment results for each DU's attainment; whether it be fully supported, has insufficient information, or is not supported. The total coastal miles for each support status are provided as well.

TABLE C-19. Individual DUs Support Summary for CNMI Coastal Marine Waters

Designated Use	Not Supporting	Threatened (miles)	Insufficient Data (miles)	Fully Supporting (miles)	Not Assessed (miles)	Total Assessed (miles)
ALL CNMI COASTAL WATERS (Class AA and A)						
Propagation of shellfish and other aquatic life	102.0	0	0.0	138.5	0	240.5
Fish/shellfish consumption	9.5	0	138.4	92.6	0	240.5
Recreation with risk of waterborne illness	85.2	0	6.7	148.6	0	240.5
Aesthetic enjoyment /other uses	4.2	0	0	236.3	0	240.5
			TOTAL CNMI COASTAL MILES			**240.5**

The most frequently unsupported DUs are *Propagation of Aquatic life* and the *Recreational* DUs. This is due to a variety of causes. The Enterococci exceedances of the WQS is now being addressed for all of Saipan's coastal waters *except for the As Matuis watershed* by the implementation of the 2018 Bacteriological TMDL. As Matuis' coastal waters were inadvertently left out of the TMDL report. Therefore, an Additional TMDL is required for this watershed.

TABLE C-20. Size of CNMI Coastal Marine Waters Impaired by Causes

Cause	Not Supporting (miles)	Insufficient Data (miles)	Fully Supporting (miles)	Total Assessed (miles)	Comments
ALL CNMI COASTAL WATERS (Class AA and A)					
Enterococcus	88.7	0.0	151.2	239.9	
Phosphate	78.0	0.0	0.0	78.0	
Combined Biota/Habitat Bioassessment	60.0	5.4	170.1	235.5	Not a pollutant
Nitrate	58.3	0.0	0.0	58.3	
pH	44.2	0.0	1.0	45.2	No trend, results suspect
DO%	37.3	0.0	0.0	37.3	
pH, Low	22.3	0.0	0.0	22.3	
Lead	9.5	0.0	0.0	9.5	
Copper	6.1	0.0	0.0	6.1	
Mercury	4.4	0.0	0.0	4.4	
Other	4.2	0.0	236.3	240.5	
Unspecified metals in sediment	0.0	49.7	90.7	140.4	
Cadmium in sediment	0.0	4.1	0.0	4.1	

Although, most coastal waters had a series of public beach advisories posted, others showed a decrease in the percent of Enterococci violations, associated with the COVID-19 travel ban restrictions. These include: Talofofo, Susupe (South), Achugao (North), and As Matuis on Saipan; and Uyulanhulo/Teteto and Chaliat/Talo watershed on Rota.

There is myriad of sources resulting in Enterococci and other contamination. Sources are listed in Table C-21.

TABLE C-21. Size of CNMI Coastal Marine Waters Impaired by Sources

Sources of Impairment	Confirmed Source (miles)	Unconfirmed Source (miles)	Total Impaired (miles)	Comments
ALL COASTAL MILES (Class AA and A)				
Source Unknown	29.2	45.2	74.4	Lack of Public toilets
Groundwater loadings	8.7	31.8	40.5	Fresh water seeps
Wet Weather Discharges NPS	8.6	30.3	38.9	
On-Site Treatment (Septic and Decentralized)	10.3	26.3	36.6	
Waste from Pets	4.4	24.9	29.3	Feral dogs and cats
Grazing in Riparian or Shoreline Zones	5.1	22.8	27.9	
Marina Boat Maintenance	0	18.7	18.7	
Waterfowl	16.0	0.6	16.6	Sea and shore birds
Sewer Overflows (Collection Systems)	6.8	9.8	16.6	
Recreation and Tourism (Non-boating)	12.2	2.8	15.0	Lack of Public toilets
Urban runoff/storm sewers	8.7	6.2	14.9	
Golf Courses	0	14.7	14.7	
NPS from Military Facilities (not port)	11.3	2.4	13.7	
Illegal Dumps/Inappropriate Waste Disposal	0	9.9	9.9	
Roads, Infrastructure (New Construction)	0	6.3	6.3	
Impervious Parking Lot Runoff	4.4	0	4.4	
Releases from Waste sites/Dumps	4.4	0	4.4	
Municipal point source discharges	0	1.7	1.7	
Animal holding/management areas	1.5	0	1.5	

The CNMI's decrease in Enterococci violations are associated with several sources: 1) upgrades to the CUC municipal sewer line and completion of the Cross Island Road reconstruction project on Saipan; 2) a substantial decrease in Rota's and Tinian's populations (2020 Census); and 3) the COVID-19 restrictions and travel ban.

The source of many pH exceedances of the CNMI WQS is associated with an aging pH probe. Its use was phased out and it was replaced with a new YSI ProDSS meter this reporting cycle, after which pH exceedances dropped.

BECQ utilizes benthic substrate, coral reef, and seagrass conditions to assess trends in biological health and to rank the associated waterbodies in accordance with those trends. Overall, biological conditions are 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, which was exacerbated by Crown of Thorns (COT) starfish predation. A few sites have consistently received poor ratings. Based on biological monitoring data, and professional judgement this suggests that degradation at these sites is likely due to a reduction in herbivory, water quality, and or increased ocean temperature events.

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 due to these differences. 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 visual field assessments upland of these sites to identify the type and source of land-based pollutants driving these poor rankings. Gathered information is used to address violations, and prioritize impaired watersheds for remediation or restoration efforts. Sections C.3.5 through C.3.8, of this report provide a discussion of each island's coastal waters.

ALL CNMI – FRESHWATER STREAMS

The WQS/NPS staff conduct regular SVAP assessments throughout the year. Water samples are collected from flowing stream reaches and pools whenever they are encountered. The coordinates of potential sources of contamination are geo-referenced and mapped using GIS.

There has been insufficient water quality data collected from most streams to make scientifically defensible inferences to assess all the stream DUs. Satellite and LiDAR imagery, and the most recent NHD, and Wetlands and Streams GIS data layers, indicate that the geology and topography of several stream systems would not allow for soil saturation or stream flow outside of a torrential rain event. Most precipitation flows quickly over land or by subterranean transport to the sea in these areas. Saipan's ephemeral stream systems quickly dry up once rains cease. Therefore, seasonal freshwater pools are not present in some of these systems to provide habitat for harvestable aquatic life to exist. Therefore, they are not used for swimming, fishing, or other recreational purposes that would involve skin contact with water. Self-reporting by residents, hikers, and field crew conducting SVAP assessments corroborate this anecdotal evidence.

However, at the time of this writing, there is too little data or information to assess the*, Fish and Shellfish Consumption, and Recreational* DUs for several of the for ephemeral streams this reporting cycle. BECQ may choose to conduct a use attainability analysis for those streams that appear to warrant removal of these DUs.

Table C-22., provides the assessment results from the ATTAINS database for each streams' attainment of its DU's; whether it be fully supported, has insufficient information, or is not supported. The total stream miles for each support status are provided as well.

TABLE C-22. Individual DUs Support Summary for CNMI Freshwater Streams

Designated Use	Not Supporting (miles)	Threatened (miles)	Insufficient Data (miles)	Fully Supporting (miles)	Not Assessed (miles)	Total Assessed (miles)	Total in CNMI (miles)
ALL STREAMS (Class 1)							
Propagation of shellfish and other aquatic life	3.2	0	27.9	69.4	0	100.5	100.5
Fish/shellfish consumption	9.7	0	90.8	0	0	100.5	100.5
Recreation with risk of waterborne illness	50.3	0	50.2	0.0	0	100.5	100.5
Potable Water Supply	0	0	0.0	0	100.5	100.5	100.5
Aesthetic enjoyment /other uses	3.2	0	0.0	97.3	0	100.5	100.5

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

SVAP assessments have only been completed in the North and South Achugao, and LaoLao watersheds on Saipan. They have not been completed for the rest of Saipan, or on the other islands. In some instances, SVAP assessments have confirmed that no surface water pools exist to sustain harvestable aquatic life as their flow is too infrequent or the stream flows subterraneously to the coast. This is the case for Aguigan ("Goat Island"), Tinian, Mañagaha, and No'os (FDM) islands.

Table C-23., on the following page lists the causes for stream water impairment including pollutants and non-pollutants. For stream systems with sufficient water quality data, Enterococci was found to be the most frequent cause of impairment.

There is also very limited fish tissue and biota contaminant data for the majority of streams with harvestable aquatic life to assess the *Fish and Shellfish Consumption* DU. However, initial fish tissue and biota studies by Denton, et.al., did find heavy metals in a few streams at concentrations of concern.

TABLE C-23. Size of CNMI Freshwater Streams Impaired by Causes

Cause	Not Supporting (miles)	Insufficient Data (miles)	Fully Supporting (miles)	Total Assessed (miles)	Comments
ALL CNMI STREAMS (Class 1)					
Other	3.2	0	97.3	100.5	
Enterococcus	50.3	23.6	0	73.9	
Combined Biota/Habitat	3.2	0	69.4	72.6	Not a pollutant
Lead	6.5	0	0	6.5	WWII debris/dumpsite
Habitat Alteration	3.2	0	0	3.2	Not a pollutant
Flow Regime Modification	3.2	0	0	3.2	Not a pollutant
Mercury	3.2	0	0	3.2	

* This does not include the streams on the Northern Islands

The sources of stream water Impairment are listed in Table C-24. An assessment of the *Support and Propagation of Aquatic Life* DU was possible for a few stream systems where SVAP were completed, and by referring to the survey results from the 2008 study conducted by DLNR DFW (2008, McKagan et.al).

TABLE C-24. Size of CNMI Freshwater Streams Impaired by Sources

Sources of Pollutants	Confirmed Source (miles)	Unconfirmed Source (miles)	Total Streams Impaired (miles)	Comments
ALL STREAM WATERS (Class 1)				
Grazing in Riparian or Shoreline Zones	6.5	43.8	50.3	cows
Wet Weather Discharges (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	
Sewer Overflows/system failures	0	9.7	9.7	
NPS from Military Base (not ports)	0	6.5	6.5	
Impervious Surface/Parking Lot Runoff	3.2	0	3.2	
Introduction Non-native organisms	3.2	0	3.2	
Anthropogenic land use changes	3.2	0	3.2	

* This does not include the streams on the Northern Islands

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.

As was the case for the Northern Islands' coastal waters, most of the Northern Islands' stream systems fully support all their DUs due to their remoteness and lack of any consistent anthropogenic stressors or pollutants at this writing. The exceptions to this are the stream systems on Anatahan and Pagan. These islands have 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 practicably be avoided. Therefore, continued 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 restoration project, or developments within the area. This reporting cycle BECQ took part in the 2021 NARS - NWCA. The assessment was partially completed with 11 sites assessed and a few other sites evaluated on reconnaissance. This provided vastly more information about CNMI wetland conditions than previous IRs.

Table C-25., provides the ATTAINS database assessment results for Wetlands' support of the *Propagation of Aquatic life* DU; whether it be fully supported, has insufficient information, or is not supported. The total wetland acres for each support status are provided as well.

TABLE C-25. Individual DUs Support Summary for CNMI Wetlands

Designated Use	Not Supporting/ pollutant or non-pollutant	Threatened (Acres)	Insufficient Data / Does not exist (Acres)	Fully Supporting (Acres)	Not Assessed (Acres)	Total Assessed (Acres)	*Total in CNMI (Acres)
ALL WETLANDS (Class 1)							
Propagation of shellfish and other aquatic life	568.4	0	89.2	58.6	0	716.2	716.2

*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 and their sizes in acres are listed in Table C-2., on the following page. However, if the causes are not pollutants, they are not contained within the 303(d) list.

TABLE C-26. Size of CNMI Wetlands Impaired by Causes

Cause	Not Supporting (acres)	Insufficient Information (acres)	Fully Supporting (acres)	Total Wetlands Assessed (acres)	Comments
ALL WETLANDS (Class 1)					
Habitat Alterations	568.4	60.2	0	628.6	Non-pollutant
Non-Native Aquatic Plants	568.4	0	0	568.4	Non-pollutant
Flow Regime Modification	568.4	0	0	568.4	Non-pollutant
Biota/Habitat Bioassessment	0	27.0	58.6	85.6	

The sources of impairment are listed in Table C-27., but as they are not a pollutant, they are not included in the 303(d) list in Section C.3.2., of this report.

There is further discussion of wetlands contained within each watershed in Sub-sections C.3.5., through C.3.8. In addition, Section C.4., provides a detailed discussion of BECQ's current "WETLANDS PROGRAM", and new projects that have been undertaken this reporting cycle.

TABLE C-27. 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

C.3.4. Section 314 (CLEAN LAKES PROGRAM)

There are five (5) lakes within the CNMI archipelago, most of which have been tested and are known to be brackish, with a salinity level of greater than 0.5 ppt, but less than 30.0 ppt. There is one Lake on Saipan, Susupe Lake (57.4 acres), and the other four are in the Northern Islands. There are 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 Lagona 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-28., 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.

All lakes in the CNMI are publicly owned and fall within DCRM's APC. 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. 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-28. Individual DUs Support Summary for CNMI Lakes

Designated Use	Not Supporting /pollutant or non-pollutant (acres)	Threatened (acres)	Insufficient Data (acres)	Fully Supporting (acres)	Not Assessed (acres)	Total Assessed (acres)	*Total in CNMI (acres)
ALL LAKES (Class 1)							
Recreation with risk of waterborne illness	57.4	0	149.0	61.0	0	267.4	267.4
Propagation of shellfish and other aquatic life	57.4	0	149.0	61.0	0	267.4	267.4
Fish/shellfish consumption	0	0	267.4	0	0	267.4	267.4
Aesthetic enjoyment /other uses	0	0	0	267.4	0	267.4	267.4
Potable Water Supply	0	0	149.0	0	118.4	267.4	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 the safety hazards associated with potential volcanic activity. This has limited BECQ field staff abilities to test water quality and conduct field surveys. Therefore, the lakes are only tested when other research is being conducted on the islands at the same time. Pagan's lake water quality was tested for the first time by BECQ during their field survey in 2021.

Due to the brackishness of Pagan's lakes, they are not used as a *Potable Water Supply* so this DU is not assessed. There is no water quality data available on Anatahan's lakes. However, volcanic activity may cause gases to dissolve or mix within the lakes' water column. Therefore, there is insufficient information to assess their potential use as a *Potable Water Supply*.

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* DU. Every effort should be made to collect this data given the US military's interest in expanding exercises to other islands.

Susupe Lake covers 57.4 acres in Saipan's South Susupe watershed. It is the only regularly monitored fresh surface waterbody. It is tested every two weeks for the bacteriological FIB, *E. coli*, as well as for pH, turbidity, conductivity, DO%, and temperature. Table C-29., lists the causes of impairment to CNMI Lakes.

TABLE C-29. Size of CNMI Lakes Impaired by Causes

Cause of Impairment	Not Supporting (acres)	Threatened (acres)	Insufficient Information (acres)	Fully Supporting (acres)	Total Assessed (acres)	Comments
ALL LAKES (Class 1)						
Other	0.0	0.0	0.0	267.4	267.4	Aesthetic Enjoyment
Unspecified Metals in Sediment	0.0	0.0	210.0	0.0	210.0	Military debris
Biota/Habitat Bioassessment	57.4	0.0	0.0	61.0	118.4	Non-pollutant
Enterococcus	0.0	0.0	0.0	61.0	61.0	
E. Coli	57.4	0.0	0.0	0.0	57.4	
Non-native Fish/Shellfish/Zooplankton	57.4	0.0	0.0	0.0	57.4	Non-pollutant
Dissolved Oxygen	57.4	0.0	0.0	0.0	57.4	
pH, High	57.4	0.0	0.0	0.0	57.4	

*Does not include Hagoi Lagu on Anatahan

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 non-native aquatic species, although these are not pollutants.

Sources of Susupe Lake's impairments are listed in Table C-30., on the following page. The source for the high pH levels is unproven at this time. However, pH and diminished oxygen levels in lakes 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-30. 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 analysis needed	0	57.4	57.4
Source 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

Table C-31., lists the trophic status of all five of CNMI's publicly owned lakes.

TABLE C-31. Trophic Status of Significant Publicly Owned CNMI Lakes

Trophic Status	Description	Number of Lakes	Acres of Lakes
Total in the CNMI		**5**	**267.4**
Assessed		1	57.4
Oligotrophic	Poor in nutrient and plant life and rich in oxygen	0	0
Mesotrophic	submerged aquatic plants and medium levels of nutrients.	0	0
Eutrophic	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

There is a lack of available water quality or other data for most of the lakes in the Northern Islands. This reporting cycle was the first time that WQS/NPS collected water samples from Pagan lakes. However, this is only one sampling event, which does not provide a statistically defensible inference on water quality. 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%. 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.

Lake water quality trends are listed in Table C-32., on the following page.

TABLE C-32. 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

It is also important for BECQ WQS/NPS and WEEC programs to continue coordination and collaboration with CUC to implement the Bacteriological TMDL recommendations 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

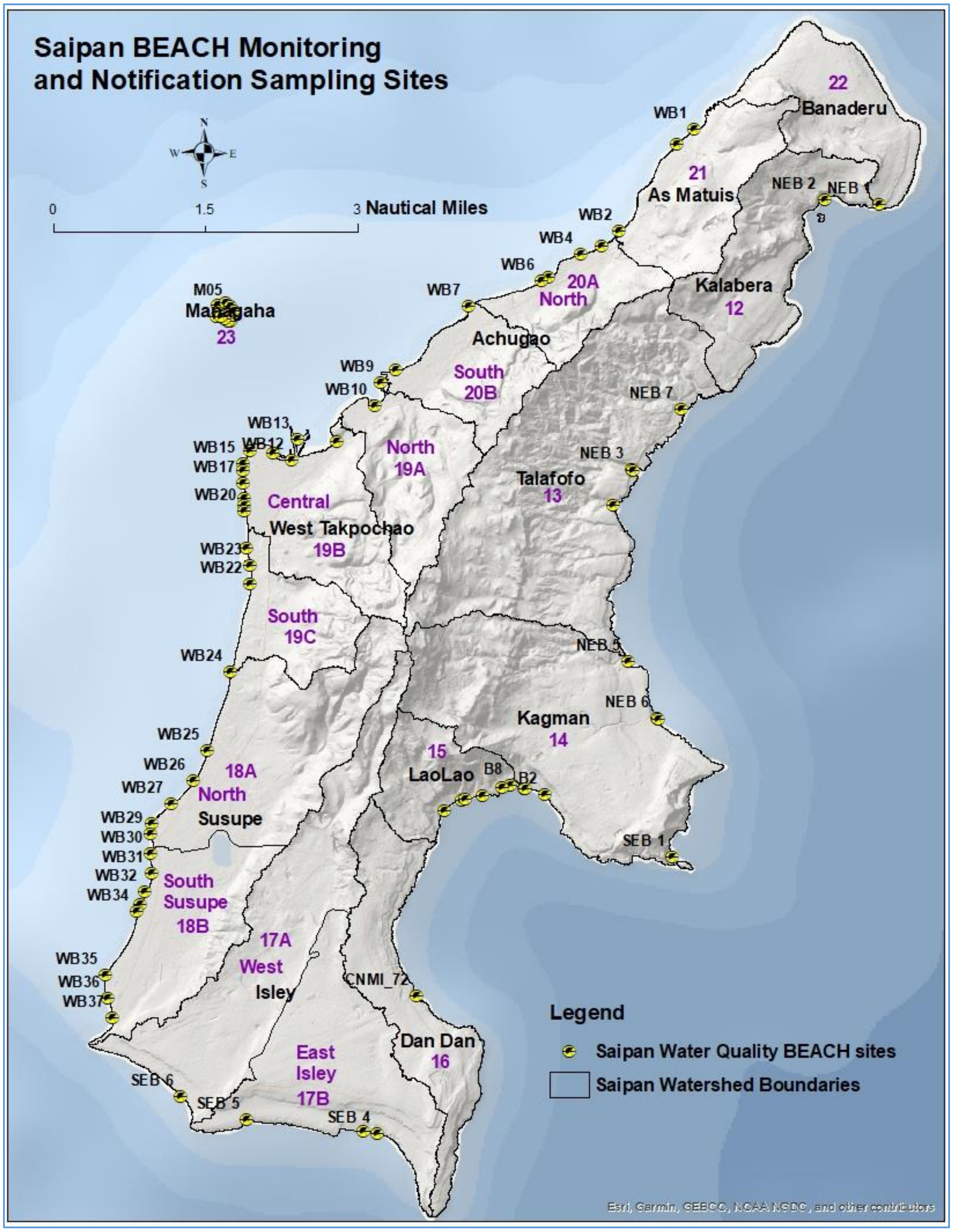
The following section and sub-sections provide a detailed assessment of each of Saipan's watersheds, and of Mañagaha's water quality status for the benefit of watershed communities, government policy and lawmakers, students, researchers, resource managers and other stakeholders interested in improving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

The island of Saipan has 17 designated watersheds (or waterbody segments), four of which are further sub-divided. Traveling from North to South these include Achugao, West Takpochau, Susupe, and Isley watersheds.

SAIPAN and MANAGAHA - COASTAL MARINE WATERS

Figure C-6., shows the 58 long-term coastal water quality BEACH monitoring and notification sites surrounding Saipan, and 11 surrounding Mañagaha.

FIGURE C-6. Saipan BEACH Monitoring and Notification Sites



There are additional lagoon, seagrass, and reef biological criteria monitoring sites that are used to determine if Saipan's coastal waters support the *Propagation of Aquatic Life* DUs.

FIGURE C-7. Saipan Seagrass, Forereef, and Reef Flat Biological Criteria Monitoring Sites

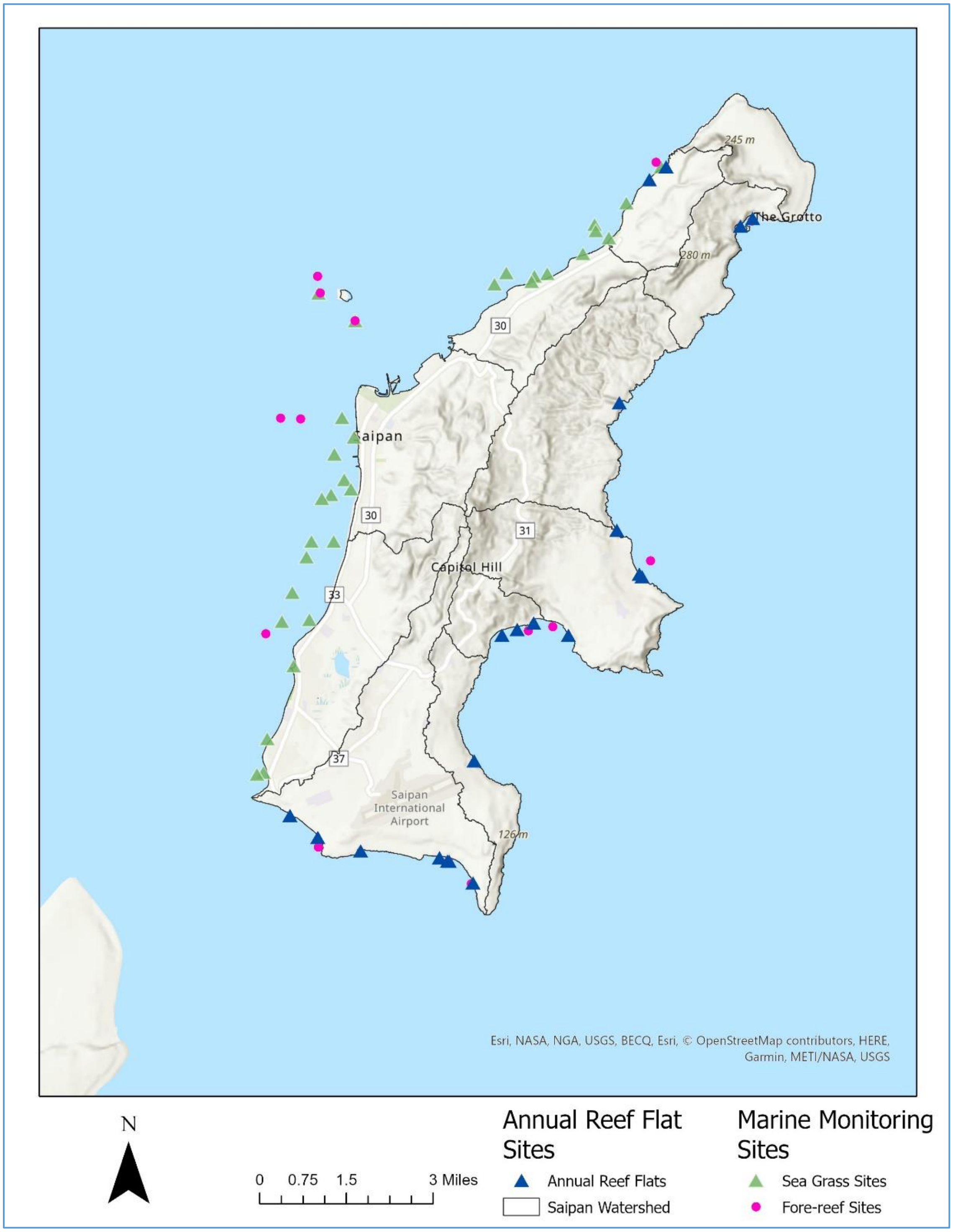


TABLE C-33. Criteria Assessment of Individual DUs Support of Saipan's and Mañagaha's Coastal Waters

	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**
						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
Coastal Waters – **Aquatic Life**	***Poor Habitat,*** Orthophos & ***NO3 Good***	No ALUS data, Orthophos & ***NO3 Good***, pH exceed	Fair Habitat, Orthophos & ***NO3 Good***, ***pH Good***	Poor Habitat, Orthophos & NO3 Exceed	F	***Fair Habitat,*** Orthophos & ***pH good***	Poor Habitat, Orthophos & ***pH Good***	***Good Habitat***, DO% &***pH Good***, Orthophos & NO3 Exceed	Good Habitat, DO% & pH low, Orthophos & NO3 Exceed	Poor Habitat, DO% & pH low, Orthophos & NO3 Exceed	Poor Habitat, DO% & ***pH good***, Orthophos & NO3 Exceed	Poor Habitat, ***Orthophos good,*** NO3 Exceed ***pH delisted***	Poor Habitat, DO%	Fair Habitat, DO%, Orthophos Exceeds	Poor Habitat, Orthophos & ***NO3 good*** DO%, ***pH good***	Orthophos Exceeds	Orthophos Exceed, ***NO3 good, & pH good***
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 exceed & ***pH Good***	Entero Exceed	F	Entero exceed & ***pH good***	*Entero exceed &* ***pH Good***	***Entero Good & pH Good***	***Entero Exceed*** & pH low	Entero exceed, pH low	Entero exceed, ***pH good***	Entero exceed, ***pH delisted***	Entero exceed	***F***	***Entero & pH good***	Entero exceed	***pH good***
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-33., on the previous page lists the assessment results for Saipan's and Mañagaha's coastal waters' DUs. Presently, none of Saipan's or Mañagaha's coastal waters fully support *all* DUs, as there is insufficient information to assess the *Fish and Shellfish Consumption* DU.

Eight (8) out of 15 of Saipan's coastal waterbody segments received a "Poor" ALUS ranking this reporting cycle. Only three (3) were ranked as "Good", including Dan Dan (Seg 16), South Susupe (Seg 18b), and North Susupe (Seg 18A). Kagman, East Isley, North Achugao, and Mañagaha received a "Fair" ALUS ranking.

These ALUS rankings are based upon benthic habitat, coral reef, and seagrass assemblage data collected over the past five (5) years, with a greater weight placed on data from the last two years. The same weighted method is used for assessing coastal water quality. The biological monitoring data for each coastal waterbody are listed in the tables contained in Appendix V. Water quality assessment data is listed in the tables contained in Appendix II.

The most frequent pollutant causes for not supporting a DU were Enterococci exceedances, followed by 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. These do not support the *Consumption* DU due to elevated levels of heavy metals (Denton, et.al, of UoG WERI, 2010, 2014, 2016 and 2018).

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, Talofofo, South Susupe, North Achugao, and As Matuis' coastal waters did show improvement. These improvements are most often associated with improvements and upgrades to the municipal sewer system and roadway reconstruction projects which include stormwater BMPs to prevent sediment from entering coastal waters. The Cross Island Road Reconstruction project completed last reporting cycle, traverses several watersheds and is shown in Figure C-8., on the following page. This reporting cycle construction began for Route 36 roadway that will connect the Talofofo watershed with Kalabera watershed. The road winds from Hidden Beach to Bird Island.

This and the completion of the 2018 Bacteriological 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 of Saipan's and Mañagaha's coastal waters will be discussed in detail in the watershed sub-sections of C.3.5.1., through C.3.5.12. of this report.

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-34., on the following page lists the assessment results for Saipan's stream systems.

FIGURE C-8. Phases of the Cross Island Road Reconstruction Project

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).

The 2016 fish tissue and biota study by Denton, et.al, suggest that heavy metal levels in Central West Takpochau and South Achugao streams systems may be unsupportive of the *Fish and Shellfish Consumption* DU. Further fish tissue and biota studies are needed to make a full assessment. The sources of heavy metal accumulation include runoff from the old hospital incinerator in Garapan, and heavy metal transport into sediment at WWII debris dumpsites sites.

TABLE C-34. 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**	***i***	Native Habitat	Native Habitat	***SVAP Fully***	***i***	i	i	i	i	i	Non-native species	i	Native Habitat, ***SVAP Fully***	Native Habitat, ***SVAP Fully***	i		
Fish Consumption	i	i	i	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	***2***	2	***2***	***2***	***2***	2	***2***	5	2	5	2	2		

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

As was discussed in Section C.3.3, there is insufficient water quality data to assess support of the *Recreational DU* for the majority of Saipan's ephemeral streams due to very limited water quality data. Although, the surface water quality sampling program was discontinued after FY2017, the SVAP was put into place to provide assessment data for streams. Many of the ephemeral streams were found to have insufficient flow or soil saturation for pools to provide habitat for harvestable aquatic life to exist.

The collected data and results from the qPCR MST study have provided valuable information for identifying sources of FIB contamination, which are used to target stream restoration efforts. Table C-34., on the previous page lists assessment results for Saipan's stream DU attainment.

There has been no systematic survey instrument used to measure visitor's 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". 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.

New wetland delineations on Saipan have not been conducted this reporting cycle. However, CNMI Wetland RAM valuations were conducted by the DCRM Watershed Coordinator with assistance of DCRM's NOAA Summer Interns in 2020; 57 wetland sites were assessed. Assessments were conducted primarily, in the West Takpochau and Achugao watersheds, and included some depressional wetland sites. These were located in Kagman, Kalabera, Isley and Susupe watersheds.

In general, the *Propagation of Aquatic Life* DU is considered under threat on Saipan due to wetland loss. Wetlands now cover less than 1% 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, and unpermitted fills.

TABLE C-35. 2022 Assessment of Saipan's Waterbodies DUs – Wetlands and Susupe Lake

			Talofofo	Kagman Education Island		Dan Dan	E. Isley Agricultural	Flores Pond, W. Isldy Agricultural	Lake, Chalan Kanoa Pot holes, Chalan Piao	Chalan LauLau		MIHA, AMP	DPW Mangrove, Sadok Tasi, Lower Base	Falig Mitigation	San Roque			
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																	
	Aesthetic Enjoyment/others								F									
CALM Assessment Category									5									
Wetlands	**Aquatic Life**		i	F		i	i	***N***	N	N	X	N	N	N	N			
CALM Assessment Category			4c	1		4c	***4c***	4c	4c	4c	X	4c	4c	4c	4c			

Available water quality data, along with the most recent NHD, and Wetland and Streams GIS data layers, and wetland information gathered during the 2021 EPA NWCA were used to evaluate Saipan's wetlands and lake's attainment of their DUs. These are shown in Table C-35.

Hydrological alterations from fill and the introduction of invasive species, and plants, were found to be the primary cause of most impairment of wetlands, but not due to a pollutant. Therefore, these wetlands were assigned a CALM Category of 4c.

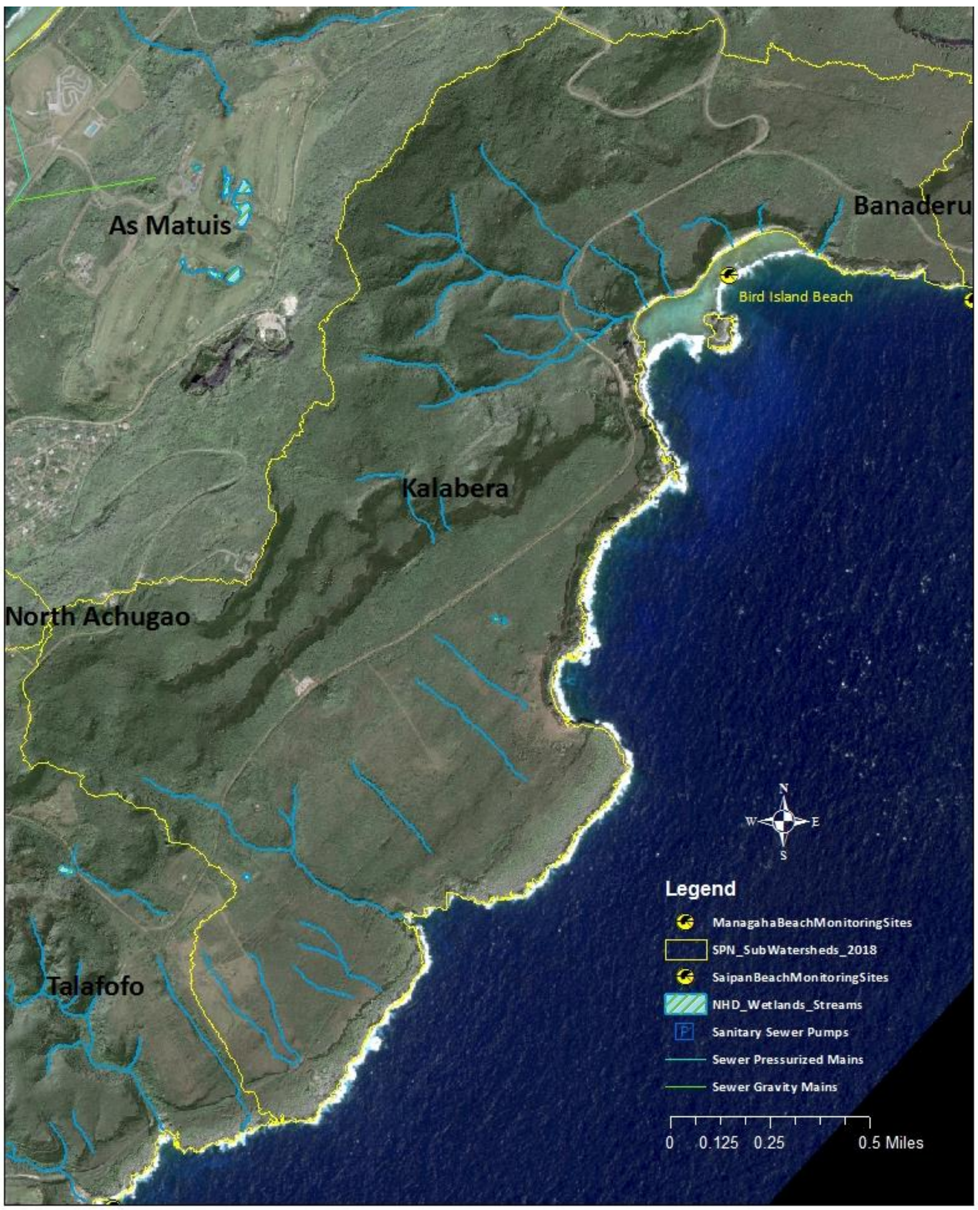
Susupe Lake was also found unsupportive of the *Propagation of Aquatic Life*, and *Recreational* DUs, for having both non-native invasive species, and water quality exceedances of the WQS. This is discussed in more detail in the South Susupe watershed sub-section, C.3.5.7.

Subsections C.3.5.1-C.3.5.12., that follow provide specific details about each of Saipan's watersheds, Mañagaha's coastal waters and the condition of each 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 seen in Figure C-9. Kalabera has only one long-term BEACH monitoring site, which is located next to Bird Island Beach's shoreline.

FIGURE C-9. Kalabera Watershed (Segment 12)



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 Bacteriological 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."

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 MMT ALUS assessment of Kalabera's forereefs were ranked as "Poor" this reporting cycle due to a significant decrease in coral coverage at Bird Island (13.47% from previous survey years). The primary cause of this decline is attributed to a widespread bleaching event in 2017 and a localized outbreak of Crown of Thorns (COTS) in 2019 and 2020 (Perez, et.al, 2021). However, the benthic substrate ratio of the reef flat closer to shore found a significant increase in coral coverage compared to macroalgae this reporting cycle, resulting in a ranking of "Good". Taking into account the ALUS results over the past five years, Kalabera's coastal waters receive an overall cumulative ranking of "Poor" this reporting cycle.

It should be noted, at present there is insufficient water quality data at these long-term forereef monitoring and NCCA sites to confirm whether or not there are indeed water quality pollutant sources causing this decline in coral health. To address this shortfall, the WQS/NPS field staff began regular biological assessments of benthic cover at shallow (knee deep) NCCA near shore reef sites this reporting cycle to augment data collected by the MMT during the 2010, and 2015 NCCAs. As of FY2020, these long-term near shore biological assessments are now paired with water quality data at least annually to provide more robust statistical analysis of ALUS trends.

Kalabera's coastal waters at the Bird Island BEACH site exceeded the CNMI WQS for Orthophosphate this reporting cycle, and NO_3-N in FY2018. The source of these nutrients was found to be primarily from birds, based on qPCR MST results. Therefore, these coastal waters remain 303(d) listed as impaired, 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 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.

Kalabera's coastal waters did not meet CNMI WQS DU due to Enterococci exceedances of the WQS, which does not support the *Recreational* DU. Sanitary 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. Although, stream visual assessments have not been completed on the flat southern shelf of the watershed, available aerial imagery, the most recent NHD, and the Wetlands and Streams GIS data layers indicate that the geology and topography is less likely to support regular soil saturation or stream flow for seasonal freshwater pools to exist to support harvestable aquatic life. Most precipitation flows by subterranean transport from land to sea, and quickly dries up. As a result, no water quality data has been collected for Kalabera's ephemeral streams. Therefore, the *Support and Propagation* of *Aquatic Life, Fish and Shellfish Consumption,* and *Recreational* DUs have insufficient information to be assessed at the time of this writing.

The ephemeral streams flow too infrequently to provide streambed saturation or a stable and sufficient *Potable Water Supply*. Therefore, this DU is not assessed.

However, based on WQS/NPS field crew observations during SVAP assessments, it is suspected that seasonally there is enough water present to support some life stages of aquatic invertebrates. So, for now the *Support and Propagation* of *Aquatic* (Invertebrate) *Life* DU is reinstated, but is yet to be assessed.

However, Kalabera's northern dry streambeds are known to be enjoyed regularly 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

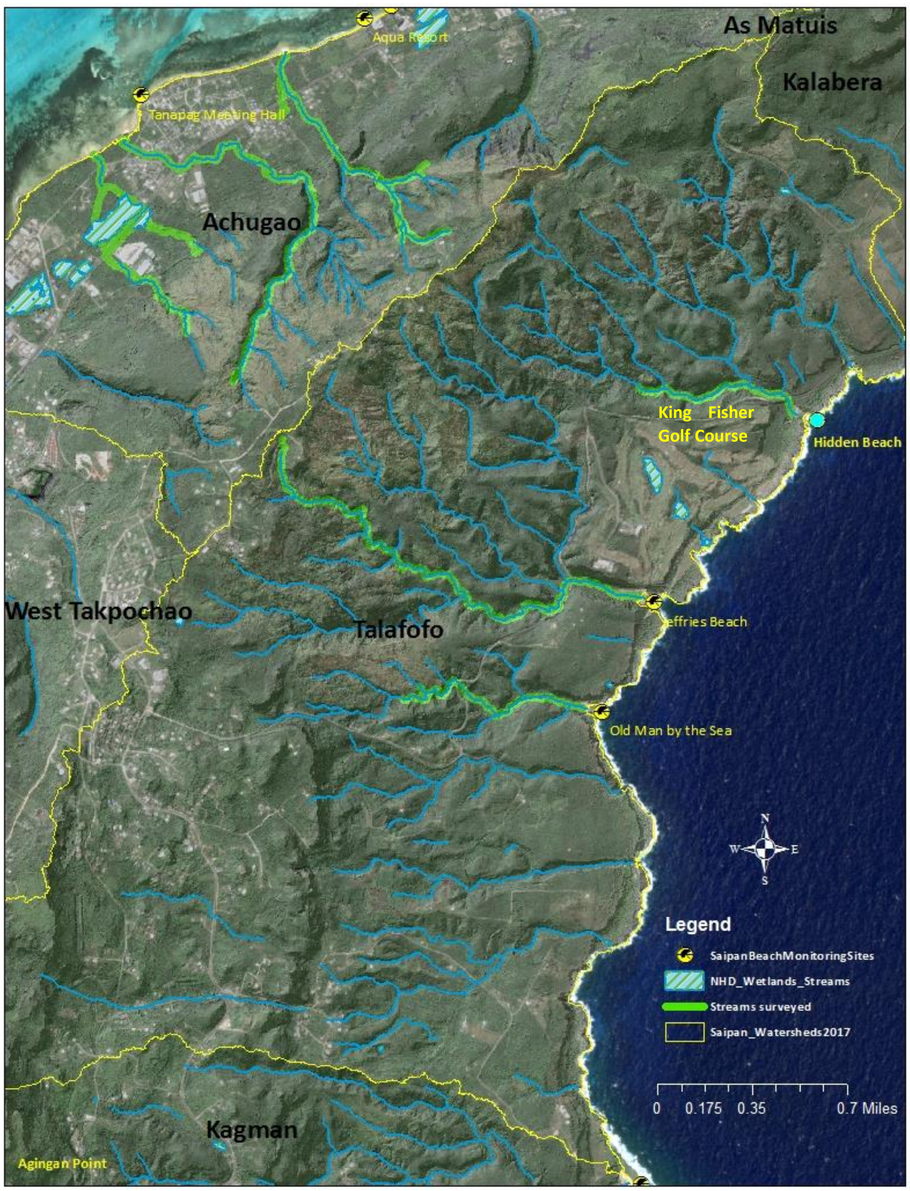
Kalabera's coastal waters remain CALM Category 5 this reporting cycle due to exceedances of the WQS for Orthophosphate and NO_3-N, which does not support the *Propagation of Aquatic Life* DU. The Enterococci exceedances are being addressed through implementation of the 2018 Bacteriological TMDL.

Kalabera's freshwater streams retain a CALM Category 3, due to insufficient water quality and biological monitoring data.

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-10.

FIGURE C-10. Talofofo Watershed (Segment 13)



An additional biological reef flat site (CNMI-104) is located in the shallows of Jeffry's forereef. It was established in 2010 as part of EPA's NCCA.

The Talofofo Watershed is more developed than Kalabera. It contains "a mix of land uses in a topographically complex environment." (Bacteriological TMDL, 2018). The Kingfisher 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.

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" (Bacteriological TMDL, 2018).

This practice exposes hilltops and, "contributes directly to steep ravines that flow directly to the coastal edge…" of Hidden, Jeffry's Beaches, and Old Man by the Sea. All of these remote sites are popular tourist destinations. This reporting cycle, ground was broken on Route 36 that will link Talofofo Road to the Kalabera and As Matuis Watersheds. This roadway will cut off vehicular access to Hidden beach. Instead, cars and SUVs may park at a lookout to view coastal waters, or walk down a foot path like that at Jeffrey's and Old Man by the Sea to access the beach. This will significantly decrease erosion and sediment-laden runoff from entering coastal waters.

DCRM is working closely with DLNR, to apply for Infrastructure Investment and the Jobs Act funding to build a raised footpath to Jeffrey's beach, with centralized restroom facilities, and trash bins. This will diminish the amount of waste that used to find its way to the shore and allow visitors to enjoy the ruggedness of this unspoiled and far-off terrain, without causing further contamination from unsanitary practices.

Due to high surf hazards, ALUS biological assessments have not been conducted on Talofofo's coastal waters. Therefore, there is insufficient data to provide an ALUS ranking. However, water quality data is used to assess the *Support and Propagation of Aquatic Life* DU.

Nutrient water quality levels exceeded the CNMI WQS for Orthophosphate at Old Man by the Sea. There were also exceedances of Orthophosphate and NO_3-N in FY2018 and 2019. Potential sources of nutrients may be run off from the Kingfisher golf course, as well as cows grazing in riparian areas, and sea birds. Sinigalliano's qPCR-MST study reported both elevated human and sea bird markers in this watershed.

In addition, pH exceeded the WQS at Jeffrey's beach again this reporting cycle, but without a notable trend. The source of pH exceedances is unknown. Therefore, Talofofo's coastal waters remain on the 303(d) list as impaired for Phosphate, Nitrate, and pH and do not support the *Propagation of Aquatic Life* DU.

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". This reporting cycle, The Army Corps of Engineers (ACoE) completed a remedial study of the Hospital Dump site and determined that based on their soil results, metals do not exceed the Tropical Pacific Environmental Screening Levels (TPESL) with the exception of Arsenic, which was less than the site-specific background value (US ACoE Investigating Report for Hospital Dump Site, 2020). ACoE concluded that no further action was needed for cleanup. Although the study noted that hospital related debris is still present at the base of the cliff, e.g., broken bottles, test tubes, IV fluid bottles, metal fragments and a vehicle frame.

To ensure the safety of harvesting food from these coastal waters, BECQ is proposing a future Tier II study of heavy metal contamination in fish tissue and/or biota to assess the *Fish and Shellfish Consumption* DU, as part of the development of a TMDL.

Since, Hidden and Jeffry's beaches have been virtually closed off from visitors during road construction, only Old Man by the Sea's coastal water had Enterococci exceedances again this reporting cycle. The primary sources of bacteriological impairment include sediment-laden stormwater carrying naturally occurring Enterococci, waste from free-range domestic and feral animals, birds, and visitors. There are no public restrooms in this remote watershed. As a result, diapers, and human waste have been observed in caves adjacent to this remote beach, which does not support the *Recreation* DU.

It is hoped that DCRM's infrastructure improvements will provide visitors with a much-needed public toilet to prevent further unsanitary practices.

Talofofo watershed's lookouts to coastal waters continue to attract visitors to view the dramatic shoreline, raised reef platforms and tide pools, and spectacular rock formations. Based on this, Talofofo's coastal waters fully supports the *Aesthetic Enjoyment* DU.

Talofofo - Freshwater Streams

The Talofofo Watershed has intermittent streams that flow the most consistently in 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 (July through October). 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" and beautiful for visitors to enjoy year round. Based on these findings, and visual observances of the WQS/NPS field crew, Talofofo's freshwater streams fully support the *Propagation of Aquatic Life* and *Aesthetic Enjoyment* DUs.

To ensure the safety of harvesting food from these streams, BECQ is proposing a future Tier II study of heavy metal contamination in fish tissue and/or biota to assess the *Fish and Shellfish Consumption* DU.

Stream water quality data is limited, with only one to three data points collected each year from stream reaches when they were flowing during the implementation of the SWQMP from FY2013 through FY2016. This number is insufficient to provide a robust statistical assessment of the *Recreational* DU, and further efforts to grab water quality samples were dropped and replaced with the SVAP in FY2017. However, given past Enterococci exceedances and Leptospirosis illnesses associated with skin contact in Talofofo's streams, recreating in these waters may pose a health risk, which is unsupportive of this DU. Visual field assessments established that sediment-laden stormwater and fecal contamination from free-range cows, goats, and pigs, were the most likely sources of Enterococci contamination. WQS/NPS staff monitor which farm owners are responsible for roaming livestock, request that they keep their animals penned, and if they do not comply, report them to DPL; the permit enforcement authority for agricultural plot activities.

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 groundwater 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 remain 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 Bacteriological TMDL.

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 LaoLao Bay Golf Resort, shown in Figure C-11., on the following page.

FIGURE C-11. Kagman Watershed (Segment 14)

It has four long-term BEACH monitoring sites located in the waters surrounding Marine, Tank, Forbidden Island, and North LaoLao beaches. In addition, there are also three LaoLao ARRA water quality sites, and two biological monitoring reef flat sites used to assess Kagman's coastal waters. These sites are adjacent to LaoLao's northern beach, one of Saipan's most popular dive sites.

The ARRA sites were established in 2010 to evaluate the efficacy of the LaoLao Bay road construction project, and revegetation of the badlands in the upper watershed. These efforts effectively minimized the amount of sediment and other NPS pollution from entering LaoLao Bay.

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.

Kagman's uplands are composed of porous karst soil that allows surface water to percolate into the groundwater 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." (Bacteriological TMDL, 2018). 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 not available for village residents' use. So, several low-income families unable to afford "permittable" IWDS 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 a 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 wild 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 Bacteriological TMDL report noted that the NRCS Kagman Watershed Project has made "significant infrastructural investments… in stormwater management and sediment mitigation". This reporting cycle USDA earmarked funding to complete the next phase of the project, which includes flood and sediment storage, infrastructure improvements, lining the 70 million gallon reservoir, and building the waterway to divert stormwater from flowing to and adversely impacting the Tank Beach Conservation area. The reservoir will provide essential water to irrigate Kagman's agricultural plots.

This year biological monitoring data was gathered at a new Tank Beach Reef Flat site for the 2020 NCCA. The benthic substrate assessment received an ALUS ranking of "Good". In addition, the tank beach forereef site showed a significant improvement to coral diversity and was upgraded to "Fair" resulting in a five-year cumulative ranking of "Fair" again this reporting cycle.

There was a notable improvement in Kagman's nutrient levels from last reporting cycle. Every site met the WQS for both Orthophosphate and NO_3-N, except for the North Laolao BEACH site that exceeded the CNMI WQS for Orthophosphate. Potential sources include Laolao Bay Golf Course, and fresh groundwater seeps carrying contaminants from failing IWDs.

All sites met the CNMI WQS for pH. The exceedances in FY2018 and 2019, are thought to be erroneous due to an aging YSI probe that was phased out and replaced in 2020. Due to present and past exceedances, Kagman's coastal waters remain on the 303(d) list as impaired, which does not 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.

Enterococci levels exceeded the CNMI WQS at two of the North ARRA reef flat sites on one sampling event when heavy rains were reported in 2020. Due to COVID-19 restrictions, there were only nine days in 2020 when the ARRA sites were sampled. Therefore, one exceedance resulted in 11% annual exceedance of the CNMI WQS, the source of which is associated with sediment-laden stormwater runoff. These exceedances along with the past Enterococci and pH exceedances result in Kagman's coastal waters remaining on the 303(d) list as impaired this reporting cycle, which does not support the *Recreational DU*.

Once again, Kagman's coastal waters that surround Forbidden Island, Marine Beach and the 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 using aerial drone imagery. Kagman's stream water quality data is very limited, with only one to two data points collected from stream reaches when they were flowing during the implementation of the SWQMP from FY2013 through FY2016. This number was insufficient to provide a robust statistical assessment of the *Recreational* DU, and further efforts to grab water quality samples were dropped and replaced with the SVAP in FY2017. WQS/NPS field staff reported seeing deer near the streams and evidence of local residents harvesting shrimp from its pools (Personal observation, Kathy Yuknavage). Additional information from the 2008 study by McKagan, et.al, also reported 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, Kagman's freshwater stream systems support the *Propagation of Aquatic Life* DU.

Based on past Enterococci exceedances and the presence of roaming deer near the stream, there is a potential health risk with recreating in these waters based on professional judgement. However, there is insufficient water quality data from the past five years to fully assess the *Recreational* DU.

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

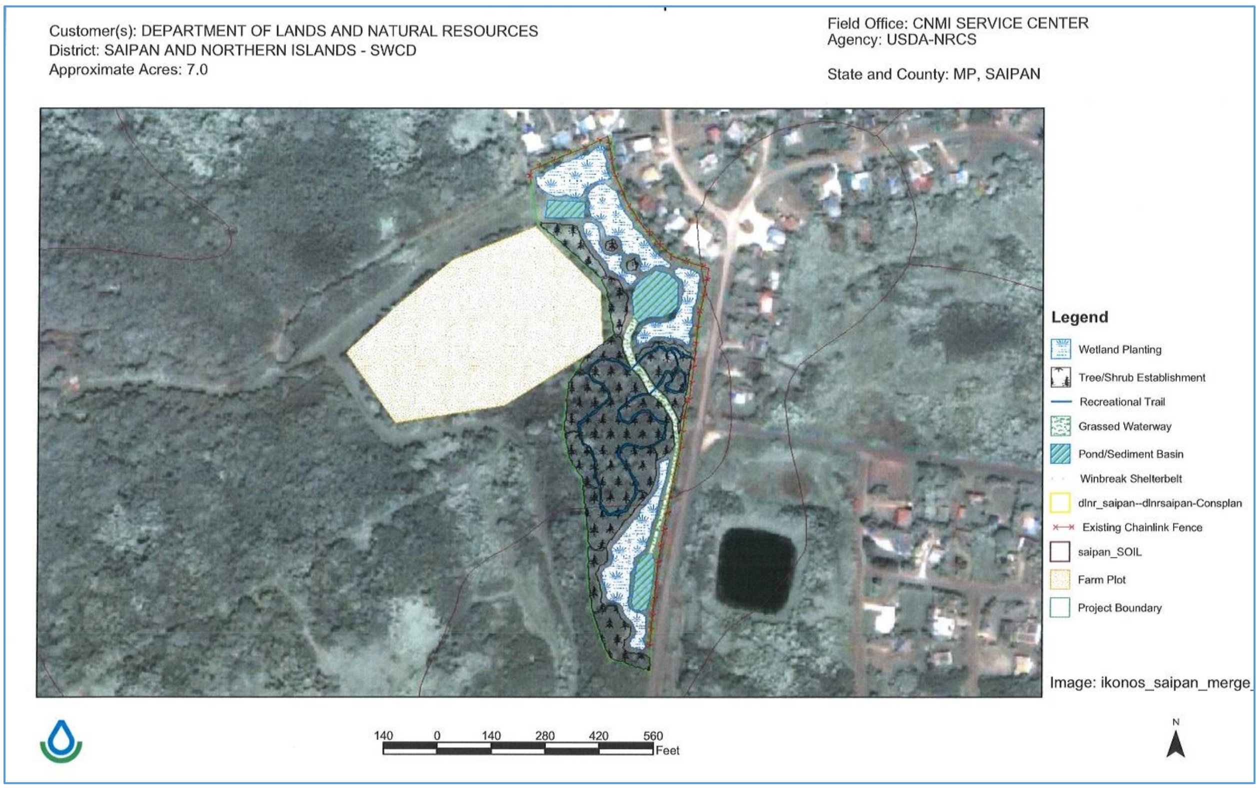
The ephemeral streams in the Kagman Watershed do not have a sufficiently sustained volume to provide a reliable *Potable Water Supply*. Therefore, they are not assessed for this DU.

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 north of ChaCha Rd.

FIGURE C-12. Education Island Wetland



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 wetland function, and wildlife habitat wetlands provide. The wetland is maintained by NRCS and for this reason it supports the *Propagation of Aquatic Life* DU.

Kagman – CALM Categories

Kagman's coastal waters retain CALM Category 5, due to Orthophosphate, and past NO_3-N, and pH exceedances, which do not support the *Propagation of Aquatic Life* or *Recreational* DUs. Enterococci exceedances are being addressed through the implementation of the 2018 Bacteriological TMDL for Saipan.

Kagman's freshwater streams retain a CALM Category 3 due to insufficient water quality data to assess the *Recreational* DU. The surrounding homesteads pose potential stressors to stream health.

Kagman's wetlands retain CALM Category 1.

C.3.5.4. LAOLAO - Waterbody Segment 15

LaoLao watershed encompasses most of LaoLao Bay, which has important historical, ecological, and cultural significance (Figure C-13). 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; three ARRA reef flat sites (C2, C5 and C8); and three biological monitoring sites that jointly 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 continued 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 for picnics under the Pala Palas. LaoLao coastal waters are enjoyed daily by visitors for fishing, swimming, snorkeling, and SCUBA, which fully supports the *Aesthetic Enjoyment* DU.

A Central LaoLao biological reef flat site was assessed this reporting cycle as part of the 2020 NCCA. It received an ALUS ranking of "Fair". There was no significant change in the biological ALUS ranking of the forereef in front of the north LaoLao dive site since last reporting cycle. It remained in "Fair" condition, and the southern LaoLao's forereef site remained in "Poor" condition.

The MMT reported in the *CNMI State of the Reef Report,* that there was a decline in coral cover, "…most notably in Lau #2". However, 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, and a COTS outbreak last reporting cycle.

FIGURE C-13. LaoLao Watershed (Segment 15)

The MMT have created a response plan to eradicate COTS during outbreaks by injecting household vinegar into the starfish, which is reported to kill them within 48 hours (Perez et.al., 2021). “The MMT employed such methods during a recent aggregation of COTS at Lao Bay in August 2021, where 31 adult COTS were injected on a single dive”.

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 through the soil into the groundwater, 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, the ARRA LaoLao Road Improvements, and the badland revegetation Projects.

LaoLao's coastal waters exceeded the CNMI WQS for Orthophosphate and NO_3-N again this reporting cycle, the source of which is unproven, but may be associated with failing septic systems in the upper watershed causing nutrient loading from stormwater runoff. Shore birds are another contributor. The Sinigalliano qPCR MST study completed this reporting cycle found bird marker in LaoLao's coastal waters.

Excessive algal growth has been observed in LaoLao Bay during the rainy season, especially September through October. As a result, LaoLao's coastal marine waters retain a 5-year cumulative ALUS ranking of "Poor" again this reporting cycle. This and nutrient exceedances are cause for LaoLao's coastal waters to remain on the 303(d) list as impaired, which is unsupportive of the *Propagation of Aquatic Life* DU.

Enterococci levels exceeded the CNMI WQS at one South ARRA reef flat site in FY2020 on a single sampling event when heavy rains were reported. Due to COVID-19 restrictions, there were only nine days in 2020 when the ARRA sites were sampled. Therefore, this one exceedance resulted in 11% annual exceedance of the CNMI WQS, which is considered impairment.

In the past, the source of exceedances has been associated with sediment-laden stormwater runoff, carrying contaminants from failing septic systems in the upper watershed and shore birds. These results are cause for LaoLao's coastal waters to remain on the 303(d) list as impaired, and are unsupportive of the *Recreational* DU.

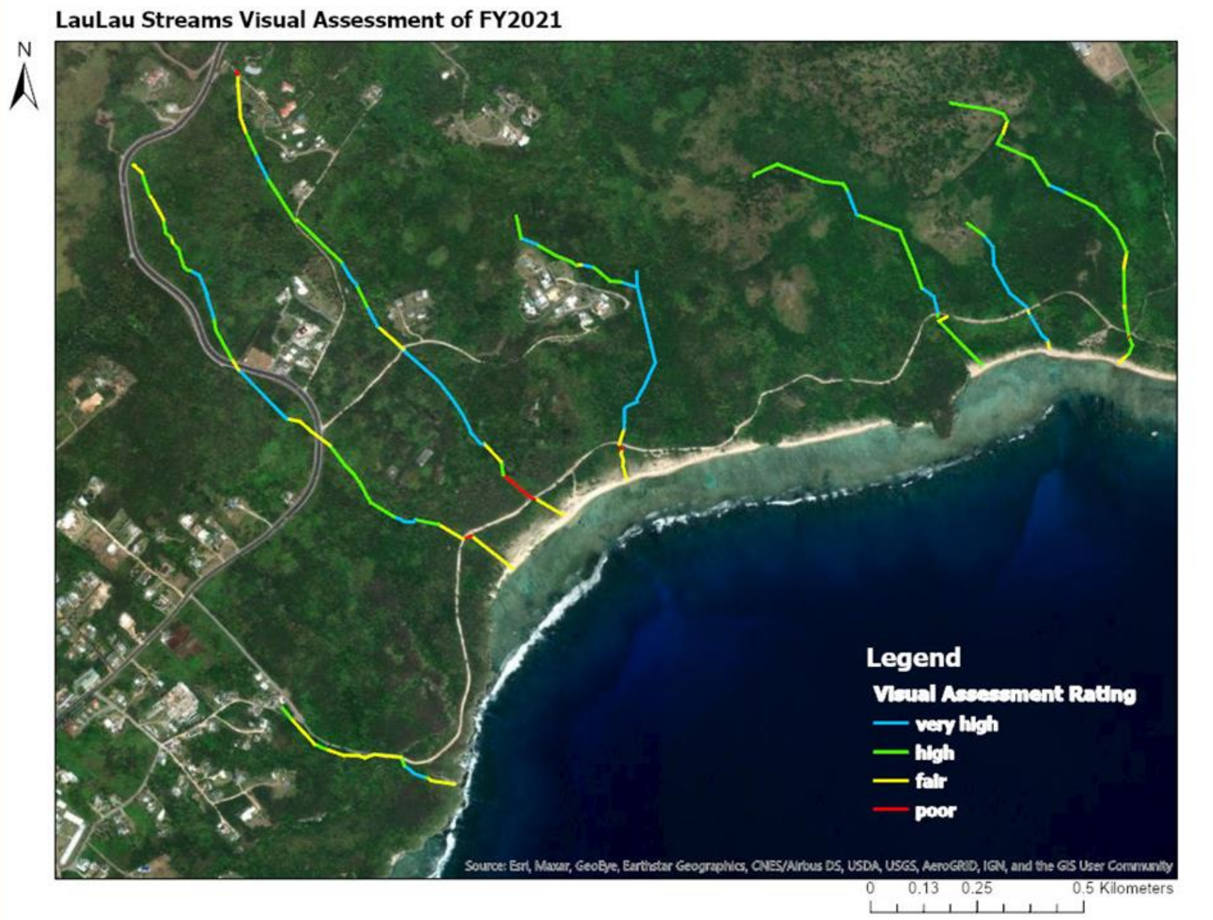
There is insufficient data concerning fish tissue or biota contamination on LaoLao's coastal waters to assess the *Fish and Shellfish Consumption* DU.

LaoLao - Freshwater Streams

A SVAP assessment of Laolao's stream systems was completed this reporting cycle. The Chamorro place name for the eastern stream system is "Kånnat Tåddung" and the furthest western system is named "Kånnat Putting". There is not a traditional name for the stream system in the middle of the watershed (Communication with Genevieve S. Cabrera, historian, 2022). Figure C-14 on the following page shows the SVAP rating of each stream reach within the LaoLao stream system that was assessed this reporting cycle. Predictably, the poorest rated reaches were adjacent to roadways and constructed culverts where eroded banks, invasive vines, and trash were frequently found. However, most reaches were ranked as "Fair", "High", or "Very High". The highest rated stream reaches were located away from developed areas and roadways with stable stream banks, embeddedness and diversity of native flora, and fauna.

There is too little precipitation, topographical, and geological features in the LaoLao watershed to sustain consistent stream flow to provide a sustainable *Potable Water Supply*.

FIGURE C-14. 2022 LaoLao SVAP Ranking (Segment 15STR)



LaoLao's stream water quality data is very limited, with only two to three data points collected from stream reaches between FY2014 through 2015 during the implementation of the SWQMP. This number was insufficient to provide a robust statistical assessment of the *Recreational* DU, and further efforts to grab water quality samples were dropped and replaced with the SVAP in FY2017. The SVAP confirmed that there is not harvestable aquatic life in the streams. Local residents support this finding (personal communication, resident Jacob T. Lizama, April 2022). However, at the time of this writing, there is insufficient data to fully assess the *Fish and Shellfish Consumption* and *Recreation* DUs.

Many aquatic invertebrates were observed in LaoLao's streambeds during the SVAP assessment. Based on these findings LaoLao Streams fully support the *Propagation of* (Invertebrate) *Aquatic Life* DU.

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 retain a 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. Enterococci exceedances are being addressed by the 2018 Bacteriological TMDL.

LaoLao's streams retain a CALM category 3.

C.3.5.5. DAN DAN - Waterbody Segment 16

The majority of Dan Dan watershed's population resides in the upper watershed well away from the coastal shelf and cliff line. A municipal sewer line is not available in this watershed. Therefore, Dan Dan 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 reef flat biological monitoring site (CNMI-72) that is sampled annually for assessment purposes and is shown in Figure C-15., on the following page. It is located adjacent to a pristine pocket beach next to the cliff line.

Dan Dan - 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 land owners that live in the upper watershed. 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.

A Biological ALUS assessment of Dan Dan's coastal waters was conducted for the first time this reporting cycle, and they were ranked as "Good". All water quality levels were well within CNMI WQS as well. Therefore, Dan Dan's coastal waters fully support the *Propagation of Aquatic Life,* and *Recreational* DUs*.*

No fish tissue or biota studies have been conducted to assess Dan Dan's coastal waters support of the *Fish and Shellfish Consumption* DU.

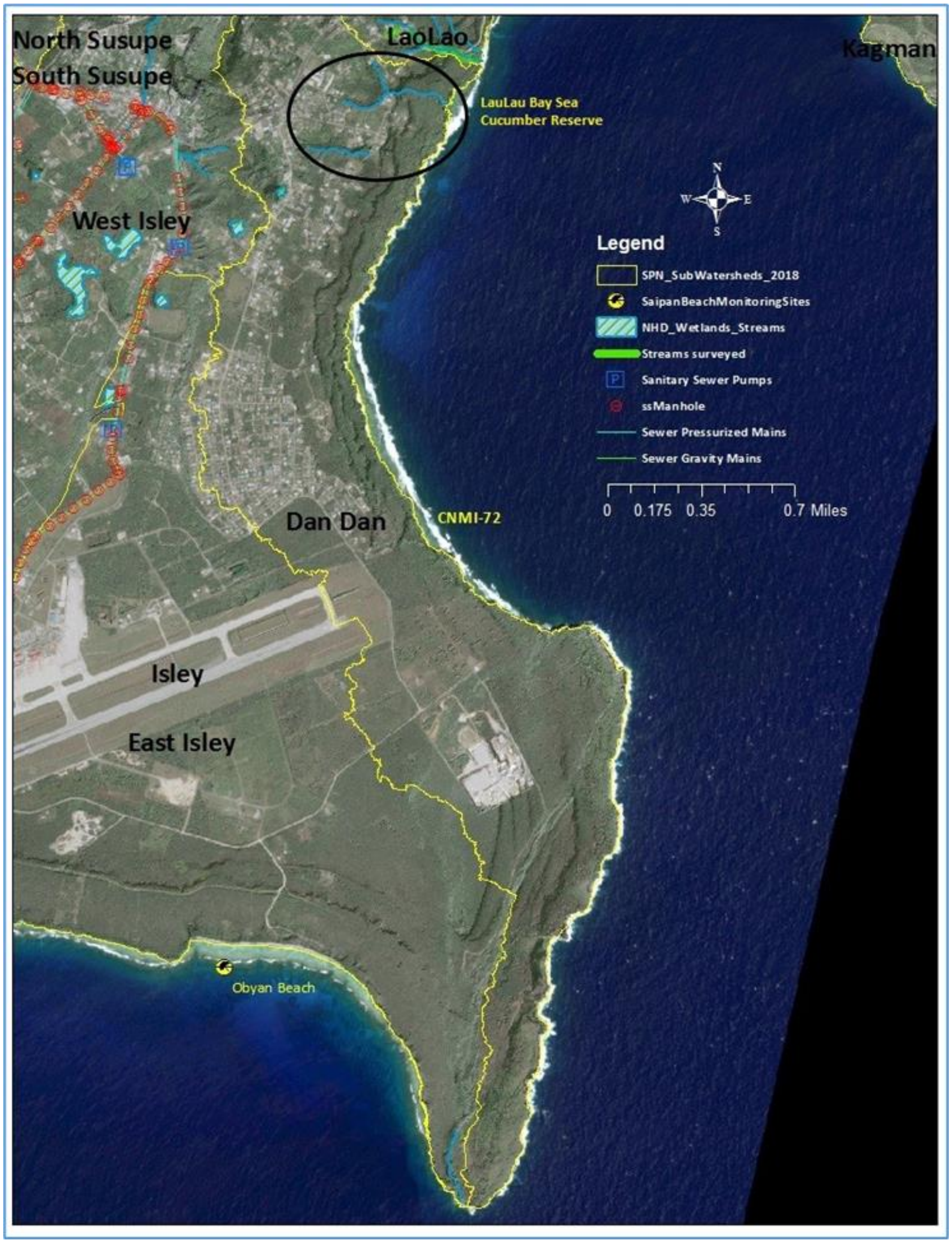
Dan Dan's rugged coastline is "pristine" with breathtaking reef assemblages for those few visitors with the opportunity to enjoy them. For this reason, Dan Dan's coastal waters fully support the *Aesthetic Enjoyment* DU.

Dan Dan – Freshwater Streams

The latest NHD, and Wetlands and Streams GIS data layers indicate that there are two stream systems in the northernmost part of the Dan Dan watershed, one flowing out to the Sea Cucumber Reserve. The soils surrounding these streams are well drained with a 5-15% slope of Chinen clay loam and Takpochau-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 for harvestable aquatic life to exist.

FIGURE C-15. Dan Dan Watershed (Segment 16)



As was stated for previous watersheds, Dan Dan's streams are not used as a *Potable Water Supply*.

In addition, there has been no water quality data collected on Dan Dan's streams due to infrequency of flow, and a SVAP assessment has not been conducted there. Therefore, at the time of this writing, there is too little information to assess the *Fish and Shellfish Consumption* and *Recreational* DUs. However, seasonally there may be enough water present to support some life stages of aquatic invertebrates, so, for now the *Support and Propagation* of (Invertebrate) *Aquatic Life* DU is reinstated, but is yet to be assessed.

Residents have reported that the streams are not visited during rain events due to the hazardous rapid flow (personal communication, resident Ana Agulto, April 2022). However, when dry they 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 latest NHD, and Wetland and Stream GIS data layers show a very small riparian wetland in Dan Dan's upper middle watershed that is surrounded by developments and homes. 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 3, due to insufficient information.

The Dan Dan wetlands were assigned a CALM Category 3 due to insufficient information. Although unproven, there are potential anthropogenic stressors from nearby residences with failing IWDS or altering of wetland habitat.

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

The Isley Watershed (Figure C-16) is divided into sub-watersheds, East Isley (17B) and West (17A). Isley's headwaters start at the centrally located peak of Mt. Takpochau at 1554 feet. Mt. Takpochau's surface waters flow from its ridge by subterranean transport to the south coast.

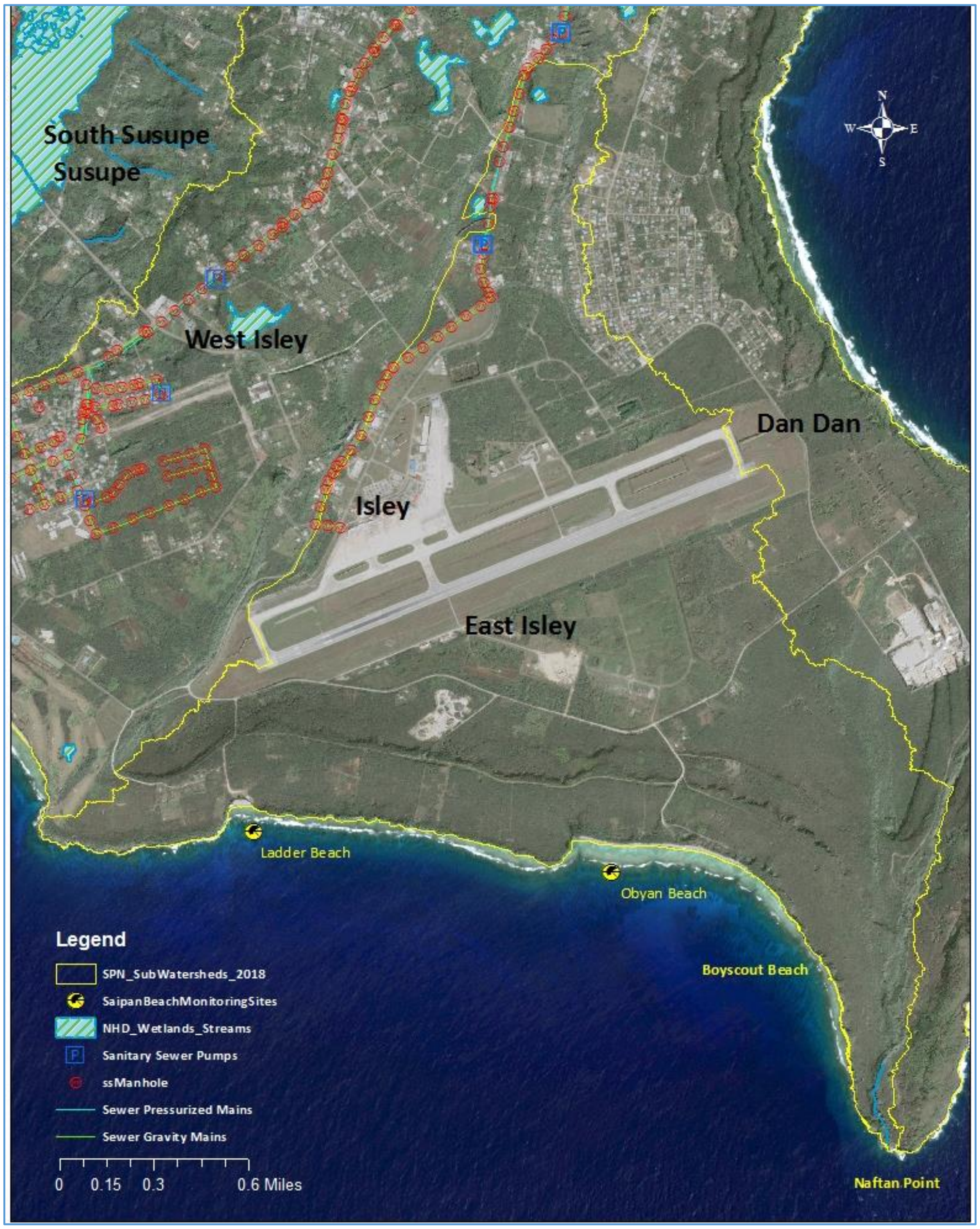
FIGURE C-16. Isley Watershed (Segment 17A and 17B)

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.

East Isley – Waterbody Segment 17B

East Isley's Watershed (Figure C-17.) contains Saipan's present day, Francisco C. Ada International Airport that was constructed over a Formerly Used Defense Site (FUDS). A WWII military dumpsite is located in East Isley at Naftan Point. There is PFOS and FPOA contamination of ground water here associated with wartime activities, and airport firefighting drills.

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



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

East Isley - Coastal Marine Waters

Obyan beach is located in the East Isley Watershed 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 restaurant is located next to the stairs, but is now closed and only occasionally rented out for weddings or other gatherings. Thus, East Isley's coastal waters attain the *Aesthetic Enjoyment* DU.

A new biological ALUS reef flat site was added this reporting cycle as part of the 2020 NCCA. It is located on Obyan's reef flat and it was ranked as "Good". The Obyan Beach's forereef showed no significant change in benthic substrate quality and remained ranked as "Poor" due to its lack of coral diversity. The reef in front of Boy scout Beach showed significant improvement with a reduction in macroalgal growth and is ranked as "Good" this reporting cycle. Therefore, East Isley's 5-year ALUS cumulated ranking was upgraded to "Fair" this reporting cycle and now meets the biological monitoring criteria.

The orthophosphate level exceeded the CNMI WQS at Ladder beach on one sampling event in FY2020. Due to COVID-19 restrictions, there were only nine sampling events that year. Therefore, one exceedance resulted in 11% annual exceedance of the CNMI WQS. Due to the very limited data. The source of phosphate exceedances remains unknown.

This reporting cycle, pH levels met the CNMI WQS at all sites. There were exceedances in FY2018, but this was attributed to the aging probe that was phased out of use and replaced with a new YSI Pro DSS meter. Due to past and present exceedances, East Isley's coastal waters remain on the 303(d) list as impaired for phosphate and pH, which is unsupportive of the *Propagation* of *Aquatic Life* DU.

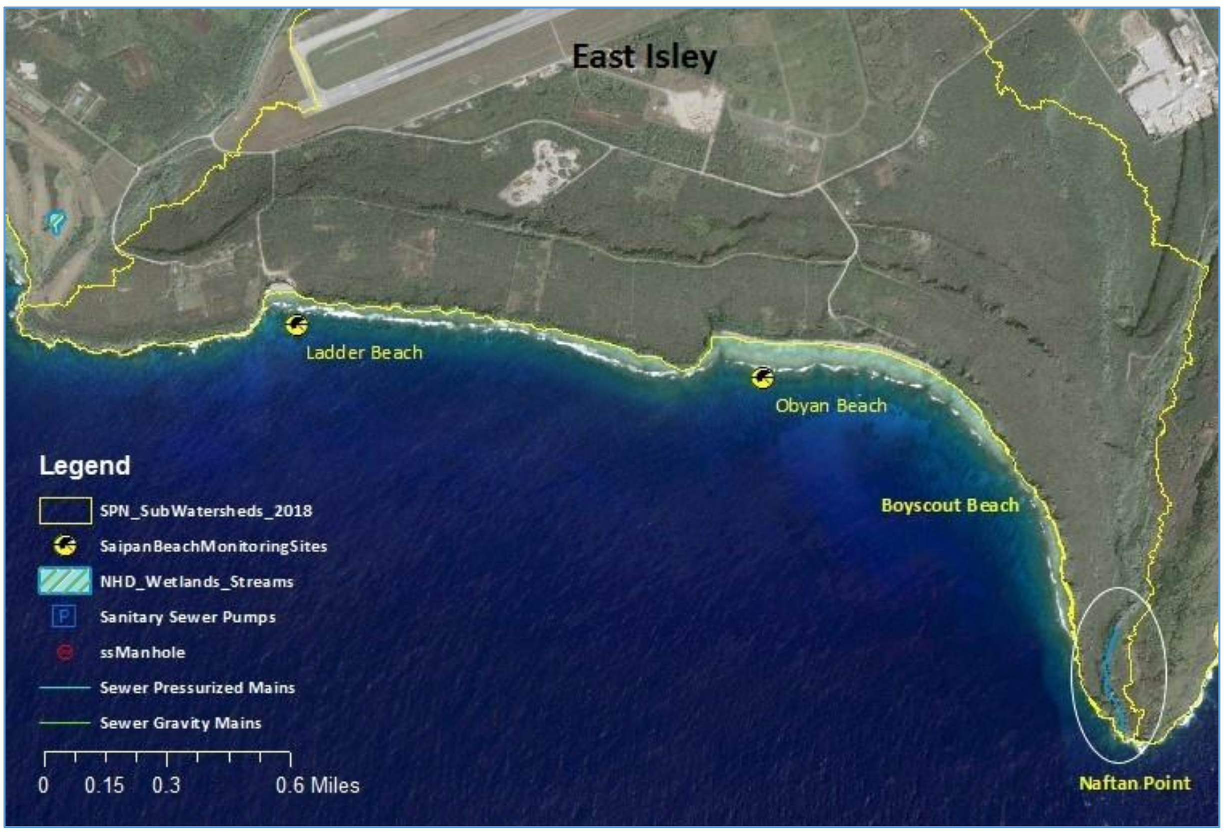
The 2016 heavy metal sediment study conducted by Denton, et.al, found that soil collected from the "extensively fired ravine dump at 'Naftan Point' …was notably enriched with all metals, especially Ag, Cd, Cu, Hg, Pb, and Zn.", (Denton, 2016). This is of importance given that metals are taken up by territorial "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 be conducted here, as well as at all legacy WWII dump 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 free-range cattle, roaming upland of the cliff line. There are very few visitors to this BEACH site due to the closure of the restaurant and COVID-19 restrictions. This includes much less vehicular traffic of any kind this reporting cycle. However, during torrential rains large volumes of sediment-laden stormwater runoff can be seen entering Ladder beach's surrounding coastal waters. Given Enterococci exceedances and past pH results, East Isley's coastal waters do not support the *Recreational* DU.

East Isley – Freshwater Streams

At this writing, the remote ephemeral Naftan Stream system has not been assessed using the SVAP (See white circle in Figure C-18).

FIGURE C-18. Naftan Point Stream (CN17STRB)



This is due to the difficulty in accessing it by land, which is far removed from any road or trail system. It meets the ocean at a steep cliff line so accessing it by boat is not possible. However, hashers that have made the difficult hike to this streambed found no evidence of trash, soil saturation, flow, or fish or shellfish (personal communication, Travis Spaeth, April 2022).

Therefore, this stream system has very limited anthropogenic impacts to alter its natural aesthetic condition.

The most recent NHD, and the Wetlands and Streams GIS data layers indicate that the geology and topography would not support the existence of freshwater pools for harvestable aquatic life to exist. Precipitation flows by subterranean transport from land to sea. However, at the time of this writing there have been no data collected to assess the *Fish and Shellfish Consumption,* or *Recreational* DUs. A SVAP assessment of East Isley's streambeds has also not been completed. However, seasonally there may be enough water present to support some life stages of aquatic invertebrates So, there is insufficient information to assess the *Support and Propagation* of (Invertebrate) *Aquatic Life* DU.

As was stated last reporting cycle, East Isley's streams have insufficient precipitation to support the *Potable Water Supply* DU.

Hikers that have reached this remote streambed may enjoy it's pristine setting and an incredible view of the ocean from the Naftan Point cliff line. Therefore, based on anecdotal information and professional opinion, East Isley's stream systems fully support the *Aesthetic Enjoyment* DU.

East Isley - Wetlands

The most recent NHD, and Wetlands and Streams GIS data layers show very small emergent or marsh wetlands in the upper East Isley watershed near agricultural plots and sewer line infrastructure that may have altered wetland habitat. Due to their small size and difficulty in accessing these remote wetlands, to date they have not been delineated or valuated using the CNMI Wetland RAM. Therefore, there is insufficient data to assess attainment 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 previous 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 Bacteriological TMDL.

East Isley's freshwater streams retain a CALM category 3. There is a lack of sufficient information to assess *Propagation of* (Invertebrate) *Aquatic Life* DU.

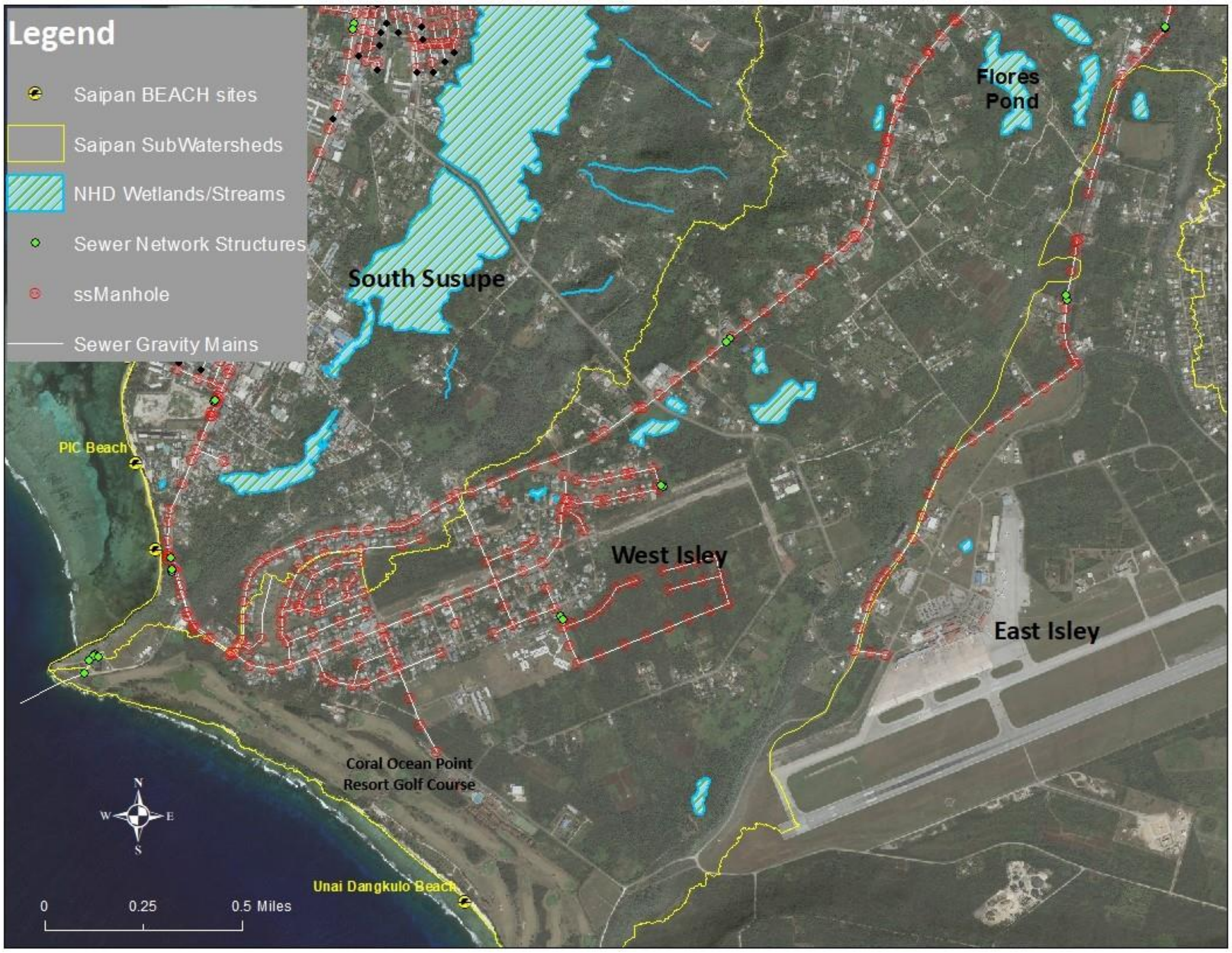
The East Isley's wetlands retain a CALM category of 4c due to lack of sufficient information, and the potential presence of anthropogenic stressors that may alter habitat, which is not a pollutant.

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), and 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.

FIGURE C-19. West Isley Watershed (Segment 17A)



As shown in Figure C-19., West Isley has one long-term BEACH monitoring site located on Unai Dangkulo Beach located west of Coral Ocean Point Golf Course and Resort. It should be noted that Coral Ocean Point Golf Course and Resort has reopened this reporting cycle after making significant repairs as part of Super Typhoon Yutu recovery efforts.

West Isley - Coastal Marine Waters

The ALUS biological assessment of West Isley's coral reef flat at Unai Dangkulo "Coral Ocean Point Beach" were ranked as "Poor" again this reporting cycle. This was due to no significant improvement to benthic substrate quality, or recovery from previous bleaching events.

In addition, Orthophosphate exceeded the CNMI WQS, but just on one occasion in FY2020. Due to the very limited number of sampling events that year, this one exceedance resulted in 11% annual exceedances. Due to the very limited data available, the source of the elevated Orthophosphate levels is unknown.

West Isley's coastal waters were well within the standards for pH. The pH previous exceedances are attributed to the aging probe that was phased out of use and replaced with a new YSI Pro DSS meter. As the result of these findings, West Isley's coastal waters remain 303(d) listed as impaired, and do not support the *Propagation* of *Aquatic Life* DU.

A 2016 study by Denton, et al., reported Cu and Pb contamination of biota within West Isley's near shore. The heavy metal contamination is thought to be associated with a former WWII debris dumpsite at Agingan point cliff. 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. These two sources are cause for West Isley's coastal waters to be considered unsupportive of the *Fish and Shellfish Consumption* DU.

West Isley's coastal water quality exceeded the CNMI WQS for Enterococci again this reporting cycle. The NPDES permitted WWTP's secondary clarifier was offline from June 2018 to May 2019, and the aerators were offline from November 2019 to February 2020 (NPDES permit application, October 2021). This may have contributed to the elevated Enterococci levels, but they may also be associated with sewer lines in need of repairs or upgrades, or failing on-site septic systems. In addition, WQS/NPS samplers have seen diapers left on the beach on days when enterococci levels exceeded 1000 MPN/100. Therefore, West Isley's coastal waters do not support the *Recreational* DU.

Unai Dangkulo 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.

West Isley – Freshwater Streams

The head waters of West Isley's stream system begin on Mt. Takpochau. The upper stream system is difficult to access due to lack of trails and roadways up to the ridgeline which is heavily vegetated with sawgrass. The most recent NHD, and the Wetlands and Streams GIS data layers, indicate that the geology and topography would not support the existence of freshwater pools for harvestable aquatic life to exist. This is supported by reports from hashers that have made this difficult hike. They report no evidence of soil saturation, fish, shellfish or flow in these streambeds (personal communication, Travis Spaeth, April 2022). Precipitation flows by subterranean transport from land to sea. Therefore, there are no data to assess the *Fish and Shellfish Consumption,* and *Recreational* DUs.

However, seasonally there may be enough water present to support some life stages of aquatic invertebrates So, there is insufficient information to assess the *Support and Propagation* of *(*Invertebrate) *Aquatic Life* DU.

As was stated last reporting cycle, West Isley's watershed, has insufficient precipitation for their ephemeral streams to support the *Potable Water Supply* DU.

Kannat Tabla village located below the ridgeline floods during torrential rains in rainy season from stormwater flowing over impervious surfaces. The flow is not considered a stream, but channelized stormwater directed into culverts and catchment basins in the highly developed San Vicente and Dan Dan villages.

FIGURE C-20. West Isley Streams (Segment 17STRA)

Hashers and West Isley residents have reported hiking in the lower dry streambeds to enjoy the natural beauty and for exercise. Based on this, West Isley's streams fully support the *Aesthetic Enjoyment* DU.

West Isley - Wetlands

The most recent NHD, and Wetlands and Streams GIS data layers show significant natural emergent wetlands, or marsh areas that have been tilled for agriculture in the mid and upper West Isley watershed, as well as a constructed mitigation wetland, and the Flores Pond system (Figure C-21).

These wetlands exist due to clay geology which acts as an aquitard and holds the freshwater longer than in other places on Saipan. Information gathered during the 2021 NWCA found that Flores Pond does not contain standing water year-round that would support fish, but it is home to many aquatic invertebrates when flooded, e.g., water striders, aquatic beetles and other insects. The Pond is an important migratory bird habitat for the endangered Mariana Moorhen. Therefore, West Isley's wetlands support the *Propagation of Aquatic Life* DU, but they also have altered habitats.

FIGURE C-21. Flores Pond in Rainy Season (NWCA – August 2021)

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, and past pH exceedances of the CNMI WQS, which are unsupportive of the *Propagation of Aquatic Life, Fish and Shellfish Consumption,* and *Recreational* DUs. Enterococci exceedances are addressed by implementation of the 2018 Bacteriological DU.

West Isley's freshwater streams retain a CALM category 3, due to insufficient information to fully assess the *Propagation of* (Invertebrate) *Aquatic Life* DU.

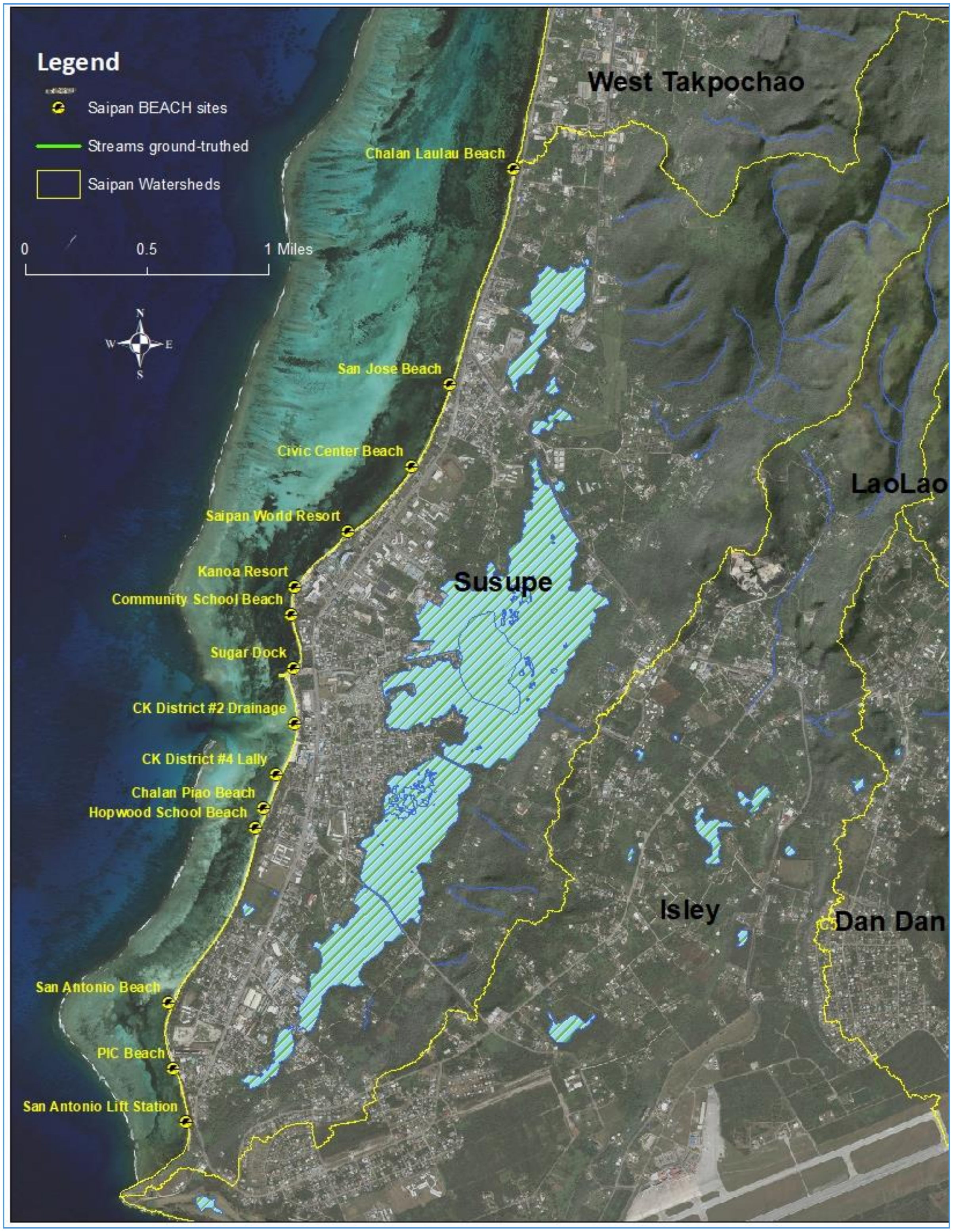
The West Isley's wetlands retain a CALM category of 4c based on findings during the 2021 NWCA, and the potential presence of anthropogenic stressors from urban development altering their habitat.

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) Susupe, as shown in Figure C-22., on the following page.

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

FIGURE C-22. The Entire Susupe Watershed



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.

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-22., on the previous page.

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

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" and barbeque pits. These are enjoyed daily by residents and visitors. Therefore, South Susupe fully supports the *Aesthetic Enjoyment* DU.

The MMT assessment of three long-term biological monitoring sites found a significant increase in Halodule spp. near the Sugar Dock and San Antonio seagrass beds. Each were given an ALUS ranking of "Good". This resulted in South Susupe's coastal waters receiving a five-year cumulative ranking of "Good", upgraded from "Fair" last reporting cycle.

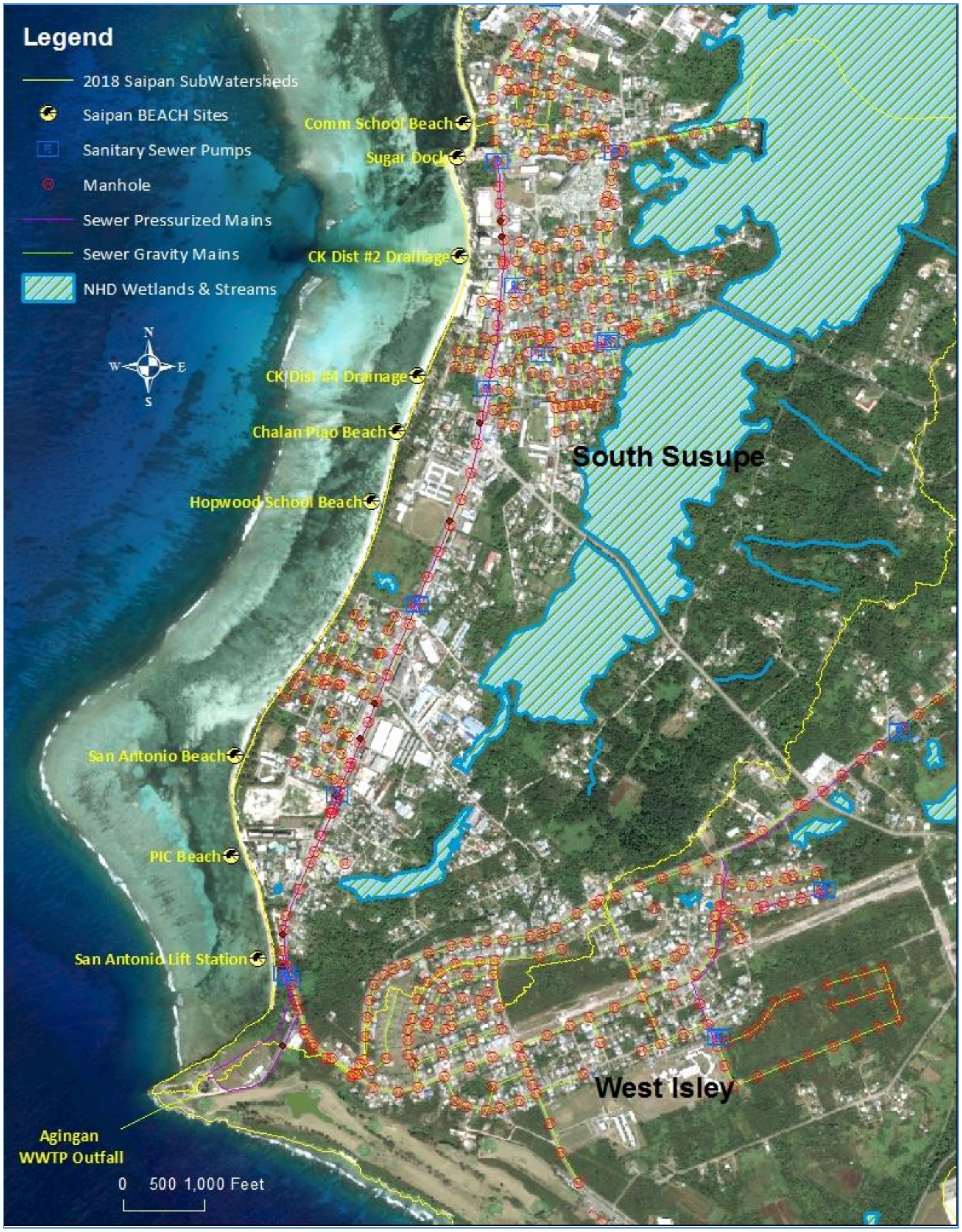
South Susupe's coastal water quality exceeded the CNMI WQS for Orthophosphate and NO_3-N again this reporting cycle, resulting in South Susupe's coastal waters remaining on the 303(d) list as impaired. DO% levels have noticeably improved, but Sugar Dock still had exceedances in FY2020.

There were no exceedances of the WQS for pH this reporting cycle. The exceedance at Sugar Dock in FY2019 is attributed to the aging pH probe that was phased out of use in 2020, and replaced with a new YSI meter.

The source of elevated nutrient levels and diminished DO% is unknown, but may be associated with urban runoff during heavy rains, sewer overflows, or fresh groundwater seeps carrying nutrients and aerobic microbes, resulting in decreased oxygenation of coastal waters. 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 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.

FIGURE C-23. South Susupe Watershed (Segment 18B)



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, a future Tier II study of heavy metal contamination in fish tissue and/or biota is being proposed for South Susupe’s coastal waters by next reporting cycle to assess the *Fish and Shellfish Consumption* DU.

There were no Enterococci exceedances of South Susupe’s coastal waters this reporting cycle. The probable cause of improvement is due to CUC’s replacement of dilapidated asbestos cement pipes, installation of new sewer manholes, and rehabilitation of existing manholes inland of Sugar Dock last reporting cycle (2020. As reported by Larry Manacop, CUC engineer). In addition, CUC rehabilitated sewer lines between CK District #2 Drainage and CK District #4 Lally Beach. However, due to exceedances at Sugar Dock and CK District #2 Drainage last reporting cycle, they do not support the *Recreational* DU.

Of note, two additional lift station upgrades are planned (one near Sugar Dock) to increase sewer capacity and improve water quality here. These improvements were delayed this reporting cycle due to COVID-19 government shutdown.

In addition to sanitary overflows, urban runoff, failing IWDs, leftover picnic waste (containing diapers), and waste from stray dogs and cats are other sources of fecal contamination.

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, the latest NHD, and Wetland and Stream data layers indicate that there may be ephemeral streams in South Susupe’s upper watershed near the ridge line. However, there are no roads leading to the streambeds in this rugged undeveloped area, so water quality data has never been collected on its stream flow, nor have visual field assessments been completed. Therefore, there is insufficient information to assess the *Recreational* and *Fish and Shellfish Consumption* DUs. However, South Susupe residents have stated that the streams only flow during torrential rains then quickly dries up (personal communication, resident Shawn Masga, April 2022).

Seasonally there may be enough water present in the streams to support some life stages of aquatic invertebrates, but there is insufficient information to fully assess the *Support and Propagation* of (Invertebrate) *Aquatic Life* DU.

As was stated last reporting cycle, South Susupe’s watershed has insufficient precipitation for their ephemeral streams to support the *Potable Water Supply* DU.

Based on professional judgement, due to the remoteness of this undeveloped portion of the Susupe watershed, these streams like other remote streambeds are less exposed to anthropogenic impacts, and are considered to be fully supporting the *Aesthetic Enjoyment* DU.

South Susupe – Wetlands and Lakes

Wetlands - There has been a plethora of research done in the South Susupe watershed by wetland experts and hydrologists. There is approximately 350 acres of contiguous palustrine emergent and forested freshwater wetland complex located primarily in the South Susupe Watershed.

These wetlands and the Chalan Kanoa Pot Holes, "comprise approximately 75% of Saipan's freshwater wetlands (60% total CNMI's freshwater wetlands", and offer the highest economic value of all CNMI inland wetlands, valued at $4.1 million annually. (*Economic Valuation Study of CNMI inland Wetlands*, Wolfs Co., et.al., Nov. 2019, version 2).

This reporting cycle WQS/NPS staff conducted reconnaissance visits and assessed several wetland sites within the South Susupe complex as part of the 2021 NWCA. Aquatic and terrestrial wetland flora and fauna are in abundance here.

FIGURE C-24. Southeast of Susupe Lake

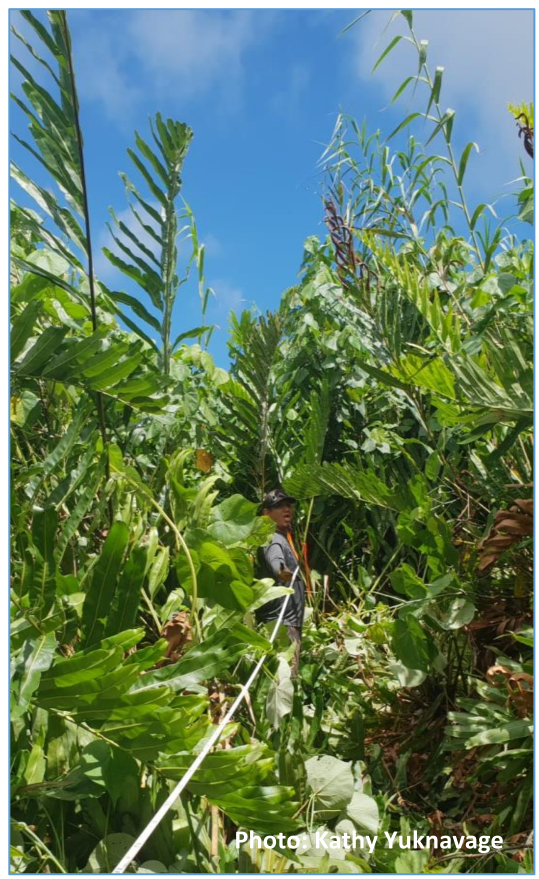


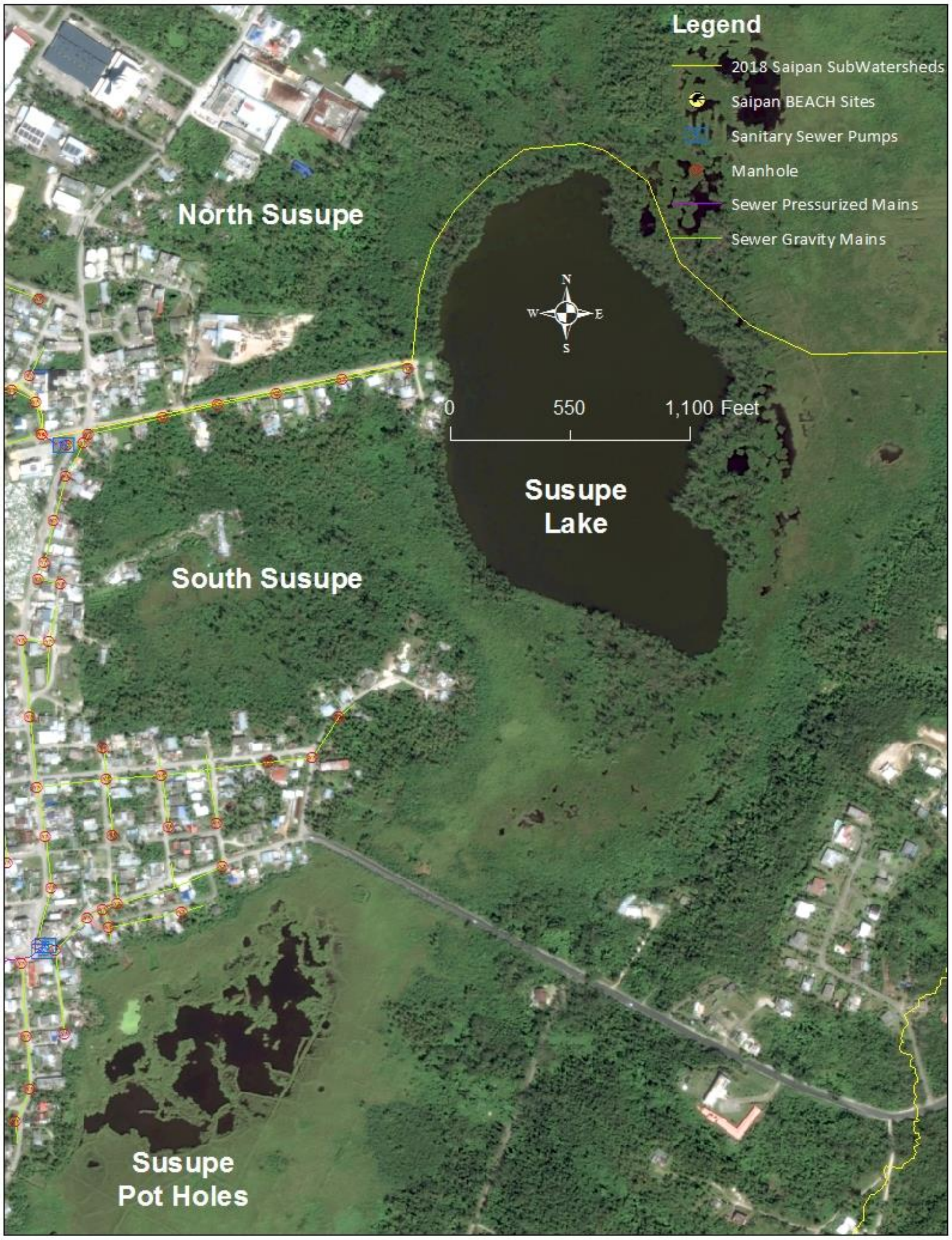
Figure C-24, shows a mature wetland with old growth *Acrostichum aureum* mixed with *Hibiscus* and *Phragmites*.

These wetlands continue to provide vital habitat for many native and endangered species, no matter the size or condition of the wetlands. However, there have been substantial hydrological alterations 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.

Lake - Saipan's only lake, the 40-acre "Susupe Lake" resides in the South Susupe watershed (Figure C-25). Lake water quality is tested every two weeks.

The most recent study by Environet, Inc., entitled "*Assessment of Toxicity and Water Quality of Lake Susupe*", concluded in 2006 that Susupe Lake, "consists primarily of rainfall with minimal groundwater influence" and is "isolated from surrounding groundwater 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 state that the Lake would require treatment to be used as a *Potable Water Supply* due to chloride (unpalatability) and *E. coli* levels.

FIGURE C-25. Susupe Lake and the Surrounding Wetlands and Chalan Kanoa Potholes



Therefore, Susupe Lake could potentially support the *Potable Water Supply* DU given appropriate treatment. However, it is not used as a potable water supply to date. Therefore, the *Potable Water Supply* DU for Susupe Lake is not assessed.

FIGURE C-26. Susupe Lake

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% in FY2019, and high pH concentrations in FY2020 resulting in the lake remaining on the 303(d) list as impaired waters.

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 and requires further investigation to see if the alkalinity is related to natural daily fluctuations from photosynthesis and respiration; increasing pH levels.

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 row 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, and DO% and past pH exceedances, which are unsupportive of the *Propagation of Aquatic Life* and *Recreational* DUs. E. coli exceedances are being addressed by the 2018 Bacteriological TMDL.

South Susupe's Streams received a CALM Category 3 for insufficient information to assess the *Propagation of* (invertebrate) *Aquatic Life* DU.

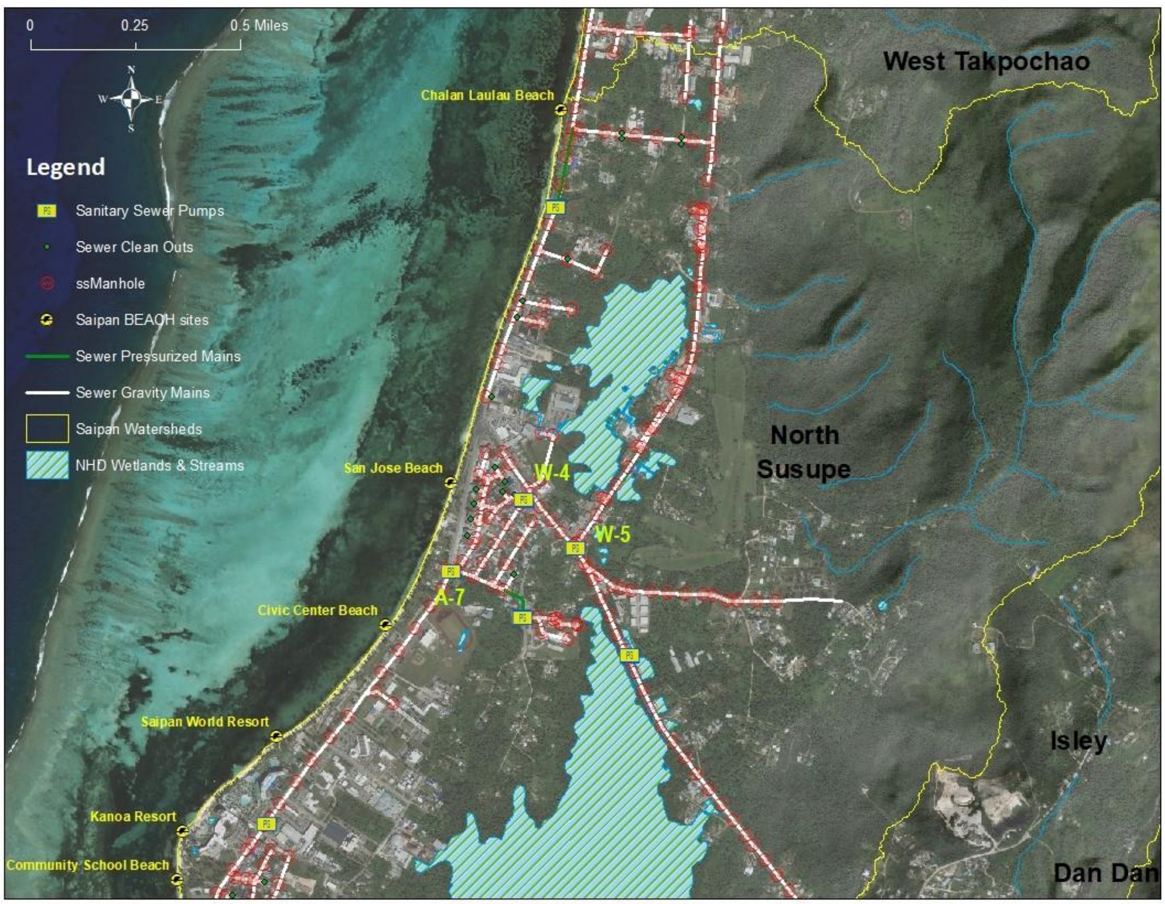
The South Susupe wetlands and potholes retain a CALM Category of 4c, due to non-native aquatic life, and habitat and flow regime alterations, all of which are not considered pollutants.

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

<u>North Susupe – Waterbody Segment 18A</u>

The North Susupe coastline extends from Saipan Community School in the south to Chalan Laulau Beach in the north (Figure C-27).

FIGURE C-27. North Susupe Watershed (Segment 18A)



There are several large resorts, hotels, public beach parks, two Saturday public markets, and basketball courts. 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 previous CNMI IRs. There was no significant change to the benthic substrate, therefore North Susupe's coastal waters retain an ALUS ranking of "Good" this reporting cycle, as well as a 5-year cumulative ranking of "Good".

However, Orthophosphate, NO_3-N, DO% and pH exceeded the CNMI WQS again this reporting cycle for which they remain 303(d) listed as impaired waters. Chalan Laulau beach is the only BEACH site with consistently low pH exceedances over the years. Therefore, North Susupe's coastal waters remain unsupportive of the *Propagation of Aquatic Life* DU.

The source of nutrients, diminished DO% and pH is associated with urban runoff during heavy rains, sewer overflows, and groundwater seeps carrying nutrients and aerobic microbes, resulting in decreased oxygenation of coastal waters. This is supported by the isotope nutrient tracing study lead by Dr. Kiho Kim. The 2020 study entitled, "Submarine Groundwater Discharge to Coastal Waters of Saipan; Implications for Nitrogen Sources, Transport and Ecological Effects", found high submarine groundwater discharge (SGD) areas along the Chalan Laulau coastline. The study stated that, "High SGD areas had lower salinity and pH, higher dissolved inorganic nitrogen concentrations…, and were indicative of sewage nitrogen inputs". (Knapp, et.al., 2020).

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 sewer line and lift stations between San Jose (WB25) and Civic Center Beach (WB26) were upgraded and rehabilitated, which was associated with the decrease in Enterococci exceedances, for which this parameter was delisted. However, this reporting cycle there were again exceedances at the Chalan Laulau BEACH site, which is unsupportive of the *Recreational* DU. This impairment is being addressed by implementation of the 2018 Bacteriological TMDL. It is surmised that there is need for further sewer line upgrades in the area. Groundwater seeps carrying Enterococci from failing on-site IWDS are the other suspected sources of contamination.

North Susupe – Freshwater Streams

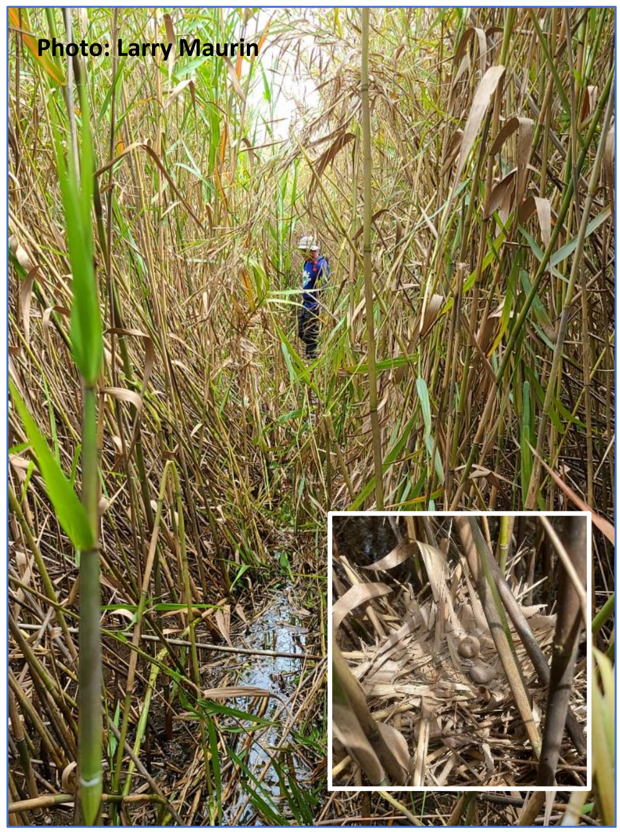
The USGS report completed in 2000 stated that there appears to be, "Some surface runoff from the southwest flank of Mount Tagpochau (sp), which does have discernable stream channels on the topographic maps." This correlates with the latest NHD, and wetland and stream GIS data layers, which also show 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, just like the South Susupe watershed, water quality data have never been collected from North Susupe's stream flow, nor have visual field assessments been completed there. Therefore, there is insufficient information to assess the *Recreational* and *Fish and Shellfish Consumption* DUs.

However, a hasher has reported that, "I have been around the North Susupe area quite a bit. …Very little standing water" (personal communication, Hasher Travis Spaeth, April 2022). They also reported that harvestable aquatic life has not been observed. However, seasonally there may be enough water present to support some life stages of aquatic invertebrates So, there is insufficient information to assess the *Support and Propagation* of (Invertebrate) *Aquatic Life* DU.

As was stated last reporting cycle, North Susupe's watershed has insufficient precipitation for these ephemeral streams to support the *Potable Water Supply* DU.

Due to the streams' remoteness in this undeveloped portion of the watershed, the North Susupe freshwaters streams are considered exposed to limited anthropogenic impacts, and therefore to be fully supporting the *Aesthetic Enjoyment* DU, based on professional judgement.

FIGURE C-28. Moorhen Nest - Chalan Laulau Wetland



North Susupe – Wetlands

This reporting cycle WQS/NPS staff conducted reconnaissance visits and assessed several wetland sites within the North Susupe complex as part of the 2021 NWCA. Aquatic and terrestrial wetland flora and fauna are in abundance here.

These wetlands continue to provide vital habitat for many native and endangered species, no matter the size or condition of the wetlands (See Figure C-28).

However, there have been substantial hydrological alterations from fill for roadways, and urban development. WQS/NPS field staff reported many disturbed areas, dump sites, fill, and introduced non-native species in and around the Chalan Laulau wetlands. These wetlands are located between the Joeten Superstore and Chalan Pale Arnold Road, west of several strip malls, and McDonalds.

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 once again exceeded the CNMI WQS this reporting cycle. This is being addressed by implementation of the 2018 Bacteriological TMDL.

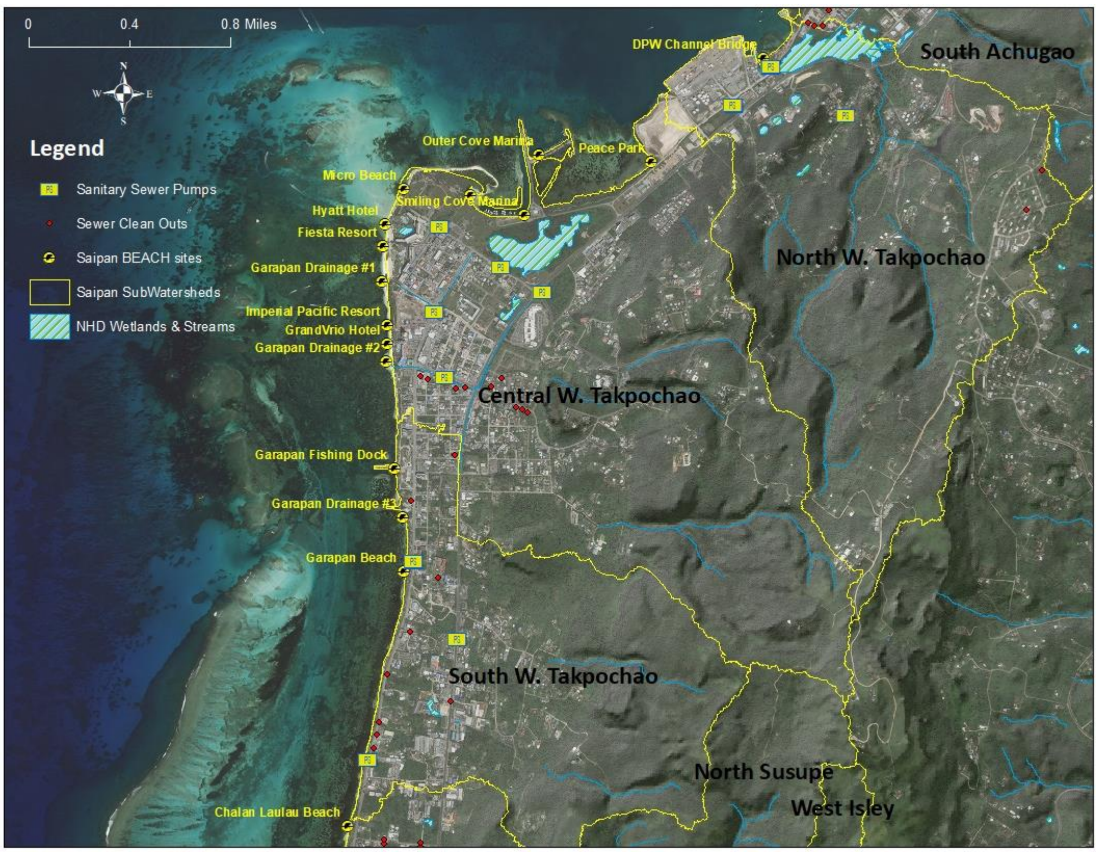
The North Susupe streams retain a CALM Category 3 due to insufficient information about the support and *Propagation of* (invertebrate) *Aquatic Life*, but are not considered threatened due to their remote location.

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

West Takpochau's headwaters start at the peak of Mt. Takpochau (Figure C-29). It is the most urbanized watershed in the CNMI, with the greatest pressure from rapid development. It is the heart of Saipan's tourist district.

FIGURE C-29. 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). A more recent survey of languages and dialects spoken in CNMI villages has not been completed as of the 2020 Census.

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

South W. Takpochau – Waterbody Segment 19C

The South W. Takpochau contains three (3) long-term BEACH monitoring sites at Garapan Beach, north of the "13 Fishermen Monument", Garapan Drainage #3, and Garapan Fishing Dock. These are shown in Figure C-30.

FIGURE C-30. South W. Takpochau Watershed (Segment 19C)

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

There was a significant improvement in the quality of *Halodule* seagrass assemblages in front of the 13 Fishermen Beach site, which received an ALUS ranking of “Good” this reporting cycle, an upgrade from “Poor” last reporting cycle. There was no improvement to the seagrass site near Chalan Laulau Beach, which ranked as “Poor” again this reporting cycle. Therefore, the overall ALUS ranking for South West Takpochau’s coastal waters remained “Poor”, as did the five-year cumulative ranking this reporting cycle.

Several BEACH sites exceeded the CNMI WQS for NO3-N again this reporting cycle, as did pH and DO%. Orthophosphate also exceeded the CNMI WQS for the first time. Therefore, these coastal waters were added to the 303(d) list as impaired for phosphate and the other parameters remain listed. The source of nutrients and diminished DO% levels are groundwater seeps carrying untreated waste from failing septic systems, and urban runoff carrying waste from sanitary sewer overflows that contribute to an excess of aerobic bacteriological activity resulting in decreased oxygenation of coastal waters. This is supported by the 2020 Knapp et.al., isotope nutrient tracing study that states, “an area of persistent high SGD exists in Garapan Lagoon…”, (Knapp et.al., 2020). Samples taken from the South W. Takpochau coastal waters had, “…an isotopic signature consistent with manure or septic systems. Sewage appears to be a more likely N source than manure because the area has relatively little agriculture that would produce or use manure…, but a relatively large human population and failing sewage infrastructure.”

High SGD areas are also associated with low pH levels. Another potential source for low pH is boat maintenance (e.g., residual cleaning solutions or other chemicals used on boat decks or hull surfaces at Garapan fishing dock), or road or other new construction projects in the area (Bacteriological TMDL, 2018).

Due to these findings South West Takpochau’s coastal waters do not support the *Propagation* of *Aquatic Life* DU.

There is insufficient data 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. This indicates that more infrastructure upgrades are needed, as the continued fecal contamination is associated with groundwater seeps carrying waste from failing on-site systems, sanitary sewer overflows, and animal waste. The qPCR-MST and nitrogen isotope source tracking studies supported these findings. Sinigalliano reported that the coastal waters surrounding the Garapan Fishing Dock had high levels of Human marker (Sinigalliano, 2020). In addition, there were significantly high levels of dog FIB marker, which is unsurprising given the number of stray dogs that can be found on the beach and the number of people whom walk their dogs along the beach path every day. 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 up to 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 latest NHD, and Wetlands and Stream GIS data layers (Figure C-31). 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 that discharges through groundwater seeps into Saipan Lagoon.

FIGURE C-31. South W. Takpochau Streams (Segment 19STRC)

Stream water quality samples have never been collected from South West Takpochau's stream flow, as there is only flow during torrential rain events. A visual field assessment has not been completed here either. Therefore, there is insufficient information to assess the *Recreational* and *Fish and Shellfish Consumption* DUs.

However, the topography, and geology of the South West Takpochau watershed is the same as that seen in the North Susupe stream system. A hasher reported that standing pools do not exist that would support harvestable aquatic life (Personal communication, Hasher Travis Spaeth, April 2022). However, seasonally there may be enough water present to support some life stages of aquatic invertebrates So, there is insufficient information to assess the *Support and Propagation* of (Invertebrate) *Aquatic Life* DU.

South West Takpochau's watershed has insufficient precipitation for the ephemeral streams to support the *Potable Water Supply* DU.

However, these dry 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 – CALM Categories

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

South W. Takpochau's Streams retain a CALM Category 3, as there is insufficient information to assess the support of the *Propagation of* (invertebrate) *Aquatic Life* DU.

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 and running north up to the Eloy Inos Peace Park site as shown in Figure C-32, on the following page.

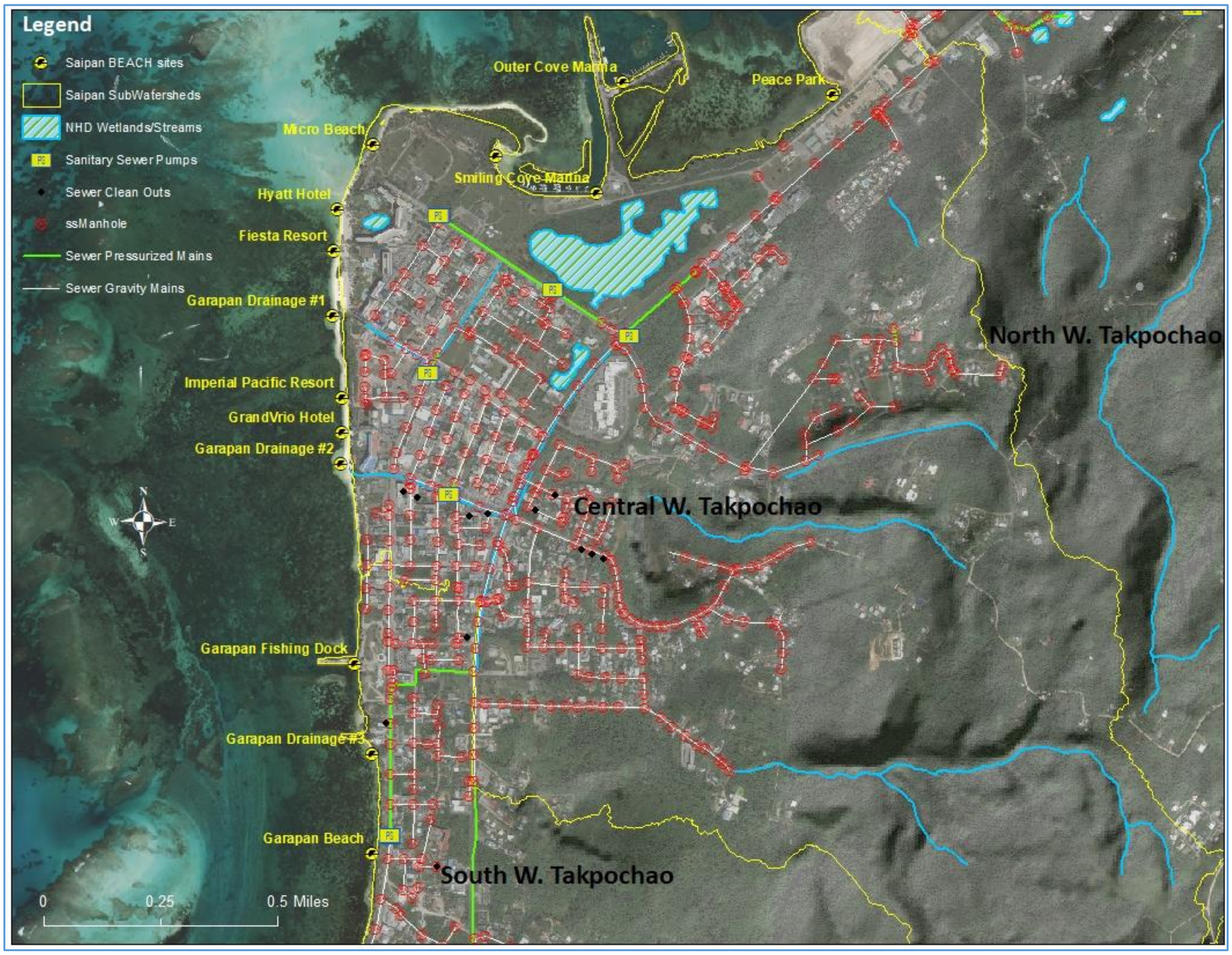
The lower part of the Central West Takpochau sub-watershed contains many large-scale resort hotels, apartment buildings, nightclubs, restaurants, boutiques, duty free shops and other stores in what is called the 'Garapan Tourist District'. This is Saipan's busiest shopping and dining district. Homes, 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 construction of the multi-million dollar 14-story Imperial Pacific Resort and Casino has ceased this reporting cycle due to ongoing litigation concerning labor disputes, lack of tax payment, environmental compliance issues, and money laundering allegations. The site is upland of the ancient Samoa Housing area. A Continuous Deflective Separator (CDS) stormwater treatment unit was installed in the Garapan Drainage #2 channel. It is designed to pretreat stormwater, and remove trash before being discharged into the Saipan Lagoon, and thereby improve water quality. However, no maintenance has been done on the unit since construction ceased.

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 and contains a constructed wetland, and a separate large natural wetland with mangroves.

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.

FIGURE C-32. Central W. Takpochau Watershed (Segment 19B)



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 rumored 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 (Bacteriological TMDL, 2018). In FY2020 DCRM completed an

IWMP for the W. Takpochau Central watershed (Garapan Watershed Management Plan). Implementation of the plan began in 2021. Progress will be reported in the next reporting cycle.

Central W. Takpochau - Coastal Marine Waters

There was no new ALUS data collected on seagrass assemblages near Garapan Beach. Therefore, it retains a ranking of “Fair” this reporting cycle. There was a significant increase in seagrass near Fiesta Resort and Imperial Pacific Resort and Casino, and its ALUS ranking was upgraded to “Good” this reporting cycle. There was no significant improvement to the seagrass assemblage in front of Garapan Drainage #3, and it remains ranked as “Poor” this reporting cycle. Therefore, the Central W. Takpochau’s cumulative five-year ALUS ranking remains “Poor”.

Orthophosphate, NO3-N, and DO% exceeded the CNMI WQS again this reporting cycle and these waters remain 303(d) listed as impaired. The suspected source of nutrients and diminished DO% is groundwater seeps and urban stormwater runoff carrying waste from failing septic systems, and sanitary sewer overflows. The nutrients increase microbial aerobic activity, causing decreased oxygenation in these coastal waters.

However, pH levels met the WQS this reporting cycle, but remains 303(d) listed due to exceedances last cycle. The source of the previous low pH is unproven, but was associated with 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. Due to these exceedances, 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, which is “a few meters down gradient of an old incinerator site.” (2011, Denton, et.al). The hospital incinerator has since been replaces and all stormwater runoff is collected for treatment, and is prevented from discharging to drainages.

In 2016, Denton, conducted further toxicity studies of alga, seagrass, bi-valves and sediment around the Marinas 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 was 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, Cu, and Pb, which does not support the *Fish and Shellfish Consumption* DU. BECQ plans to do further Tier II fish tissue and biota testing in a future study, as part of TMDL development.

CUC renovated two lift stations in the Garapan Tourist District in FY2021 (Personal communication, Larry Manacop, CUC Engineer, 2021). Lift Station S-5 is located North of Micro Beach Road and south of American Memorial Park's Artificial Wetland. Lift Station S-9 is located midway on Garapan Street east of GrandVrio Hotel. However, exceedances of the CNMI WQS for Enterococci is still an ongoing issue throughout the watershed. The source of fecal contamination is attributed to, "sanitary sewer overflow, and runoff from roads and construction/maintenance during rain events." (Bacteriological TMDL, 2018). The qPCR-MST study supported this finding and found 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." In order to address this, further renovation and upgrades of the sewer system's infrastructure is warranted.

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 wastewater, but to seabirds instead.

FIGURE C-33. Micro Beach's White Sand Beaches

Therefore, Central West Takpochau's coastal waters do not support the *Recreational* DU due to Enterococci and previous pH levels.

However, Central W. Takpochau coastal waters 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 streams in the Central West Takpochau sub-watershed begin at Mt. Takpochau and flow northwest into the mid-watershed. These ephemeral streams have been mapped using GIS, but stream water quality is very limited, with only one to three data points collected each year from the reaches that were flowing during the implementation of the SWQMP from FY2013 through FY2016. This number is insufficient to provide a robust statistical assessment of the *Recreational* DU, and further efforts to grab water quality samples were dropped and replaced with the SVAP in FY2017. Visual field assessments of Central West Takpochau stream reaches are scheduled for next reporting cycle in FY2023.

In lieu of SVAP assessments, the 2008 stream study conducted by McKagan, et.al, was used to assess the support and *Propagation of Aquatic Life* DU. Fishermen living near the streams in the lower watershed reported the presence of freshwater shrimp, and eels. These streams drain into constructed concrete conveyances that eventually flow out of Garapan Drainage #1. The study also found Thiarid snails and Sailfin Molleys (*Poecilia latipinna*) as the predominant species, along with juvenile milk fish, and invasive Tilapia in the drainage. McKagen, et.al., considered this the most disturbed stream system surveyed. Therefore, Central West Takpochau freshwater streams do not support the *Propagation of Aquatic Life* DU, but not due to a pollutant.

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 is no longer monitored in Central West Takpochau since adoption of the SVAP. 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 and not in their natural state for visitors' enjoyment. 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, but not due to a pollutant.

Central W. Takpochau - Wetlands

American Memorial Park (AMP), has two distinct wetlands, a constructed wetland that is used to pre-treat stormwater runoff from the Garapan Tourist District before discharging it into Smiling Cove Marina's coastal waters, and a another relatively large natural wetland. The latter has some disturbed hydrological wetland features due to both pre- and post-WWII activities. However, it also contains some of the CNMI's last remaining natural mangroves that are located east of the Park. The entirety of the fringing mangrove stands along AMP were assessed using the CNMI Wetland RAM in 2020 with an overall "high" ranking.

The constructed wetland is home for a few endangered Mariana Common Moorhens, and non-native and native fish (2016 communication, Mike Gawel, National Park Service, Integrated Resources Program Manager). The invasive water hyacinth that used to clog this wetland has since died off, likely due to increased tidal influence. This wetland may be assessed next reporting cycle since the revised WQS recognizes it as Commonwealth waters.

Another very disturbed wetland is located southwest of the Mariana Islands Housing Association (MIHA) building next to Middle Road. It acts as a catchment basin for stormwater runoff from the roadway and other adjacent impervious surfaces. It has many invasive vines and trees.

In FY2021 WQS/NPS staff began monitoring the wetland's water quality in preparation for a restoration project funded by National Fish and Wildlife Foundation. While water quality sampling, field staff discovered a UXO on the path leading into the wetland used by area residents. Its coordinates were taken and reported to SARS and DFEMS for removal.

FIGURE C-34 UXO in MIHA Wetland

The Office of Planning and Development (OPD) and DFW are collaborating on the wetland restoration project and plan to remove invasives species and replace them with native trees next reporting cycle. Water quality data collected initially will be compared to data collected after the restoration to measure the degree of treatment the wetland provides to stormwater runoff.

Given the amount of land use alteration, and urban encroachment into these wetlands they are not considered supportive of the *Propagation of Aquatic Life* DU, but not due to pollutants.

Central W. Takpochau – CALM Categories

Central W. Takpochau's coastal waters retain CALM Category 5, due to elevated Orthophosphate, NO_3-N, DO%, Hg in fish, Cu and Pb in bi-valves, and past 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 Bacteriological TMDL.

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 non-native introduced species.

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

North W. Takpochau – Waterbody Segment 19A

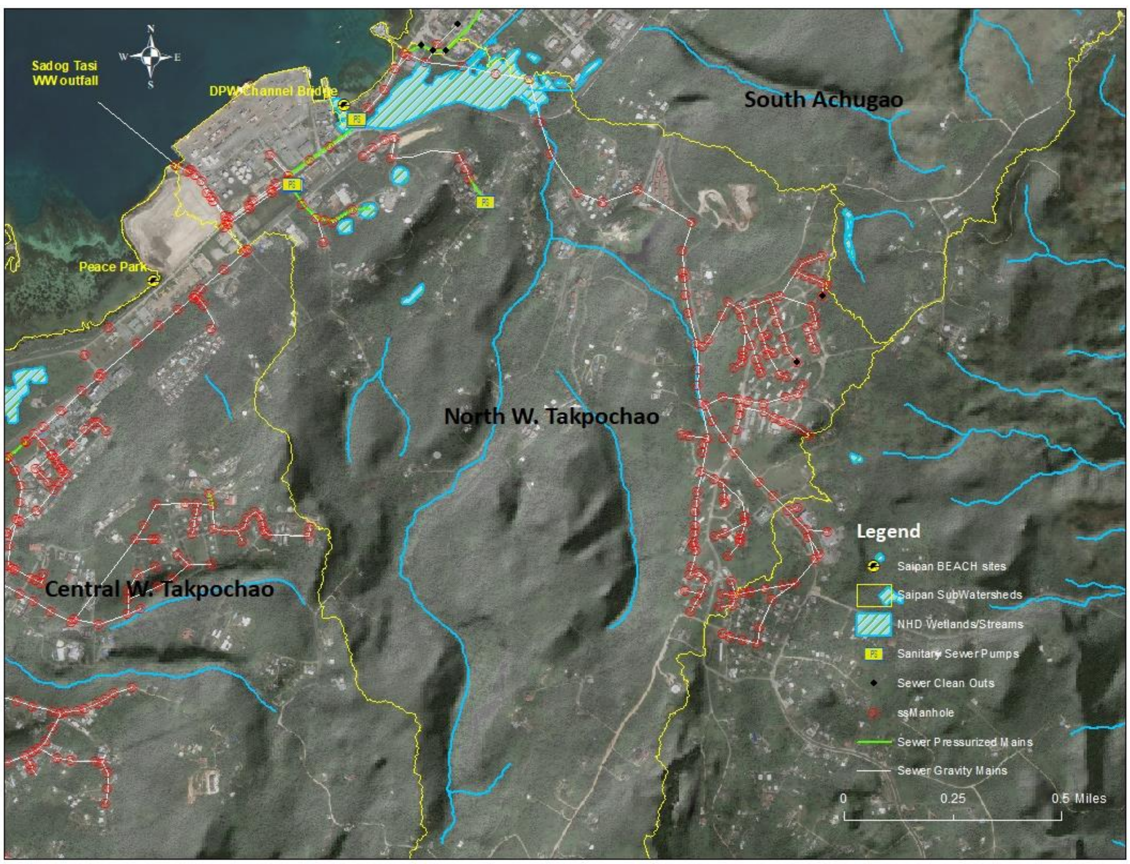
There is only one (1) BEACH monitoring site in the North W. Takpochau Watershed at DPW Channel Bridge (Figure C-35., below). The site is located adjacent to one of the last remaining mangroves on Saipan.

The CUC municipal sewer system running through the mangrove has had several repairs and upgrades over the years to bypass aging broken asbestos pipes and improve lift station function. However, Enterococci levels continue to exceed the CNMI WQS, indicating that there is still more work to be done to address this and future wastewater treatment demands. 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, the cumulative five-year biological ALUS ranking remains as "Poor".

FIGURE C-35. North West Takpochau Watershed (Segment 19A)



This is the sixth year that pH levels met the CNMI WQS. Therefore, North West Takpochau's coastal waters have been removed from the 303(d) list as impaired for pH.

NO_3-N levels exceeded the CNMI WQS again this reporting cycle. However, orthophosphate met the standards. Both nutrients remain 303(d) listed as impaired, and do not support the *Propagation of Aquatic Life* DU.

The source of nutrient loading is attributed to untreated wastewater from sanitary sewer overflows, urban runoff, and commercial harbor and port activities.

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 in this watershed. 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 the 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 Central West Takpochau's coastal waters, the North West Takpochau's waters remain unsupportive of the *Recreational* DU due to Enterococci exceedances of the WQS. The primary sources being the aging CUC Municipal sewer line in the mangrove, and other failing infrastructure. Other potential sources include the Sadog Tasi WWTP outfall, and urban runoff from the commercial industrial port complex.

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 enjoy a sunset under the shade of the iron wood trees surrounding the coastline.

North W. Takpochau – Freshwater Streams

North West Takpochau's stream water quality data is limited, with only one to three data points collected each year from flowing reaches during the implementation of the SWQMP from FY2013 through FY2016. This number is insufficient to provide a robust statistical assessment of the *Recreational* DU, and further efforts to grab water quality samples were dropped and replaced with the SVAP in FY2017. The SVAP assessments in this watershed are scheduled for FY2022. Therefore, there is insufficient data to assess the *Support and Propagation of Aquatic Life* and *Recreational* DUs.

The heavy metal studies conducted by Denton, et.al, did not mention collecting fish tissue or biota samples from North West Takpochau stream upland from the DPW Channel Bridge BEACH site. Initial visual assessments revealed no overt evidence of WWII debris. However, there is insufficient information at this time to assess the *Fish and Shellfish Consumption* 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 athletes for training and exercise.

North W. Takpochau – Wetlands

The black mangrove in the North West Takpochau sub-watershed lies next to Saipan's industrial port and is one of few remaining mangroves in Saipan. Many mangrove trees were felled by Super Typhoon Soudelor and Yutu. Although they are growing back, this area has not yet fully recovered.

FIGURE C-36. 2021 NWCA Site Lower Base Wetland

This mangrove area provides vital habitat for many native species. However, there are also many non-native invasive plants at its borders next to roads. In addition, CUC has aging asbestos sewer lines running through the mangrove area which require frequent repair, causing land alterations and compaction by heavy equipment.

WQS/NPS field crew visited several wetland sites in the North West Takpochau watershed during the 2021 NWCA. One lacustrine Hibiscus forested wetland located in Lower base southwest of JG Sablan repair shop had mounds of fill and WWII era debris at the wetland boundaries (Figure C-36).

FIGURE C-37. 2021 NWCA North of Middle Rd.

The mounds of fill surrounding the wetland were used to redirect water flow and prevent flooding. Old tires, junk vehicles, trash, and a CUC water meter line and other infrastructure were observed within the wetland. Coral roadways surround the wetland, as do invasive vines.

Another site located north of Middle Rd., and west of Isa Drive is a beautiful mature lacustrine hibiscus forested wetland with large bird nest ferns (Figure C-37). The wetland provides habitat for several endangered Nightingale Reed Warblers.

Although these wetlands continue to provide invaluable habitat for native and endangered species, there has been many land use alterations, hydrological and flow regime changes, and other anthropogenic stressors, which are not supportive of the *Propagation of Aquatic Life* DU, but are not considered pollutants.

North W. Takpochau – CALM Categories

North West Takpochau's coastal waters retain a CALM Category 5, due to elevated NO_3-N, past Orthophosphate exceedances, and Pb contamination in bi-valves, 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 the 2018 Bacteriological TMDL.

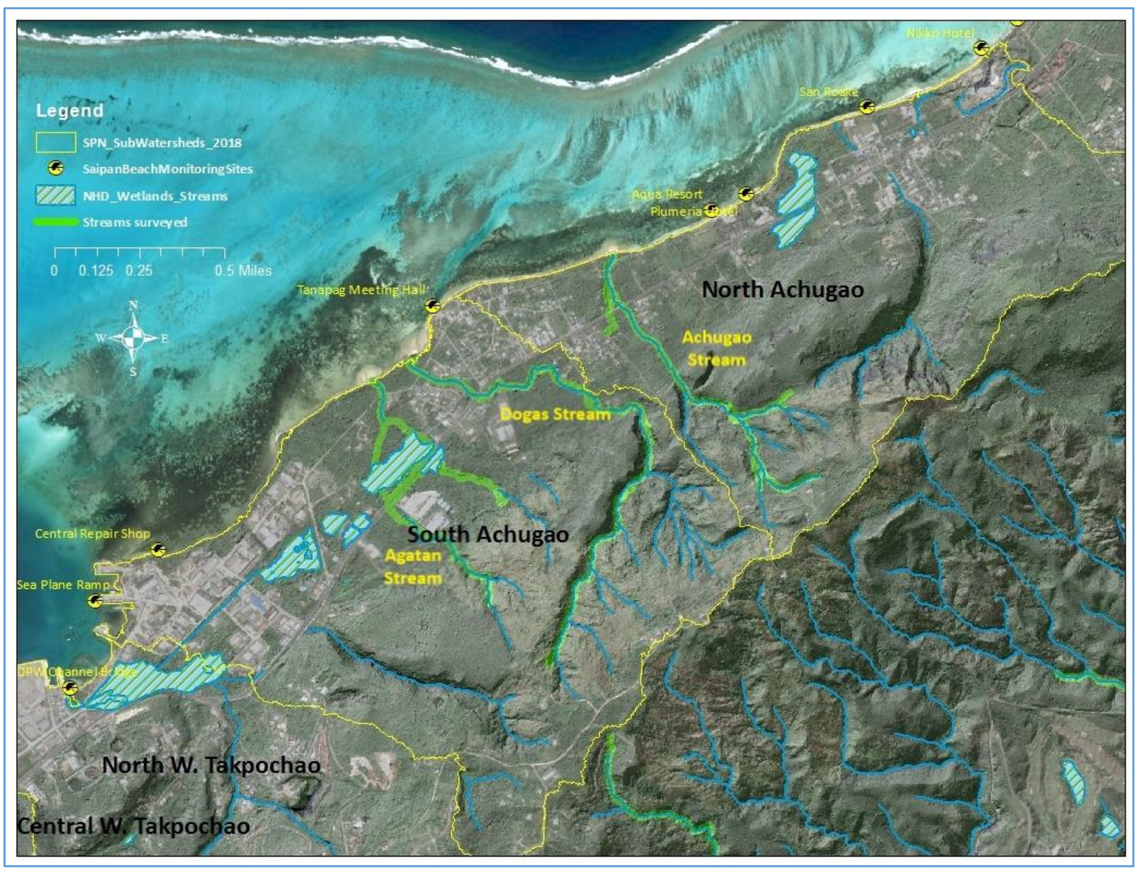
North West Takpochau's streams retain a CALM Category 3 due to insufficient information.

North West Takpochau wetlands retain a CALM Category 4c due to habitat alterations, flow regime modifications and non-native species. However, these are not considered pollutants.

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

Achugao watershed is split into two sub-watersheds, North (20A) and South (20B) Achugao.

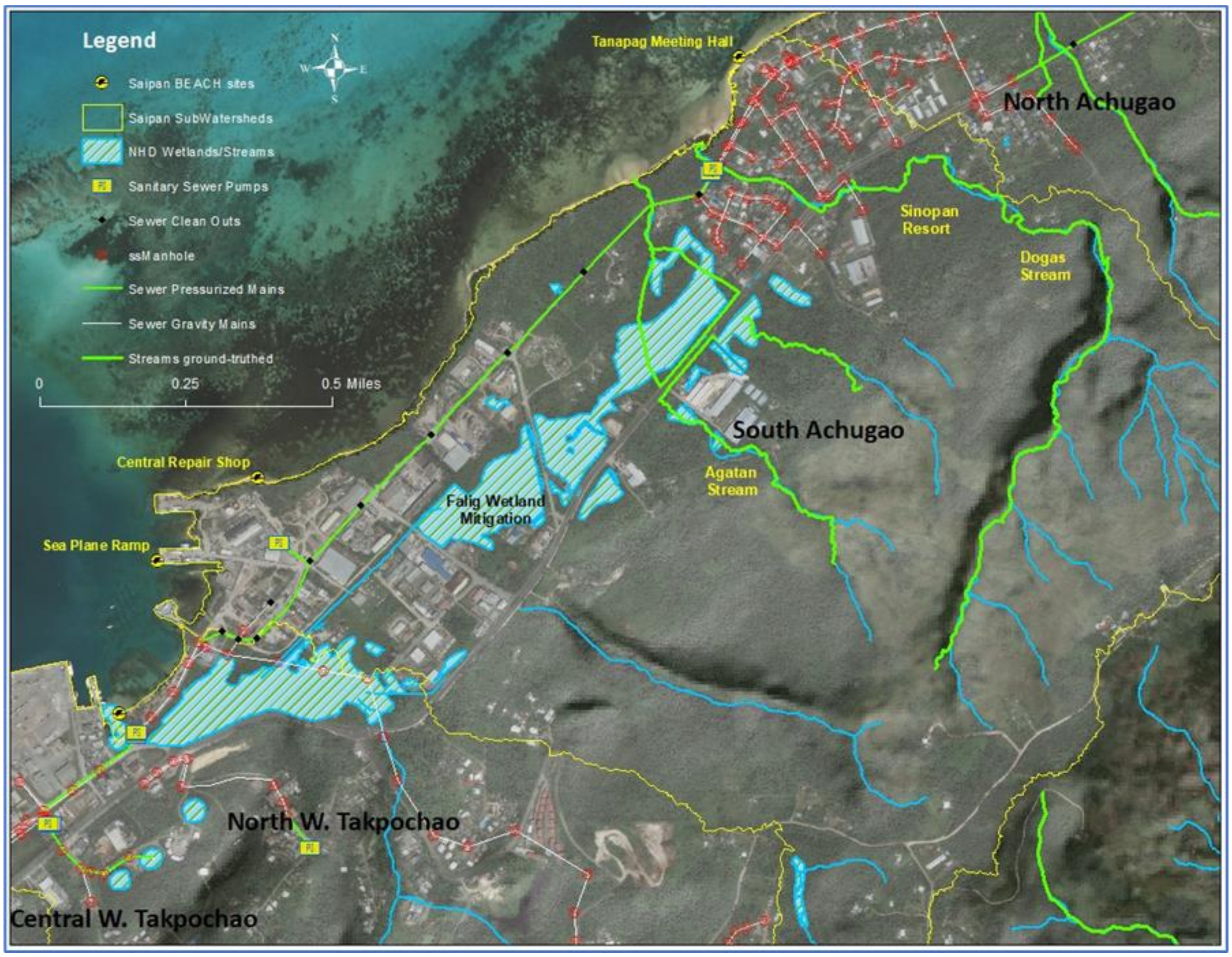
FIGURE C-38. Achugao Watershed (Segment 20)



Achugao headwaters begin on "Wireless Ridge" and empties into Tanapag Lagoon. The coastline contains the northern portion of Saipan's industrial area, known as "Lower Base", whose coastal waters are designated as Class A.

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"). In the past, some of these farms and a worker's barracks were found to have contributed to fecal contamination of the wetlands located in their immediate vicinity.

FIGURE C-39. South Achugao Sub-watershed (Segment 20B)



Presently, there are two large resorts in operation in the North Achugao's lower watershed, with more developments proposed in the future that will result in extensive portions of land being cleared, but construction has not begun as of yet.

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

BECQ is currently working on developing a new IWMP to address the many stressors impacting the Achugao Watershed.

South Achugao – Waterbody Segment 20B

South Achugao contains Tanapag Village located north of the Lower Base industrial area. There are three BEACH monitoring sites in this watershed; 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.

South Achugao - Coastal Marine Waters

There has not been an ALUS biological assessment of the *Halodule spp*. seagrass assemblages in front of Tanapag meeting hall since FY2015. Therefore, South Achugao's five-year cumulative biological ALUS assessment remains ranked as "Poor". Every effort should be made to conduct another biological assessment at this site before the next reporting cycle.

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, septic systems, 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, 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. Therefore, South Achugao's coastal waters remain on the 303(d) list as impaired, which is unsupportive of the *Fish and Shellfish Consumption* DU.

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, 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

SVAP assessments were completed within and around South Achugao's As Agatan and Saddok Dogas stream systems. Several large cisterns from the Japanese occupation, metal drums, WWII UXO, planes and other military equipment can be found in the mid Saddok Dogas stream system.

FIGURE C-40. Cistern in Dogas Streambed

Several lush bamboo strands, small pristine waterfalls, and freshwater riffle pools are located above the debris in the mid and upper watersheds. McKagan's 2008 study found As Agatan stream to be relatively pristine upland of Tanapag village with *Macrobrachium lar* shrimp present. Shrimp and freshwater eels were also observed in both the As Agatan and Saddok Dogas streams by WQS/NPS field staff. In addition, SVAP assessments ranked South Achugao from "Fair" to "High" in most reaches with only those reaches close to roadways or subsistence farms receiving "Low" rankings (Figure C-42 on the following page).

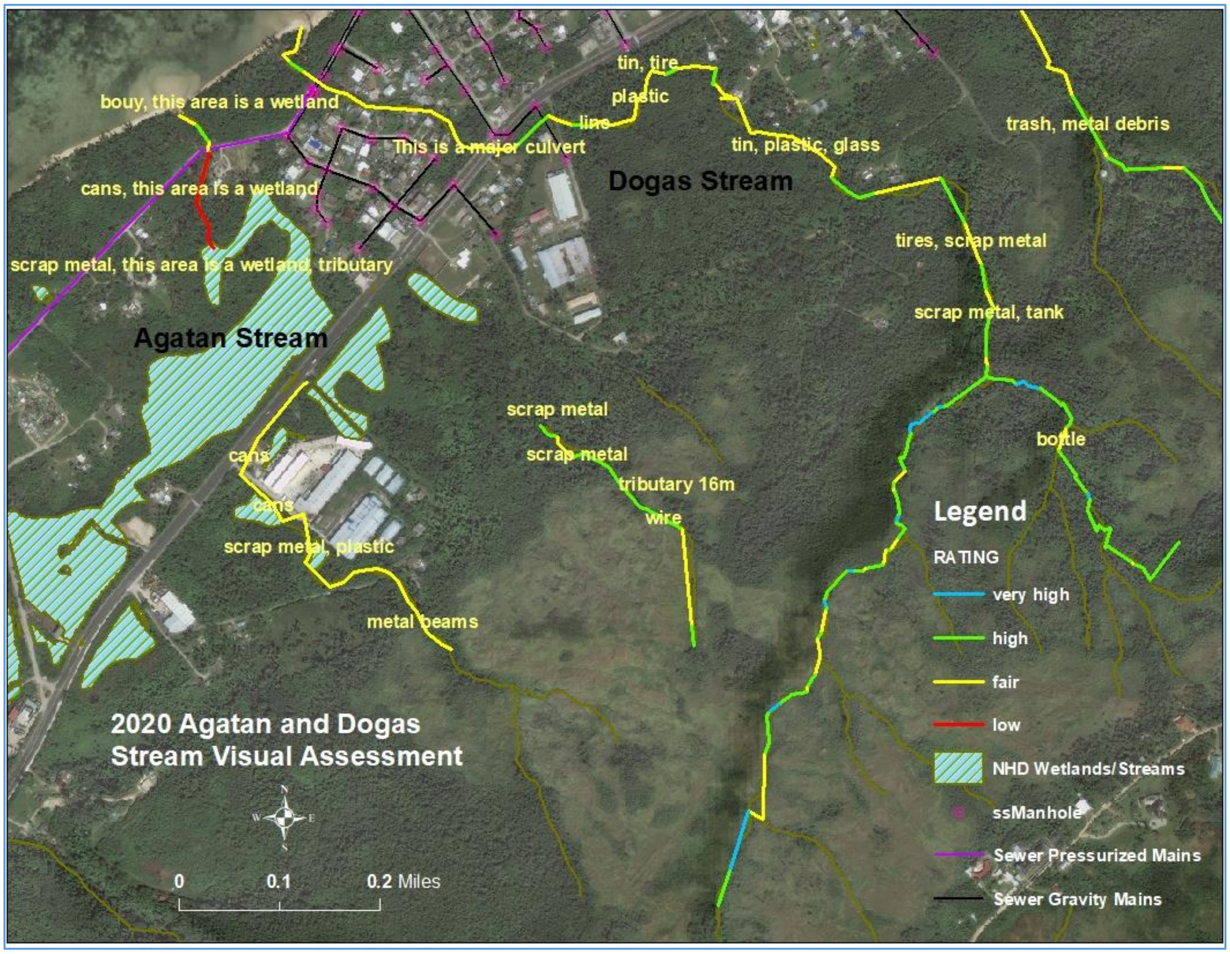
FIGURE C-41. Mid-Watershed - Saddok Dogas Stream

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, 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 assessments of the streams resulted in South Achugao remaining on the 303(d) list as impaired for Pb, and does not support the *Fish and Shellfish Consumption* DU. In order to determine the level of heavy metal contamination and the safety of consuming aquatic life harvested from these streams, BECQ is proposing a future Tier II study of fish tissue and/or biota in these streams.

There is limited water quality data available from South Achugao streams' middle and upper sampling sites. However, samples taken from the lower sites during the implementation of the SWQMP from FY2013 through FY2016, showed that water quality regularly exceeded the CNMI WQS for Enterococci.

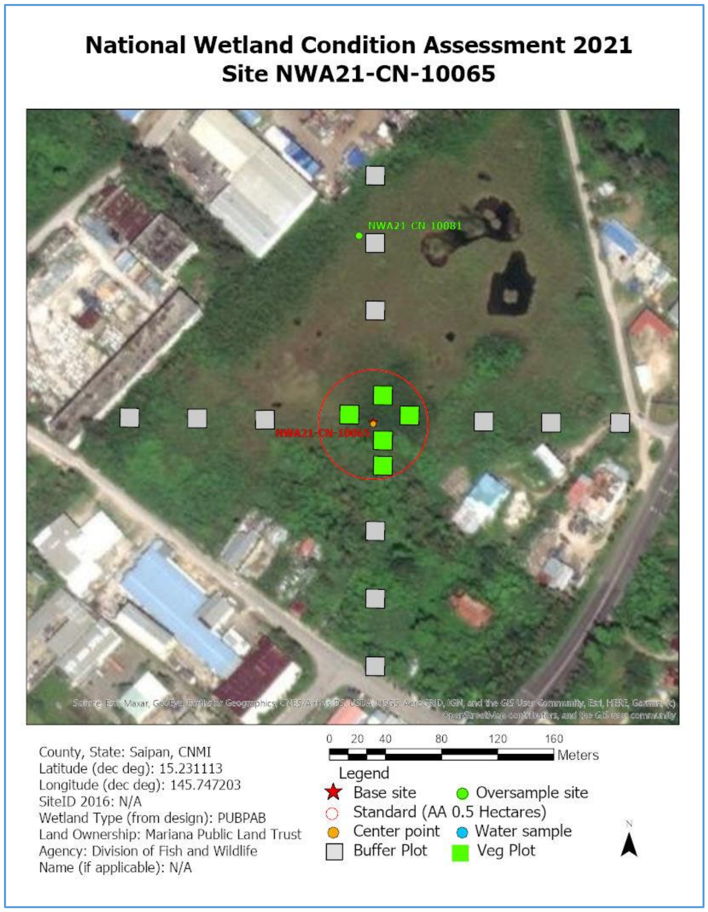
FIGURE C-42. South Achugao's SVAP Ranking



There has not been any more recent data collected. However, given that local residents are known to harvest from these streams and may have skin contact with contaminated water, the South Achugao streams remain on the 303(d) list 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 (Bacteriological TMDL, 2018). 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/.

FIGURE C-43. Falig Wetland Reconnaissance Map



The South Achugao stream systems only flow during heavy rain events. They are too low in volume to provide a stable and sufficient *Potable Water Supply*, 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 fished and 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, they were visited by the WQS/NPS field crew on reconnaissance as part of the 2021 NWCA desktop evaluation (Figure C-43).

The wetland's hydrology has been altered by roadway construction and fill. 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.

The American Sinopan Resort development northeast of the wetland began construction last reporting cycle. The developer is required to preserve a 50-foot vegetated buffer on either side of the streams, and a 50ft buffer from the wetland itself. However, the permittees cleared a significant portion of land in close proximity to the wetland. Construction has since stalled as the result of COVID-19 restrictions. If construction is to continue it will require regular monitoring to ensure permit requirements are followed to minimize the risk of further adverse impacts from continued development of the resort.

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 *Fish and Shellfish Consumption* and *Propagation of Aquatic Life* DUs. However, Enterococci exceedances are now being addressed by the 2018 Bacteriological TMDL.

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 *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.

<u>North Achugao – Waterbody Segment 20A</u>

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-44, on the following page).

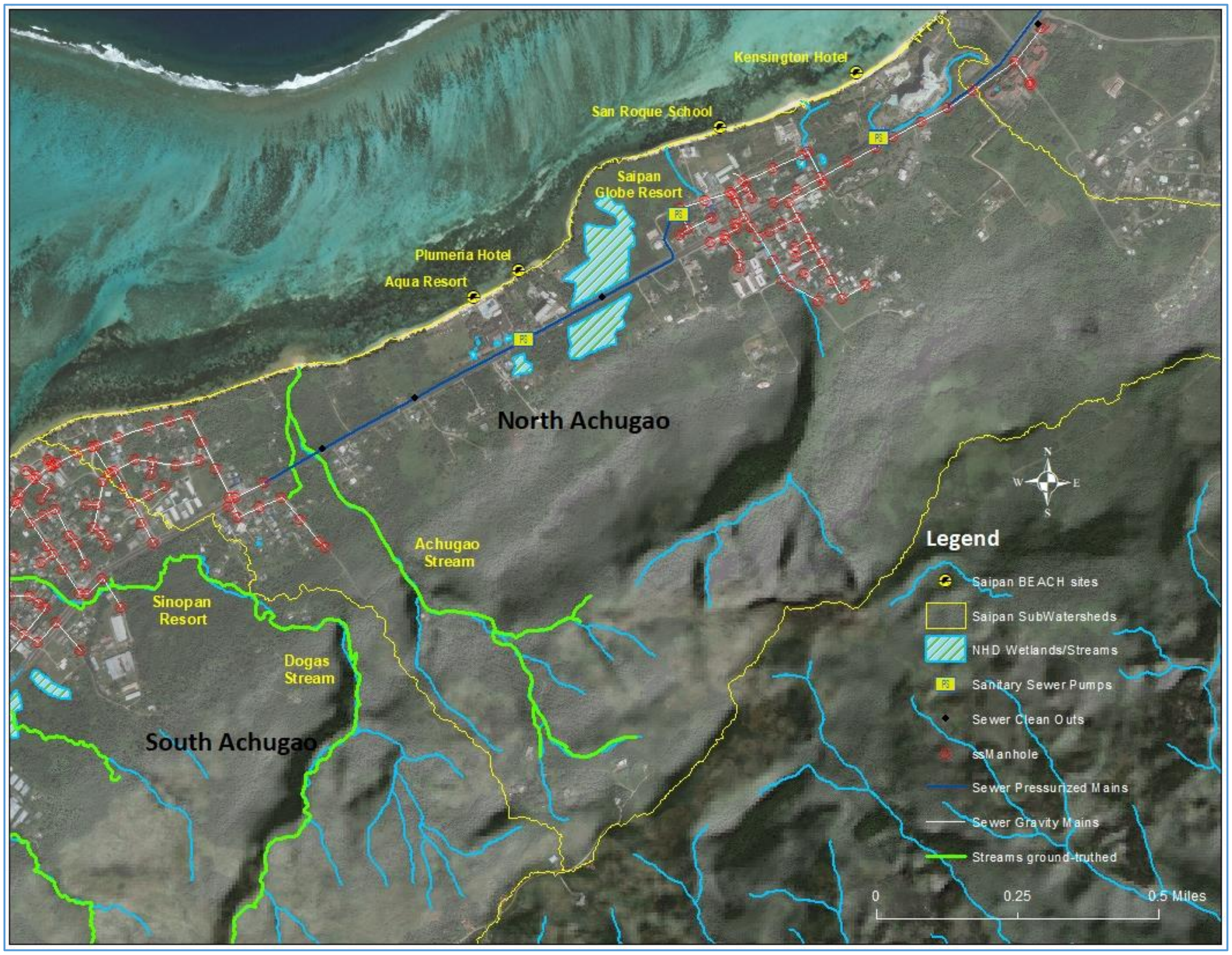
San Roque village is located in the lower watershed, as is San Roque Elementary School. There are also three hotels: Aqua Resort, Plumeria Hotel, and, Kensington Hotel. At present construction continues on Saipan Global Resort. Aqua Resort remained in operation during the COVID-19 pandemic restrictions. Plumeria Hotel has been out of operation for the past six years, and Kensington Hotel was used as a travel bubble site for South Korean tourists, after the travel ban was lifted. There are four (4) long-term BEACH monitoring sites located at these same locations.

North Achugao - Coastal Marine Waters

There has been no significant change to the ALUS biological assessments of seagrass assemblages located near San Roque School, which remain in "Good" condition again this reporting cycle. The other seagrass sites near Plumeria Hotel and Aqua Resort were assessed this reporting cycle. Both sites received and ALUS ranking of "Good". The Aqua Resort's *Halodule spp*. assemblage had over 50% coverage at all 5 transects. The Resort's mixed *Enhalus and Halodule spp*. seagrass assemblage had consistently high *Enhalus* spp. coverage as in previous years. However, there is a decline in *Halodule* spp. numbers at this seagrass bed. Therefore, the cumulative five-year ALUS ranking of North Achugao's coastal waters remains "Fair", which is supportive of the *Propagation of Aquatic Life* DU.

Coastal water quality data exceeded the CNMI WQS for Orthophosphate at Kensington and Plumeria hotels on two separate occasions. The exceedances occurred during rainy season so this may be related to fertilizer runoff from hotel grounds or upland agricultural applications, but remains unproven.

FIGURE C-44. North Achugao Sub-watershed (Segment 20A)



DO% levels have improved at all sites except for Kensington Hotel. It is suspected that the elevated orthophosphate levels here may have increased aerobic microbial activity in near shore waters resulting in depleted oxygen levels here. This too is unproven. Therefore, North Achugao's coastal waters remain on the 303(d) list as impaired, which is 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.

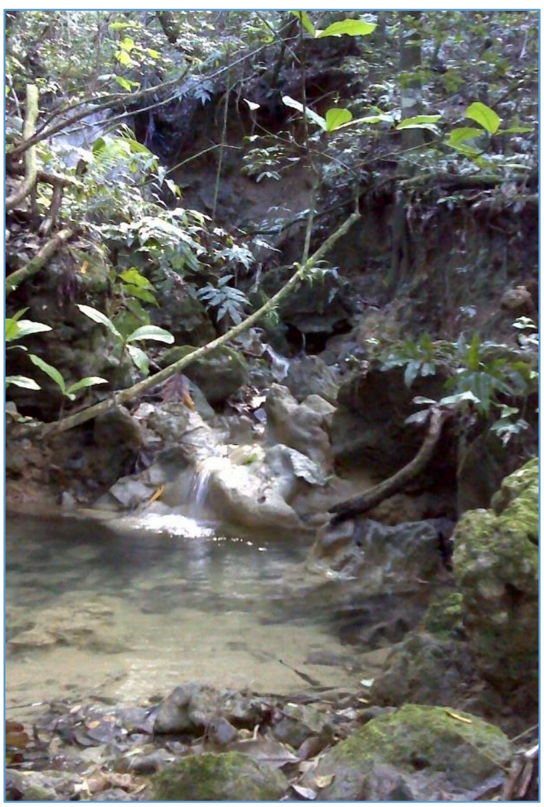
North Achugao's coastal water quality data met the CNMI WQS for Enterococci for the past six years. This improvement is associated with repairs to the CUC sewer line in San Roque Village, and upgrades to CUC's SR-1 and SR-3 lift stations located between San Roque School and Aqua Resort. As a result, sewer overflows are no longer occurring in the area. This bacteriological improvement was cause to delist these coastal waters in ATTAINS. North Achugao's Coastal waters are now fully supportive of the *Recreational* DU.

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 Stream

A SVAP assessment of Achugao Stream was completed this reporting cycle. This stream's headwaters begin at Wireless Ridge and flows through the pristine upper watershed through a small cluster of homes in the mid watershed, and out to Saipan Lagoon.

FIGURE C-45. Achugao Stream



SVAP assessments results ranked Achugao stream from "Fair" to "High" in most reaches with only those reaches close to households receiving "Low" rankings due to trash (See Figure C-46 on the following page).

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.

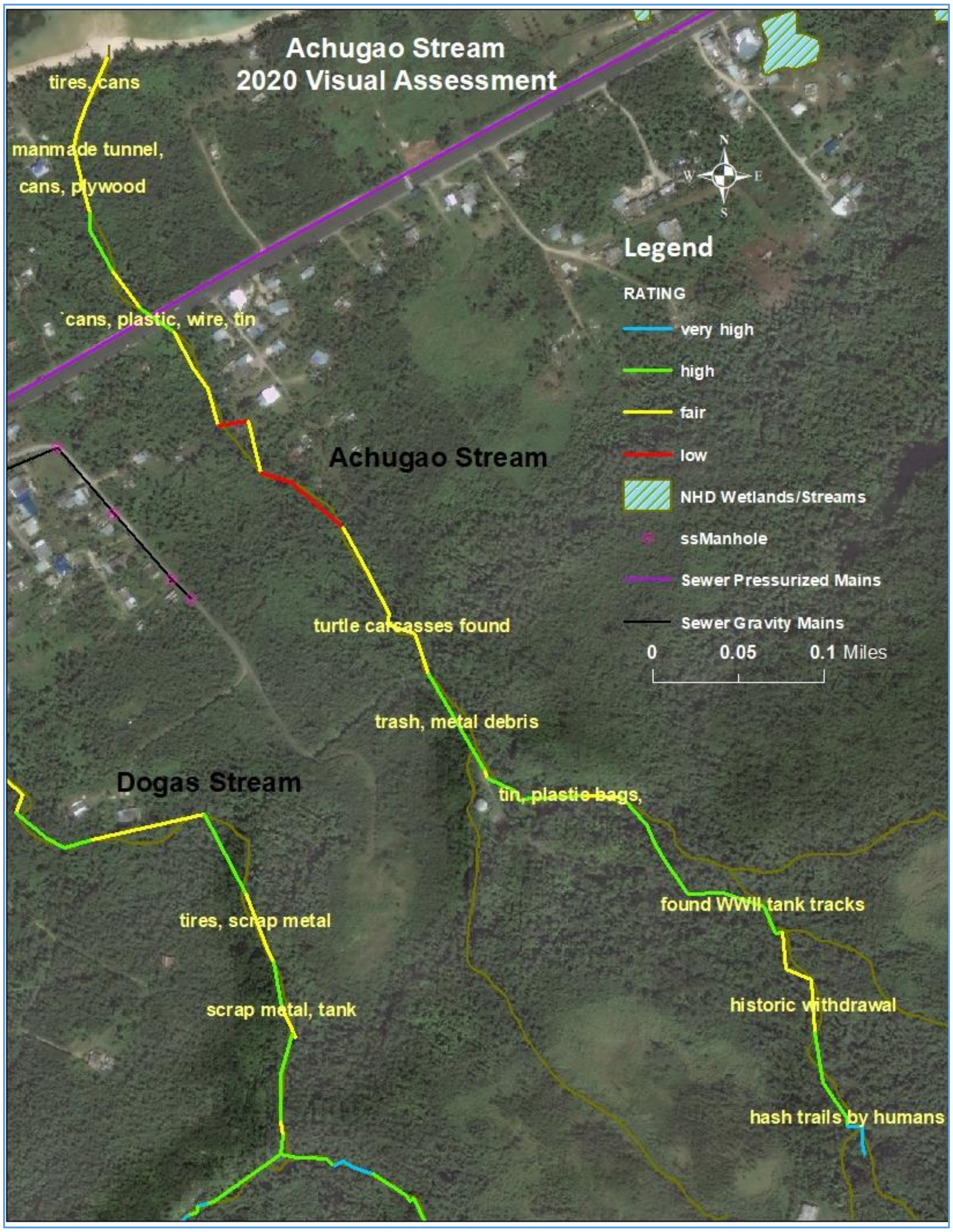
Achugao stream is fed by a spring system that was formerly used by CUC as a potable water supply source, but that was decades ago. The volume was too low to provide a stable and sufficient *Potable Water Supply* so this DU is not assessed.

The WQS/NPS field crew observed several freshwater pools containing shrimp and eels in the upper and mid-watershed, thus North Achugao's streams support the *Propagation of Aquatic Life* DU.

Some legacy WWII debris were found in the mid-watershed, but less than that seen in the South

Achugao's Saddok Dogas stream. There are very few homes in the mid-watershed. They are clustered southeast of Middle Road, and adjacent to the stream. These are low-income homesteads that rely on small farm plots, and a few pigs, and fowl for subsistence purposes.

FIGURE C-46. Achugao Stream SVAP Ranking



The Achugao's stream fully supports the *Aesthetic Enjoyment* DU. It is used by "Hashers", hikers, and tri-athletes for training throughout the jungle areas and within dry streambeds in the pristine upper and mid-watershed.

North Achugao – Wetland

The centrally located San Roque wetland in North Achugao's lower watershed has not been fully delineated or valuated using the CNMI Wetland RAM. It also was not assessed during the 2021 NWCA. However, the hydrology and flow regime are known to have been altered by the roadway that dissects the wetland, and there are many introduced non-native species within the wetland. Therefore, North Achugao's wetland does not support the *Propagation of Aquatic Life* DU, but not due to pollutants.

In order to protect San Roque wetland from further developmental impacts, the Saipan Globe Resort permit includes many BMP requirements, e.g., a 50-foot vegetated buffer on either side of the riparian zones and from the wetland itself, as well as removal of invasive plants. Construction that began last reporting cycle is ongoing. This site is being monitored to prevent further alteration and anthropogenic impacts from surrounding development activities.

North Achugao – CALM Categories

North Achugao's coastal waters retain a CALM Category 5, due to elevated Orthophosphate and diminished DO% levels. Enterococci levels now meet the CNMI WQS and support the *Recreational* DU. However, the 2018 Bacteriological TMDL continues to be implemented to prevent future impairment.

The Achugao stream system retains CALM Category of 3 due to insufficient information.

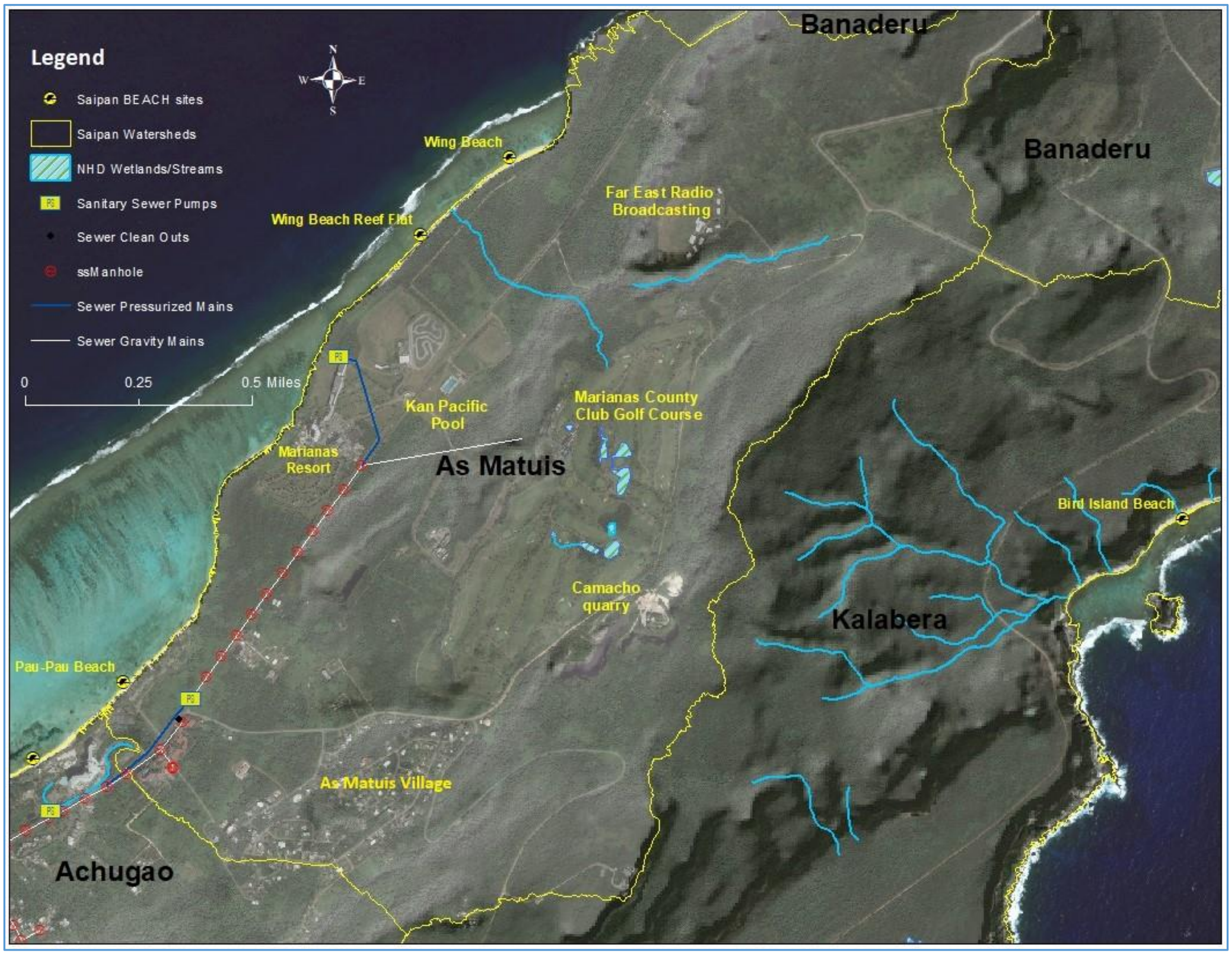
The San Roque wetland retains CALM Category of 4c due to alteration of habitat, and hydrological changes from roadways and fill, and non-native species, that are not pollutants.

C.3.5.10. AS MATUIS – Waterbody Segment 21

The As Matuis watershed is sparsely populated. There is one residential village located in the south of the watershed, mid-way to the ridgeline (Figure C-47 on the following page). The New Hope Quarry was reopened in 2020 and is also located near the ridge. Marianas Resort is the only hotel facility in the watershed and is located next to the coast. Its operations ceased last reporting cycle due to a change in ownership. However, it was reopened this reporting cycle to act as a COVID-19 quarantine facility. The Kan Pacific public swimming pool across the road from the Resort is part of the Marianas Country Club Golf Course, but is no longer in operation. The Course's driving range is near the Resort in the lower watershed, and was reopened for locals and visitors once COVID-19 restrictions were eased for outdoor recreating.

The CUC municipal sewer line ends at Marianas Resort and is only available for connection with homes and businesses located next to Middle Road in the lower watershed. Therefore, the majority of homes within the As Matuis village, which lies upland of the sewer line infrastructure, rely on IWDS for wastewater collection and treatment. The SR-2 lift station upgrade near PauPau Beach was completed this reporting cycle.

FIGURE C-47. As Matuis Watershed (Segment 21)



As Matuis - Coastal Marine Waters

As Matuis has two (2) long-term BEACH monitoring sites at Pau Pau and Wing Beaches. There are three additional biological ALUS monitoring sites on the Wing Beach forereef and reef flat, and in Pau Pau's seagrass assemblage. There was no significant improvement to the Wing Beach forereef benthic substrate, which remains ranked as "Poor". Wing Beach's reef flat's was assessed for the first time this reporting cycle. Both Wing Beach's reef flat's benthic habitat, and the Pau Pau seagrass assemblages were ranked as "Fair". However, there has been little data collected on these two biological sites. Therefore, As Matuis' cumulative five-year ALUS ranking for its coastal waters remains ranked as "Poor" until more data shows improved habitat function.

Orthophosphate exceeded the CNMI WQS again this reporting cycle, and NO_3-N exceeded in FY2018. In addition, DO% was diminished again at the Pau Pau BEACH site, but pH met CNMI WQS for the past four years. The source of the diminished DO%, pH levels, and exceedance of the CNMI WQS for nutrients is unknown. Due to these exceedances, As Matuis coastal waters remain 303(d) listed as impaired, which is not supportive of the *Propagation* of *Aquatic Life* DU.

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.

As Matuis' bacteriological water quality has improved at all sites. However, there was an exceedance of the WQS for Enterococci at Pau Pau BEACH in FY2018. Pau Pau is a relatively long drive from Saipan's busy tourist district, so the source of bacteriological contamination remains unknown. These past exceedances for Enterococci and pH do not support the *Recreational* DU.

Pau Pau and Wing Beaches are popular with local residents. Pau Pau's calm and shallow waters are ideal for triathletes to train for open water swimming competitions. Wing Beach has very limited light pollution, which 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, which allowed a return of its natural beach profile, and native vegetation providing a suitable location for turtles to nest, and visitors to enjoy star gazing. 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 streams only flow during torrential rain events, and quickly dry up. Water quality data has not been collected, nor has a SVAP assessment been completed in this watershed. As a result, there is insufficient information to assess the *Recreational* and *Fish and Shellfish Consumption* DUs. As Matuis's streams do not remain saturated long enough to allow for the formation of freshwater pools for harvestable aquatic life to exist.

It is unclear if, seasonally there may be enough water present to support some life stages of aquatic invertebrates. So, there is insufficient information to assess the *Support and Propagation* of (Invertebrate) *Aquatic Life* DU.

As Matuis' watershed has insufficient precipitation for the ephemeral streams to support the *Potable Water Supply* DU.

"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 – CALM Categories

As Matuis' coastal waters retain CALM Category 5, due to low DO%, elevated Orthophosphate and Nitrate, and pH exceedances, which are unsupportive of the *Propagation of Aquatic Life* and

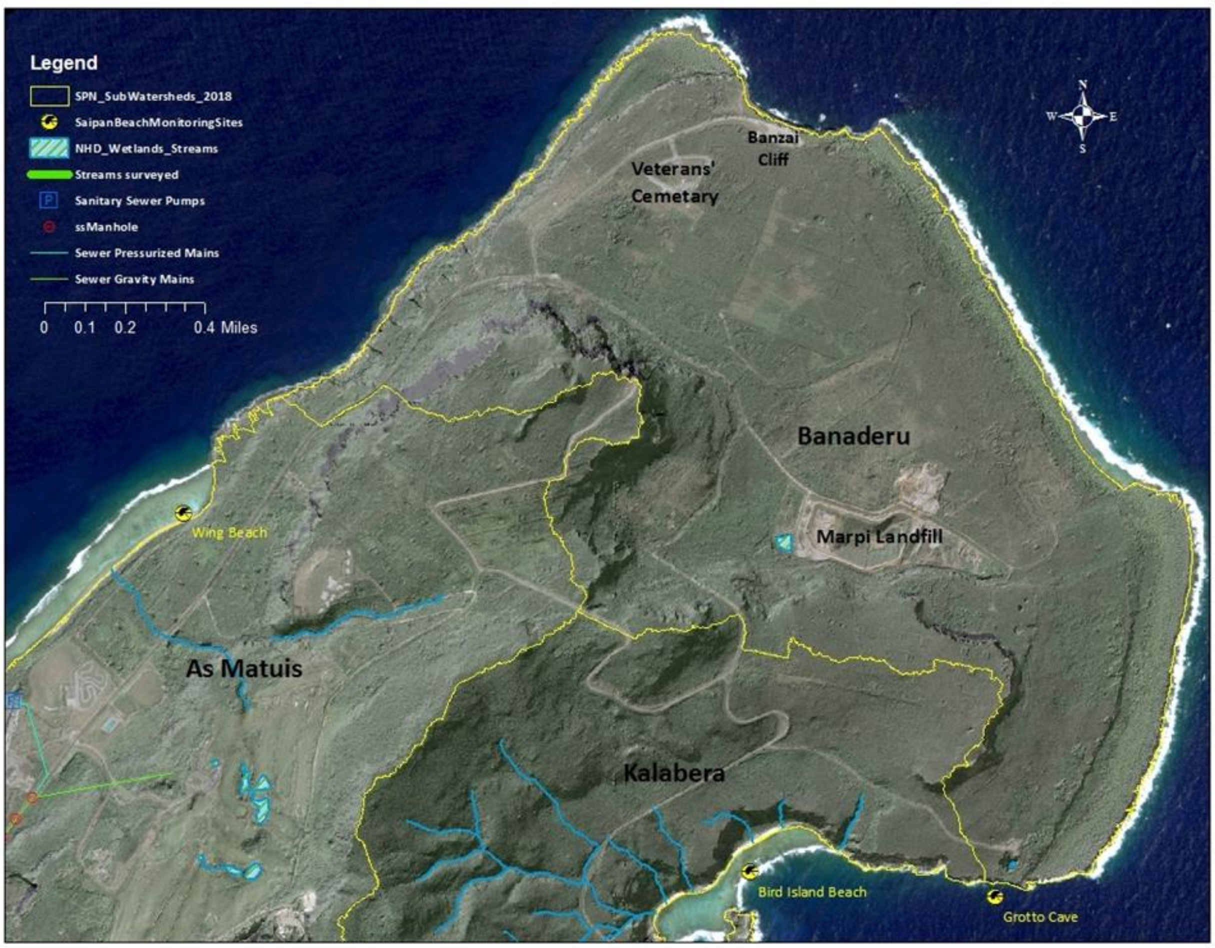
Recreational DUs. Since As Matuis' coastal waters were inadvertently excluded from the 2018 Bacteriological TMDL, a TMDL is still required.

As Matuis' freshwater streams retain CALM category of 3 due to insufficient information.

C.3.5.11. BANADERU – Waterbody Segment 22

Banaderu is the northernmost watershed on Saipan. There is very limited development in this remote watershed. 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-48).

FIGURE C-48. Banaderu Watershed (Segment 22)



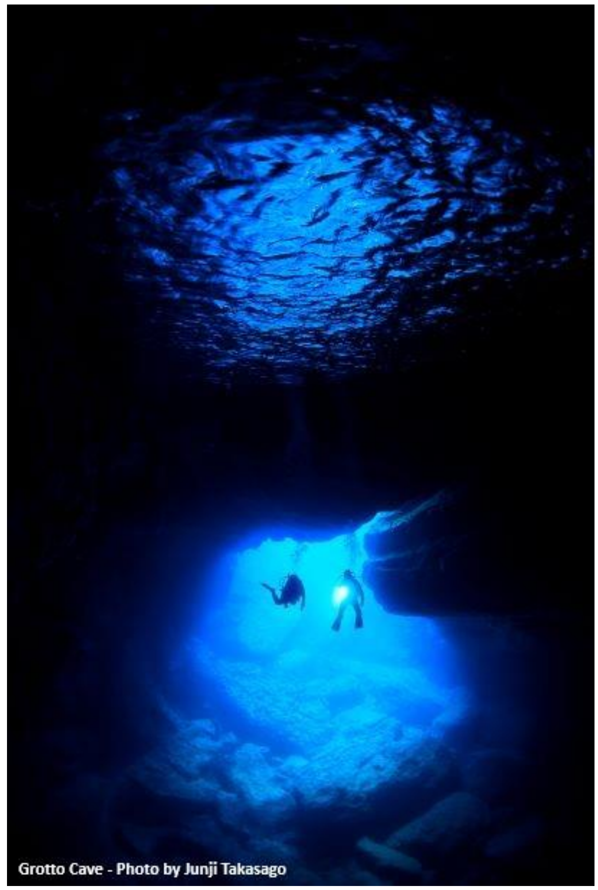
The landfill is located well away from the coastline. There are no municipal water supplies or sewer infrastructure available for homesteads or businesses here. The few homes that are located in the watershed use IWDSs for wastewater collection and treatment.

Banaderu lacks any surface water streams, or natural wetlands. However, there is one constructed 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 Banaderu Watershed, in Grotto Cave. The Grotto formed naturally over time from the dissolution and collapse of karst soil through the cliff line. This created openings to the surrounding open ocean water.

FIGURE C-49. Grotto Cave



There are no biological ALUS monitoring sites along this remote, and rugged cliff line. However, the grotto itself has some of the most diverse coral reef coverage, sponges, and sea fans in the waters surrounding Saipan, and a plethora of fish. This is the reason hundreds of thousands of visitors snorkel or SCUBA dive at the Grotto each year. Therefore, Banaderu's coastal waters fully support the *Propagation of Aquatic Life* DU based on anecdotal and professional judgement.

Orthophosphate levels exceeded the CNMI WQS at Grotto Cave on only two occasions this reporting cycle. Therefore, Banaderu's coastal waters remain 303(d) listed as impaired for Phosphate. The source of which is associated with nesting sea birds.

Sinigalliano's qPCR MST study found that, "The Grotto (Site NEB01) frequently had elevations of both live Enterococci and human fecal HF183 marker, plus some elevations of seabird marker" (Sinigalliano, 2021). 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, et.al., (2016). It should be noted that Banzai cliff is located on the opposite side of the watershed, approximately 2.6 coastal miles away from the Grotto Cave and there are no beaches located in Banaderu's 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. However, unlike last reporting cycle the source of contamination was not due to human visitors, as the COVID-19 travel ban and the Governor's closure of the Grotto in March 2020 prevented access. Even after the Grotto was reopened in May 2020 only very few local residents were recreating in its waters. The unexpected result of having fewer people visiting the Grotto, was that cows that roamed away from their designated grazing lots in the area, now frequented the deserted parking area. WQS/NPS samplers frequently observed cow manure here, which would wash down to the Grotto's coastal waters during rain events, thus the source of Enterococci exceedances. The DPL was contacted and they informed cattle owners to return their livestock to their designated grazing areas.

Grotto Cave is featured in numerous international dive publications as a premier dive destination. The walls of the Grotto Cave have ledges from which swimmers can dive into its deep clear waters. It is considered one of CNMI's top tourist sites for visitors to snorkel, SCUBA, or even to just 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 retain 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 Bacteriological TMDL.

FIGURE C-50. A Prime Tourist Destination

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. It is the number one destination for tourists visiting the CNMI. Before the COVID-19 travel ban was imposed, close to 300,000 people visit Mañagaha each year (MVA tourist exit surveys, 2016).

Mañagaha is surrounded by a "no-take" Marine Conservation Area (MCA) 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 overland or by subterranean transport from land to sea.

FIGURE C-51. Mañagaha (Segment 23)

There are 11 long-term BEACH monitoring sites surrounding Mañagaha's shoreline and pier (Figure C-50., above).

Mañagaha - Coastal Marine Waters

The *2021 CNMI State of the Reef report* found adult COTS within Saipan lagoon and the waters surrounding Mañagaha for the first-time (Perez et.al., 2021).

Outside of Mañagaha's back reef, turf algal coverage dominated over coral, crustose coralline algae, and branching crustose coralline algae. There was also a decrease in coral diversity, which resulted in an ALUS rating of "Poor" at this site. This is a downgrade from last reporting cycle.

The MPA forereef had no significant change and remained in "Good" condition. Mañagaha's Patch Reef had significant improvements to the benthic habitat and coral diversity, resulting in an ALUS ranking of "Fair", and upgrade from last reporting cycle. Therefore, the cumulative five-year ALUS ranking remains ranked as "Fair" overall.

Mañagaha's coastal waters exceeded the CNMI WQS for Orthophosphate on two occasions at BEACH site M07 again this reporting cycle. However, NO_3-N and pH levels were within standards. The source of the phosphate exceedances is unknown, but may be associated with the nearby Shearwater bird nesting site. The population of nesting seabirds increased significantly during this reporting cycle as a result of few tourists visiting the island. The source of past nitrate levels is unverified.

Although unconfirmed, the low pH exceedances in FY2017 were associated with on board boat cleaning activities. These present and past exceedances cause Mañagaha's coastal waters to remain 303(d) listed as impaired, which does not support the *Propagation of Aquatic Life* or *Recreational* DUs.

There have been no data collected on fish tissue and/or biota contamination of Mañagaha's coastal waters to assess the *Fish and Shellfish Consumption* 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.

Mañagaha – CALM Categories

Mañagaha 's coastal waters retain a CALM Category 5 due to elevated phosphate levels, and past Nitrate and Low pH levels, which are unsupportive of the *Propagation of Aquatic Life* and *Recreational* DUs.

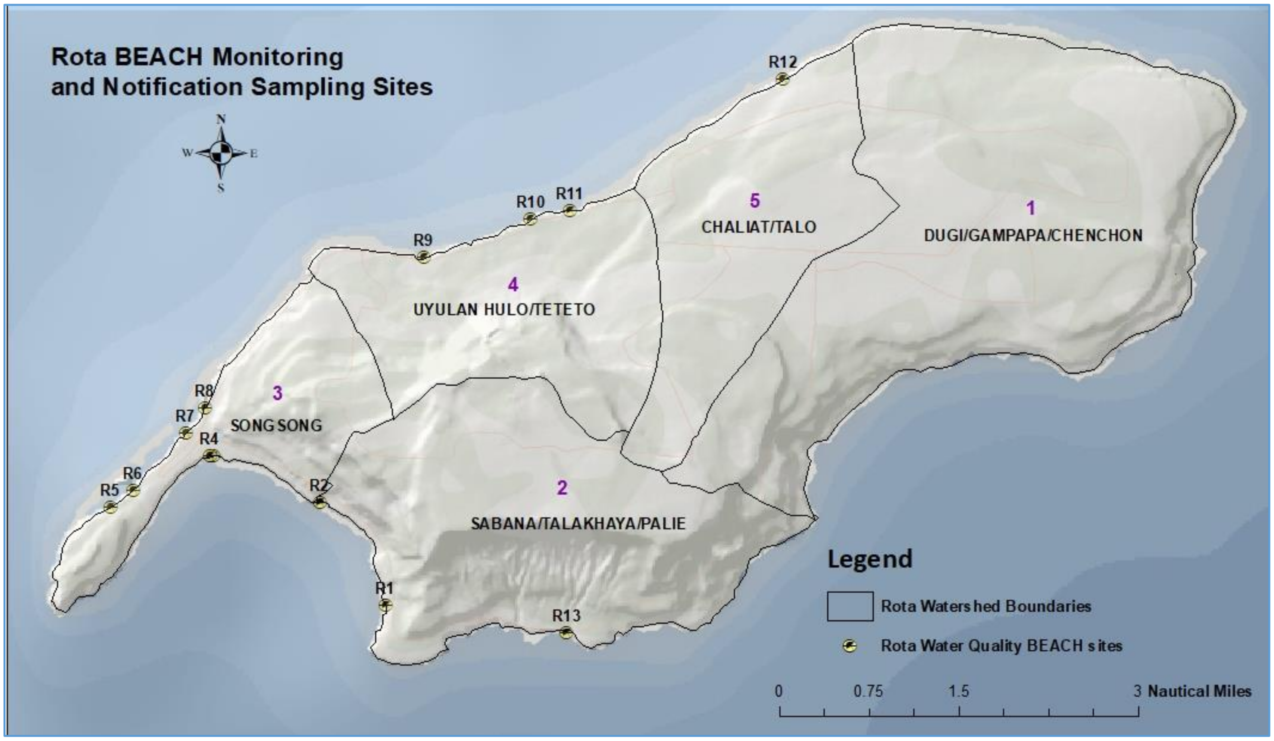
C.3.6. Five-Part Categorization of Rota's Surface Waters

"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).

Rota has the lowest population of the three southern islands of the archipelago. The 2020 Census listed only 1,893 residents; a 25% decrease in population since the last Census in 2010. There are much fewer residents today due to an economic downturn, high cost of living, 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 in September 2018, followed by Super Typhoon Yutu in October 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.

FIGURE C-52. Rota's BEACH Water Quality Monitoring and Notification Sites



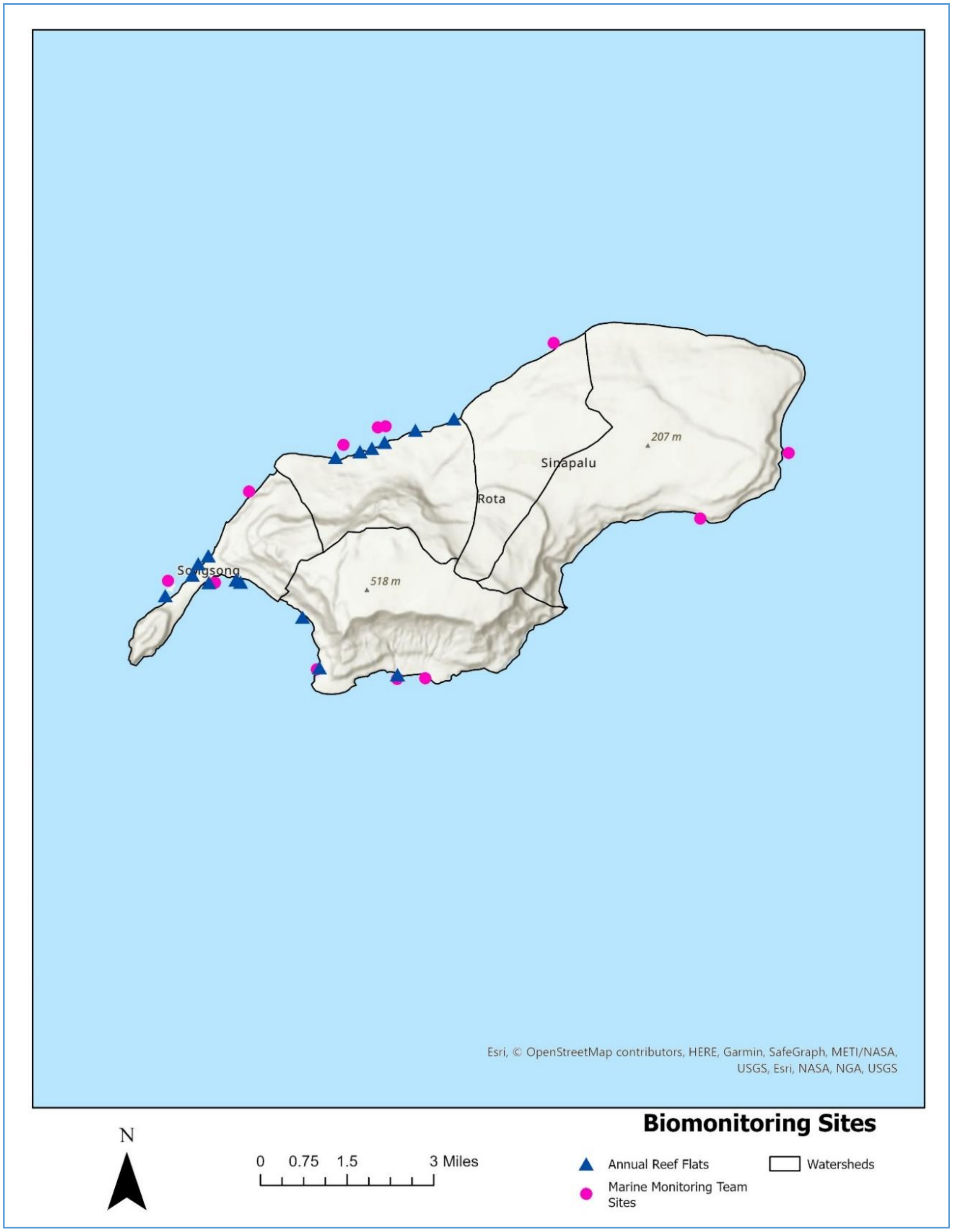
Rota is split into five (5) watersheds, with 12 regularly monitored BEACH sites. In addition, Rota has three wildlife preserves: The Wedding Cake Mountain Region on the southwest peninsula; Sabana Heights in the island's upper plateau; and I'Chenchon Park on the Dugi/Gampapa/Chenchon watershed's coastline. Rota also has one Marine Protected Area, the Sasanhaya Fish Reserve off the Sabana/Talakhaya/Palie coastline.

There are less data on Rota's coastal water quality due to the truncated 8-week sampling schedule. However, the schedule does allow for seasonal variation and 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.

In addition, there are 28 biological criteria monitoring reef sites. These are assessed annually by the MMT and WQS/NPS staff (Figure C-53., on the following page).

There are also five (5) 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).

FIGURE C-53. Rota Reef Biological Criteria Monitoring Sites



Comparatively speaking, Rota's flora has been less altered than Saipan or Tinian, leaving vast forested 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

Rota's coastlines are relatively untouched. Residents regularly barbeque under the many covered "Pala Palas" 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.

ALUS biological assessments of benthic habitat and coral reef assemblages in Rota's coastal waters ranged from "fair" outside of three watersheds, to "poor" outside of the Sabana/Talakhaya/Palie and Chaliat/Talo watersheds. Therefore, Rota's overall ranking remains "Fair", for the *Support and Propagation of Aquatic Life* DU overall, but is showing a declining trend.

TABLE C-36. 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
Rota						
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	***Poor 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	***Entero delist,*** pH Low
	Aesthetic enjoyment/others	F	F	F	F	F
	CALM Assessment Category	1	5	5	***5***	5
	F - Fully Supported	i - Insufficient Information	Not supporting	***Changes bold italics***		

The 2021 *CNMI State of the Reef Report*, states that, "the 2017 bleaching event and a COTS outbreak that lasted from 2019-20, have negatively impacted Rota's reefs. These cumulative impacts continue to impede coral recovery at long-term monitoring sites surveyed during 2020-21" (Perez, et.al., 2021).

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 COTS, 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 met WQS in all watersheds except for the Swimming Hole in the Chaliat/Talo watershed, which again exceeded the standard for Nitrate as it had in the last IR.

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 consumption* DU.

Three (3) of Rota's watersheds again do not support the *Recreation* DU. The primary sources of Enterococci contamination in this sparsely populated island are soil-laden stormwater runoff from eroded badlands, roaming deer, free-range livestock grazing, and fresh groundwater seeps carrying human waste from failing septic systems.

The bacteriological water quality of the Swimming Hole's coastal waters in the Chaliat/Talo watershed, has met the WQS for Enterococci for the past six years. The improvement is associated with a drastic decrease in both the island's resident population and the dramatic decrease in visitor numbers associated with the COVID-19 travel ban. This resulted in Chaliat/Talo being delisted for Enterococci.

ROTA – FRESHWATER STREAMS

The Sabana/Talakhaya/Palie watershed is the only watershed on Rota that provides sufficient precipitation, topographical and geological features to support a freshwater spring system, which feed the water caves that provide 90% of Rota's *Potable Water* Supply. However, upon investigation the water cave's waters were not considered "under the influence of surface water" by CUC and BECQ Safe Drinking Water Branch.

TABLE C-37. 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
		Rota				
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 streams themselves that flow from this area are not used as a potable water supply. The assessment results for these streams are provided in Table C-37., above.

Rota has riparian areas and several lush streams that provide native habitat for aquatic species to thrive, and beautiful waterfalls. As such, these streams fully support the *Aesthetic Enjoyment* DU.

Although there has been a decrease in the percent of Enterococci exceedances of the WQS from past years, these waters are still not considered supportive of the *Recreational* DU.

ROTA – WETLANDS AND LAKES

Rota's wetlands have been reported as constructed 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.

There are no lakes on Rota.

TABLE C-38. Assessment of Rota Waterbodies' DUs – Wetlands and Lakes

		Rota				
WATER BODY SEGMENT ID		1	2	3	4	5
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 watershed is the largest on Rota based on land coverage. It is the most remote and undeveloped area as well, as shown in Figure C-54., on the following page. Rota's Benjamin Taisacan Manglona International Airport is located here.

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 panoramic views and 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 visits for biological monitoring of reef flat sites by the MMT.

FIGURE C-54. Dugi/Gampapa/Chenchon (Segment 1)

The Biological ALUS assessment found no significant change to the reef site near Route 1 in Rota's Dugi/Gampapa/Chenchon coastal waters this reporting cycle, which remained ranked as "Fair". The predominant environmental stressor to the reef environment is runoff from agriculture and free-range cattle, as 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, these coastal waters retain an overall 5-year 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.

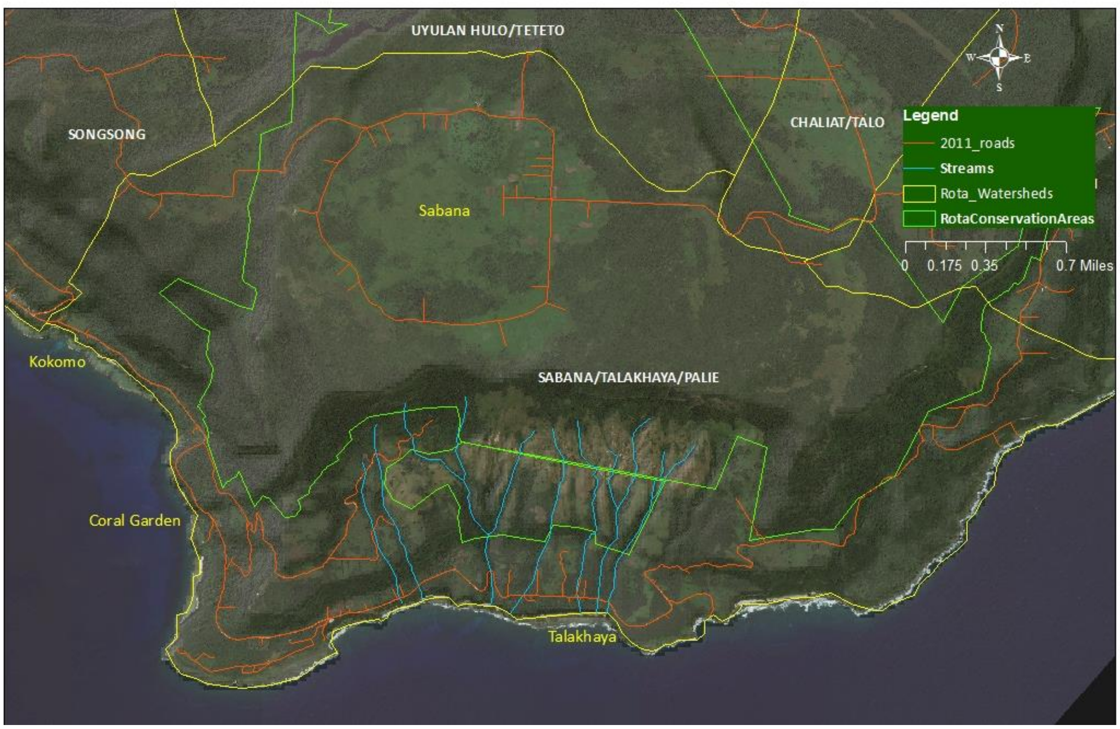
Dugi/Gampapa/Chenchon – CALM Categories

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-55.

FIGURE C-55. Sabana/Talakhaya/Palie (Segment 2)



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 stabilize soils and prevent further erosion of the Sabana/Talakhaya/Palie's badlands, a multi-phase revegetation project was instituted by DCRM in 2007. Funding was provided by NOAA to address sedimentation on the reefs. Ten stream water quality sampling sites were established in 2017. However, monitoring was discontinued in February 2020, at the end of NOAA fellow's contract.

However, native planting is ongoing and fencing is being installed to keep out ungulates from the revegetation plots. This project is funded by the US Forestry Service.

The NOAA Coral Reef Fellow ended their contract in 2020. However, with the completion of the Talakhaya Integrated Watershed Management Plan in 2020, a position was created to hire a Rota Watershed Technician to implement the next phases of revegetation in coordination with the Rota DLNR Forester. It is hoped that stream water quality monitoring will be taken up again once the Watershed Technician has been hired.

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 safety hazards associated with accessing the shoreline. Therefore, regular 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 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.).

Talakhaya appeared to be less affected by coral bleaching events in 2013 and 2014, than in 2017, which had a greater negative impact on the reefs. The *2021 CNMI State of the Reef Report* states that, "These cumulative impacts continue to impede coral recovery at long-term sites surveyed during 2020-21", (Perez, et.al., 2021).

The ALUS ranking of the benthic substrate of the Talakhaya BEACH site and the Talakhaya stream outlets, remained "Poor" again this reporting cycle. There was no significant change to the Coral Garden reef site, which remains in "Good" condition. However, this was not enough to prevent the Sabana/Talakhaya/Palie's coastal waters being downgraded to a cumulative 5-year ALUS ranking of "Poor" this reporting cycle.

Sabana/Talakhaya/Palie's coastal waters nutrient levels were well within the CNMI WQS at all BEACH sites again this reporting cycle.

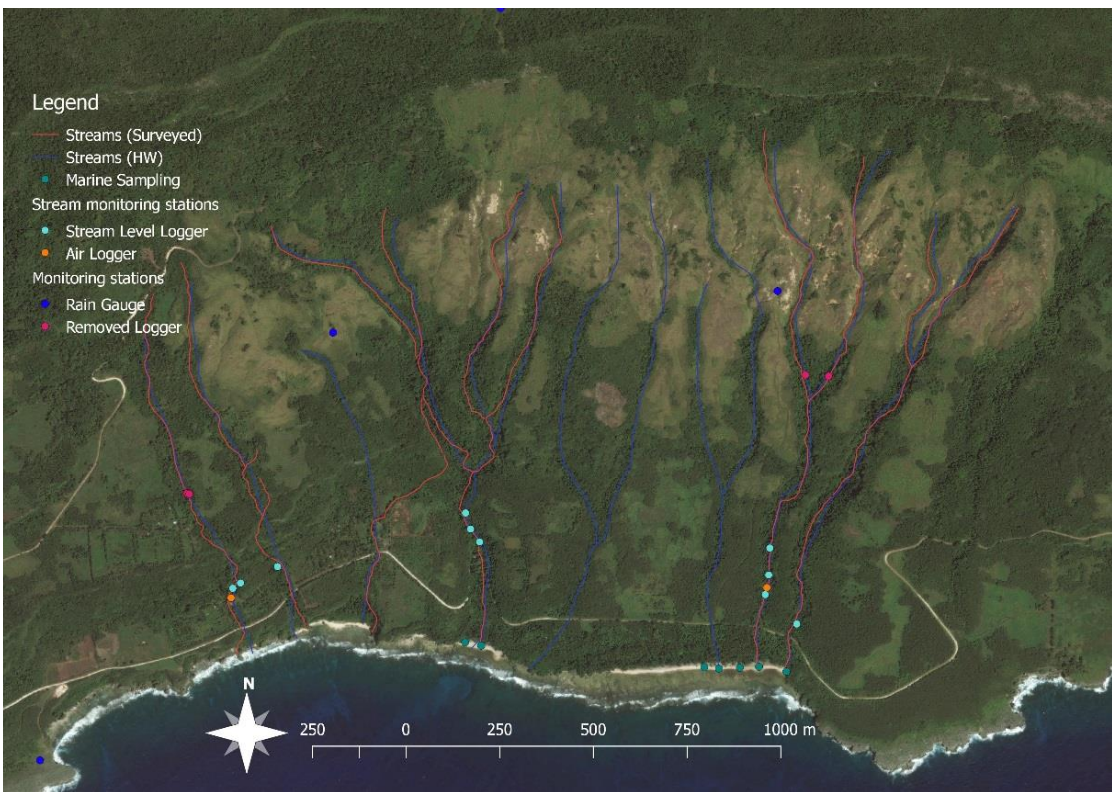
There were no exceedances of the CNMI WQS for pH this reporting cycle. However, there were exceedances at the Kokomo Beach Club in FY2019. The pH levels are thought to be erroneous due to an aging YSI probe that was phased out and replaced with a new YSI meter this reporting cycle. Therefore, these coastal waters remain 303(d) listed as impaired for pH, and are unsupportive of the *Propagation of Aquatic Life* and *Recreation* DU.

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.

Water quality remains impaired for Enterococci at the Talakhaya site. The sources in this sparsely populated watershed are associated with fresh groundwater 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.

Kokomo, Coral Garden and the Talakhaya coastal waters are further removed from roadways compared to Songsong watershed and have beautifully diverse coral reefs. Many residents go to these beautiful rubble and sandy beach enclaves to enjoy a day snorkeling or fishing. For this reason, Sabana/Talakhaya/Palie coastal waters fully support the *Aesthetic Enjoyment* DU.

FIGURE C-56. Talakhaya Stream Water Monitoring Sites



Sabana/Talakhaya/Palie – Freshwater Streams

Sabana/Talakhaya/Palie is the only watershed with perennial freshwater streams on Rota, as shown in Figure C-56. 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.

A portion of the Water Caves' lush stream system flows to the coast primarily during rainy season. Other portions are hyporheic (mixing of ground and surface water) during dry season.

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/Talakhaya/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 show a decreasing trend in the percent exceedances of the CNMI WQS for Enterococci in the streams after the revegetation project began here. The exceedances decreased from a collective average of 100% in 2018 to 42% in 2020. However, these streams are is still considered impaired at this time, and do not support their *Recreational* DU. Sources of Enterococci exceedances are associated with failing septic systems near the streams, free-range livestock, and sediment laden stormwater.

Sabana/Talakhaya/Palie – Wetlands and Lakes

There are no lakes on Rota. However, Talakhaya's riparian wetland area that contributes to Rota's public potable water supply is said to provide an economic value of $2.4 million annually to the CNMI. (Wolf Co., Nov. 2019, version 2).

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 retain CALM Category 5 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-57., 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.

The Songsong watershed has insufficient precipitation, topographical and geological features to support stream systems. Precipitation flows through subterranean transport from land to sea.

FIGURE C-57. 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 for recreating. Visitors enjoy picnics, fishing and sunsets at these beaches. Therefore, this watershed's coastal waters fully support the *Aesthetic Enjoyment* DU.

Biological ALUS assessments at the East Harbor showed a significant improvement in benthic substrate and coral diversity from the "Poor" ranking last reporting cycle. This resulted in the ALUS ranking to be upgraded to "Fair" this reporting cycle. The reef near Rota's West Harbor had no significant change from the past six years and remains ranked as "Fair". Therefore, Songsong's coastal waters retain a cumulative 5- year overall ALUS ranking of "Fair".

Songsong's coastal waters exceeded the CNMI WQS for DO% at several sites, and pH at the Mobil Storm Drainage site in FY2019, with no apparent trend. Although the latter may be related to the aging pH probe that was phased out and replaced by a new YSI meter. However, there may be other port related activities that contributed to the pH exceedances in 2019. The source of which remains unknown.

The potential sources for the diminished DO% include fresh groundwater 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.

All of the BEACH sites in Songsong's coastal waters were well within the WQS for nutrients. Although, the West Harbor Marina BEACH site exceeded the CNMI WQS for Orthophosphate in FY 2019.

These findings result in Songsong's coastal waters remaining 303(d) listed as impaired for DO%, pH, and phosphate, which together, are unsupportive of the *Propagation of Aquatic Life* DU.

No fish tissue and/or biota contamination data are 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 – CALM Categories

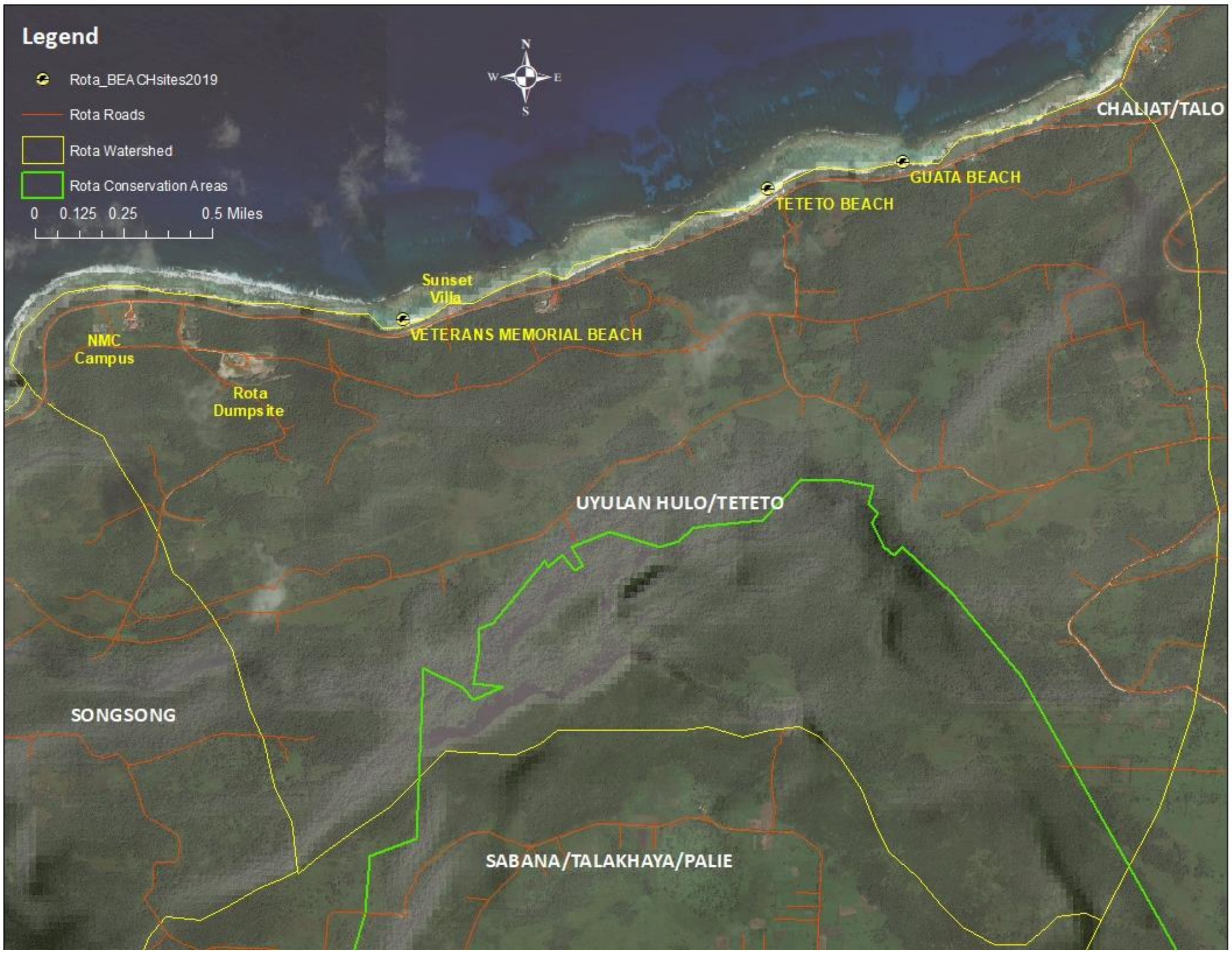
Songsong's coastal waters retain a CALM Category of 5 this reporting cycle due to DO%, pH, Phosphate and Enterococci exceedances of the CNMI WQS, which are unsupportive of the *Propagation of Aquatic Life* and *Recreational* DUs.

C.3.6.4. UYULANHULO/TETETO – Waterbody Segment 4

The Uyulanhulo/Teteto watershed contains Rota's NMC Campus, the closed Sunset Villa Hotel, and three (3) BEACH monitoring sites: Veterans' Memorial; Teteto; and Guata beaches (Figure C-58., on the following page). These idyllic beaches are frequented by residents and tourists, for swimming, picnicking and barbeques, even more so than 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.

FIGURE C-58. Uyulanhulo/Teteto (Segment 4)



The Uyulanhulo/Teteto watershed has insufficient precipitation, topographical and geological features to support stream systems. Precipitation flows through subterranean transport from land to sea.

Uyulanhulo/Teteto - Coastal Marine Waters

There was no significant change to the biological ALUS assessment of Uyulanhulo/Teteto's coastal waters. Both the reefs in front of Rota's dump site, and in front of Sunset Villa received an ALUS ranking of "Fair" again this reporting cycle. Therefore, Uyulanhulo/Teteto's coastal waters retain a cumulative five-year overall ALUS ranking of "Fair".

In FY 2019, there were low pH levels, recorded at Guata beach, which is far removed from the dump or any other anthropogenic stressors. These have been associated with aging pH probes. These probes were phased out this reporting cycle and replaced with a new YSI Pro DSS meter, after which all of the pH levels fell within the CNMI WQS.

Again, this reporting cycle, Uyulanhulo/Teteto's coastal waters at all BEACH sites were well within the CNMI WQS for both nutrients. However, due to the pH levels in 2019, Uyulanhulo/Teteto's coastal waters remain listed as impaired for pH, and do not support the *Propagation of Aquatic Life* DU.

No fish tissue and/or biota contamination data is available on Uyulanhulo/Teteto coastal waters to assess the *Fish and Shellfish Consumption* DU.

All BEACH sites were within the WQS for Enterococci this reporting cycle. The source of the exceedances at the undeveloped Teteto Beach in FY 2019 are unknown, but may be the result of resuspension of naturally occurring Enterococci in stormwater, and not actually fecal contamination. However, this has not been proven. Therefore, Uyulanhulo/Teteto coastal waters remain 303(d) list as impaired, for Enterococci and pH, 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 in the future.

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 – 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.

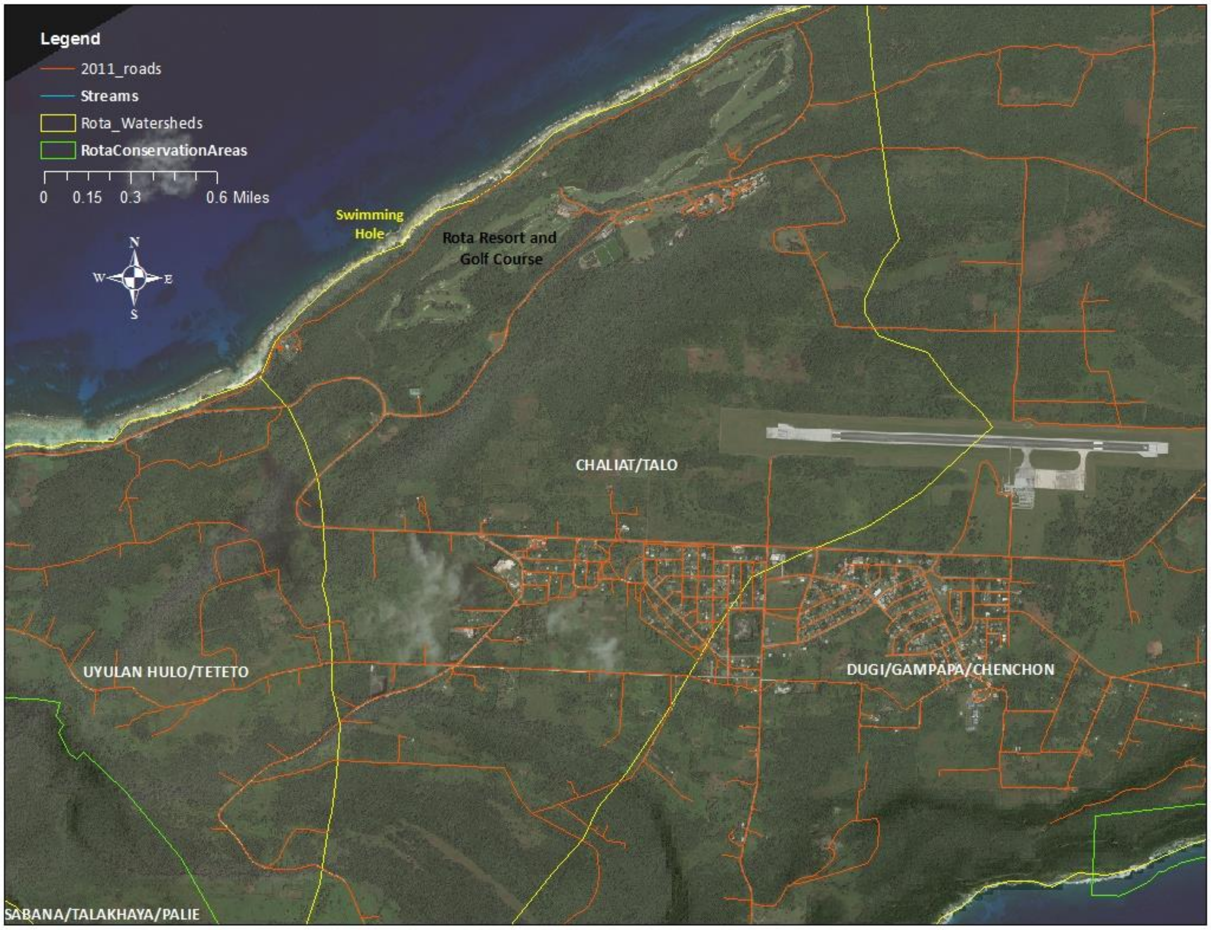
C.3.6.5. CHALIAT/TALO – Waterbody Segment 5

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-59., on the following page). These open pools attract native invertebrates, birds, and numerous introduced and invasive cane toads, "*Rhinella marina*".

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.

The Chaliat/Talo watershed has insufficient precipitation, topographical and geological features to support stream systems. Precipitation flows through subterranean transport from land to sea.

FIGURE C-59. Chaliat/Talo (Segment 5)



Chaliat/Talo - Coastal Marine Waters

No ALUS biological data was collected on the forereef near the Swimming Hole BEACH site this reporting cycle. There was a significant decrease in the benthic substrate health last reporting cycle. 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 forereef monitoring sites to confirm whether or not there are water quality pollutants contributing to this decline. These findings result in the Chaliat/Talo's coastal waters retaining a cumulative five-year overall ALUS ranking of "Poor" again this reporting cycle.

In FY 2019, there were low pH levels, recorded at the Swimming Hole. These have been associated with aging pH probes. These probes were phased out this reporting cycle and replaced with a new YSI Pro DSS meter, after which all of the pH levels fell within the CNMI WQS. Therefore, the previous levels may have been erroneous. However, this is unproven so the source remains unknown.

In addition to pH exceedances, water quality data exceeded the CNMI WQS for NO_3-N again this reporting cycle. The elevated levels may be from fresh groundwater seeps carrying contaminants from the Rota Resort or golf course or other upland land applications, but this is unproven. These findings resulted in Chaliat/Talo's coastal waters remaining on 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.

For the sixth year in a row, the Swimming Hole was well within the CNMI WQS for Enterococci. The reason for this recovery may be due to a decrease in visitor numbers. The access road is difficult to navigate since Super Typhoon Yutu. Fallen trees block the access. In addition, there is a general decrease in Rota's population, and tourism numbers due to the COVID travel restrictions. As a result, these waters have been removed from the 303(d) list as impaired for Enterococci this reporting cycle. However, because of the low pH levels reported in 2019, the *Recreational* DU remains unsupported.

Chaliat/Talo coastal waters are surrounded by grassy beaches furnished with covered "Pala Palas", and barbeque pits for visitors to relax after a swim, barbeque and enjoy sunrises or sunsets. It is for this reason that Chaliat/Talo's coastal waters fully support the *Aesthetic Enjoyment* DU.

Chaliat/Talo – CALM Categories

Chaliat/Talo coastal waters retain a CALM Category of 5 this reporting cycle, due to pH and elevated Nitrate levels, which does not support the *Propagation of Aquatic Life* and *Recreational* DUs.

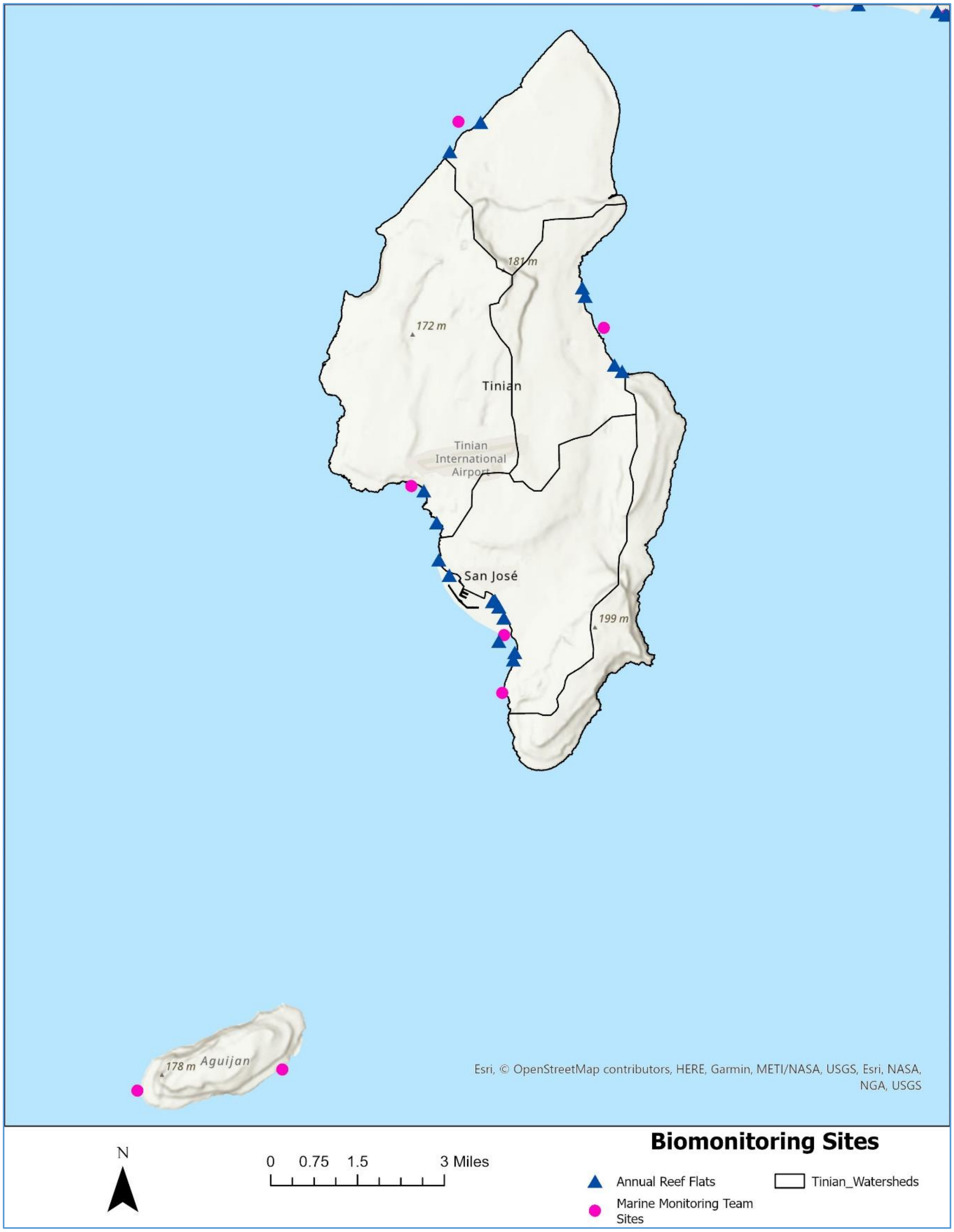
C.3.7. Five-Part Categorization of Tinian's Surface Waters

Tinian is divided into six (6) watersheds, including the uninhabited island of Aguigan ("Goat Island") off the southwestern tip of Tinian. The northern two thirds of the island of Tinian, known as the Military Lease Area (MLA), is leased by DoD for military training and exercises. There are no residents living in this zone, but visitors are allowed access to beaches. Free-range cattle are sometimes found roaming.

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 (Figure C-60., on the following page). A new site at Chiget Beach north of Unai Babui will be added before next reporting cycle. Tinian also has 21 long-term biological monitoring reef sites around Tinian and two around Aguigan. (Figure C-61).

FIGURE C-60. Tinian BEACH Water Quality Sites and Aguigan Biological Monitoring Sites

FIGURE C-61. Tinian Reef Biological Criteria Monitoring Sites



Due to past WWII and present military activities, there is evidence of debris, UXO, and other munition constituents detected in Tinian soils, which may present persistent adverse impacts to Tinian's waterbodies.

San Jose is the largest village on Tinian, followed by Marpo Heights I and II respectively. These villages are located in the Makpo watershed; as are Tinian's only Class A designated waters, San Jose Harbor.

There are drastically fewer residents and foreign workers living on Tinian today. The 2020 CNMI Census listed Tinian as having only 2,044 residents. This is a 35% decrease from the 2010 Census population of 3,136 individuals. There are several reasons for this including the closure of Tinian Dynasty in 2015, followed by residents leaving the island due to infrastructure damage and power outages after Super Typhoons Soudelor and, in particular, Yutu. Yutu devastated Tinian with a direct hit in October 2018. In addition, there was 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 now employed on Saipan, which offers the most job opportunities.

The drastic downturn in the tourist industry from the COVID-19 travel ban also led many people to leave Tinian to pursue other job opportunities. With less people to feed, there are also much fewer cattle now reared on Tinian for consumption, or for export to Guam for consumption or breeding. Tinian's population is not expected to increase in the foreseeable future.

Tinian's few residents and visitors have a plethora of open spaces to enjoy expansive views of the ocean 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 dynamic ocean waters below.

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 upland of Leprosarium beaches I and II.

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. 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 only for use by more advanced swimmers, unless waters conditions are calm.

Coral cover for Tinian has historically been lower compared to Saipan, due to the geomorphology of the area, but the cover has remained stable in comparison to previous survey years (*State of the Reef,* 2021). ALUS biological assessments of Tinian's coral reef assemblages found many of the benthic habitats appeared to be degraded from the effects of climate related bleaching events, as were the reefs surrounding Aguigan. Only Masalok and the Carolinas reef systems received a passing ranking this reporting period. Therefore, most of Tinian's coral reef systems do not support the *Propagation of Aquatic Life* DU.

There was an improvement to some nutrient levels this reporting cycle, with all watersheds meeting the CNMI WQS for Orthophosphate. However, NO_3-N exceeded standards in most coastal waters in FY2020 except for Aguigan island and the Carolinas which were not tested. It should be noted that these were based on only six (6) to seven (7) sampling events, making even one single sample exceedance resulting in a greater than 10% annual exceedance. Assessment results for Tinian's coastal waters are provided in Table C-39.

TABLE C-39. Assessment of Tinian Waterbodies' DUs – Coastal Marine Waters

		Goat Island	Unai Masalok, Dangkolo		Tachogna, Taga, Kammer	Harbor	Leprosarium I & II	Unai Babui, Chulu
		AGU1 - AGU2	T1-T2		T7-T10	T9	T5-T6	T3-T4
		Aguigan	**Tinian**					
	WATER BODY SEGMENT ID	**6**	**7**	**8**	**9**	**9 H**	**10**	**11**
	Designated Use	Aguigan	Masalok	Carolinas	Makpo	Makpo Harbor	Puntan Daiplolamanibot	Puntan Tahgong
Coastal Waters	Aquatic Life	Poor Habitat	Fair Habitat, ***Orthophos good***, NO3, & pH Exceed	F	Poor Habitat, ***Orthophos good, NO3 exceed***	***No ALUS site, Orthophos good,*** & Low DO%	Poor Habitat, ***Orthophos good, DO%*** & NO3	Poor Habitat, ***Orthophos good,*** NO3 & pH Exceed
	Fish Consumption	F	i	F	i	i	i	i
	Recreation	F	***Entero*** & pH Exceed	F	***Entero*** & Low pH	***Entero Exceed***	Entero exceed	Entero & pH exceed
	Aesthetic enjoyment/others	F	F	F	F		F	F
	CALM Assessment Category	4c	5	1	5	5	5	5

Changes in bold italics | Fully Supporting | Insufficient information | Not Attaining DU

All coastal waters met the CNMI WQS for pH after the aging pH probes were phased out and new YSI Pro DSS meters were put into use this reporting cycle.

DO% levels in San Jose Harbor in the Makpo Harbor watershed (Segment 9H) continue to be diminished, and for the first time so were Leprosarium beaches, I and II. The source of Makpo Harbor's low pH 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 source of the Leprosarium beaches nitrate levels was due to inappropriate disposal of pumper truck wastewater at the unlined Tinian dump.

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.

There were violations of the CNMI Water Quality Standards (WQS) for Enterococci at all of Tinian's coastal waters, which was attributed to sample contamination. A review of sampling protocols and handling by all WQS/NPS resulted in a reduction in violations thereafter at all but two BEACH sites, Leprosarium I and II. Further details are given in Sub-section C.3.7.5. Puntan/Diaplolamanibot.

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 with open water called, "Hagoi".

There are a few depressional wetland complexes named Makpo, Bateha I and II, and Mahalang, together covering a total of 83.5 acres. Table C-40, on the following page provides the assessment results for the *Propagation of Aquatic Life* DU, and the wetland's CALM category for each watershed.

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 CNMI Wetland RAM. The RAM is discussed in detail in Section C.4., "Wetland Program" that follows this section. The Mahalang Complex is also in the Puntan/Tahgong watershed.

The Bateha I and II Complex is located in the Puntan/Diaplolamanibot watershed, with Bateha II wetland lying adjacent to the Masalok watershed boundary.

The Makpo Complex that surrounds the San Jose Village's public potable water supply on the southern half of the island lies within the Makpo watershed.

TABLE C-40. Assessment of Tinian Waterbodies' DUs – Wetlands

			Bateha II is relocated to Puntan/ Daiplolamanibot		Makpo Complex		Bateha I & II	Hagoi & Mahalang Complexes
		Aguigan	**Tinian**					
WATER BODY SEGMENT ID		**6**		**8**	**9**	**9 H**	**10**	**11**
	Designated Use	Aguigan	Masalok	Carolinas	Makpo	Makpo Harbor	Puntan Daiplolamanibot	Puntan Tahgong
Wetlands	**Propagation of Aquatic Life**		***X***		i		F	F
	CALM Assessment Category				4c		1	1
	No wetland present		Fully		Insufficient		***Changes in bold italics***	

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 approximately 6.6 nautical miles southwest of Tinian's San Jose Harbor. Aguigan's coastal waters are designated as a conservation area by DLNR DFW. This provides the island with substantial protection from anthropogenic stressors.

During calm weather, Aguigan's coastal waters are enjoyed almost daily by dive enthusiasts. DFW also receives requests for research permits from visiting academics who wish to conduct marine surveys in Aguigan's coastal waters. BECQ also schedules biological ALUS assessments of the coral reef assemblages at least once per year, weather permitting. There are two long-term biological monitoring sites off the east and west coasts of Aguigan (Figure C-62). The MMT are asked to collect water quality samples at the monitoring sites whenever biological assessments are conducted there. However, data is extremely limited, thus far.

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.

FIGURE C-62. Aguigan – Earthstar Geographics Powered by ESRI imagery (Segment 6)

Aguigan - Coastal Marine Waters

An ALUS assessment of Aguigan's coral forereef assemblages was conducted by the MMT at the AGU-2 site in 2021. The MMT reported in the *2021 State of the Reef Report* that,"…coral cover is showing a slight increase compared to 2018, but has not yet recovered to levels last observed in 2012." and "Macroalgal cover is continuing to increase, at the loss of Crustose Coralline Algae (Perez, et.al., 2021). However, Aguigan's coastal waters cumulative five-year ALUS ranking remains "Poor", and does not support the *Propagation of Aquatic Life* DU. At this time, BECQ lacks sufficient water quality data at these long-term forereef monitoring sites to confirm whether or not there are water quality pollutants contributing to this decline.

The fact that Aguigan is unpopulated, undeveloped, and difficult to access by visitors 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 professional judgement.

Aguigan – CALM Categories

Aguigan's coastal waters retain a CALM Category of 4c this reporting cycle due to insufficient information if pollutant sources are causing poor ALUS rankings that are 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 located in the MLA and is a long drive from San Jose Village and the Marpo homesteads. It contains two long-term BEACH water quality monitoring sites, Unai Masalok, and Unai Dangkolo ("Long Beach"), as shown in Figure C-63., 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. These are two of the three easily accessible BEACH sites 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 biological assessment of Unai Dangkolo's coral reef assemblages showed a high degree of biodiversity in coral species and invertebrates. There was also a high percentage of coral coverage. Therefore, the ALUS assessment was ranked as "Good"; upgraded from "Fair" last reporting cycle. Therefore, Masalok's coastal waters cumulative five-year ALUS ranking remains "Fair" this reporting cycle.

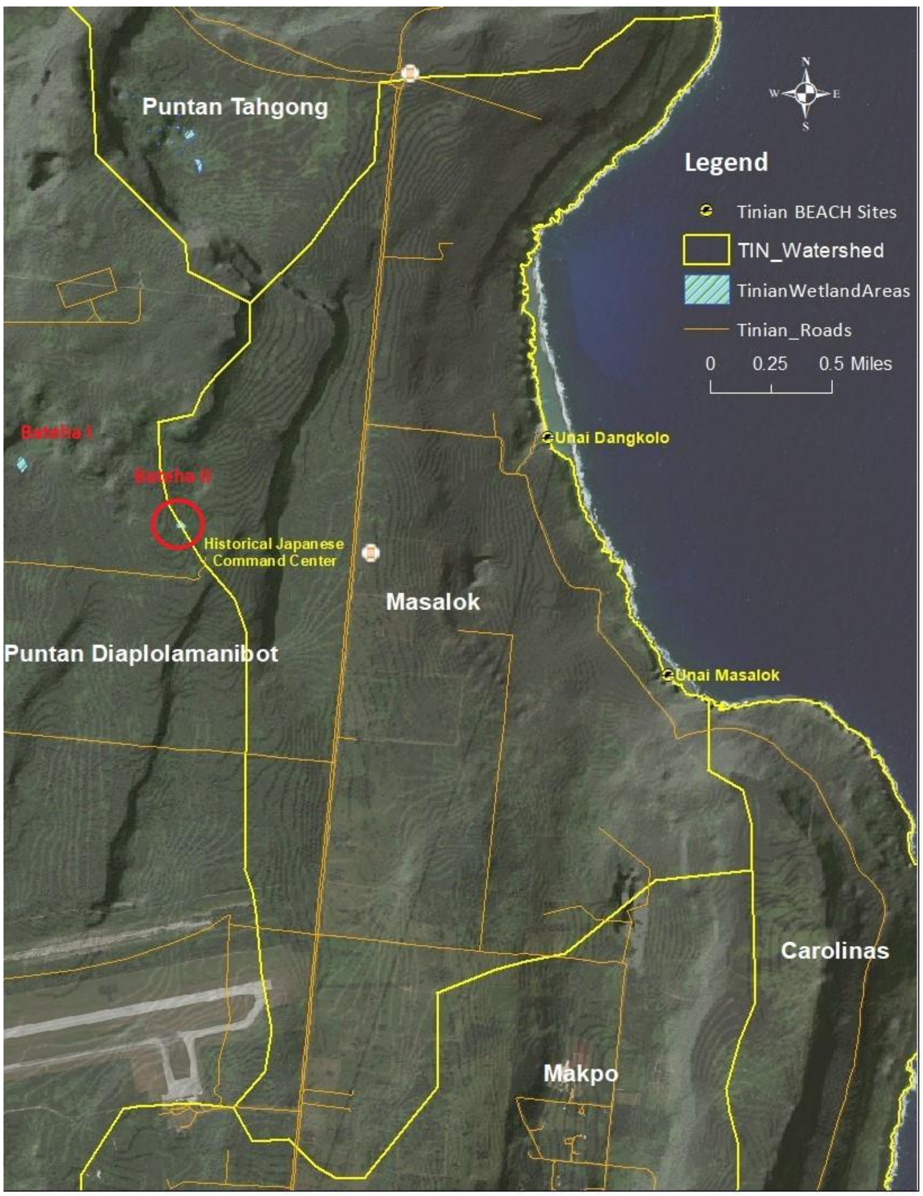
Nitrate levels exceeded the CNMI WQS again this reporting cycle, but Phosphate levels met WQS. There were only a small number of data points collected from these remote beaches so there is insufficient data to be confident of the source of this nutrient loading. It remains unknown at this time.

The pH levels were all within the CNMI WQS this reporting cycle. Previous low pH levels are thought to be erroneous and associated with the use of an aging pH probe. After the probe was phased out and replaced with a new YSI Pro DSS meter, pH levels fell within standards. However, Masalok's coastal waters remain listed due to exceedances in 2019. These findings do not support the *Propagation of Aquatic Life* DU.

There have 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 by DoD representatives in the most recent CJMT in talks with CNMI agencies in July 2021.

Masalok watershed's coastal water quality had a spike in Enterococci exceedances of the CNMI WQS in 2020. The WQS/NPS branch manager suspected sample contamination during transport when several sites around the island all tested positive on the same dates. A review of sampling protocols was required of all responsible staff, and a reduction in violations was seen thereafter. However, manure from free roaming cattle has been observed on Masalok's beach. Therefore, these waters were placed on the 303(d) list for Enterococci. These results and past pH exceedances, are unsupportive of the *Recreational* DU.

FIGURE C-63. Masalok (Segment 7)



Both Unai Dangkolo and Masalok Beaches are frequented by residents 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 Masalok watershed does not contain a wetland. Figure C-63., on the previous page shows that part of a depressional wetland complex lies on the watershed boundary between the Masalok and Puntan Diaplolamanibot watersheds. This is actually the Bateha II wetland, and together with Bateha I, forms the wetland complex. Therefore, the CN7WET waterbody has been removed this reporting cycle. The Bateha I and II depressional wetland (CN10WET) assessment is now discussed in the Puntan Diaplolamanibot watershed subsection of this reporting cycle. See Section C.3.7.5.

Masalok – CALM Categories

Masalok's coastal waters retain a CALM Category 5 this reporting cycle, due to nutrients, Enterococci, and past pH levels, which are unsupportive of the *Propagation of Aquatic Life* and *Recreational* DUs.

C.3.7.3. CAROLINAS – Waterbody Segment 8

The Carolinas watershed lies along the southern east coast of Tinian (Figure C-64 on the following page). There are only a few roadways within the watershed, but virtually no developments. There are no streams or wetlands in this watershed.

The coast line has a steep cliff face that provides a panoramic view of the ocean. The cliff drops to hazardous coastal waters below. 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 ALUS 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 to collect water samples. Therefore, careful attention must be paid to weather conditions before scheduling any sampling or biomonitoring events here.

Carolinas - Coastal Marine Waters

The Carolinas watershed's rough terrain, remote location, and hazardous coastline provides substantial protection from anthropogenic stressors or the introduction of potential pollutants. 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.

FIGURE C-64. Carolinas (Segment 8)

Carolinas – CALM Categories

The Carolinas watershed's coastal waters retain a CALM Category 1.

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, Jones (Kammer), and San Jose Harbor beaches (Figure C-65 on the following page).

The most densely populated areas on Tinian are San Jose Village, followed by Marpo Heights I and II, all of which lie within the Makpo Sub-watershed (Segment 9). The previously proposed Marpo Heights III homestead has since stalled due to the downturn in Rota's economy, and significant reduction in the island's population.

Tinian's San Jose Harbor and the adjacent beach is Tinian's only designated Class A waters. It lies within the Makpo Harbor Sub-watershed (Segment 9H).

Makpo – Waterbody Segment 9

There are three (3) long-term BEACH monitoring sites in Makpo's coastal waters; Tachogna, Taga, and Jones "Kammer" beaches. The largest commercial buildings are hotels. The Tinian Dynasty Casino has remained closed since 2015. However, there is a two-story "shipping container" hotel next to Tachogna Beach named Ocean View Hotel. The hotel is small with only 14 rooms which were used primarily by tourists before the COVID-19 travel ban. Now it is used on occasion by local visitors from Saipan, Rota, or Guam.

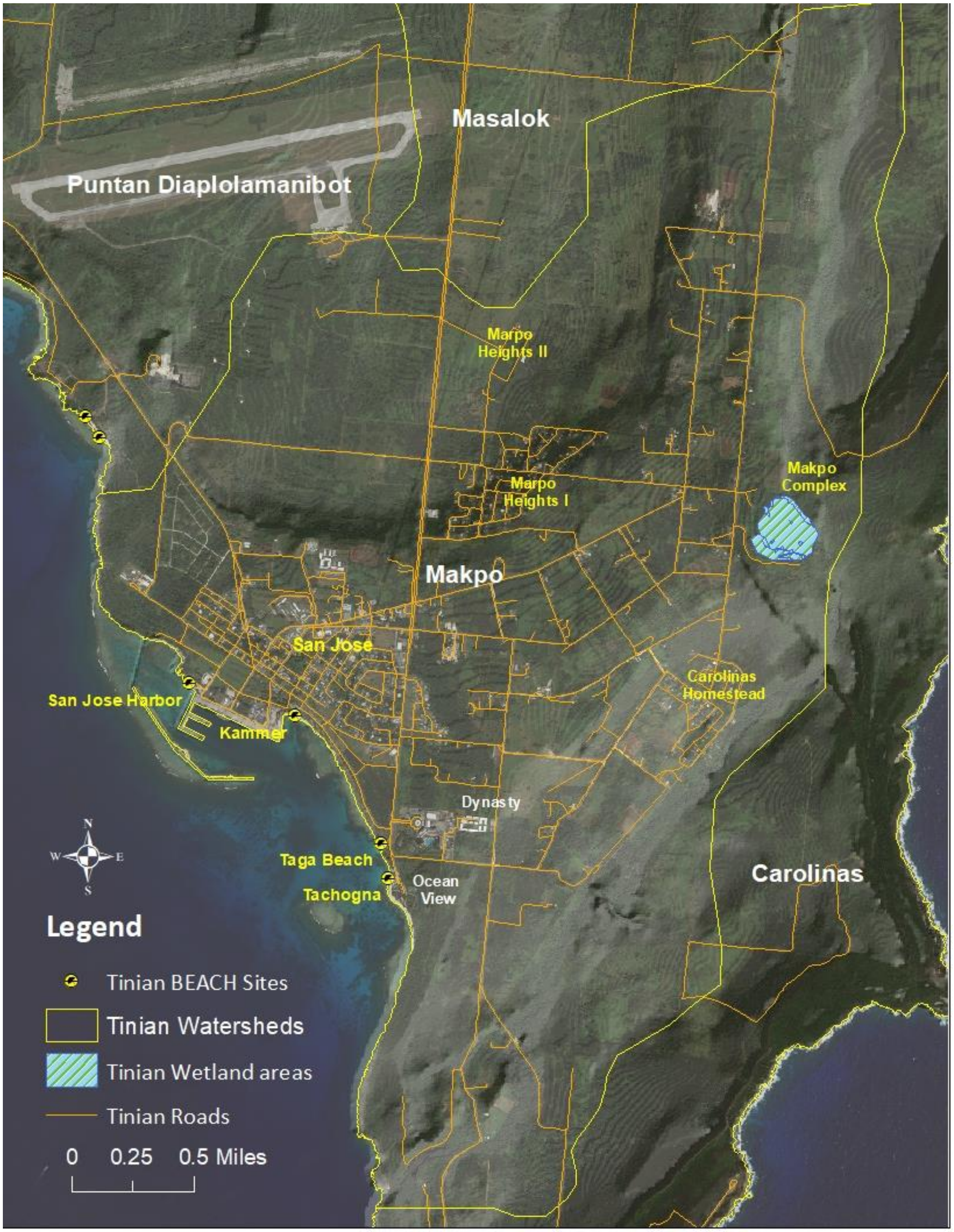
Makpo - Coastal Marine Waters

The ALUS biological assessment of the coral forereef assemblages south of Tachogna Beach had significant improvement in coral coverage and was ranked as "Fair" this reporting cycle. Even though the percentage of Cyanobacteria "Blue Green Algae" coverage was generally lower than in previous years (FY2018 -2019), there is still a high percent cover, which is of concern as it can outcompete with other benthic substrates, reducing biodiversity. In addition, the forereef in front of Taga Beach had no significant change in coral diversity and the ALUS ranking remained as "Poor". These findings resulted in a cumulative five-year overall ALUS ranking of "Poor".

The pH levels at all of Makpo's BEACH sites met the CNMI WQS this reporting cycle. This indicates the exceedances reported in 2018 were due to the aging pH probe. After the YSI meter was phased out and a new YSI Pro DSS was put into use, pH levels met standards.

Water quality nutrient levels exceeded the CNMI WQS for Nitrate at Tachogna beach in FY2020. However, there were only seven sampling events that year, and only one single sample exceedance resulting in a greater than 10% annual exceedance. This is the first time that Makpo watershed has not met the Nitrate standard. Orthophosphate levels were within standards for all three sites this reporting cycle.

FIGURE C-65. Makpo and Makpo's "San Jose" Harbor (Segment 9 and 9H)



At present, there is very little nutrient data to confirm the source of nitrate, but it may be groundwater loading from failing upland on-site IWDS. Therefore, Makpo's coastal waters are added to the 303(d) list as impaired for Nitrate and remain listed for pH and Phosphate for previous exceedances. Therefore, these coastal waters do not support the *Propagation of Aquatic Life* DU.

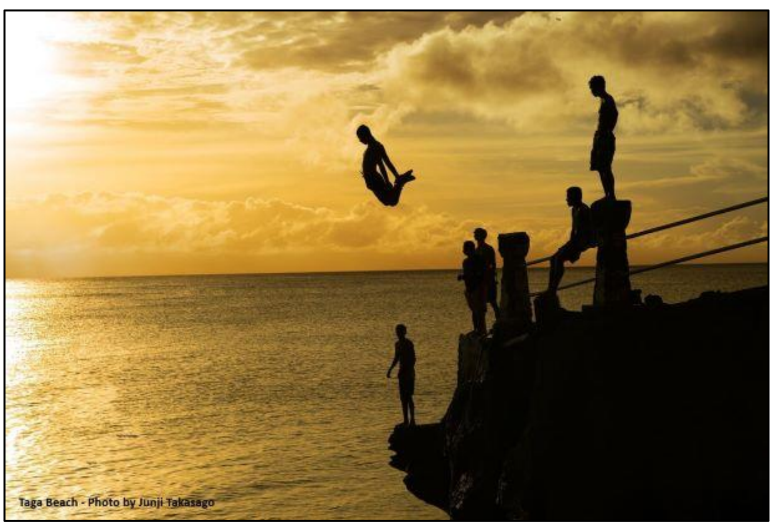
To date, there has been no data collected on fish tissue and/or biota contamination in Makpo's coastal waters to assess the *Fish and Shellfish Consumption* DU.

2021 was the first time since 2012 that Makpo watershed's coastal waters exceeded the CNMI WQS for Enterococci. This is thought to be associated with contaminated samples due to poor sample collection and handling techniques. After staff were required to review QAAP sampling protocols there was a reduction in violations thereafter. However, just as for nutrients, a suspected source of fecal contamination may be from groundwater seeps carrying wastewater from failing IWDS.

Therefore, Makpo's coastal waters are added to the 303(d) list as impaired for Enterococci. These results and the pH exceedances last reporting cycle do not support the *Recreational* DU.

Taga's pocket beach is surrounded by a rock outcropping that is a popular place for visitors to use as a platform to jump off or dive into the shoreline's deep waters. Makpo's other beaches offer picnic areas, Pala Palas, water sports, or just a place to relax and take in a sunset.

FIGURE C-66. Taga Beach Diving Platform



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

Makpo watershed contains the "Makpo Wetland Complex" in the upper watershed near the Carolinas' watershed boundary. This wetland is where the San Jose village's groundwater supply is sourced. The *Economic Valuation Study of CNMI inland Wetlands* completed in 2019 reported that, "The Maui II well located near the wetland provides water for 2,984 inhabitants in 926 households, with 900,000 gallons of water being extracted from the well daily…", (Wolf Co., Nov. 2019, version 2). Wolf's population estimate was reduced after Super Typhoon Yutu. There are now only approximately 2,000 residents on Tinian (CNMI Census, 2020). Wolf's report also found that the Maui II well,

"…provides an economic value of $2.3 million annually towards Tinian's public potable water supply".

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.

Makpo – CALM Categories

Makpo coastal waters retain a CALM Category 5 due to past pH and Orthophosphate levels; and current elevated Nitrate and Enterococci 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.

<u>Makpo Harbor – Waterbody Segment 9H</u>

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-67., on the following page).

There have been significantly less tourists visiting Tinian since 2015. However, Major Siting permits are now in place for a new development next to the harbor. Construction began in 2019 and will continue into 2022. If the construction is completed, it will include a small commercial building with retail office space, restaurants and a casino. A ferry terminal has also been considered for providing additional means for residents to travel to and from Saipan.

In 2021, Naval Facilities Engineering Systems Command (NAVFAC) Marianas began work to rehabilitate Tinian Harbor, including installation of new lighting and bollards in anticipation of increased military activity in the harbor. In-water work to repair ageing harbor facilities is expected to commence in 2022. BECQ is closely monitoring these activities for impacts to marine water quality.

Makpo Harbor - Coastal Marine Waters

There is not an ALUS biological monitoring site located within Makpo Harbor's Sub-watershed. The site used to evaluate coral reef health reported in previous IRs, is actually located north west of the harbor, and would not reflect the health of aquatic life within the harbor. Therefore, the combined biota/habitat bioassessments parameter has been removed in ATTAINS this reporting cycle. Instead, the Harbor's water quality parameters are used to assess the *support and Propagation of Aquatic Life* DU.

Makpo Harbor's BEACH site met the CNMI WQS for all nutrients. Last reporting cycle there was one exceedance of orthophosphate levels in FY2019, out of seven (7) sampling events (14% annual exceedance). Therefore, these waters remain 303(d) listed as impaired, but there is too little data to be certain of the source of nutrient loading. Coastal waters also exceeded the CNMI WQS for DO% this cycle, which is unsupportive of the *Propagation of Aquatic Life* DU.

FIGURE C-67. San Jose Harbor (Segment 9H)

Potential sources of elevated phosphate and diminished DO% is run-off from the marina's boat maintenance activities, cow manure, and nutrient loading from groundwater seeps carrying waste from failing on-site treatment systems.

Cows are temporarily held on the Harbor's boat ramp before being loaded and transported to Saipan and Guam by boat. All these sources can cause increased aerobic microbial activity resulting in oxygen depletion of coastal waters.

Makpo Harbor's waters also exceeded the CNMI WQS for Enterococci in FY2020, and remain 303(d) listed as impaired this reporting cycle. The sources of elevated Enterococci levels are thought to be primarily from cows, and from groundwater seeps carrying waste from on-site treatment systems. Given this exceedance, Makpo Harbor's coastal waters do not support the *Recreational* 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.

Makpo's Harbor is the primary site where fisherman launch their boats, and swimmers and snorkelers can dive from the boat ramp into the water. It also offers picnic areas to enjoy the scenic views, and sunsets. For this reason, Makpo Harbor supports the *Aesthetic Enjoyment* DU.

Makpo Harbor – CALM Categories

Makpo Harbor's coastal waters retain a CALM Category 5 due to Enterococci, diminished DO% levels, and elevated Orthophosphate, which are unsupportive of the *Propagation of Aquatic Life* and *Recreational* DUs.

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 MLA. 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 (Figure C-68).

FIGURE C-68. Puntan/Diaplolamanibot (Segment 10)

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.

There are two depressional wetlands in the Puntan/Diaplolamanibot watershed, making up the Bateha I and II wetland complex (approximately 12.9 acres). Bateha II lies on the boundary between the Masalok and Puntan/Diaplolamanibot watersheds. Previously, Bateha was listed within the Masalok watershed in the ATTAINS database. It has since been moved to the Puntan/Diaplolamanibot watershed for reporting purposes.

Tinian's only solid waste disposal site is an unlined dump located here, 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 waste, and in FY2020 from pumper trucks improperly disposing of wastewater.

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 Puntan/Diaplolamanibot coral forereef assemblages was conducted on the reef between the two Leprosarium BEACH sites. There was significant improvement in the benthic substrate and an increase in coral diversity. There was also an upward trend in Crustose Coralline Algae and Branching Crustose Coralline Algae percent cover compared to previous years when turf algal cover was dominant. This resulted in upgrading the ALUS ranking to "Fair" this reporting cycle. However, the "Poor" rankings in previous years resulted in Puntan/Diaplolamanibot coastal waters retaining a cumulative five-year overall ALUS ranking of "Poor".

In addition, DO% also exceeded the CNMI WQS on two occasions in FY2020. The source of which is associated with fresh groundwater seeps carrying leachate from the dump, increasing microbial aerobic activity, in turn causing oxygen depletion in coastal waters.

This reporting cycle Orthophosphate met the CNMI WQS, However NO_3-N exceeded standards again this reporting cycle. Therefore, these coastal waters remain on the 303(d) list as impaired for nutrients, which does not support the *Propagation of Aquatic* Life DU.

Leprosarium's coastal waters are located down slope from Tinian's unlined open dump. This reporting cycle, a private pumper truck company contracted by DoD to collect waste from the Seabee training camp was investigated for improper disposal. The Tinian DEQ Program Manager found the company dumping the truck's wastewater directly into the unlined dump instead of the designated leaching field. The company was penalized, and the percent of Enterococci violations dropped from a collective 33% in FY 2020, to 5% in FY 2021. The company continues to be closely monitored.

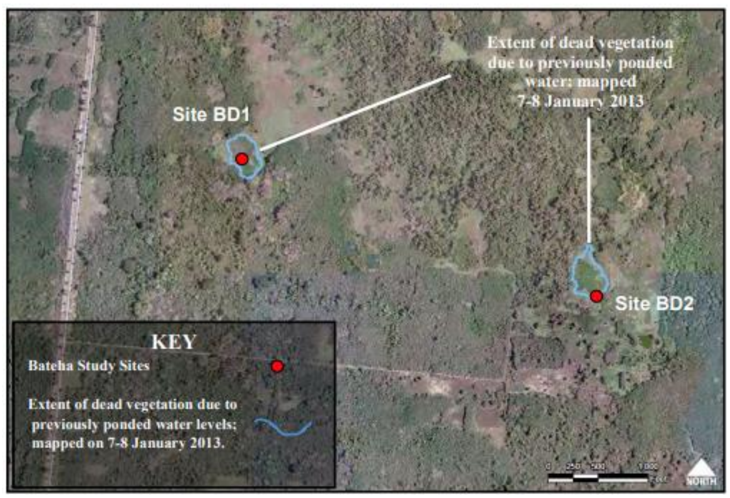
This was the primary source of the increase in Enterococci exceedances and nutrient loading this reporting cycle. Other notable sources include roaming dogs and trash (containing diapers) left on the beach. Therefore, Puntan/Diaplolamanibot coastal waters remain 303(d) listed as impaired and do not support the *Recreational* DU.

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.

Puntan/Diaplolamanibot – Wetlands

The Puntan/Diaplolamanibot watershed contains the Bateha I and II depressional wetland complex. Field testing of the CNMI Wetland RAM was conducted there in FY2014 in preparation for increase military exercises in the MLA. These wetlands were explored, but not fully delineated or valuated.

FIGURE C-69. Bateha I and II (source: NAVFAC, 2015)



"*Surveys of Potential Wetland Sites on Tinian in Support of the Commonwealth of the Northern Mariana Islands Joint Military Training Environmental Impact Statement/Oversea Environmental Impact Statement*", prepared for NAVFAC, March 2015, confirms that the Bateha I and II Complexes have "suitable hydrology, wetland vegetation, and hydric soils…". According to the survey, Bateha I, is the larger wetland at 7.1 acres and Bateha II is smaller at 5.8 acres. It has, "a relatively deeper depressional basin. There appear to be man-made berms along the south and southeast borders and it has been suggested that this wetland may be an abandoned stock pond" (NAVFAC, 2015).

Both these wetland complexes are far from any residential developmental or other anthropogenic stressors. Therefore, they currently support the *Propagation of Aquatic Life* DU.

However, increased frequency of military exercises and expansion of activities near these wetland complexes have the potential to introduce new and adverse environmental stressors, and should be carefully monitored.

Puntan/Diaplolamanibot – CALM Categories

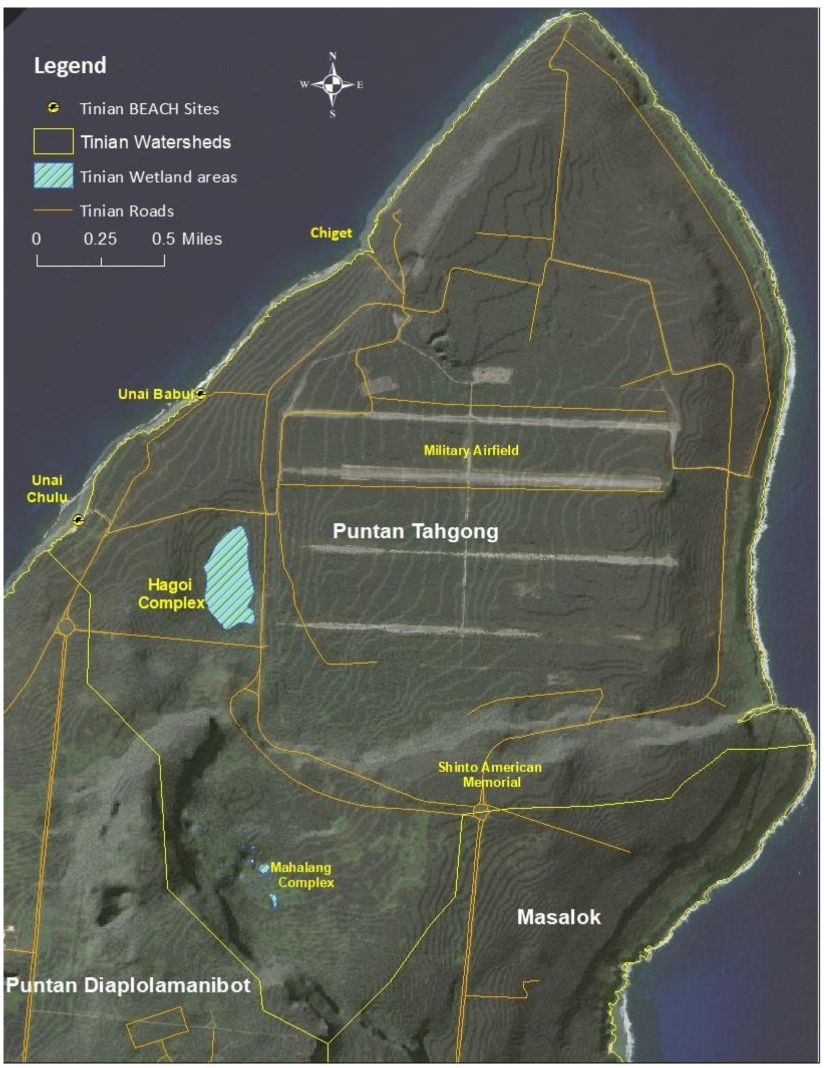
The Puntan/Diaplolamanibot watershed's coastal waters retain a CALM Category 5 due to elevated Orthophosphate, DO%, and Enterococci levels, which are unsupportive of the *Propagation of Aquatic Life,* and *Recreational* DU.

The Bateha I and II wetland complex, retains a CALM Category 1.

C.3.7.6. PUNTAN/TAHGONG – Waterbody Segment 11

The northern most waterbody segment on Tinian is the Puntan/Tahgong watershed.

FIGURE C-70. Puntan/Tahgong (Segment 11)



It is contained in the US Military leased land area, and contains two long-term BEACH monitoring sites, Unai Babui ("Pig Beach") and Unai Chulu beaches (see Figure C-70., previous page).

Next reporting cycle BEACH monitoring data will be collected at Chiget beach, which has recently been opened to the public. DoD removed legacy UXO from a foot path leading to the beach in 2022. The path dissects the old live fire range. Bollards are erected on either side of the path to keep people from walking into the uncleared range area as a safety measure.

Chiget is a beautiful pocket beach containing one of the few *Enhalus* sp. seagrass areas in Tinian's coastal waters. Babui and Chulu are energetic shorelines with high surf that make them hazardous for inexperienced swimmers. This beach and Unai Babui and Chulu provide a serene place for visitors to swim and enjoy sunsets; fully supporting the *Aesthetic Enjoyment* DU.

All of these sites are undeveloped, remote, and are not used as frequently as other Tinian beaches. This leaves them in a nearly pristine state with few anthropogenic stressors, other than from past WWII activities and ongoing military exercises.

The Hagoi wetland lies East of Unai Chulu. The depressional Mahalang Complex lies in the southern point of the watershed.

Puntan/Tahgong - Coastal Marine Waters

An ALUS biological assessment of the coral forereef assemblages near Unai Babui was conducted this reporting cycle. There was no significant improvement in the benthic substrate from its previously reported "Poor" ranking. The MMT reported that the, "…coral cover has decreased, and interestingly, the dominant colonies have shifted from *Goniastrea* and *Favites spp*. to *Leptoria* and *Favia spp*." (Perez, et.al., 2021). Turf algal is also outcompeting coral growth. However, the "Poor" ranking is not likely 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, groundwater 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 forereef monitoring site to confirm whether or not there are water quality pollutants 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 listed Unai Babui and Chulu beaches as alternatives for expanding training exercises in the CJMT in the 2015 DEIS and in more recent agency meetings.

Puntan/Tahgong coastal water met the CNMI WQS for pH this reporting cycle. Past pH exceedances are associated with an aging probe that was in use at the time, and has since been phased out and replaced with the new YSI ProDSS meter.

In addition, NO_3-N levels exceeded the CNMI WQS on two occasions at Unai Babui in FY2021, but with only 7 sampling events that year, this caused an annual exceedance of 29%. Orthophosphate met WQS this reporting cycle, but there was an exceedance in FY2019. There was one exceedance for NO_3-N in FY2019 at Chulu and Babui, but again with only 6 sampling events (17%

annual exceedances). There is very little data to confidently determine the source of nutrient loading. Given that there is little anthropogenic activity at these remote beach sites, the source of nutrients remains unknown. Even so, due to these and past exceedances, Puntan/Tahgong's coastal waters remain on the 303(d) list as impaired, which is unsupportive of the *Propagation of Aquatic Life* DU.

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 legacy WWII debris and dump sites on Saipan. Any exceedances of CNMI WQS caused by military exercises would require action to restore Puntan/Tahgong's coastal waters to their ambient state before returning these leased lands to the CNMI government.

Unai Babui's coastal waters exceeded the CNMI WQS for Enterococci again this reporting cycle. Given the remote location of these beaches, the exceedances were associated with improper sample collection and handling. Other sites around the island had exceedances at this same time. However, after samplers reviewed the water collection SOP in the QAPP, exceedances dropped thereafter. Notwithstanding, the Puntan/Tahgong coastal waters do not support the *Recreational* DU.

Puntan/Tahgong – Wetlands

Puntan/Tahgong watershed contains the only significant open surface water on Tinian, the Hagoi wetland which covers 39.4 acres. 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.

FIGURE C-71. Survey Site in Mahalang Complex (Source: NAVFAC, 2015)

Puntan/Tahgong also contains the Mahalang Complex with 20 depressional areas. The latter's largest two wetland features are estimated to cover 1.2 acres each (NAVFAC, 2015). Several of these depressional areas exhibit wetland hydrology, vegetation, and in some cases, hydric soils. They are "…likely resulting from the detonation of stored munitions after WWII." The survey also noted 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)." The Survey also noted that, "…based on recent field investigations, they appear to function more like ephemeral ponds (e.g., lacustrine)."

Since the Mahalang Complex, like Hagoi Wetland, are far removed from any other anthropogenic stressors, these wetlands are currently considered pristine and fully support the *Propagation of Aquatic Life* DU.

However, increased frequency of military exercises and expansion of activities near these wetlands have the potential to introduce new and adverse environmental stressors, and should be carefully monitored.

Puntan/Tahgong – CALM Categories

The Puntan/Tahgong's coastal waters retain a CALM Category 5 due to nutrients, past pH exceedances, and Enterococci, which are unsupportive of the *Propagation of Aquatic Life* and *Recreational* DUs.

Puntan/Tahgong's wetlands retain a CALM Category of 1.

C.3.8. Five-Part Categorization of the Northern Islands' Surface Waters

The CNMI archipelago contains 10 Northern Islands and four southern islands, Figure C-72., 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).

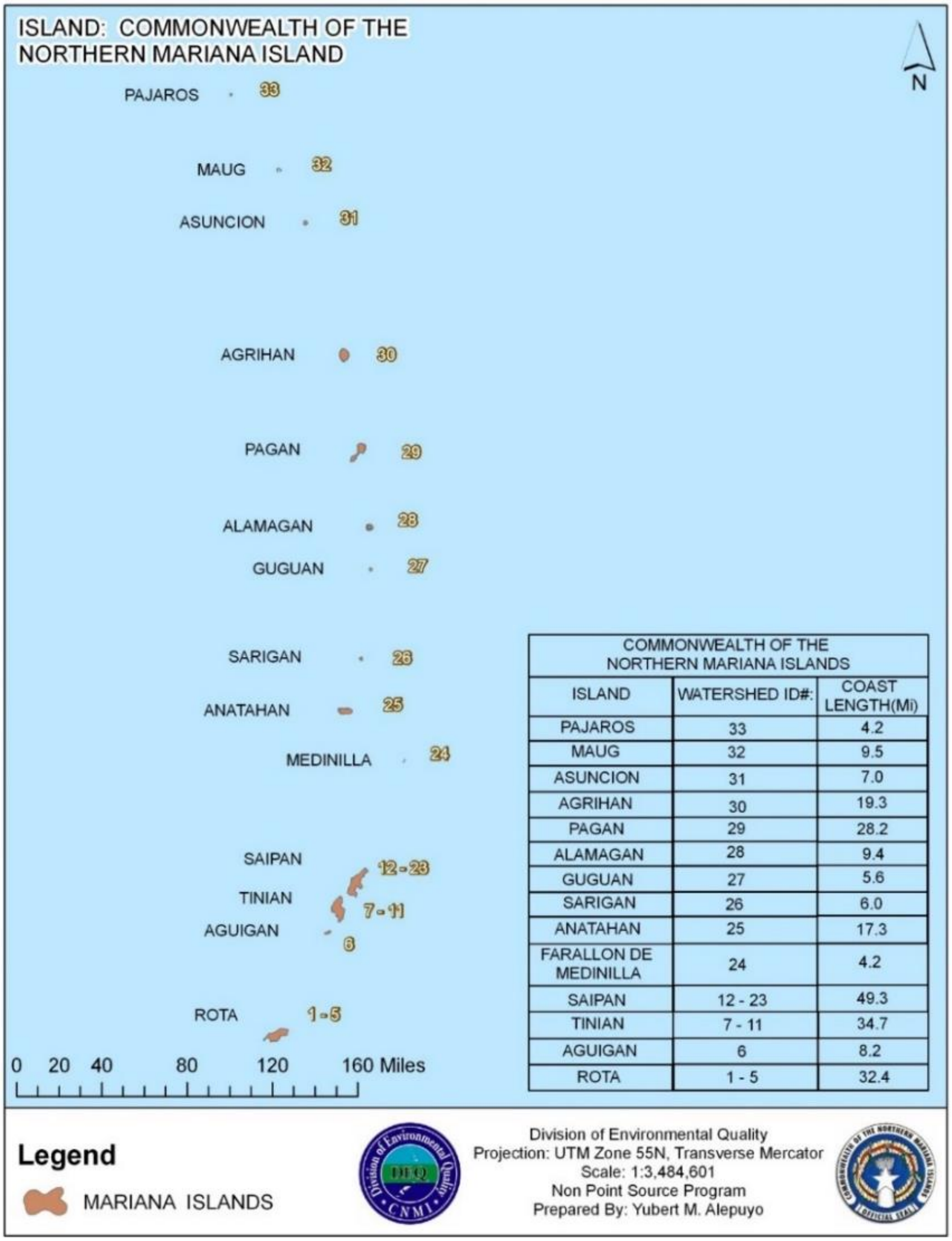
As stated in PART B. BACKGROUND INFORMATION, of this report, there is frequent seismic activity in the region due to the islands being formed on the still volcanically active Mariana Ridge. The Ridge overlies an active subduction zone where the Pacific Plate is passing beneath the Philippine Plate (Trusdell, 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). Pagan erupted most recently in July 2021, causing it to be temporarily evacuated.

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).

Only four of the Northern Islands can be embarked upon by boat landing. They are Agrihan, Pagan, Alamagan, and Anatahan. 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, No'os (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 in fish tissue or biota from WWII debris, munitions, or munition constituents. In contrast, No'os (FDM) has had continued US military live bombing exercises since the early 1970s. Therefore, No'os (FDM) 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 constituents.

FIGURE C-72. The Mariana Islands Archipelago



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

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 are 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 islands' 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. BECQ was able to visit Pagan to collect water quality samples at beaches, lakes, and coral reef sites for the first time in June 2021. 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, they have had negligible anthropogenic impacts to coastal water quality from residents or visitors. However, all were affected by global bleaching events.

TABLE C-41. 2022 Assessment of the Northern Islands Waterbodies' DUs – Coastal 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-41., on the previous page.

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 No'os (FDM). These islands were occupied during the WWII campaign, and all three have legacy military debris from these activities. No'os (FDM) continues to accumulate munition debris. Therefore, the potential presence of heavy metals, and toxins from UXO, and munition constituents is in need of further study.

No'os' (FDM) topographical and geological features do not appear to support stream systems (Table C-42). 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.

TABLE C-42. 2022 Assessment of the Northern Islands Waterbodies' DUs – 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	*i*	F	F	F	F
	Fish Consumption		i	F	F	F	i	F	F	F	F
	Recreation		F	F	F	F	i	F	F	F	F
	Potable Water Supply			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

NORTHERN ISLANDS – WETLANDS AND LAKES

There are two lakes on Pagan, the largest of the Northern Islands, and two lakes 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.

TABLE C-43. 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									
	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

BECQ does not have any recent lake or wetland water quality data for the Northern Islands, except for the lakes on Pagan that were sampled during the 2021 survey trip. Due to the remoteness of these islands, and the fact that only a few individuals reside therein, the most notable old and new anthropogenic stressors to these waterbodies would be substantial development, or expansion of military exercises. These would pose potential hydrological alterations, sedimentation caused by erosion from heavy equipment, live fire from military exercises, and potential grass fires, as well as surface and groundwater pollution from munitions. There is also the possibility that current volcanic activity may cause additional impairment to surface waters, by a natural process and not by a pollutant.

Depending on the extent and location of proposed agricultural activities on the island, eutrophication issues may be of concern in the future as well. More data is needed to fully assess whether all DUs are supported.

Northern Islands – CALM Categories

The Northern Islands' coastal waters retain CALM Category 1 for most of the islands due to lack of anthropogenic stressors. No'os (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); and prohibits visiting the island due to safety concerns.

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 toxin bioaccumulation from WWII military activities. These islands are assigned CALM Category 3.

Anatahan's and Pagan's wetlands and lakes are designated CALM Category 3 as well due to lack of information about potential fish and shellfish contamination from past WWII dumps, expended munitions, and other military debris.

The following Sub-sections will discuss each island as a distinct waterbody in detail.

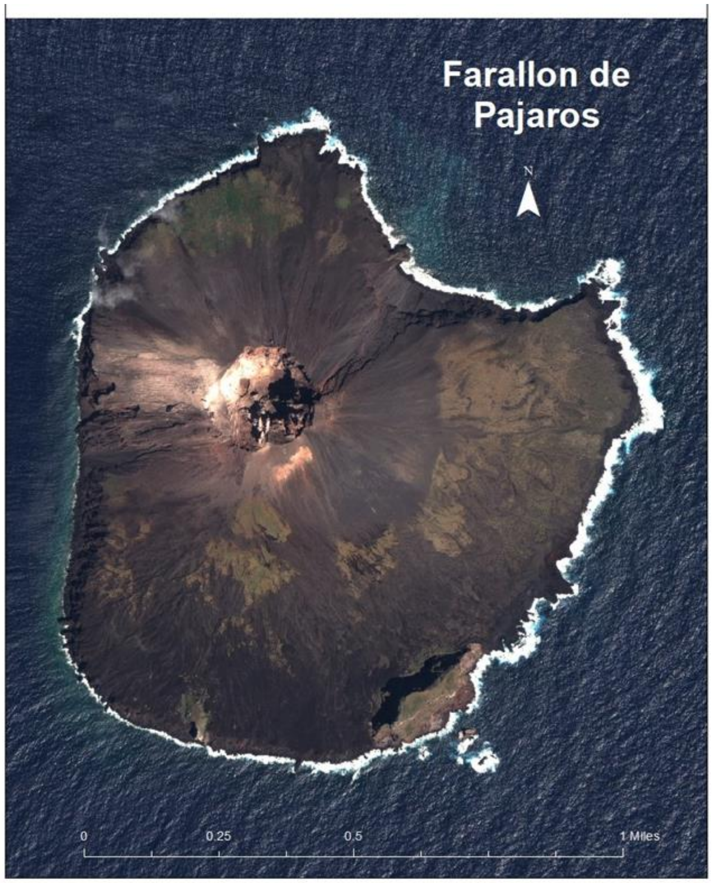
C.3.8.1. FARALLON DE PAJAROS – Waterbody Segment 33

Farallon de Pajaros (FDP), which roughly translates to "Cliff of Birds", is also known as Uracas, which is Spanish for "Magpie" (Figure C-73., 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).

FIGURE C-73. Farallon de Pajaros "Uracas" (Segment 33)



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)".

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 northern 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

No visual field assessments have been conducted by BECQ on FDP's streams to determine if there are ephemeral stream systems. However, due to their remote location, lack of easy accessibility, or invasive species; this prevents any water courses from anthropogenic stressors, and they remain in their natural pristine state. For this reason, FDP's stream systems fully support all of their DUs.

Farallon de Pajaros – CALM Categories

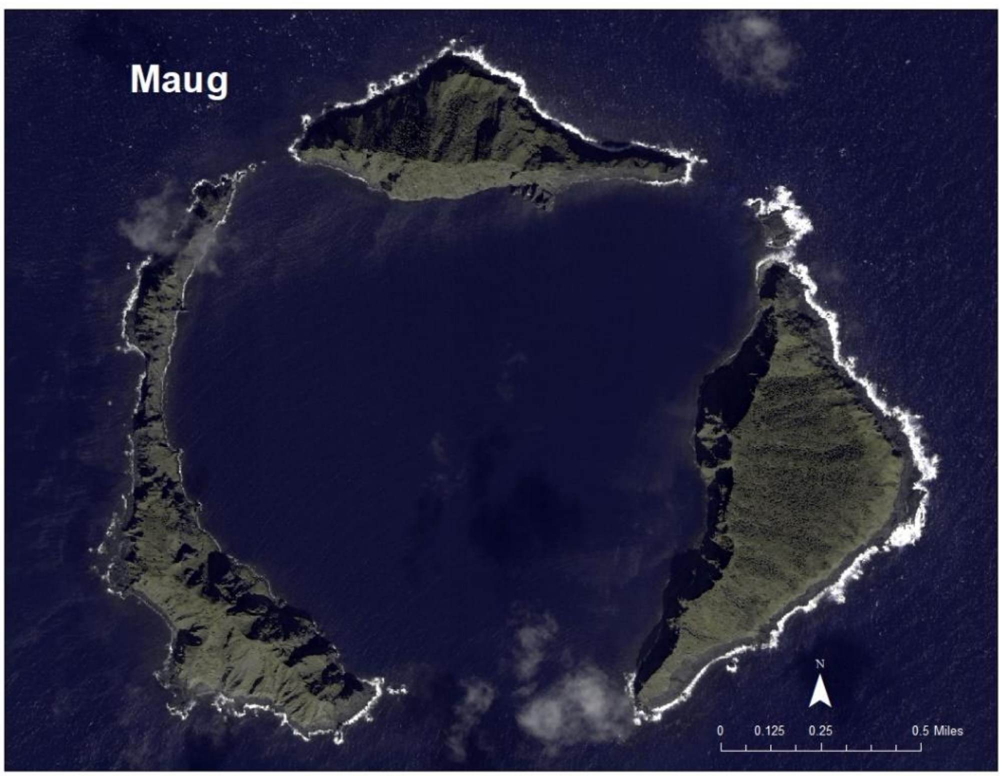
Due to its remote location FDP's coastal waters and streams retain a CALM Category 1, which fully support all their DUs.

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.

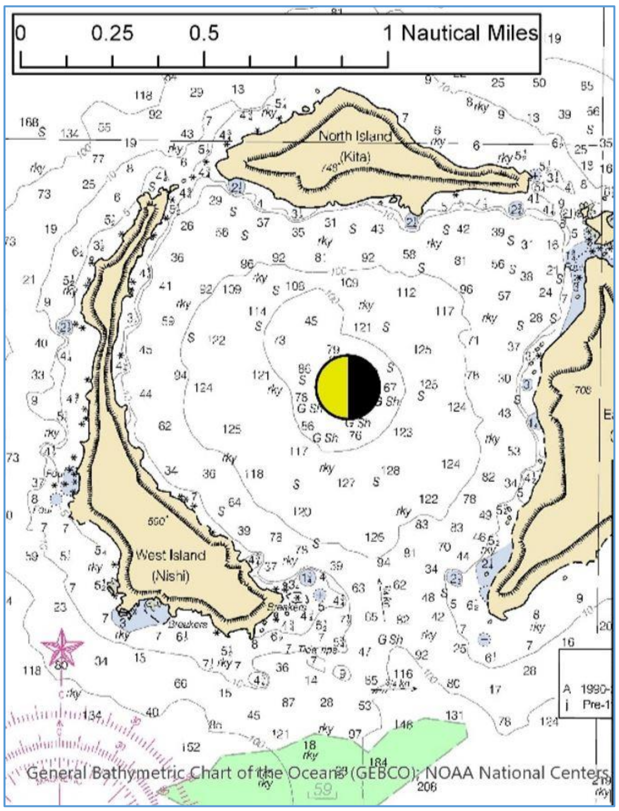
FIGURE C-74. Maug (Segment 32)



The outer rim was once part of a stratovolcano (2009. Gillespie). 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. Gillespie).

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).

FIGURE C-75. NOAA Bathymetry map of Maug's Waters



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, after which a large wave was produced from the wall of the western island indicating seismic activity.

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

No visual field assessments have been conducted by BECQ on Maug's streams to determine if there are ephemeral stream systems. However, due to their remote location, lack of easy accessibility, or invasive species; this prevents any water courses from anthropogenic stressors, and they remain in their natural pristine state. For this reason, Maug's stream systems fully 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-76., 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

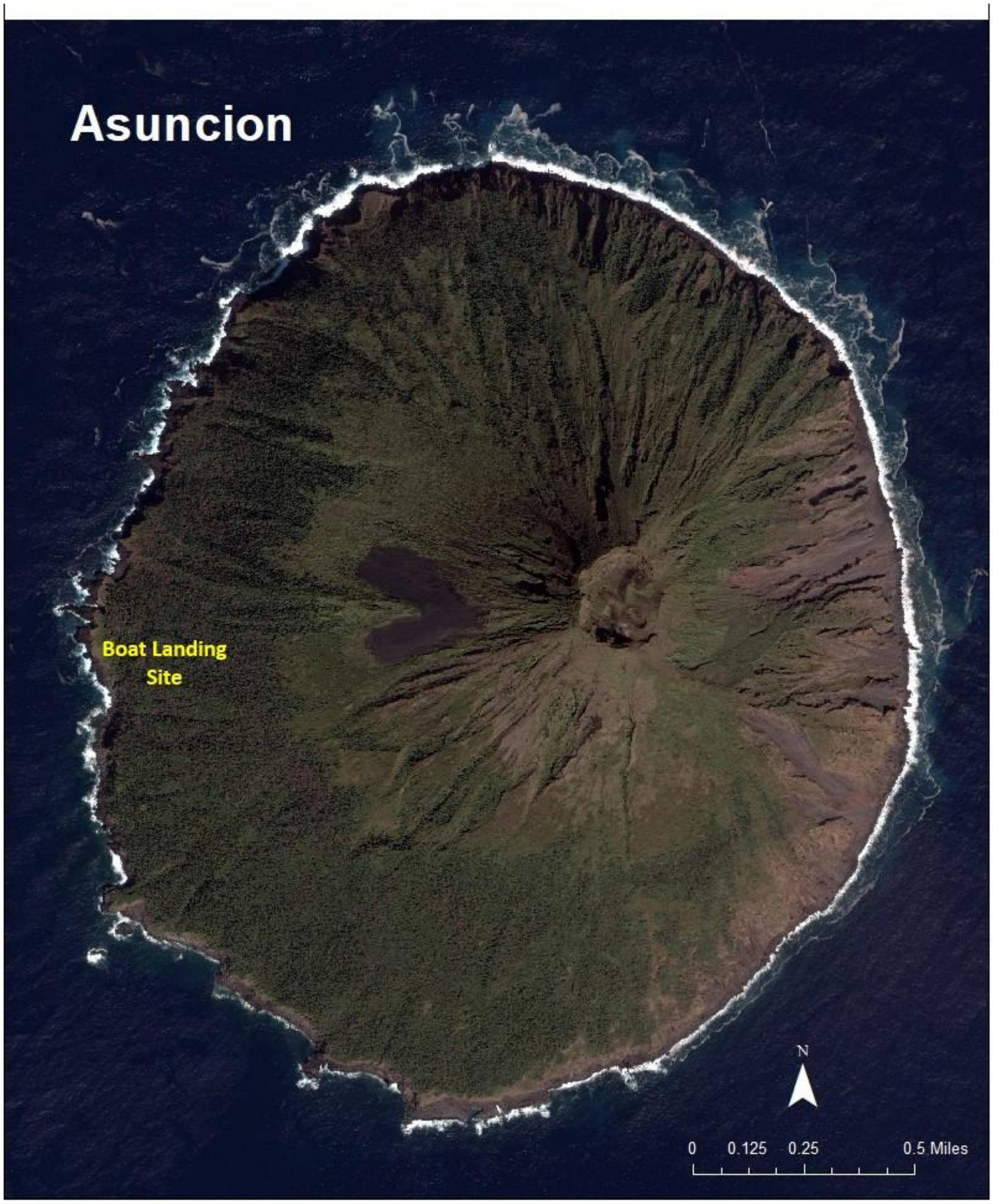
Asuncion is the southernmost island of the Marianas Trench Marine National Monument established in 2009. Its surrounding coastal waters are high quality waters and constitute an outstanding Commonwealth resource. Asuncion's coastal waters provide valuable marine ecosystems. However, all reefs in the 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.

For this reason, visual assessments, anecdotal evidence, and professional judgement, Asuncion's coastal waters fully support all its DUs.

Asuncion's - Freshwater Streams

No visual field assessments have been conducted by BECQ on Asuncion's streams to determine if there are ephemeral stream systems. However, due to their remote location, lack of easy accessibility, or invasive species; this prevents any water courses from anthropogenic stressors, and they remain in their natural pristine state. For this reason, Asuncion's stream systems fully support all of their DUs.

FIGURE C-76. Asuncion (Segment 31)



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. Since last reporting cycle (6) people have returned to reside on Agrihan (personal communication, Northern Islands Mayor, Vicente "Ben" Santos, December 5th, 2019).

Figure C-77., 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).

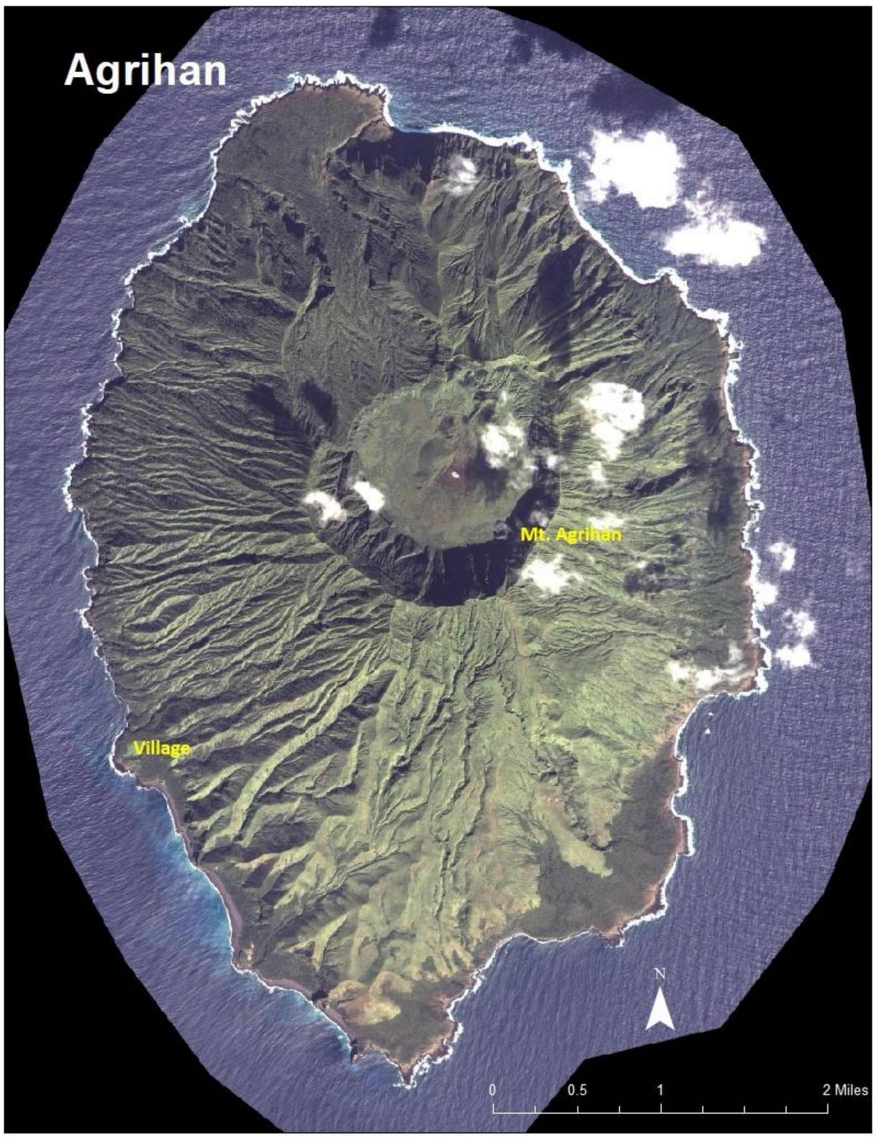
Agrihan's sparse population, remote location, and lack of development or military activities has provided its surrounding coastal waters with a great deal of protection from anthropogenic stressors. However, all reefs in the Northern Islands were affected by the 2014 and 2017 global bleaching events, 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.

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.

FIGURE C-77. Agrihan (Segment 30)



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

Pagan is the only Northern Island that contains an operational airstrip, which was established prior to WWII. It is one of the only Northern Islands with a long history of settlement. 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 pre and post Japanese and US WWII debris, munitions, dumpsites, UXO, and blast pits.

FIGURE C-78. Legacy Munitions (2021)

There were seven (7) Japanese "Zero" fighter planes observed on the island (2020. Personal Communication, Capt. Tenorio).

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-80., on the following page.

FIGURE C-79. May 2021 Total Lunar Eclipse Above Pagan

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.

Pagan's residents were evacuated to Saipan in 1981 after a large eruption occurred. Families subsequently returned to the island after volcanic activity subsided in 1985. 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). At this time an Aviation Color Code and Volcano Alert Advisory was put in place. It was lowered in 2016, and past island residents returned to the island. Since then, indigenous people of Northern Mariana Island descent have traveled to the island and stayed for the required 45 days in order to be eligible for a homestead lot. Many others have traveled as researchers, or ecotourists just to enjoy this unique island ecosystem, and for stargazing unimpeded by obstructing light pollution (Figure 7-29, on the previous page).

FIGURE C-80. Pagan – Earthstar Geographics Powered by ESRI imagery (Segment 29)

In 2021 there were several private parties and government agencies that visited Pagan. A private party sailed the "Aoba" from Saipan to Pagan at the end of May. The purpose was for witnessing a total lunar eclipse and for two crew members to record GPS coordinates of points of interest, e.g., UXO, WWII artifacts, well, cisterns, more recent dump sites, and to evaluate selected water quality monitoring sites for their accessibility and appropriateness, and to add any additional sites that may be helpful in establishing baseline water quality data. This information was provided to BECQ staff to prepare for their subsequent field survey and planning trip funded by the CNMI Bureau of Military Affairs Office in June of that same year. Staff from several programs took part for various purposes as reported in the June 2021, *Pagan Island Surveys and Monitoring Report* (CNMI Office of the Governor, BECQ, 2021).

WQS/NPS staff collected baseline water quality samples from the lakes and several locations around the coast. Water was tested for Enterococci, pH, DO%, temperature, salinity, and nutrients.

SAR's staff assessed the island for potential contaminated sites (Brownfields) due to legacy WWII installations, munitions, military equipment, the former fuel farm, and other hazardous substances.

AST staff inspected two above ground tanks to ensure that they were in compliance with DEQ regulations and had not significantly deteriorated. Staff also delineated other areas that would be considered safe to install a future AST for a proposed plane runway for emergency landing and evacuation, in preparation for a One-Start Permit review. BECQ staff returned to Saipan on June 28th.

FIGURE C-81. July 2021 Pagan Northern Volcano Eruption

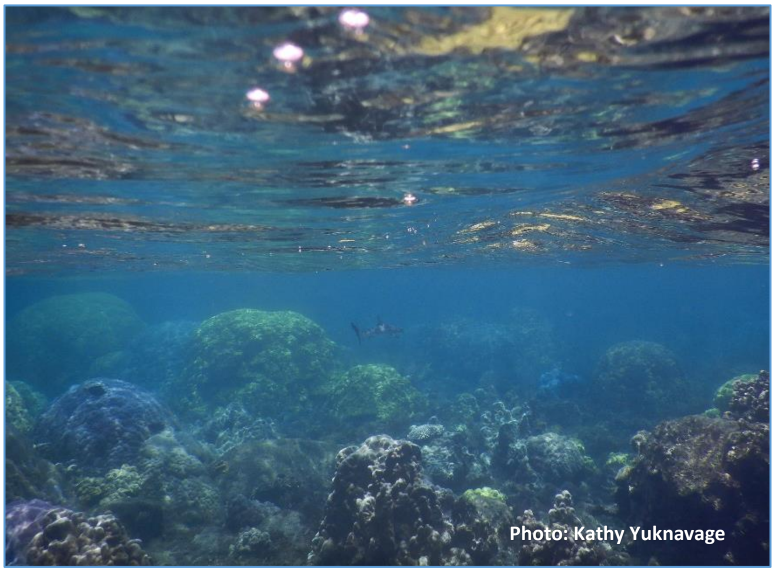
The primary objective of the MMT was to obtain current benthic data on the long-term monitoring sites off the northern coast that were established in 2014 (Perez, et.al, 2021). The secondary objective was to collect benthic data for the remaining long-term monitoring sites on the southern half of the island. This information is especially important in the light of DoD's interest in expanding military activity in the region, the plans for which are still a work in progress.

On July 28th, 2021, the Northern volcano erupted again requiring a full evacuation of the island. After the CNMI Emergency Management Office lowered the Volcano Alert Advisory the Pagan residents immediately returned to their home.

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.

FIGURE C-82. Grey Reef Shark in Pagan's Bandeera Bay



Pagan's coastal marine habitats include 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.,).

The most recent *2021 State of the Reef Report*, found that, "From the 11 sites surveyed in 2014, the average live coral cover from benthic photoquadrat surveys was 13%, and the average for bleached corals was 64%. In 2021, there was no bleaching recorded…" (Perez, et.al., 2021). However, there was a decrease in the average coral cover with 10 of the sites now having 8% coral cover.

The recovery from coral bleaching in 2021 is promising and all water quality data collect from each of Pagan's coastal water sites were well within the CNMI WQS. Therefore, Pagan's coastal waters remain in full support of the *Propagation of Aquatic Life* and *Recreation* DUs.

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 great potential for Pagan's marine habitat to be contaminated as well, (2018., 2016., 2009. Denton, et.al.). This underscores the importance of conducting biota toxicity studies on Pagan's near shore environment, as well as other islands where live fire has occurred, or new ranges are proposed, should military exercises be allowed there.

Pagan is the easiest of the Northern Islands to access by boat or air, hence it is a valuable resource for tourism and for indigenous resettlement. Due to its remote location, and underdevelopment it is also an ideal location for expanding the CNMI's tourism industry into eco-adventure, and as a solar and lunar eclipse tourism destination.

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.

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).

FIGURE C-83. Ravine Leading to Unairididi Beach

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, this has not been validated by BECQ conducting an independent SVAP assessment.

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 may exist here as well.

Visual stream assessments have not been conducted by BECQ on Pagan. However, residents have stated that Pagan's soils do not remain saturated long enough to allow for the formation of freshwater pools for harvestable aquatic life to exist (personal communication, Jordan and Jun Ogo, May, 2021).

To date, there have been no biota data collected in Pagan's streams 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 great potential for Pagan's stream sediment to be contaminated as well, (2018., 2016., 2009. Denton, et.al.). Therefore, there is insufficient information to assess the *Recreational, Fish and Shellfish Consumption,* or *Potable Water Supply* DUs.

However, seasonally there may be enough water present to support some life stages of aquatic invertebrates. So, at present there is insufficient information to assess the support and *Propagation of* (Invertebrate) *Aquatic Life* DU.

The deep ravines that carry ephemeral stream flow from Mt. Pagan down to the coast and lake shores are steep and breathtaking. They are filled with beautifully diverse flora and fauna. For these reasons Pagan's streams fully support the *Aesthetic Enjoyment* DU.

Pagan – Wetlands and Lakes

Wetlands - Pagan contains no mangroves, but there are rather young undeveloped wetland marshes with emergent vegetation surrounding Pagan's lakes (CNMI DFW, Oceana, 1990). According to the 2000 DFW study of Pagan, wetlands are dominated by *Casuarina equisetifolia*, "with no wetland grasses – a change since the 1981 volcanic eruption and subsequent increase in the animal population." (CNMI Wetlands Report, State of the wetlands and recommendations for new wetlands policy, AECOS, Inc., et.al., 2005).

In previous years, the biggest threat to these wetlands were legacy WWII debris, grazing by free roaming ungulates; cows, goats, and pigs, and from fallen ash due to volcanic eruptions. However, these impairments are not caused by pollutants.

A delineation or a CNMI RAM has not been conducted on these wetlands. Therefore, there is insufficient information to assess the *Propagation of Aquatic Life* DU.

Lakes - Pagan also has two large brackish lakes (Salinity >0.5 to 30 ppt) 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.

FIGURE C-84. Pagan's Sanhalom "Inner Lake"

Captain Tenorio who lives on Pagan seasonally, has observed black and white tilapia in Sanhalom Lake (2020. Personal Communication, Capt. Tenorio). Many shore birds dot the banks of the lake. 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 describes, "Storm driven waves occasionally over top the bar, and enter the lake."; adding to its salinity. Given these facts and observations, both of Pagan's lakes fully support the *Propagation of Aquatic Life* DU.

There are no fish tissue or biota contamination data to assess the *Fish and Shellfish Consumption* DU.

FIGURE C-85. Pagan's Lagona Sanhiyong

However, given the amount of WWII debris and dump sites left on Pagan, there may be heavy metal or other toxic contamination bioaccumulating. This emphasizes the need for future Tier II fish tissue and/or biota toxicity studies on Pagan's lakes to fully assess if harvestable aquatic life is contaminated above FDA consumption guidelines.

The water samples taken in 2021 from both lakes met all water quality standards. This is unsurprising given that there are few people residing on the island at any one time, and that the lakes are used for recreational purposes with no reports of water borne ailments. Based on these findings, Pagan's Lakes are fully supportive of the *Recreational* DU.

The brackishness of both lakes makes them unpalatable, and they are not used as a *Potable Water Supply* source. Therefore, this DU is no longer assessed for Pagan.

Lakes within the CNMI Archipelago are rare and a valuable resource. They provide a serene setting for visitors to swim and enjoy the surrounding natural environment. For this reason, Pagan's Lakes fully support the *Aesthetic Enjoyment* DU.

Pagan – CALM Categories

Pagan's coastal waters retain a CALM Category 3, due to insufficient information about the potential presence of heavy metal or other toxic contaminants in fish tissue or biota from WWII debris, UXO, 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 streams retain a CALM Category 3 due to insufficient information about the support for *Propagation of* (Invertebrate) *Aquatic Life* DU.

Pagan's wetlands retain a CALM Category 3 due to insufficient information about the support for *Propagation of Aquatic Life* DU.

Pagan's lakes retain a CALM Category 3 due to insufficient information about the potential presence of heavy metal or other toxic contaminants in fish tissue or biota affecting the *Fish and Shellfish Consumption* DU.

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, and 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).

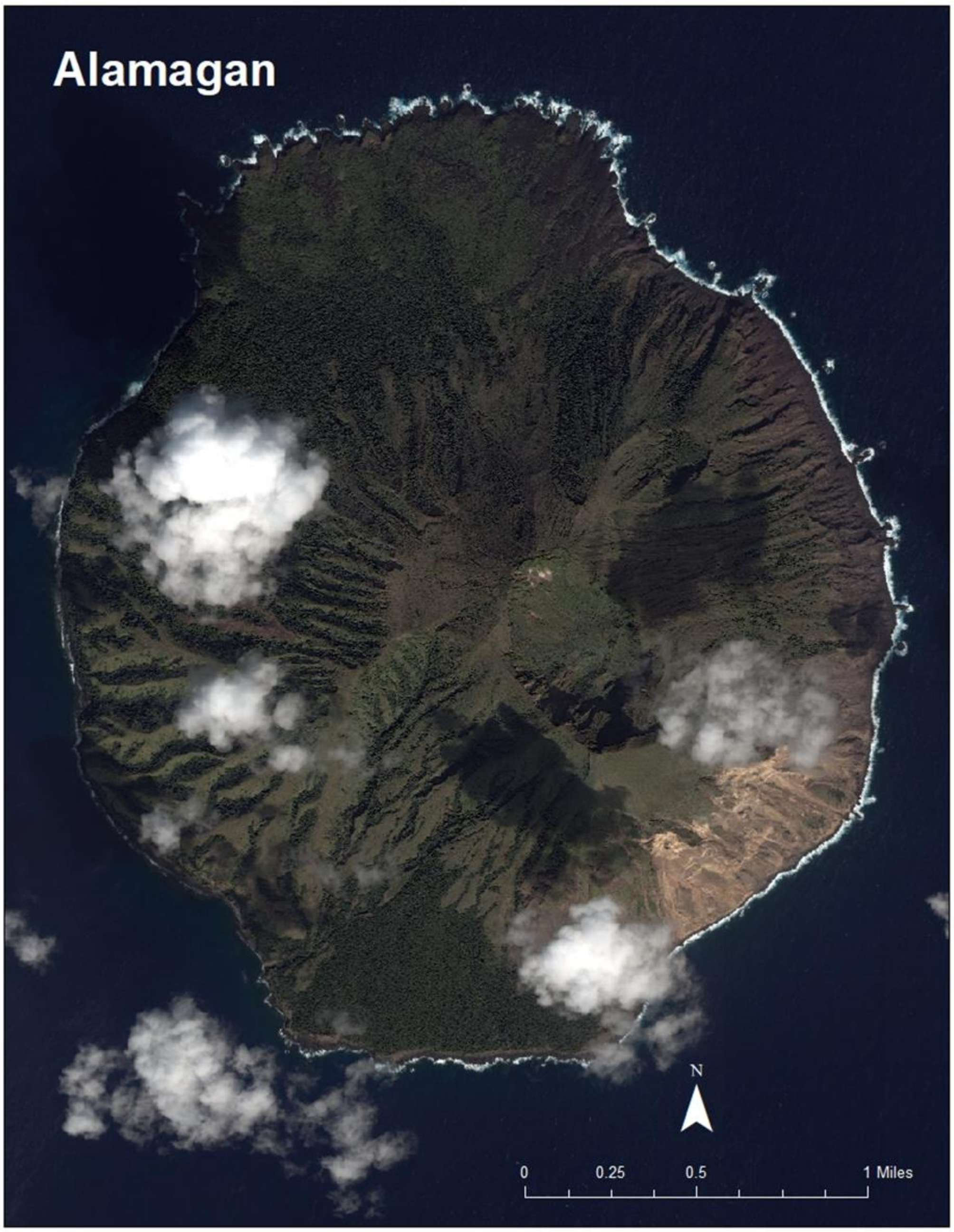
FIGURE C-86. Alamagan's Peak 2014

Last 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. Personal communication, 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-87., 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).

FIGURE C-87. Alamagan (Segment 28)



"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."

Alamagan - Coastal Marine Waters

Alamagan's sparse population, remote location, and lack of development or military activities 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.

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. Gillespie). Its highest elevation is at 942 ft on the southern stratovolcano (Smithsonian GVP) and is surrounded by 5.6 miles of coastline.

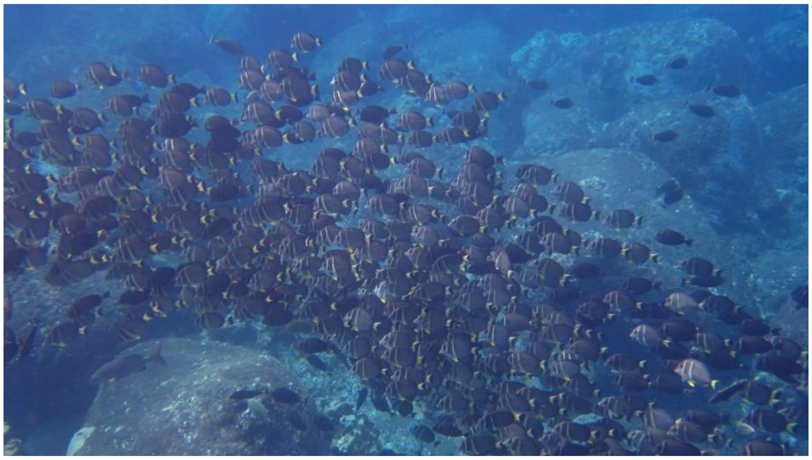
Guguan - Coastal Marine Waters

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."

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-88. Guguan (Segment 27)

FIGURE C-89 Guguan Reef in 2014 (with *Acanthurus guttatus*)



Guguan's lack of inhabitants, remote location, and lack of development or military activities 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

Visual assessments have not been conducted by BECQ on Guguan's ephemeral stream systems. However, due to their remote location, and lack of military activities, or other 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.

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. Sarigan was also used as a fuel depot. Ships would bring in large fuel tanks, or they were brought to the island by chopper. It was also a seasonal home for the Pangelinan family." (2020. Personal Communication, Capt. Tenorio).

FIGURE C-90. Sarigan (Segment 26)

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 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's steep slopes on its southeast and southwest flanks are prone to erosion as seen in Figure C-90., 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 Oscar Elton 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. The crew thought that a similar outcome was likely from the 2017 global bleaching event. However, given Sarigan's lack of inhabitants and remoteness, the reefs were expected to have a greater potential for recovery.

For this reason, and the lack of previous or current military activities here, 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, including past or current military activities, 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.

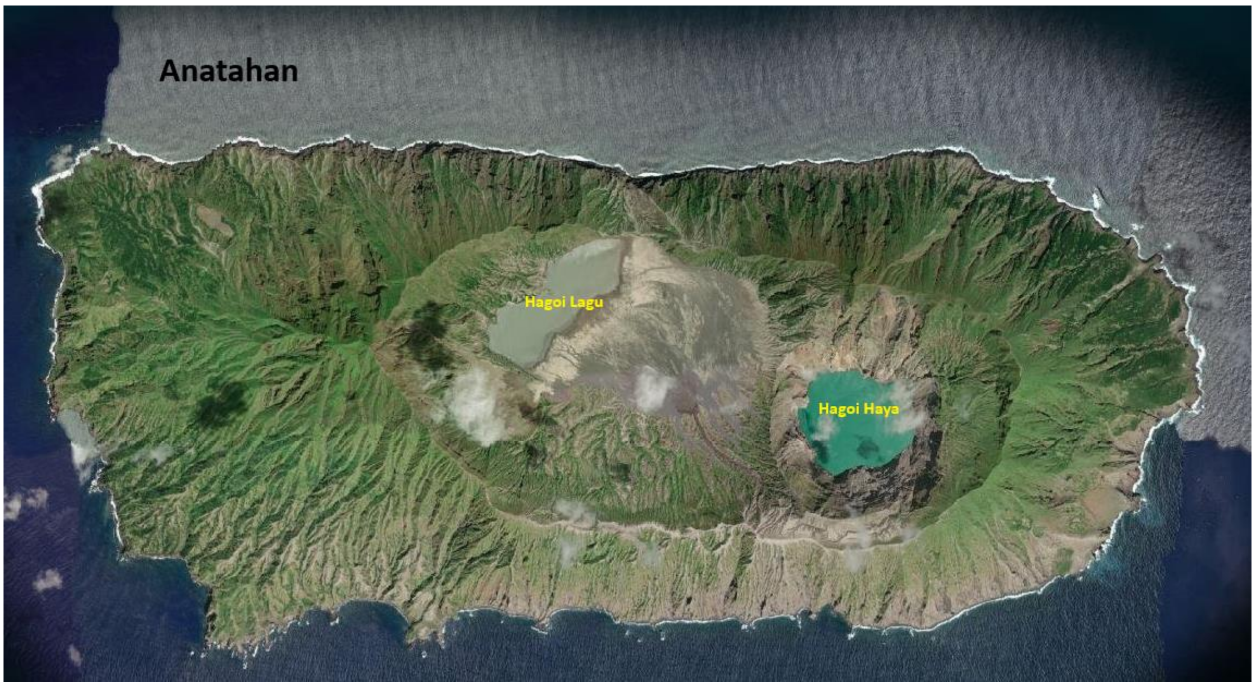
There are no lakes or wetlands on Sarigan.

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-91., below shows an active vent emitting a white plume from the eastern crater.

FIGURE C-91. Anatahan (Segment 25) ESRI Image.



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 Oscar Elton 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 was expected that there would be coral recovery, as there was after the 2003 eruption.

Testing has not been conducted in Anatahan's nearshore to determine whether or not residual contamination is present in fish tissue or biota from WWII debris, munitions, or munition constituents. Therefore, there is insufficient information to assess the *Fish and Shellfish Consumption* DU.

Anatahan, is inhabited by very few individuals and not consistently. The removal of ungulates has allowed natural vegetation to return. There are very little new anthropogenic stressors to its coastal waters. For this reason, Anatahan's coastal waters fully support the *Propagation of Aquatic Life*, *Recreational* and *Aesthetic Enjoyment* 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* DU.

Anatahan's streams are not used as a *Potable Water Supply*.

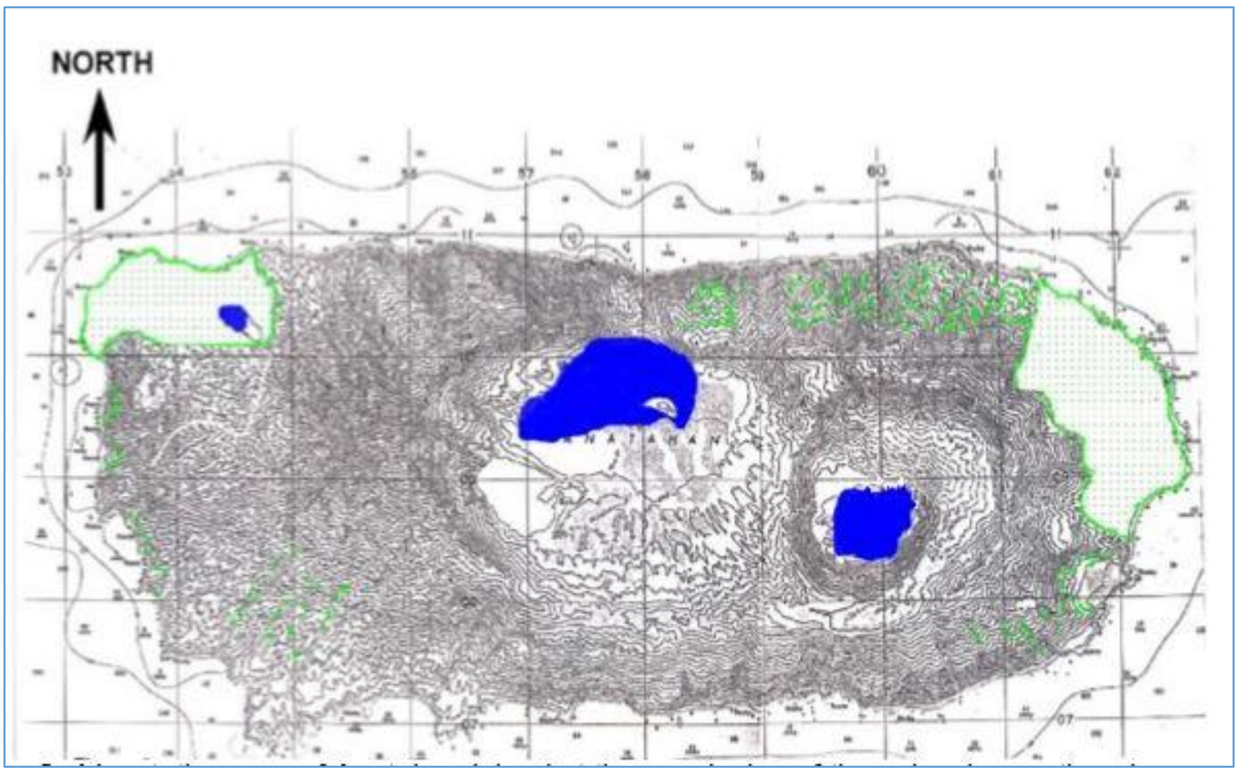
Anatahan – Wetlands and Lakes

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 a new open water lake forms 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 Northern Islands' 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-92. (2013. Kessler).

FIGURE C-92. 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).

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 aquitard …" 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).

To date, BECQ has not conducted water quality data or visual assessments of Anatahan's wetland or lakes. Therefore, there is insufficient information to assess the lakes' support of the *Propagation of Aquatic Life, Fish and Shellfish Consumption,* 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. There is insufficient information to assess if these waters support the *Recreational* DU, but it is not considered to be due to a pollutant. See Section C.3.4. for further assessment of all CNMI lakes.

Anatahan – CALM Categories

There is a lack of anthropogenic stressors to this remote island, other than potential contamination from legacy WWII debris. However, studies have not been conducted at the time of this writing. Therefore, Anatahan's coastal waters are given a CALM Category 3 due to insufficient information to assess the *Fish and Shellfish Consumption* DU.

Anatahan's ephemeral stream systems retain a CALM Category 3 this reporting cycle, due to insufficient information about the potential presence of heavy metal or other toxic contaminants from WWII debris, UXO, and dumpsites.

Anatahan's caldera "marshy area" has not been established as a wetland at this time. Every effort should be made to visit, delineate and assess this regenerated wetland.

Given that Anatahan's Eastern Hagoi Haya Lake may contain dissolved gases from natural volcanic activity, that are not the result of anthropogenic pollutants, Hagoi 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 also assigned a CALM Category 3.

C.3.8.10. FARALLON DE MEDINILLA (No'os) – Waterbody Segment 24

"No'os" island or FDM, 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. No'os is uninhabited with 4.2 miles of coastline.

FIGURE C-93. No'os (FDM) 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.

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 No'os' topography (See Figure C-94 – C-96 on the following pages).

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.

FIGURE C-94. No'os Training Areas (Source NAVFAC)

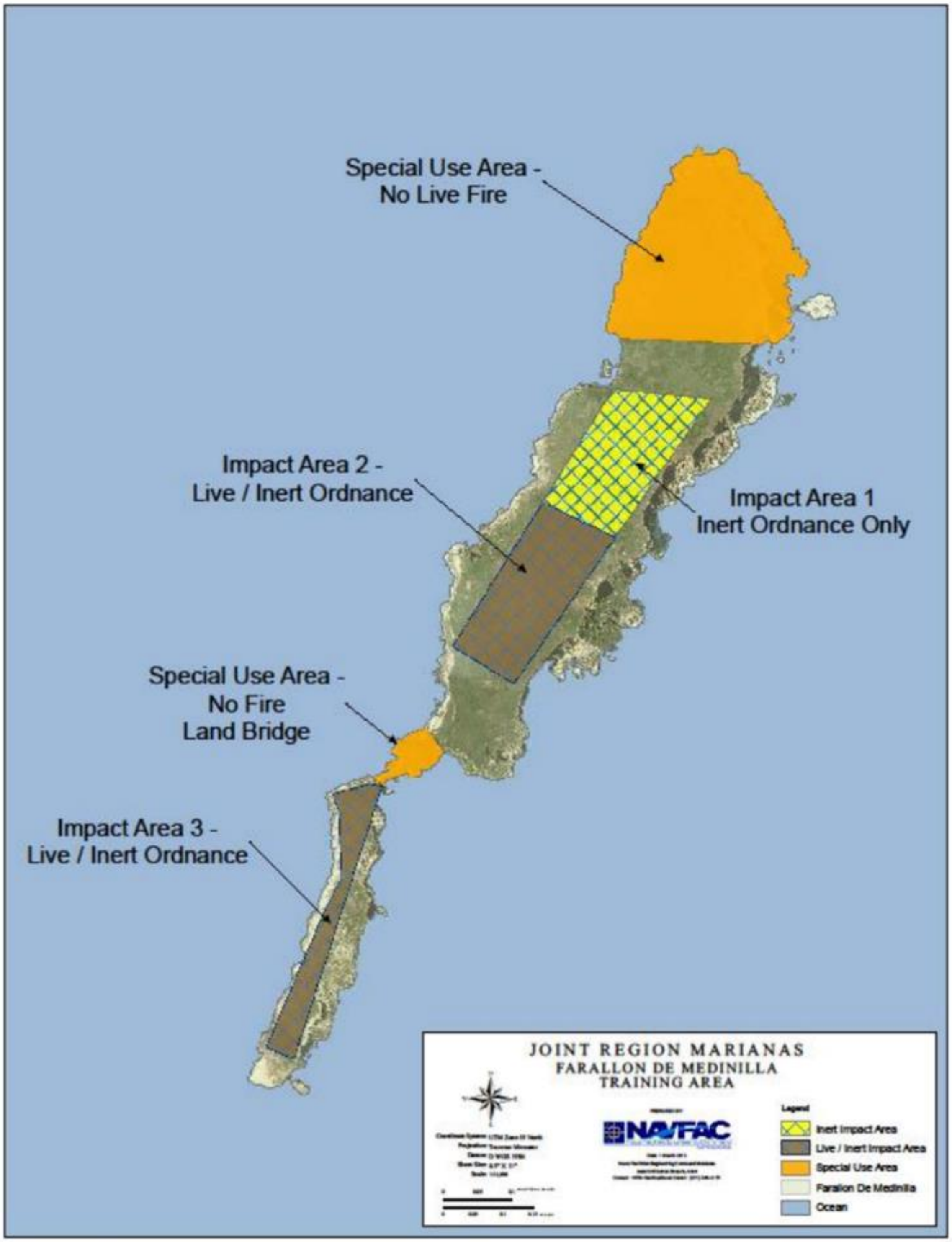


FIGURE C-95. No'os Impact Area 2 Live/Inert Ordinance (source Google Earth 2020)

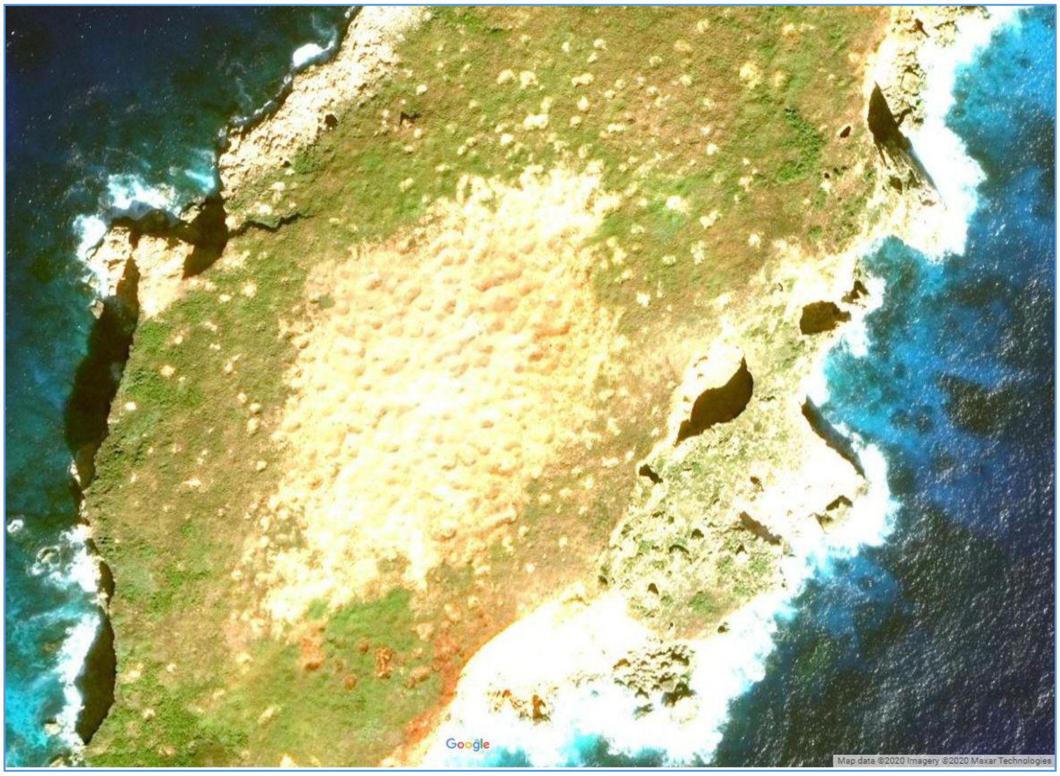
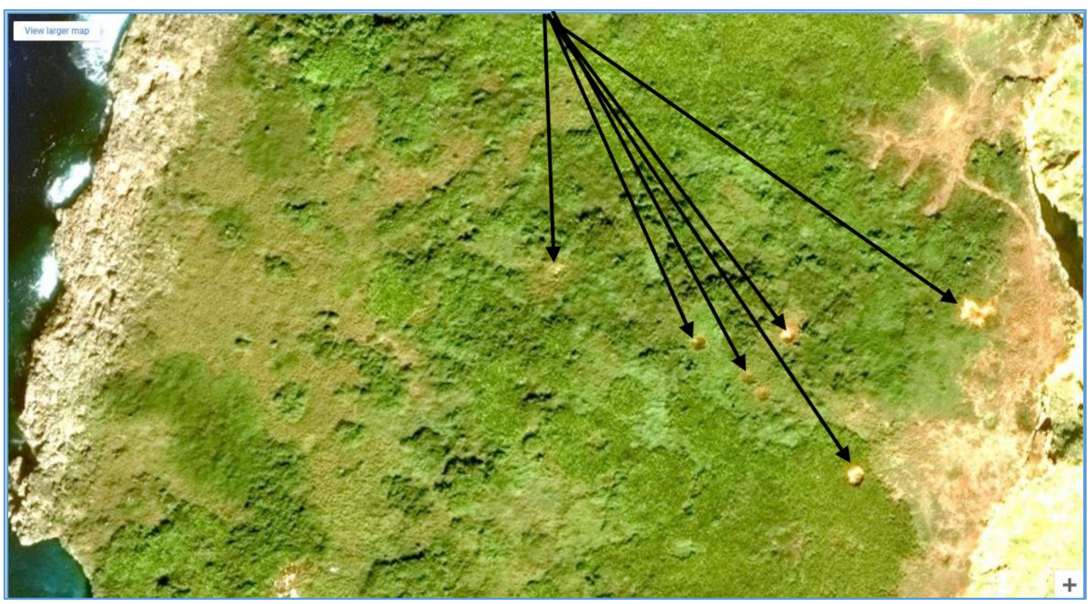


FIGURE C-96. No'os Northern No Live Fire – Impact Craters (source Google Earth 2020)



Although, No'os' 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 No'os 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 (No'os) - 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, No'os' coastal waters are in full support of its *Propagation of Aquatic Life* DU.

To date, there have been no data collected on fish tissue and/or biota contamination in No'os' 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 No'os' 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 No'os' 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 No'os' coastal waters. However, due to the island's remoteness and lack of potential contamination from agricultural activity or human waste, No'os' 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, No'os' coastal waters aesthetics' may not be enjoyed by locals or visiting tourists. For this reason, No'os' coastal waters do not support of the *Aesthetic Enjoyment* DU.

FARALLON DE MEDINILLA (No'os) - Freshwater Streams

No'os has insufficient precipitation, topographical or geological features to support stream systems. Precipitation flows through subterranean transport from land to sea. Therefore, there are no streams present for assessment purposes.

FARALLON DE MEDINILLA (No'os) – CALM Categories

No'os' coastal waters are assigned a CALM Category 5 due to the lack of opportunities for visitors to access these waters, and the destruction of its natural topography, which is unsupportive of the *Aesthetic Enjoyment* DU.

C.4. WETLANDS PROGRAM

The collaborative BECQ Wetlands Program provides regulatory oversight and management of wetlands, their delineation, assessment, valuation, and monitoring of present and potential future impacts to wetlands.

DCRM regulates all developments and/or activities that may affect wetlands through their APC permit review process. DEQ regulates impacts to wetland water quality through CNMI WQS that include an Anti-degradation policy.

Both agencies participate in delineating wetlands and their assessment. The Wetland Program adopted a uniform method for delineating wetland boundaries based on the USACE 1987 Delineation Manual and applicable 2012 Hawaii and Pacific Regional Supplemental guidance. These changes are intended to decrease or eliminate further development of, or loss of wetlands, and to support and enhance wetland habitat, and function, including water quality protection (2021-2025 DCRM 309 Program Guidance, 2020).

The CNMI Wetland RAM adopted in 2016, was further refined in 2020. The RAM builds upon a CNMI Hydrogeomorphic (HGM) Functional Assessment technique pilot-tested in early 2000. CNMI Wetland RAM training is offered regularly to NMC students, new BECQ employees and other interested agencies as an ongoing effort to promote continuity of assessing and managing wetland systems.

The RAM uses 13 CNMI typical “high”, “medium”, and “low” valued wetland systems as reference wetlands. Eleven (11) of the sites are “depressional” systems and two (2) are “tidal fringe” systems. The RAM assigns wetland values using an assessment matrix based on status of vegetation, soils, wildlife habitat, hydrological integrity, regional significance, and the degree of the wetland’s isolation from development and other anthropogenic stressors. This reporting cycle, most of Saipan’s wetlands have received at least an initial RAM rating. Wetlands will be reassessed as part of the Wetland Program’s ongoing monitoring efforts, as resources allow.

Currently, the 1990, *Saipan Comprehensive Wetlands Management Plan* is being revised. The Plan identified and classified wetlands on Saipan, building upon previous studies, the 1989 US FWS National Wetlands Inventory (NWI) that was based on old 1987 aerial imagery, and soil maps from the USDA Soil Conservation Service. The Plan’s anticipated revision will incorporate the objectives of IWMPs for wetlands in Garapan, Achugao, LaoLao, and Talakhaya watersheds. Each IWMP will provide recommendations for wetland management, protection measures, and potential wetland restoration projects. Implementation of the Plans will provide innovative comprehensive management for the protection and restoration of wetlands in these priority watersheds.

C.4.1. Extent of Wetland Resources

NOAA stated in their 2012 monitoring report that there are 47,197 hectares (116,626.33 acres) of land area in the CNMI archipelago (Coral Reef Ecosystem Monitoring Report of the Mariana Archipelago: 2003-2007, NOAA Fisheries, pg. 43., 2012.). The largest wetlands are located on the islands of Saipan and Tinian, and are listed in Table C-44., on the following page.

TABLE C-44. Size of CNMI Wetlands

Watershed	Seg	Wetland ID	Wetland Name	Wetland Acres	Wetland Type
ROTA:					
Sabana/Talakaya/Palie	***2***	2WET	Talakhaya streams	?	Riparian
Rota Total:				***?***	
TINIAN:					
Makpo	***9***	9WET	Makpo Complex	*28.4*	Marsh
Puntan Diaplolamanibot	***10***	10WET	Bateha I and II	*12.9*	Depressional
Puntan Tahgong	***11***	11WET	Hagoi and Mahalang Complex	*40.6*	Marsh
Tinian Total:				***81.9***	
Watershed	**Seg**	**Wetland ID**		**Wetland Acres**	**Wetland Type**
SAIPAN:					
Talofofo	***13***	13WET	Talofofo Ridge	***2.6***	Riparian
Kagman	***14***	14WET	Kagman Education Island	***5.1***	Marsh
			Kagman North Catchman Basin		Constructed
			Kagman South Catchman Basin		Constructed
Dan Dan	***16***	16WET	DanDan Driving Range Wetland	***2.8***	Riparian
Isley	***17***			***28.4***	
Isley (West)	17A	17WETA	Tilled Wetland	3.4	Constructed
			Flores Pond	23.0	Marsh
Isley (East)	17B	17WETB	Airport Reservoir	2.0	Artificial concrete
Susupe	***18***			***489.7***	
Susupe (North)	18A	18WETA	Chalan LaoLao Wetland	194.6	Marsh
			North Susupe Pot Holes	2.7	Pot Holes
Susupe (South)	18B	18WETB	Susupe Wetland	292.4	Marsh
			Chalan Kanoa Pot Holes		Pot holes
West Takpochau	***19***			***40.7***	
W. Takpochau (North)	19A	19WETA	DPW Mangrove	18.0	Mangrove
				2.2	Pond
W. Takpochau (Central)	19B	19WETB	American Memorial Park Wetland	20.5	Marsh
Achugao	***20***			***38.0***	
Achugao (North)	20A	20WETA		0.8	Constructed
			San Roque Wetland	12.1	Marsh
Achugao (South)	20B	20WETB	Falig Wetland	24.4	Marsh
			Pond within Falig Wetland	0.7	Pond
As Matuis	***21***	21WET	Marianas Country Club Golf Course	***?***	Constructed
Saipan Total:				***607.3***	
Watershed	**Seg**	**Wetland ID**		**Wetland Acres**	**Wetland Type**
NORTHERN ISLANDS:					
Anatahan	25	25WET	Caldera Marshes	?	Marsh
Pagan	29	29WET	Surrounding Sanhiyong and Sanhalom	27.0	
Northern Islands Totals:				***27.0***	
CNMI Grand Total:				***716.2***	

According to the 1989 NWI maps there are approximately, "300 hectares (740 acres) …of wetlands on the islands of Saipan, Tinian, Rota and Pagan" (CNMI Wetlands Report, AECOS, 2005). The 1990 *Wetlands Management Plan*" states that, "Less than two percent of the total land area in the Commonwealth is wetlands." Similarly, more recent GIS wetland measurements using the 2017 NHD, and Wetland and Stream GIS data layers, calculates 291 hectares (717.8 acres) of inland wetlands, and 25 hectares (61.4 acres) of tidal mangrove wetlands totaling 316 hectares (780.9 acres). Therefore, presently less than 1% of the total CNMI land area are covered by wetlands. However, to confirm the true extent of CNMI wetland resources, every effort should be made to ground truth delineated boundaries and record the GPS coordinates.

In 2021 BECQ staff participated for the first time in the EPA National Wetland Condition Assessment (NWCA). While conducting desktop evaluations and wetland reconnaissance visits to the randomly selected "wetland" sample sites, staff found that several sites would not be considered wetlands today. This is because the sites were selected from the outdated 1989 NWI maps. Therefore, the actual extent of CNMI wetlands can only be considered approximations without ground truthed delineated boundaries.

For certain, Saipan has the most wetlands within the CNMI, the largest being the brackish, "…40-acre Lake Susupe complex and 350 acres of contiguous palustrine emergent and forested freshwater wetland surrounding the lake," that comprises approximately, "…75 percent of Saipan's freshwater wetlands (60% total CNMI's freshwater wetlands)." (Wolfs Co., et.al., Nov. 2019). This is followed by Talakhaya riparian wetlands on Rota, and the Makpo (Maui well) wetland complex on Tinian.

C.4.2. Wetland Water Quality Standards and Protection Activities.

CNMI wetlands are protected through: 1) Enforcement of DCRM APC Regulations and the "no net loss" wetlands policy; and 2) Enforcement of the CNMI DEQ WQS's anti-degradation policy.

DCRM revised their regulations and policies in 2018 to better establish jurisdiction and more adequately define what constitutes a CNMI wetland area. (Coastal Zone Management Act Section 309 Program Guidance 2021-2025 Enhancement Cycle, CNMI, September, 2020). CNMI regulations do not limit a wetland to that defined as "waters of the United States.", and does not require a "federal nexus" as required by ACoE's definition. Therefore, CNMI isolated wetlands are not affected by 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 revised regulations also included vegetated buffer zones and BMPs to support a "no net loss" wetland policy, and sequential "mitigation hierarchy" guidelines for any development with unavoidable impacts to a wetland. The policy makes clear that avoidance and minimization of impacts should be required before mitigation is deemed acceptable. This guidance is used by DCRM permit reviewers when developing commensurate Wetland APC permit requirements.

Developers must then implement the required mitigation measure(s) to protect all wetland functions therein.

DEQ's WQS were revised in 2021 to update the wetland definition to reflect DCRM's definition. The Anti-degradation policy states 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 policy also requires 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.

Although DEQ has not adopted quantitative wetland water quality criteria, data collection began as part of the 2021 EPA NWCA. Staff were also certified by the "Wetland Training Institute" in wetland delineation methods based on the ACoE manual in December 2021. As a result, WQS/NPS established a regular wetland monitoring program for several sites in two wetlands on Saipan located in the Central West Takpochau watershed. Collected data will be used to evaluate the efficacy of coral reef and inland wetland restoration projects and together with data from other wetlands will be the basis for developing regulatory wetland water quality criteria in the future.

C.4.3. Integrity of CNMI Wetlands

The BECQ Wetland Program conducts wetland water quality monitoring and the Wetland RAM to identify potential harmful impacts and stressors to the integrity of CNMI wetlands.

CNMI Wetland RAM rankings are used to determine existing wetland conditions on public lands, as well as on US Military leased lands, and to identify causes and sources of impairments. It is critically important to establish present conditions so impacts from developments on public lands and expansion of US Military exercises and live firing ranges on leased lands can be assessed. If these developments or Military exercises or activities result in wetland impairment or loss, responsible parties including the DoD will be held accountable for commensurate mitigation and restoration of wetlands as required by the CNMI local laws and regulations. Table C-45., on the following page provides a description of CNMI Wetland assessment methods for determining attainment of the Wetland's *Propagation of Aquatic Life* DU.

TABLE C-45. Wetland Assessment Method (RAM rankings) for Propagation of Aquatic Life

EPA CALM CATEGORY:	DESCRIPTION	CNMI Wetland RAM Rankings 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-25), and the causes (Table C-26) and sources (Table C-27) 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 in priority watersheds. Assessments of streams in the South Achugao watershed was completed last reporting cycle. The North Achugao and LaoLao watersheds' streams were assessed this reporting cycle, and the streams in the West Takpochau watershed will be assessed next reporting cycle.

Lake water quality trends are reported in Section C.3.4., in a previous section of this report.

C.6. PUBLIC HEALTH ISSUES

C.6.1. Beach Water Quality Issues

Bacteriological Contamination:

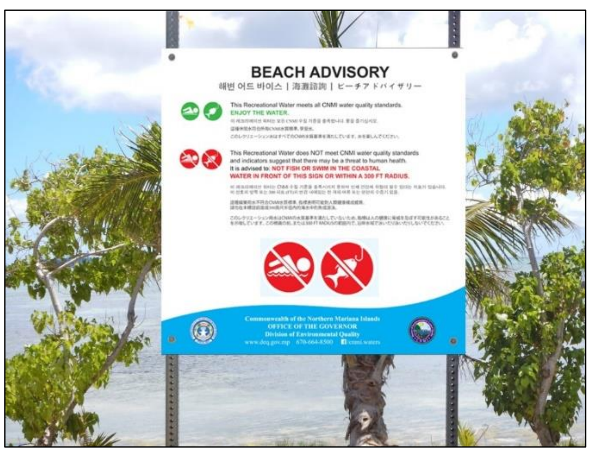
One of the primary purposes of the BECQ Surface Water Monitoring Program is to evaluate compliance with the CNMI WQS for Enterococci. Sample sites are commonly placed in areas frequently used by the public, which have been listed as impaired for the *Recreational* DU.

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**.

New BEACH advisory signboards were designed last reporting cycle with internationally recognizable symbols indicating “no swimming” and “no fishing”, with Chinese, Korean and Japanese translations as shown in Figure C-97. Each sign has replaceable placards (green on one side and red on the other) to display the appropriate symbol based on water quality results. 10 signs damaged last reporting cycle due to Super Typhoon Yutu have been replaced, and two old signs remain posted.

FIGURE C-97. 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. A Microbial Source Tracking (MST) study found that human waste from overflows and leaks from sewage collection systems, and animal waste from feral dogs are the sources of bacterial contamination. Runoff carrying resuspended sediment with naturally occurring Enterococci from densely populated areas can cause DEQ to post Beach Advisories when an actual health risk does not exist.

The MST study found that Enterococci contamination observed on some of Saipan's remote western and eastern beaches were found to be due to free range domestic animals, livestock, and birds, or sediment-laden runoff containing naturally occurring Enterococci (rather than fecal 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, thereby causing the continued observance of Enterococci exceedances. There have also been a handful of suspected and highly publicized leptospirosis infections associated with recreational exposure to surface waters in the Talofofo watershed, and 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 Bacteriological TMDL to reduce bacteriological contaminant levels on Saipan.

<u>Mercury and Heavy Metals in Sediment, Fish Tissue and Biota</u>

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 Tier II 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 Takpochau 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 Takpochau 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. A study completed by BECQ in FY2022 on metals in stream sediments has underscored the need for further investigation of metals in fish and shellfish tissues to assess risks to human health from consumption. BECQ anticipates conducting a Tier II fish tissue study in these areas of concern as funding becomes available.

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 previously 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 was open to the atmosphere and potentially subject to contamination from local fauna visiting or living in the cave, it has since been enclosed to prevent exposure. Therefore, the cave was 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 Groundwater 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 groundwater 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.

The assessment of the water in the Saipan airport's runway rainwater catchment system is scheduled to be completed before next reporting cycle. It has not been in use during this reporting cycle as a drinking water source.

PART D. GROUNDWATER MONITORING AND ASSESSMENT

This section describes known or suspected sources of groundwater contamination, existing groundwater protection programs, and summarizes the quality of groundwater in the CNMI.

TABLE D-1. Major Sources of Groundwater 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 & 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.1. OVERVIEW OF GROUNDWATER CONTAMINATION CAUSES & SOURCES

There are very few incidents of groundwater contamination in the CNMI, as shown in Table D-1., on the previous page. There are only eight confirmed or highly suspected sources in the CNMI based on professional judgements. They are “X”ed in the table’s second column (Suspected Sources), 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 groundwater contamination problems on the island of Rota. There was one leaking above ground fuel storage tank documented on the island of Tinian, which has since been addressed.

This reporting cycle CUC finished several water supply projects as listed in Table D-2., below.

TABLE D-2. CUC Potable Water Supply Improvement Projects

Potable Water Supply Projects	Location	Cost	Year
Waterline Replacement			
Gualo Rai Waterline Distribution	W. Takpochao Central	$ 1,269,761.90	2020
Koa Lane 6-inch WL Extension	W.Takpochao Central, Garapan	$ 201,099.01	2020
Islandwide Waterline Repair	Saipan wide	$ 230,569.85	2021
Water Tank Replacement			
San Vicente 750,000-Gal Water Tank Replacement	DanDan	$ 4,775,160.91	2021
Water Source Improvements			
Installed Granulated Activated Carbon Filters for 10 wells	Isley	$279,255.00	2021
Rota Water Cave Enclosure	Rota	$68,585.00	2021
Booster Pump and Valve Stations Replacement			
Waterline & Booster Station Rehabilitation	Kagman	$1,373,118.80	2021
Water System Improvements Phase 2	Rota	$385,030.00	2020
Water System Replacement of Flow Meter & PRV	Rota	$192,332.00	2022

Dilapidated Asbestos Cement water lines were removed on the islands of Saipan and Rota. The 750,000 gallon water reservoir located in San Vicente village on Saipan was entirely upgraded. Most importantly, in order to reduce PFOS and PFOA contamination in the 10 Isley wells, Granulated Activated Carbon (GAC) filters were installed this reporting cycle. There is further discussion on this topic in section D.2.5., that follows.

In addition, Rota’s Water Cave has been enclosed to prevent the influence of surface water on this groundwater supply.

D.2. OVERVIEW OF STATE GROUNDWATER PROTECTION PROGRAMS

DEQ is the agency whose primary responsibility is to protect and manage groundwater 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-3, summarizes the status of Program implementation.

TABLE D-3. Summary of State Groundwater Protection Programs

Programs or Activities	In the CNMI	Implementation Status	DEQ Branch
Active SARA Title III Program	X	continuing efforts	TWM
Ambient groundwater monitoring system	X	USGS & CUC Partners	SDW
Aquifer vulnerability assessment	X	continuing efforts	SDW
Aquifer mapping	X	continuing efforts	SDW
Aquifer characterization	X	continuing efforts	SDW
SDW Comprehensive data management system	X	continuing efforts	SDW
State Groundwater Protection Program (EPA approved)	X	Pending data Mgmt System	SDW
groundwater discharge permits	X	Annual Private & Commercial Wells Permits	SDW
groundwater Best Management Practices	X	fully established	SDW
groundwater legislation	X	fully established	SDW
groundwater classification	X	continuing efforts	SDW
groundwater quality standards	X	fully established	SDW
Interagency coordinaed groundwater 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
State RCRA Primacy	X	For RCRA-D (only solid waste)	SWM
State RCRA Program more stringent than RCRA Primacy			
Source Water Assessment Program	X	continuing efforts	SDW
State Superfund			
State septic system regulations	X	fully established	WEEC
Underground storage tank installation requirements	X	fully established	UST
Underground storage tank remediation fund	X	continuing efforts	UST
Underground Storage Tank Permit Program	X	fully established	UST
Underground Injection Control Program	X	fully established	SDW
Vulnerability assessment of SDW/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

TWM – Toxic Waste Management, SDW – Safe Drinking Water, WQS/NPS – Water Quality Surveillance / Non-Point Source, PEST – Pesticide Management, SWM – Solid Waste Management, WEEC – Wastewater, Earthmoving, and Erosion Control, and UST - Underground Storage Tanks

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 have 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.

The Well Operation Regulations include Groundwater Management Zones for Saipan, which are used in other BECQ regulations to set additional restrictions on activities that may contaminate groundwater including wastewater disposal systems, land disposal of waste, and above ground (AST) and underground storage tanks (UST).

In addition, the SDW Program maintains a database on all wells in the CNMI. As of December 2021, the program has documented the locations of 727 wells in the CNMI (629 on Saipan, 75 on Tinian, 22 on Rota, and 1 on Pagan). The majority of these wells are used for drinking water sources (344), while some are used for irrigation (27). There are also monitoring wells (138), exploratory wells that have not been designated for another use yet (38), injection wells (25), industrial wells (9), geotechnical wells (8), and wells that have been destroyed (138).

D.2.2. Underground Storage Tank Regulations

The Storage Tanks 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 groundwater 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. Polyfluoroalkyl Substances and Perfluorooctane Sulfonate 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. BECQ is in the process of adopting a MCL for combined PFAS of PFOA, PFOS and Perfluorononanoic Acid (PFNA) of 70 parts per trillion (ppt) and an MCL of 4.4 ppt for PFNA. The MCL should be published officially in the CNMI registrar in the Spring of 2022.

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. CUC was able to install 10 Granular Activated Carbon (GAC) filters at 10 wells within the Obyan and Isley wells fields to treat the respective Groundwater for PFAS.

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 in March of 2022. The results showed that the concentration of PFOS and PFOA from the As Terlaje Tank entry point was 26 ppt, the IF-28 entry point as non-detect, and the Isley Reservoir entry point as 28 ppt. All below the newly proposed MCL of 70 ppt.

D.3. SUMMARY OF CNMI GROUNDWATER CONTAMINATION SOURCES

Rota and the Northern Islands have no known groundwater contamination issues. However, some exist on the island of Saipan and Tinian. They are listed in Table D-4., below. There are no new leaking underground storage tank (LUST) sites. There were sites in previous reports, but all sites have been cleaned up. There is also no new leaking above ground storage tank (LAST) sites.

TABLE D-4. Summary of State Groundwater Contamination

Source Type	Total Sites (n =)	Listed 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=)
SEMS	0	0							
FUDS	11	11	2? Check APC	SVOCs, VOCs, Metals. UXO	11				
LUST									
LAST									
Underground Injection	19	0	0						
RCRA Corrective action	2								
***ARFF**	1	1	1	PFAS	1	1	1	1	
****CNMI PWS Source**	1	1	TBD	Calcium carbide	1				

*ARFF – Aircraft Rescue and Fire Fighting

**Saipan Industrial Co. in East Isley dumped Acetylene waste product of calcium carbide into an unlined basin. Soil pH 10-12

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 were tested as required by the CNMI Safe Drinking Water regulations.

Per the CNMI SDW regulations required frequency for testing pesticides, CUC tested well entry points for glyphosate in November 2020. All points were non-detects (Eurofins Eaton Analytical, LLC laboratory results, 2020).

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 groundwater 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 GROUNDWATER QUALITY

Table D-5., summarizes groundwater quality monitoring results for untreated well water on the islands of Saipan, Rota and Tinian.

TABLE D-5. Aquifer Monitoring Data for Saipan, Tinian and Rota (FY 2009 to 2021)

		Number of Wells						
			NO3 ranges from background levels to ≤5 mg/l	NO3 ranges from > 5 to ≤10 mg/l				
Results of Untreated Wells Used in Assessment (n =)	Parameter Groups	No detections above MDLs or background levels	No detections other than NO3 > MDLs or background levels	Other parameters detected > MDL but ≤ MCLs	Parameters detected > MCLs	Wells removed from service	Wells requiring special treatment	Background parameters > MCLs.
Saipan								
0	VOC							
0	SOC							
524	NO_3	33	338	152	1	0	0	0
0	Other							
Rota								
0	VOC							
0	SOC							
3	NO_3	0	3	0	0	0	0	0
0	Other							
Tinian								
0	VOC							
0	SOC							
1	NO_3	0	1	0	0	0	0	0
0	Other							

Semi-annual 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.

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: groundwater, 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 groundwater 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-5.

Groundwater from 213 wells in the CNMI (209 on Saipan, 3 on Rota, and 1 on Tinian) were analyzed for nitrates during this reporting period. One (1) well had water that exceeded the MCL of 10 mg/l, but it was not removed from service because its water is blended with water from wells with lower concentrations of nitrates.

D.5. SUMMARY OF GROUNDWATER-SURFACE WATER INTERACTIONS

Groundwater to surface water interactions, as well as surface to groundwater 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 groundwater 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 groundwater 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 groundwater 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 periods has reduced the demand significantly such that nearly every CUC customer has 24-hour water. 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 groundwater management plan moving forward, to continue to improve the water system's quality.

CUC is now beginning the process of developing a groundwater 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.

As mentioned previously in Section C.6.2., CUC conducted a study to determine if well fields on Saipan, Tinian and Rota were Groundwater 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 groundwater from this well showed changes in turbidity and conductivity immediately following rain events.

PART E. PUBLIC PARTICIPATION

In order to better promote public participation in the final development of this IR and increase its accessibility, the WQS/NPS Branch produced an IR Fact Sheet with pertinent information about the IR process, which was posted along with the Draft IR on DEQ's website on September 19th, 2022 (Please refer to Appendix X, to see posted public notices). This began the 30-day comment period.

A press release requesting for Public Comments was also shared via the CNMI Water's Facebook page and the cnmi.waterquality@gmail.com Email listserv, after which it was also posted on the Office of Planning and Development's website, and the CNMI House of Representatives Natural Resources Committee Chair's Instagram account.

Press Releases requesting for public comment were also published in two local newspapers on September 20th, and September 21st, 2022.

The final day for public comment submission ended at 4:30 pm on October 19th, 2022. The Public comments received and the responses are provided in Section E.1 that follows.

E-1. SUMMARY OF PUBLIC COMMENTS AND BECQ RESPONSES

COMMENT 1 - 09.20.22_Muna_Joseph-Drinking Water Palatability and Chlorine Treatment

"From: **J Muna** <josephmuna73@gmail.com>
Date: Tue, 20 Sept 2022 at 09:26
Subject: Water Quality Concerns / Gualo Rai
To: cnmi.waterquality@gmail.com <cnmi.waterquality@gmail.com>

Greetings,

I am submitting a comment about water quality concern effecting all residents in the Gualo Rai area. Most especially for those living in the upper portion of Gualo Rai.

I had read and reviewed the water quality report that BECQ had submitted for public view and kuddos to all that continue to keep our water system safe and clean through sampling and testing. The report states general information about regulatory standards and procedures. Which is important information.

I have been a long time resident in the village of Gualo Rai. Its always been my home village and our parcel of land has been passed down through family generations which i am proud of and blessed with. My cocnern, is this. Through my upbringing. Our family has had no issues with water quality in the past. Until the development of rural housing ie.,apartment complexes and influx of residential build up. Through these developments. Water quality had changed and of course it should be expected. Although, I am not entirely sure what quality level is BECQ basing itself from test results. But currently the water quality has gotten from bad to worst in Gualo Rai. The water service being provided by CUC in the area is almost unbearable to use because of EXCESSIVE amounts of chlorine in the water to treat contaminants. Residents or atleast for those that have no choice are left to use the water service from CUC for thier daily use. Exposing them of excessively large amount of chlorine daily. This chlorine concern has not only effected our daily lives but our health. The water quality is excessively salty to even taste which is actually a health concern. It is so bad that we as residents or at least for some. Refuse to use CUC water to even do laundry at home. It has cost lots of families financial loss because of chlorine damage to clothing and what not. The chlorine within the water system has also taken its toll of a lot of our water fixtures. Leaving us residents little to no choice but to keep replacing damaged fixtures because of chlorine deterioration. These are just some serious cocnerns that I see as an issue that needs to be properly addressed.

Thank you for allowing us citizens to submit comments to this regulatory water report. And Thank you BECQ for all the efforts in keeping our Island safe especially our natural resources."

RESPONSE 1 - 09.21.22_WQS/NPS and SDWP

From: **becq waterquality** <cnmi.waterquality@gmail.com>
Date: Wed, 21 Sept 2022 at 11:30
Subject: Re: Water Quality Concerns / Gualo Rai
To: J Muna <josephmuna73@gmail.com>, <travisspaeth@becq.gov.mp>

Hafa Adai Mr. Muna

Thank you for submitting comments to BECQ's Water Quality Surveillance/Non-point Source Pollution (WQS/NPS) Program's for the DRAFT 2022 CNMI 305(b) and 303(d) Water Quality Assessment Integrated Report (IR). Your concerns about Gualo Rai's drinking water palatability "saltiness", and chlorine treatment levels are valid. This IR provides a general overview of BECQ's groundwater program in Sections B.2.4.,; and a detailed discussion follows in PART D., beginning on page 249. However, this IR does not assess CNMI's potable "drinking" water supply, only CNMI *surface* waters.

To clarify, the WQS/NPS program is only responsible for sampling and analyzing CNMI *surface*, or coastal waters, streams, wetlands and lakes. We publish the "Red Flag" reports. Unlike other states and territories, CNMI's drinking water is sourced solely from groundwater, and not from any of our surface waters. Therefore, the potable "drinking" water supply is not assessed in this IR.

However, drinking water quality oversight and assessment is provided by BECQ's "Safe Drinking Water Program". Therefore, I have cc'd the Program's Engineer, Travis Spaeth herein, so he can respond thoroughly to your concerns. Mr. Spaeth works with CUC to direct the utility towards meeting supply pressures, demands, and contamination. He may be contacted directly at: 670-664-8509, or by replying to travis.spaeth@becq.gov.mp.

Again, thank you for your comments. We appreciate our citizens' valuable input, which improves the content of this biennial report to EPA and Congress, to better serve our community, meet environmental justice standards, and to keep our surface waters "fishable and swimmable" for everyone.

Please find out more about your village's coastal waters, streams and wetlands in the Central West Takpochao Section of this report. Please do not hesitate to contact us if you have further concerns.

Si yu'us ma'ase and Tirow for your time and comments.

PART F. CHANGES IN THIS INTEGRATED REPORT

F.1. Stream Visual Assessment Protocol Assessments

This reporting cycle the SVAP protocol was used to complete stream assessments in the Achugao and LaoLao watersheds. This provided a plethora of new information from field biologists, which was incorporated in DU assessments.

F.2. 2021 NWCA - CNMI Wetland Assessments

FY2021 was the first time that the CNMI participated in the EPA National Wetland Condition Assessment Study. WQS/NPS staff completed desk top evaluations of the probabilistic wetland sites randomly selected by EPA. Field staff used the gathered information to provide further descriptions of wetland conditions in Saipan's watersheds.

F.3. BECQ Completed a Survey of Pagan

Information gathered in the FY2021 survey of Pagan provided important coastal and lake water quality data. BECQ SAR and Storage Tanks program staff also collected baseline information on terrestrial conditions, while the MMT completed biological assessments of their long-term monitoring sites.

F.4. Annual Biological Criteria Monitoring by WQS/NPS staff

This reporting cycle WQS/NPS staff paired water quality data with biological assessments of benthic conditions at 16 Rota, 21 Saipan, and 17 Tinian reef flat sites. These biological monitoring data along with MMT's data were used to measure trends in habitat health as part of the ALUS ranking. These assessments will now be conducted on an annual basis.

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APPENDIX I: Dimensions of Aquatic Resources in Each Watershed Segment

TABLE I - a. 2022 Dimensions of Aquatic Resources for Rota, Aguigan, and Tinian Watershed Segments

Watershed	Num.	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	none	0		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***	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***		***81.9***			***0.0***		

TABLE I - b. 2022 Dimensions of Aquatic Resources for Saipan Watershed Segments

Watershed	Num.	WQ Sampling Stations	Ocean Shoreline Miles	Stream ID	Stream Miles	Wetland ID	Wetland 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***		***5.9***		***3.8***		***28.4***					
Isley (West)	17A	SEB06	1.7	17STRA	3.5	17WETA	3.4 23.0	Constructed Marsh	none	0	15° 6'25.95"N	145°42'25.66"E
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***		***5.2***		***8.4***		***489.7***			***57.4***		
Susupe (North)	18A	WB25 - WB29	2.4	18STRA	7.0	18WETA	194.6 2.7	Marsh Pot Holes	none	0	15° 9'9.43"N	145°42'1.91"E
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***		***7.3***		***9.2***		***40.7***					
W. Takpochau (North)	19A	WB9-WB13	1	19STRA	4.7	19WETA	18.0 2.2	Marsh Pond	none	0	15°13'26.77"N	145°43'55.64"E
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***		***4.3***		***9.9***		***38.0***					
Achugao (North)	20A	WB3-6	1.9	20STRA	3.4	20WETA	0.8 12.1	Constructed Marsh	none	0	15°14'35.26"N	145°45'16.66"E
Achugao (South)	20B	WB7-8	2.4	20STRB, 20STRC	6.5	20WETB	24.4 0.7	Marsh Pond	none	0	15°13'42.13"N	145°44'21.53"E
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:			***53.9***		***94.4***		***607.3***			***57.4***		

TABLE I - c. 2022 Dimensions of Aquatic Resources for Mañagaha's Segment

Watershed	Num.	WQ Sampling Stations	Ocean Shoreline Miles	Stream ID	Stream Miles	Wetland ID	Wetland 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. 2022 Dimensions of Aquatic Resources for the Northern Islands Watershed Segments and Grand Totals

Watershed	Num.	WQ Sampling Stations	Ocean Shoreline Miles	Stream ID	Stream Miles	Wetland ID	Wetland Acres				Latitude	Longitude
NORTHERN ISLANDS:												
No'os (FDM)	***24***	none	4.2	none	0	none			none	0	16° 1'10.96"N	146° 3'34.61"E
Anatahan	***25***									***149.0***		
Anatahan	25	none	17.3	25STR	?	none			25LAK A	149.0	16°21'5.04"N	145°41'3.42"E
									25LAK B	?		
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***		*28.2*				***27.0***			***61.0***	*18° 7'16.62"N*	*145°45'49.20"E*
Pagan	29	none	28.2	29STR		29WET	27.0	Marsh	29LAKA	34.0		
								Marsh	29LAKB	27.0		
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**			**210.0**		
CNMI Grand Total:			***240.5***		***100.5***		***716.2***			***267.4***		

APPENDIX II: Coastal Water Quality Criteria Data Used in 2022 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) = Dangerous access

TABLE II - a. 2022 Rota 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	2020	2021	
	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	4	10	AA
R13	Talakhaya	*	*	*	*	*	*	*	*	*	*	**	**	10	24	33	24	14	63	AA
	SEGMENT 3: SONGSONG																			
R3	Mobil Storm Drain	0	10	0	0	7	12	19	5	19	50	38	43	9	0	5	0	3	0	A
R4	East Harbor Dock	4	4	0	0	0	5	4	0	7	21	14	26	13	0	5	0	0	0	A
R5	Tweksberry Beach	12	0	0	0	0	4	4	5	7	0	5	4	0	0	5	0	0	0	AA
R6	W. Harbor Marina	12	10	0	0	7	12	0	14	15	29	29	9	13	32	14	12	7	23	A
R7	Dist #2 Storm Drain	42	17	4	14	27	12	4	4	19	43	45	35	4	20	5	12	0	35	AA
R8	Dist #1 Storm Drain	4	3	0	9	10	0	7	10	11	7	5	0	0	8	1	0	0	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	0	0	AA
R10	Teteto Beach	0	0	0	0	0	0	4	5	0	0	0	9	0	0	0	12	0	0	AA
R11	Guata Beach	19	14	4	5	0	0	4	14	7	0	0	0	0	0	0	4	3	0	AA
	SEGMENT 5: CHALIAT/TALO																			
R12	Swimming Hole	19	7	7	0	0	0	0	9	7	29	5	13	0	0	0	0	0	3	AA

TABLE II - b. 2022 Tinian Coastal Enterococci Exceedances of CNMI WQS

Sample Station ID	Sampling Station Name	Enterococci % Violations																		
		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	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	36	0	AA
T2	Unai Dangkolo	4	15	4	4	4	3	9	7	18	7	13	11	4	4	4	9	4	3	AA
SEGMENT 9: MAKPO																				
T7	Tachogna	8	4	4	0	4	0	0	11	11	10	4	5	8	0	0	4	4	4	AA
T8	Taga Beach	8	0	0	0	0	0	14	7	4	3	5	5	4	0	0	0	0	11	AA
T10	Jones (Kammer)	4	4	0	4	0	0	14	0	4	0	9	5	0	4	4	4	0	0	AA
SEGMENT 9H: MAKPO HARBOR																				
T9A	Harbor	4	19	7	0	7	0	0	4	0	17	13	20	8	0	0	0	15	3	A
SEGMENT 10: PUNTAN DIAPLOMANIBOT																				
T5	Leprosarium I	4	4	0	12	7	7	10	4	11	21	13	11	8	0	7	4	35	10	AA
T6	Leprosarium II	0	12	0	15	4	7	20	7	4	7	17	20	4	4	11	0	31	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	20	3	AA
T4	Unai Chulu	4	19	0	0	7	0	0	7	14	3	9	11	4	4	0	4	12	0	AA

TABLE II - c. 2022 Saipan Coastal Enterococci Exceedances of CNMI WQS

Sample Station ID	Sampling Station Name	Enterococci % Violations																		
		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Segment Class
	SEGMENT 12: KALABERA																			
NEB 02	Bird Island	23	30	34	10	3	7	7	14	7	21	23	23	15	38	27	6	15	14	AA
	SEGMENT 13: TALOFOFO																			
NEB 07	Hidden	38	30	31	24	30	22	18	24	13	50	17	32	11	31	32	22	7	8	AA
NEB 03	Jeffrey's	15	50	38	29	37	26	21	38	20	29	9	18	7	17	35	15	10	3	AA
CNMI-104	Jeffrey's Beach Reef flat	*	*	*	*	*	*	*	*	*	*	*	*	0	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	19	3	AA
	SEGMENT 14: KAGMAN																			
NEB 05	Marine Beach	15	15	3	14	13	11	11	0	10	29	8	0	4	7	8	0	0	0	AA
CNMI-29	Tank Beach Reef flat	*	*	*	*	*	*	0	*	*	0	*	0	0	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	0	3	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	0	0	AA
ARRA B2	North Laolao Reef Flat	*	*	*	*	*	*	*	*	*	*	*	*	0	8	22	0	11	0	AA
ARRA B5	North Laolao Reef Flat	*	*	*	*	*	*	*	*	*	*	*	*	8	0	0	13	11	0	AA
ARRA B8	North Laolao Reef Flat	*	*	*	*	*	*	*	*	*	*	*	*	8	0	0	13	0	0	AA

TABLE II - c. 2022 Saipan Coastal Enterococci Exceedances of CNMI WQS Continued

Sample Station ID	Sampling Station Name	Enterococci % Violations																		
		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Segment Class
SEGMENT 15: LAO LAO																				
CNMI-21	Central LaoLao Beach reef flat	*	*	*	*	*	*	0	*	*	0	*	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	0	7	AA
ARRA C2	South Laolao Reef Flat	*	*	*	*	*	*	*	*	*	*	*	*	8	15	11	0	11	8	AA
ARRA C5	South Laolao Reef Flat	*	*	*	*	*	*	*	*	*	*	*	*	0	8	0	0	0	8	AA
ARRA C8	South Laolao Reef Flat	*	*	*	*	*	*	*	*	*	*	*	*	0	0	0	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 Dangkulo	46	35	14	33	13	37	43	19	37	16	33	5	4	3	12	0	7	17	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	3	0	AA
CNMI-30	Obyan Beach Reef Flat	*	*	*	*	*	*	0	*	*	0	*	0	0	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	0	13	AA
SEGMENT 18A: SUSUPE (NORTH)																				
WB 24	Chalan Laulau	17	4	6	6	2	4	0	6	2	6	13	6	0	4	0	8	10	21	AA
WB 25	San Jose	6	2	6	9	0	8	8	12	2	0	12	10	0	0	2	4	4	10	AA
WB 26	Civic Center	4	0	4	11	4	2	4	6	2	6	12	10	2	2	4	10	4	6	AA
WB 27	Saipan World Resort	6	6	8	9	2	6	12	15	4	2	11	0	0	0	6	2	4	0	AA
WB 28	Kanoa Resort	4	4	8	4	2	6	12	8	0	8	4	4	2	4	0	4	0	0	AA
WB 29	Saipan Community School	8	8	8	6	2	4	8	2	0	10	3	4	0	0	0	6	2	0	AA

TABLE II - c. 2022 Saipan Coastal Enterococci Exceedances of CNMI WQS Continued

Sample Station ID	Sampling Station Name	Enterococci % Violations																		
		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Segment Class
	SEGMENT 18B: SUSUPE (SOUTH)																			
WB 30	Sugar Dock	52	14	19	19	66	37	19	29	21	29	32	18	6	15	24	31	4	2	AA
WB 31	CK Dist #2 Drainage	17	10	8	21	32	25	12	25	15	25	29	14	10	13	25	10	6	8	AA
WB 32	CK Dist #4 Lally	10	6	6	6	6	6	8	19	11	12	13	10	8	4	4	10	2	4	AA
WB 33	Chalan Piao	10	6	6	13	4	8	17	6	8	8	0	6	0	4	4	8	0	6	AA
WB 34	Hopwood School	21	6	13	21	6	2	15	10	8	10	14	16	8	6	8	8	0	6	AA
WB 35	San Antonio	19	6	6	0	4	6	8	6	4	6	3	0	6	4	2	8	0	10	AA
WB 36	Pacific Island Club	6	4	2	6	6	6	8	6	6	4	4	0	0	2	4	6	2	4	AA
WB 37	San Antonio Lift Station	33	6	4	13	22	10	12	10	6	4	23	12	4	2	4	4	0	8	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	14	25	A
	SEGMENT 19B: WEST TAKPOCHAU (CENTRAL)																			
WB 11.2	Eloy Inos Peace Park	42	76	56	68	70	50	42	33	33	39	24	33	17	27	18	13	4	17	A
WB 13	Outer Cove Marina	10	21	4	13	0	2	2	8	4	0	14	6	2	2	0	6	6	4	A
WB 12	Smiling Cove Marina	6	14	4	19	2	12	13	21	11	4	19	14	13	2	2	10	10	17	A
WB 12.1	American Memorial Park Drainage	25	39	29	32	40	50	27	48	20	21	6	15	10	28	24	28	8	40	A
WB 14	Micro Beach	8	17	13	21	12	8	13	12	21	18	4	14	2	2	6	8	4	10	AA
WB 15	Hyatt Hotel	10	21	13	15	2	4	10	17	8	12	4	12	2	6	18	6	4	12	AA
WB 16	Fiesta Resort	17	25	17	17	0	8	12	4	6	8	13	15	11	4	15	10	0	4	AA
WB 17	Drainage #1	54	37	31	36	20	10	25	17	8	12	14	10	32	2	0	10	2	6	AA
WB 18	Imperial Pacific Resort	17	17	12	15	8	2	2	12	8	10	19	18	4	4	6	6	2	4	AA
WB 19	GrandVrio Hotel	31	25	29	26	40	19	19	38	17	14	29	23	9	18	6	22	18	6	AA
WB 20	Drainage #2	33	31	38	32	46	17	25	29	13	24	32	20	13	23	8	6	14	10	AA

TABLE II - c. 2022 Saipan Coastal Enterococci Exceedances of CNMI WQS Continued

Sample Station ID	Sampling Station Name	Enterococci % Violations																		
		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	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	35	40	AA
WB 23	Drainage #3	13	10	17	43	48	33	27	56	10	14	14	16	12	15	8	8	10	15	AA
WB 22	Garapan Beach	21	17	12	23	6	10	21	31	17	16	27	20	4	12	12	10	6	15	AA
	SEGMENT 20A: ACHUGAO (NORTH)																			
WB 03	Kensington Hotel	21	8	6	19	4	6	0	10	8	8	7	16	0	0	6	0	4	4	AA
WB 04	San Roque School	35	14	13	17	14	10	4	8	6	10	18	14	4	2	4	2	0	4	AA
WB 05	Plumeria Hotel	10	12	6	13	4	0	4	19	4	2	18	12	4	6	8	4	0	4	AA
WB 06	Aqua Resort Hotel	8	14	12	13	2	4	6	8	2	4	28	12	2	4	7	4	4	8	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	8	23	AA
WB 08	Central Repair Shop	33	35	35	34	34	56	23	38	39	37	26	39	6	23	29	35	10	37	A
WB 09	Sea Plane Ramp	0	4	2	15	0	0	0	2	2	2	3	2	4	6	8	2	4	21	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	8	6	AA
CNMI-19	Wing Beach Reef Flat	*	*	*	*	*	*	0	*	*	0	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	6	8	AA
	SEGMENT 22: BANADERU																			
NEB 01	Grotto Cave	27	10	0	5	0	4	7	0	3	10	0	18	33	24	31	22	15	49	AA

TABLE II - d. Mañagaha Coastal Enterococci Exceedances of CNMI WQS

Sample Station ID	Sampling Station Name	Enterococci % Violations																		
		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Segment Class
SEGMENT 23: MANAGAHA																				
MG 01	Dock	0	4	8	0	0	0	0	0	4	0	9	5	0	0	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	0	3	AA
MG 03	Swimming Area A	8	4	4	0	4	0	5	0	0	0	0	8	0	0	3	0	0	0	AA
MG 04	Swimming Area B	4	4	0	0	0	4	***19	0	***15	0	5	4	0	7	3	4	4	0	AA
MG 05	Managaha Beach	4	4	0	0	0	0	5	4	***11	0	0	0	4	0	3	0	0	0	AA
MG 06	Managaha Beach	8	0	4	4	0	0	5	7	7	3	***18	4	4	0	0	0	0	0	AA
MG 07	Managaha Beach	0	4	7	0	0	7	5	4	4	0	0	4	0	0	3	0	0	0	AA
MG 08	Beach Near Statue	0	4	0	0	0	4	5	0	7	7	5	4	0	0	3	0	0	0	AA
MG 09	Managaha Beach	0	4	0	0	0	0	5	0	4	7	9	4	0	0	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	0	3	AA
MG 11	Next to Dock	***15	4	4	0	4	0	10	0	7	3	9	***13	4	0	3	0	0	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 in previous years are thought to be associated with extreme storm events resuspending naturally occurring Enterococci.

TABLE II - e. 2022 Northern Islands Coastal Enterococci Exceedances of CNMI WQS

Sample Station ID	Sampling Station Name	Entero % Violations		
		2020	2021	Segment Class
SEGMENT 24: FARALLON DE MEDINILLA				
*	Farallon de Medinilla	*	*	AA
SEGMENT 25: ANATAHAN				
*	Anatahan	*	*	A
SEGMENT 26: SARIGAN				
*	Sarigan	*	*	AA
SEGMENT 27: GUGUAN				
*	Guguan	*	*	AA
SEGMENT 28: ALAMAGAN				
*	Alamagan	*	*	AA
SEGMENT 29: PAGAN				
PAG-01	North of Gold Beach	*	*	AA
PAG-02	Coast (west of Church)	*	0	AA
PAG-03	NE of the tip of the Southern volcanoes	*	*	AA
PAG-04	West coast across from Sanhalom	*	0	AA
PAG-05	West coast across from the Southern volcanoes	*	*	AA
PAG-06	Southern most beach of the Southern Volcanoes	*	*	AA
PAG-07	East of Ancient Village	*	*	AA
PAG-08	West coast of Maru Mt.	*	0	AA
PAG-09	Coastline east of North Beach	*	*	AA
PAG-10	Isthmus NW coast	*	*	AA
PAG-11	Eastern coastline of the Northern volcano	*	*	AA
PAG-12	South beach (of the Northern Volcano)	*	0	AA
PAG-13	SE beach of Northern volcano	*	*	AA
PAG-14	Coastline north of PAG-04 and south of PAG-15	*	0	AA
PAG-15	Northern most coast of the Norhern volcano	*	*	AA
PAG-16	NW of Togari Rock on the Northern volcano	*	*	AA
PAG-17	West coast of Togari Mt.	*	0	AA
PAG-18	Isthmus SW coast	*	0	AA
*	Green beach of Shomushon Bay (west of Village)	*	0	AA
*	Red beach (Apaan Bay's black sand beach)	*	0	AA
*	Blue beach (west of Laguna Sahniyong)	*	0	AA
*	North beach (northern most beach)	*	*	AA
*	Gold beach (shopping mall)	*	0	AA
*	South beach (of the Northern volcano)	*	0	AA
*	Palaksi "White Sands" (cut east of South Beach)	*	0	AA

TABLE II - e. 2022 Northern Islands Coastal Enterococci Exceedances of CNMI WQS cont'd

Sample Station ID	Sampling Station Name	Entero % Violations 2020	2021	Segment Class
	SEGMENT 30: AGRIHAN			
*	Agrihan	*	*	AA
	SEGMENT 31: ASUNCION			
*	Asuncion	*	*	AA
	SEGMENT 32: MAUG			
*	Maug	*	*	AA
	SEGMENT 33: FARALLON DE PAJAROS			
*	Pajaros	*	*	AA

TABLE II - f. 2022 Rota Coastal Dissolved Oxygen (DO%) Exceedances of CNMI WQS

Sampling Station ID	Sampling Station Name	DO % Exceedences 2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	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	0	0	AA
R13	Talakhaya	**	**	**	**	**	**	**	**	0	0	0	10	0	6	AA
SEGMENT 3: SONGSONG																
R3	Mobil Storm Drainage	0	14	0	0	0	0	0	5	0	0	0	5	0	0	A
R4	East Harbor Dock	0	0	0	0	0	0	0	10	0	0	0	5	0	0	A
R5	Teweksberry Beach	32	24	0	0	0	0	0	5	0	4	0	30	7	7	AA
R6	West Harbor Marina	36	14	0	0	0	0	5	11	0	4	0	29	19	26	A
R7	Dist #2 Storm Drain	36	19	0	0	0	0	0	5	0	0	0	14	6	11	AA
R8	Dist #1 Storm Drain	32	19	0	0	0	0	0	5	0	4	5	24	0	0	AA
SEGMENT 4: UYULANHULO/TETETO																
R9	Veterans Memorial	32	5	0	0	0	0	0	5	0	0	0	5	0	0	AA
R10	Teteto Beach	36	10	0	0	0	0	0	10	0	0	0	5	0	0	AA
R11	Guata Beach	36	10	0	0	0	0	0	5	0	0	5	10	0	4	AA
SEGMENT 5: CHALIAT/TALO																
R12	Swimming Hole	0	0	0	0	0	0	0	5	0	0	0	5	0	0	AA

TABLE II - g. 2022 Tinian Coastal Dissolved Oxygen (DO%) Exceedances of CNMI WQS

Sampling Station ID	Sampling Station Name	DO % Exceedences														
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Segment Class
SEGMENT 6: AGUIGAN																
AGU 2	Goat Island	*	*	*	*	*	*	*	*	*	*	0	*	*	*	AA
SEGMENT 7: MASALOK																
T01	Unai Masalok Beach	30	0	0	0	0	7	0	0	0	4	0	0	0	0	AA
T02	Unai Dangkolo	30	0	0	0	0	7	0	0	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	0	0	AA
T08	Taga Beach	33	5	0	0	0	11	0	0	4	8	0	0	0	0	AA
T10	Jones (Kammer) Beach	30	0	0	0	0	4	0	5	4	4	0	0	0	4	AA
SEGMENT 9H: MAKPO HARBOR																
T09	Makpo Harbor	33	35	0	0	4	25	0	10	32	35	28	21	50	45	A
SEGMENT 10: PUNTAN DIAPLOMANIBOT																
T05	Leprosarium I	30	0	0	0	0	4	0	0	4	0	0	5	14	10	AA
T06	Leprosarium II	30	0	0	0	0	7	0	0	0	0	0	6	14	3	AA
SEGMENT 11: PUNTAN TAHGONG																
T03	Unai Babui	30	0	0	4	0	7	0	0	0	0	0	0	0	0	AA
T04	Unai Chulu	30	0	0	4	0	4	0	0	0	4	4	6	0	0	AA

TABLE II - h. 2022 Saipan Coastal Dissolved Oxygen (DO%) Exceedances of CNMI WQS

Sampling Station ID	Sampling Station Name	% DO Exceedences														
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Segment Class
SEGMENT 12: KALABERA																
NEB 02	Bird Island Beach	0	8	0	0	0	0	0	0	4	0	0	0	0	0	AA
SEGMENT 13: TALOFOFO																
NEB 07	Hidden Beach	0	4	0	0	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	0	0	AA
CNMI-104	Jeffrey's Beach Reef Flat	*	*	*	*	*	*	*	*	0	0	0	0	*	0	AA
NEB 04	Old Man By the Sea	0	4	0	0	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	0	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	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	0	0	AA
ARRA B2	North Laolao Reef Flat	*	*	*	0	0	0	0	0	8	0	0	0	0	8	AA
ARRA B5	North Laolao Reef Flat	*	*	*	0	0	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	0	0	AA
SEGMENT 15: LAO LAO																
CNMI-21	Central Laolao Reef flat	*	*	0	*	*	0	*	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	3	0	AA
ARRA C2	South Laolao Reef Flat	*	*	*	0	0	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	0	0	AA
ARRA C8	South Laolao Reef Flat	*	*	*	0	0	0	0	0	8	0	0	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	0	0	AA
SEGMENT 17B: ISLEY (EAST)																
SEB 04	Obyan Beach	0	0	0	0	0	0	0	0	4	0	0	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	0	0	AA

TABLE II - h. 2022 Saipan Coastal Dissolved Oxygen (DO%) Exceedances of CNMI WQS Continued

Sampling Station ID	Sampling Station Name	% DO Exceedences														
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Segment Class
SEGMENT 18A: SUSUPE (NORTH)																
WB 24	Chalan Laulau Beach	13	33	27	33	34	35	22	73	50	42	30	18	37	37	AA
WB 25	San Jose Beach	7	15	10	19	13	8	10	53	25	27	13	5	20	10	AA
WB 26	Civic Center Beach	7	19	12	15	8	4	8	35	23	27	15	9	16	6	AA
WB 27	Saipan World Resort	3	15	6	15	6	2	8	33	19	12	11	5	2	2	AA
WB 28	Kanoa Resort	4	8	2	17	0	2	6	29	12	10	9	5	0	5	AA
WB 29	Community School Beach	4	13	4	13	2	0	6	29	15	17	9	2	6	2	AA
SEGMENT 18B: SUSUPE (SOUTH)																
WB 30	Sugar Dock	7	15	4	13	15	2	17	39	25	40	23	9	12	6	AA
WB 31	CK Dist #2 Drainage	2	8	2	6	4	0	6	15	21	25	6	5	4	2	AA
WB 32	CK Dist #4 Lally Beach	2	8	4	4	0	0	6	17	19	10	6	7	2	0	AA
WB 33	Chalan Piao Beach	2	4	4	4	0	0	3	27	23	10	11	5	0	2	AA
WB 34	Hopwood School Beach	7	6	4	4	0	0	6	24	27	19	6	3	4	6	AA
WB 35	San Antonio Beach	4	8	5	6	0	0	6	7	17	13	6	5	4	2	AA
WB 36	PIC Beach	4	4	0	6	0	0	2	4	21	19	4	0	2	2	AA
WB 37	San Antonio Lift Stn.	4	6	0	10	0	0	4	9	19	21	4	0	0	2	AA
SEGMENT 19A: WEST TAKPOCHAU (NORTH)																
WB 10	DPW Channel Bridge	4	8	6	6	10	0	0	8	8	4	4	2	4	6	A
SEGMENT 19B: WEST TAKPOCHAU (CENTRAL)																
WB 11.2	Eloy Inos Peace Park	8	18	12	10	14	10	11	28	22	18	23	10	0	2	A
WB 13	Outer Cove Marina	0	2	6	2	4	0	0	0	2	0	0	7	2	2	A
WB 12	Smiling Cove Marina	4	18	6	12	10	2	11	12	29	17	11	16	4	6	A
WB 12.1	American Memorial Park Drainage	2	10	6	10	8	0	4	9	26	15	10	2	6	0	A
WB 14	Micro Beach	0	2	2	2	4	2	0	2	4	2	2	2	0	0	AA
WB 15	Hyatt Hotel	2	6	2	2	4	0	2	0	6	8	2	2	2	0	AA
WB 16	Fiesta Resort	0	6	2	0	4	0	0	2	2	8	0	0	0	0	AA
WB 17	Drainage #1	0	10	6	4	4	0	0	2	13	6	4	0	0	0	AA
WB 18	Imperial Pacific Resort	2	4	4	6	4	0	0	2	4	0	0	0	2	0	AA
WB 19	GrandVrio Hotel	11	19	15	29	30	21	6	55	38	45	17	12	27	8	AA
WB 20	Drainage #2	9	13	19	29	31	19	23	59	37	40	29	9	20	4	AA

TABLE II - h. 2022 Saipan Coastal Dissolved Oxygen (DO%) Exceedances of CNMI WQS Continued

Sampling Station ID	Sampling Station Name	% DO Exceedences														
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Segment Class
SEGMENT 19C: WEST TAKPOCHAU (SOUTH)																
WB 21	Garapan Fishing Dock	18	31	35	33	34	31	15	50	45	37	30	19	22	18	AA
WB 23	Drainage #3	13	21	12	25	21	17	11	33	23	35	41	11	14	14	AA
WB 22	Garapan Beach	11	29	17	19	28	25	18	67	40	52	45	16	37	47	AA
SEGMENT 20A: ACHUGAO (NORTH)																
WB 03	Kensington Hotel	2	12	2	4	12	4	8	4	19	21	6	9	12	8	AA
WB 04	San Roque School Beach	2	6	8	4	10	2	6	2	13	8	9	0	2	0	AA
WB 05	Plumeria Hotel	10	8	6	2	6	0	0	4	4	4	7	0	2	2	AA
WB 06	Aqua Resort Hotel	2	6	4	4	8	0	0	2	4	8	7	0	4	2	AA
SEGMENT 20B: ACHUGAO (SOUTH)																
WB 07	Tanapag Meeting Hall	2	8	8	10	6	0	4	8	15	10	9	5	4	8	AA
WB 08	Central Repair Shop	4	16	13	21	19	16	10	16	16	27	13	7	14	14	A
WB 09	Sea Plane Ramp	2	8	6	4	4	0	3	2	4	0	2	5	0	4	A
SEGMENT 21: AS MATUIS																
WB 01	Wing Beach	0	2	0	0	0	0	0	2	2	10	2	5	4	6	AA
CNMI-19	Wing Beach Reef Flat	*	*	0	*	*	0	*	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	16	24	AA
SEGMENT 22: BANADERU																
NEB 01	Grotto Cave	0	8	0	0	0	0	0	5	0	0	0	0	3	0	AA

TABLE II – i. 2022 Mañagaha Coastal Dissolved Oxygen (DO%) Exceedances of CNMI WQS

Sampling Station ID	Sampling Station Name	% DO Exceedences														
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Segment Class
SEGMENT 23: MANAGAHA																
MG 01	Dock	0	4	5	7	0	11	0	0	4	0	3	5	0	7	AA
MG 02	Swimming Area A	0	4	0	0	0	4	0	0	4	0	0	5	4	3	AA
MG 03	Swimming Area A	0	8	5	0	0	4	0	0	8	7	0	0	0	3	AA
MG 04	Swimming Area B	0	0	0	0	0	4	0	0	0	0	0	0	4	3	AA
MG 05	Managaha Beach	0	0	0	0	0	0	0	0	4	0	0	0	4	3	AA
MG 06	Managaha Beach	0	0	0	4	0	0	0	0	0	4	3	0	4	3	AA
MG 07	Managaha Beach	0	0	0	0	0	0	0	0	4	4	0	0	4	3	AA
MG 08	Beach Near Statue	0	0	0	4	0	4	0	0	4	0	0	0	4	3	AA
MG 09	Managaha Beach	0	0	0	0	0	0	0	0	4	0	0	5	0	3	AA
MG 10	Managaha Beach	0	0	0	0	0	0	0	0	4	0	0	9	8	3	AA
MG 11	Next to Dock	0	4	0	0	0	0	0	0	4	4	3	0	4	3	AA

TABLE II – j. 2022 Northern Islands Coastal Dissolved Oxygen (DO%) Exceedances of CNMI WQS

Sample Station ID	Sampling Station Name	D.O. % Violations		
		2020	2021	Segment Class
	SEGMENT 24: FARALLON DE MEDINILLA			
*	Farallon de Medinilla	*	*	AA
	SEGMENT 25: ANATAHAN			
*	Anatahan	*	*	A
	SEGMENT 26: SARIGAN			
*	Sarigan	*	*	AA
	SEGMENT 27: GUGUAN			
*	Guguan	*	*	AA
	SEGMENT 28: ALAMAGAN			
*	Alamagan	*	*	AA
	SEGMENT 29: PAGAN			
PAG-01	North of Gold Beach	*	*	AA
PAG-02	Coast (west of Church)	*	*	AA
PAG-03	NE of the tip of the Southern volcanoes	*	*	AA
PAG-04	West coast across from Sanhalom	*	*	AA
PAG-05	West coast across from the Southern volcanoes	*	*	AA
PAG-06	Southern most beach of the Southern Volcanoes	*	*	AA
PAG-07	East of Ancient Village	*	*	AA
PAG-08	West coast of Maru Mt.	*	*	AA
PAG-09	Coastline east of North Beach	*	*	AA
PAG-10	Isthmus NW coast	*	*	AA
PAG-11	Eastern coastline of the Northern volcano	*	*	AA
PAG-12	South beach (of the Northern Volcano)	*	*	AA
PAG-13	SE beach of Northern volcano	*	*	AA
PAG-14	Coastline north of PAG-04 and south of PAG-15	*	*	AA
PAG-15	Northern most coast of the Norhern volcano	*	*	AA
PAG-16	NW of Togari Rock on the Northern volcano	*	*	AA
PAG-17	West coast of Togari Mt.	*	*	AA
PAG-18	Isthmus SW coast	*	*	AA
*	Green beach of Shomushon Bay (west of Village)	*	0	AA
*	Red beach (Apaan Bay's black sand beach)	*	0	AA
*	Blue beach (west of Laguna Sahniyong)	*	0	AA
*	North beach (northern most beach)	*	*	AA
*	Gold beach (shopping mall)	*	0	AA
*	South beach (of the Northern volcano)	*	0	AA
*	Palaksi "White Sands" (cut east of South Beach)	*	0	AA

TABLE II – j. 2022 Northern Islands Coastal Dissolved Oxygen (DO%) Exceedances of CNMI WQS continued

Sample Station ID	Sampling Station Name	D.O. % Violations 2020	2021	Segment Class
SEGMENT 30: AGRIHAN				
*	Agrihan	*	*	AA
SEGMENT 31: ASUNCION				
*	Asuncion	*	*	AA
SEGMENT 32: MAUG				
*	Maug	*	*	AA
SEGMENT 33: FARALLON DE PAJAROS				
*	Pajaros	*	*	AA

TABLE II – k. 2022 Rota Coastal pH Exceedances of CNMI WQS

Sampling Station ID	Sampling Station Name	pH % Exceedences 2012	2013	****2014	2015	2016	2017	2018	****2019	2020	2021	Segment Class
SEGMENT 2: SABANA/TALAKAYA/PALIE												
R1	Coral Garden	*	*	*	*	*	*	*	*	*	*	AA
R2	Kokomo Beach Club	0	0	33	0	0	0	0	17	9	0	AA
R13	Talakhaya	*	*	*	*	0	0	5	8	4	0	AA
SEGMENT 3: SONGSONG												
R3	Mobil Storm Drain	0	0	30	0	0	0	5	13	0	0	A
R4	East Harbor Dock	0	0	30	0	0	0	5	0	0	0	A
R5	Teweksberry Beach	0	0	38	5	0	0	0	0	0	0	AA
R6	West Harbor Marina	4	0	33	0	0	0	0	4	0	0	A
R7	Dist #2 Storm Drain	0	0	19	0	0	0	5	4	0	0	AA
R8	Dist #1 Storm Drain	0	0	33	0	0	0	0	0	0	0	AA
SEGMENT 4: UYULANHULO/TETETO												
R9	Veterans Memorial	4	0	38	0	0	0	5	0	0	0	AA
R10	Teteto Beach	0	0	43	0	0	0	5	8	0	0	AA
R11	Guata Beach	0	0	29	0	0	0	5	17	0	0	AA
SEGMENT 5: CHALIAT/TALO												
R12	Swimming Hole	4	0	39	0	4	0	0	30	4	0	AA

**** 2014 pH results were due to contaminated calibration solution. In 2019 the pH results were considered erroneous due to an aging probe. It was replaced in FY2020; explaining the sudden improvement in pH levels.

TABLE II – l. 2022 Tinian Coastal pH Exceedances of CNMI WQS

Sampling Station ID	Sampling Station Name	pH % Exceedences										
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Segment Class
SEGMENT 6: AGUIGAN												
AGU 2	Goat Island	*	*	*	*	*	*	0	*	*	*	AA
SEGMENT 7: MASALOK												
T1	Unai Masalok Beach	0	0	0	0	0	0	4	13	0	7	AA
T2	Unai Dangkolo	0	0	0	0	0	4	12	14	0	10	AA
SEGMENT 9: MAKPO												
T7	Tachogna Beach	0	0	0	0	8	12	19	8	0	7	AA
T8	Taga Beach	0	0	5	0	0	8	11	9	0	7	AA
T10	Jones (Kammer) Beach	0	0	0	0	0	0	4	8	0	4	AA
SEGMENT 9H: MAKPO HARBOR												
T9A	Makpo Harbor	0	0	0	0	0	0	0	8	0	7	A
SEGMENT 10: PUNTAN DIAPLOMANIBOT												
T5	Leprosarium I	0	0	0	0	0	0	4	8	8	7	AA
T6	Leprosarium II	0	0	0	0	0	0	4	8	4	10	AA
SEGMENT 11: PUNTAN TAHGONG												
T3	Unai Babui	0	0	0	0	0	0	16	0	0	7	AA
T4	Unai Chulu	0	0	0	0	0	0	7	14	0	10	AA

TABLE II – m. 2022 Saipan Coastal pH Exceedances of CNMI WQS

Sampling Station ID	Sampling Station Name	% pH Exceedences											
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Segment Class	Comments
	SEGMENT 12: KALABERA												
NEB 02	Bird Island Beach	0	4	0	7	4	7	5	0	4	3	AA	
	SEGMENT 13: TALOFOFO												
NEB 07	Hidden Beach			0	13	4	3	13	0	0	8	AA	
NEB 03	Jeffrey's Beach			0	7	0	3	0	0	7	14	AA	
CNMI-104	Jeffrey's Beach Reef flat	*	*	*	*	*	0	0	0	*	0	AA	
NEB 04	Old Man By the Sea			0	3	4	3	8	5	0	10	AA	
	SEGMENT 14: KAGMAN												
NEB 05	Marine Beach			0	0	4	0	12	0	0	13	AA	
CNMI-29	Tank Beach Reef flat	*	0	*	0	0	0	0	0	*	0	AA	
NEB 06	Tank Beach			0	0	4	3	8	0	0	0	AA	
SEB 01	Forbidden Island			*	*	*	*	*	*	*	*	AA	
SEB 02	North Laolao Beach			0	0	0	0	4	0	0	0	AA	
ARRA B2	North Laolao Beach			0	0	8	0	0	0	0	8	AA	
ARRA B5	North Laolao Beach			0	0	0	0	0	13	0	0	AA	
ARRA B8	North Laolao Beach			0	11	0	0	0	13	0	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	0	4	0	0	0	AA	
ARRA C2	South Laolao Beach			0	0	0	0	0	0	0	0	AA	
ARRA C5	South Laolao Beach			0	0	0	0	0	0	0	0	AA	
ARRA C8	South Laolao Beach			0	0	0	0	0	0	0	8	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			0	0	4	3	23	0	0	0	AA	
	SEGMENT 17B: ISLEY (EAST)												
SEB 04	Obyan Beach			0	0	0	3	12	0	0	0	AA	
CNMI-30	Obyan Beach Reef Flat	*	0	*	0	0	0	50	0	*	0	AA	
SEB 05	Ladder Beach			0	0	0	0	23	0	0	0	AA	
	SEGMENT 18A: SUSUPE (NORTH)												
WB 24	Chalan Laulau Beach	4	4	2	14	6	8	20	26	18	10	AA	pH Low
WB 25	San Jose Beach	6	2	2	2	0	6	8	7	4	0	AA	
WB 26	Civic Center Beach	8	0	2	2	0	6	4	5	2	4	AA	
WB 27	Saipan World Resort	4	0	0	0	0	4	6	10	2	2	AA	
WB 28	Kanoa Resort	4	0	2	0	0	4	2	5	4	5	AA	
WB 29	Community School Beach	4	0	0	0	0	4	2	7	2	4	AA	

TABLE II – m. 2022 Saipan Coastal pH Exceedances of CNMI WQS Continued

Sampling Station ID	Sampling Station Name	% pH Exceedences											
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Segment Class	Comments
	SEGMENT 18B: SUSUPE (SOUTH)												
WB 30	Sugar Dock	2	0	0	2	0	4	4	12	2	2	AA	
WB 31	CK Dist #2 Drainage	2	0	2	6	0	4	6	7	4	2	AA	
WB 32	CK Dist #4 Lally Beach	2	0	2	6	0	2	4	7	2	2	AA	
WB 33	Chalan Piao Beach	4	0	0	0	2	0	4	7	2	2	AA	
WB 34	Hopwood School Beach	4	0	0	2	0	4	4	5	0	2	AA	
WB 35	San Antonio Beach	6	0	0	0	0	2	6	2	2	2	AA	
WB 36	Pacific Island Club Beach	6	0	2	2	0	8	4	2	4	2	AA	
WB 37	San Antonio Lift Station	6	0	2	2	2	4	6	5	0	4	A	
	SEGMENT 19A: WEST TAKPOCHAU (NORTH)												
WB 10	DPW Channel Bridge	2	0	6	15	8	10	4	5	4	4	A	
	SEGMENT 19B: WEST TAKPOCHAU (CENTRAL)												
WB 11.2	Eloy Inos Peace Park	2	0	7	3	7	2	11	12	2	0	A	
WB 13	Outer Cove Marina	0	2	3	2	2	2	8	7	0	0	A	
WB 12	Smiling Cove Marina	0	4	3	6	4	2	2	5	0	0	A	
WB 12.1	American Memorial Park Drainage	0	0	4	0	3	2	4	5	0	0	A	
WB 14	Micro Beach	0	4	10	0	6	0	4	2	0	0	AA	
WB 15	Hyatt Hotel	0	6	8	2	4	2	0	5	0	0	AA	
WB 16	Fiesta Resort	0	2	6	2	4	2	8	2	0	0	AA	
WB 17	Drainage #1	0	0	0	4	8	0	0	0	0	0	AA	
WB 18	Imperial Pacific Resort	0	0	6	4	6	0	0	0	0	0	AA	
WB 19	GrandVrio Hotel	4	0	2	2	8	23	23	18	2	0	AA	
WB 20	Drainage #2	4	0	0	2	0	12	20	9	0	0	AA	
	SEGMENT 19C: WEST TAKPOCHAU (SOUTH)												
WB 21	Garapan Fishing Dock	4	2	0	6	4	19	12	17	2	2	AA	
WB 23	Drainage #3	4	4	3	10	10	13	17	21	6	6	AA	
WB 22	Garapan Beach	6	2	4	21	6	21	22	19	12	10	AA	
	SEGMENT 20A: ACHUGAO (NORTH)												
WB 03	Kensington Hotel	0	0	10	2	4	4	0	7	0	2	AA	
WB 04	San Roque School Beach	0	8	3	2	4	0	0	5	0	0	AA	
WB 05	Plumeria Hotel	2	4	0	2	4	0	0	2	0	0	AA	
WB 06	Aqua Resort Hotel	0	4	6	2	4	2	0	2	0	0	AA	

TABLE II – m. 2022 Saipan Coastal pH Exceedances of CNMI WQS Continued

Sampling Station ID	Sampling Station Name	% pH Exceedences											
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Segment Class	Comments
	SEGMENT 20B: ACHUGAO (SOUTH)												
WB 07	Tanapag Meeting Hall	2	2	6	0	2	10	4	5	0	0	AA	
WB 08	Central Repair Shop	2	0	3	3	4	3	4	5	0	0	A	
WB 09	Sea Plane Ramp	0	2	3	2	4	2	2	2	2	0	A	
	SEGMENT 21: AS MATUIS												
WB 01	Wing Beach	2	4	2	0	8	12	8	9	2	2	AA	
CNMI-19	Wing Beach Reef Flat	*	0	*	0	0	0	0	0	0	0	AA	
WB 02	Pau-Pau Beach	0	4	6	0	2	6	6	9	2	2	AA	
	SEGMENT 22: BANADERU												
NEB 01	Grotto Cave	0	0	0	7	4	10	8	6	5	2	AA	

TABLE II – n. 2022 Mañagaha Coastal pH Exceedances of CNMI WQS

Sampling Station ID	Sampling Station Name	% pH Exceedences											
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Segment Class	Comments
	SEGMENT 23: MANAGAHA												
MG 01	Dock	0	3	0	0	4	15	10	0	0	0	AA	
MG 02	Swimming Area A	0	7	0	0	8	4	0	0	0	0	AA	
MG 03	Swimming Area A	0	3	0	0	8	0	0	0	0	0	AA	
MG 04	Swimming Area B	0	3	0	0	4	0	3	0	0	0	AA	
MG 05	Managaha Beach	0	3	0	0	4	0	3	0	0	0	AA	
MG 06	Managaha Beach	0	3	0	0	8	0	0	0	0	0	AA	
MG 07	Managaha Beach	0	3	0	0	8	0	0	0	0	0	AA	
MG 08	Beach Near Statue	0	3	0	0	8	0	0	0	0	0	AA	
MG 09	Managaha Beach	0	3	0	0	8	0	0	0	0	0	AA	
MG 10	Managaha Beach	0	3	0	0	4	0	0	0	0	0	AA	
MG 11	Next to Dock	0	3	0	0	4	0	0	0	0	0	AA	

TABLE II – o. 2022 Northern Islands Coastal pH Exceedances of CNMI WQS

Sample Station ID	Sampling Station Name	pH % Violations		
		2020	2021	Segment Class
SEGMENT 24: FARALLON DE MEDINILLA				
*	Farallon de Medinilla	*	*	AA
SEGMENT 25: ANATAHAN				
*	Anatahan	*	*	A
SEGMENT 26: SARIGAN				
*	Sarigan	*	*	AA
SEGMENT 27: GUGUAN				
*	Guguan	*	*	AA
SEGMENT 28: ALAMAGAN				
*	Alamagan	*	*	AA
SEGMENT 29: PAGAN				
PAG-01	North of Gold Beach	*	*	AA
PAG-02	Coast (west of Church)	*	*	AA
PAG-03	NE of the tip of the Southern volcanoes	*	*	AA
PAG-04	West coast across from Sanhalom	*	*	AA
PAG-05	West coast across from the Southern volcanoes	*	*	AA
PAG-06	Southern most beach of the Southern Volcanoes	*	*	AA
PAG-07	East of Ancient Village	*	*	AA
PAG-08	West coast of Maru Mt.	*	*	AA
PAG-09	Coastline east of North Beach	*	*	AA
PAG-10	Isthmus NW coast	*	*	AA
PAG-11	Eastern coastline of the Northern volcano	*	*	AA
PAG-12	South beach (of the Northern Volcano)	*	*	AA
PAG-13	SE beach of Northern volcano	*	*	AA
PAG-14	Coastline north of PAG-04 and south of PAG-15	*	*	AA
PAG-15	Northern most coast of the Norhern volcano	*	*	AA
PAG-16	NW of Togari Rock on the Northern volcano	*	*	AA
PAG-17	West coast of Togari Mt.	*	*	AA
PAG-18	Isthmus SW coast	*	*	AA
*	Green beach of Shomushon Bay (west of Village)	*	0	AA
*	Red beach (Apaan Bay's black sand beach)	*	0	AA
*	Blue beach (west of Laguna Sahniyong)	*	0	AA
*	North beach (northern most beach)	*	*	AA
*	Gold beach (shopping mall)	*	0	AA
*	South beach (of the Northern volcano)	*	0	AA
*	Palaksi "White Sands" (cut east of South Beach)	*	0	AA

TABLE II – o. 2022 Northern Islands Coastal pH Exceedances of CNMI WQS continued

Sample Station ID	Sampling Station Name	pH % Violations 2020	2021	Segment Class
SEGMENT 30: AGRIHAN				
*	Agrihan	*	*	AA
SEGMENT 31: ASUNCION				
*	Asuncion	*	*	AA
SEGMENT 32: MAUG				
*	Maug	*	*	AA
SEGMENT 33: FARALLON DE PAJAROS				
*	Pajaros	*	*	AA

TABLE II – p. 2022 Rota Coastal Nutrient Exceedances of CNMI WQS

Sampling Station ID	Sampling Station Name	Nutrient % Exceedences 2016		2017		2018		2019		2020		2021		Segment Class
		PO_4	NO_3	PO_4	NO_3	PO_4	NO_3	PO_4	NO_3	PO_4	NO_3	PO_4	NO_3	
SEGMENT 1: DUGI/GAMPAPA/CHENCHON														
*	*	*	*	*	*	*	*	*	*	*	*	*	*	AA
SEGMENT 2: SABANA/TALAKAYA/PALIE														
R1	Coral Garden	*	*	*	*	*	*	*	*	*	*	*	*	AA
R2	Kokomo Beach Club	*	*	0	0	0	0	0	0	0	0	0	0	AA
R13	Talakhaya	*	*	0	0	0	0	0	0	0	0	*	*	AA
SEGMENT 3: SONGSONG														
R3	Mobil Storm Drainage	*	*	0	0	0	0	0	0	0	0	0	0	A
R4	East Harbor Dock	*	*	0	0	0	0	0	0	0	0	0	0	A
R5	Teweksberry Beach	*	*	0	0	0	0	0	0	0	0	0	0	AA
R6	West Harbor Marina	*	*	0	0	0	0	20	0	0	0	0	0	A
R7	Dist #2 Storm Drain	*	*	0	0	0	0	0	0	0	0	0	0	AA
R8	Dist #1 Storm Drain	*	*	0	0	0	0	0	0	0	0	0	0	AA
SEGMENT 4: UYULANHULO/TETETO														
R9	Veterans Memorial	*	*	0	0	0	0	0	0	0	0	0	0	AA
R10	Teteto Beach	*	*	0	0	0	0	0	0	0	0	0	0	AA
R11	Guata Beach	*	*	0	0	0	0	0	0	0	0	0	0	AA
SEGMENT 5: CHALIAT/TALO														
R12	Swimming Hole	*	*	0	100	0	0	0	20	0	40	0	0	AA

TABLE II – q. 2022 Tinian Coastal Nutrient Exceedances of CNMI WQS

Sampling Station ID	Sampling Station Name	Tinian Nutrient % Exceedences												Segment Class
		2016		2017		2018		2019		2020		2021		
		PO4	NO3	PO4	NO3	PO4	NO3	PO4	NO3	PO4	NO3	PO4	NO3	
SEGMENT 6: AGUIGAN														
AGU 2	Goat Island	*	*	*	*	0	0	*	*	*	*	*	*	AA
SEGMENT 7: MASALOK														
T1	Unai Masalok Beach	*	*	*	*	0	0	33	17	0	0	0	9	AA
T2	Unai Dangkolo	*	*	*	*	0	75	17	67	0	57	0	27	AA
SEGMENT 9: MAKPO														
T7	Tachogna Beach	*	*	*	*	0	0	14	0	0	14	0	0	AA
T8	Taga Beach	*	*	*	*	0	0	29	14	0	0	0	0	AA
T10	Jone's (Kammer) Beach	*	*	*	*	0	0	57	0	0	0	0	0	AA
SEGMENT 9H: MAKPO HARBOR														
T9A	Harbor	*	*	*	*	0	0	14	0	0	0	0	0	A
SEGMENT 10: PUNTAN DIAPLOMANIBOT														
T5	Leprosarium I	*	*	*	*	0	25	29	29	0	43	0	9	AA
T6	Leprosarium II	*	*	*	*	0	0	14	14	0	43	0	9	AA
SEGMENT 11: PUNTAN TAHGONG														
T3	Unai Babui	*	*	*	*	0	0	17	17	0	29	10	0	AA
T4	Unai Chulu	*	*	*	*	0	0	17	17	0	0	9	9	AA
T11	Chiget Beach	*	*	*	*	*	*	*	*	*	*	*	*	AA

TABLE II – r. 2022 Saipan Coastal Nutrient Exceedances of CNMI WQS

Sampling Station ID	Sampling Station Name	Coastal Marine Waters % Nutrient Exceedences												Segment Class
		2016		2017		2018		2019		2020		2021		
		PO4	NO3	PO4	NO3	PO4	NO3	PO4	NO3	PO4	NO3	PO4	NO3	
	SEGMENT 12: KALABERA													
NEB 02	Bird Island Beach	*	*	0	0	0	17	33	0	22	0	0	0	AA
	SEGMENT 13: TALOFOFO													
NEB 07	Hidden Beach	*	*	0	0	0	17	17	0	0	0	0	0	AA
NEB 03	Jeffrey's Beach	*	*	0	0	0	0	17	0	0	0	8	0	AA
CNMI-104	Jeffrey's Beach Reef Flat	0	0	*	*	0	0	0	0	*	*	0	0	AA
NEB 04	Old Man By the Sea	*	*	0	0	0	17	33	0	11	0	0	0	AA
	SEGMENT 14: KAGMAN													
NEB 05	Marine Beach	*	*	0	0	0	17	33	0	0	0	8	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	33	0	0	0	8	0	AA
SEB 01	Forbidden Island	*	*	*	*	*	*	*	*	*	*	*	*	AA
SEB 02	North Laolao Beach	*	*	0	0	0	0	17	0	22	10	0	0	AA
ARRA B2	North Laolao Beach	9	0	0	0	0	0	14	14	0	0	8	0	AA
ARRA B5	North Laolao Beach	0	0	0	0	0	0	14	14	0	0	8	0	AA
ARRA B8	North Laolao Beach	0	0	0	0	0	0	14	0	0	0	0	0	AA
	SEGMENT 15: LAO LAO													
CNMI-21	Central Laolao Beach Reef flat	0	0	0	0	0	0	0	0	*	*	0	0	AA
SEB 03	South Laolao Beach	*	*	0	0	0	17	33	0	0	0	0	15	AA
ARRA C2	South Laolao Beach	9	0	0	0	0	0	0	0	33	0	15	0	AA
ARRA C5	South Laolao Beach	9	0	0	0	0	0	17	0	0	0	0	0	AA
ARRA C8	South Laolao Beach	0	0	0	0	0	11	14	0	0	0	0	0	AA
	SEGMENT 16: DAN DAN													
CNMI-72	DanDan Reef Flat	0	0	0	0	0	0	0	0	*	*	0	0	AA
	SEGMENT 17A: ISLEY (WEST)													
SEB 06	Unai Dangkulo	*	*	0	0	0	0	17	0	11	10	0	0	AA
	SEGMENT 17B: ISLEY (EAST)													
SEB 04	Obyan Beach	*	*	0	0	0	0	17	0	0	0	8	8	AA
SEB 05	Ladder Beach	*	*	0	0	0	0	17	0	11	10	8	0	AA
CNMI-30	Ladder Reef Flat	0	0	0	0	0	0	0	0	*	*	0	0	AA
	SEGMENT 18A: SUSUPE (NORTH)													
WB 24	Chalan Laulau Beach	*	*	0	0	0	0	0	0	0	0	25	0	AA
WB 25	San Jose Beach	*	*	0	0	0	0	0	0	0	0	0	17	AA
WB 26	Civic Center Beach	*	*	0	0	0	0	17	0	13	0	17	17	AA
WB 27	Saipan World Resort	*	*	0	0	0	0	17	17	0	0	0	0	AA
WB 28	Kanoa Resort	*	*	0	0	0	0	0	0	0	0	0	0	AA
WB 29	Saipan Community School Beach	*	*	0	0	0	0	17	17	0	0	0	8	AA

TABLE II – r. 2022 Saipan Coastal Nutrient Exceedances of CNMI WQS Continued

Sampling Station ID	Sampling Station Name	Coastal Marine Waters % Nutrient Exceedences												Segment Class
		2016		2017		2018		2019		2020		2021		
		PO4	NO3	PO4	NO3	PO4	NO3	PO4	NO3	PO4	NO3	PO4	NO3	
	SEGMENT 18B: SUSUPE (SOUTH)													
WB 30	Sugar Dock	*	*	0	0	0	0	17	0	0	0	8	17	AA
WB 31	CK Dist #2 Drainage	*	*	0	0	0	0	17	0	13	0	8	0	AA
WB 32	CK Dist #4 Lally Beach	*	*	0	0	0	17	17	0	0	0	8	8	AA
WB 33	Chalan Piao Beach	*	*	0	0	17	17	0	17	0	0	0	17	AA
WB 34	Hopwood School Beach	*	*	0	0	0	0	17	17	0	0	17	0	AA
WB 35	San Antonio Beach	*	*	0	0	0	0	17	0	25	0	0	0	AA
WB 36	Pacific Island Club Beach	*	*	0	0	0	0	33	17	0	0	8	0	AA
WB 37	San Antonio Lift Station	*	*	0	0	0	33	17	33	0	0	8	8	AA
	SEGMENT 19A: WEST TAKPOCHAU (NORTH)													
WB 10	DPW Channel Bridge	*	*	0	0	0	80	17	17	0	40	0	17	**A**
	SEGMENT 19B: WEST TAKPOCHAU (CENTRAL)													
WB 11.2	Eloy Inos Peace Park	*	*	0	0	0	0	0	17	0	20	8	0	**A**
WB 13	Outer Cove Marina	*	*	0	0	0	0	0	0	0	0	0	0	**A**
WB 12	Smiling Cove Marina	*	*	0	0	0	0	0	0	0	0	0	0	**A**
WB 12.1	American Memorial Park Drainag	*	*	0	0	0	0	0	0	0	0	0	0	**A**
WB 14	Micro Beach	*	*	0	0	0	0	0	0	0	0	0	0	AA
WB 15	Hyatt Hotel	*	*	0	0	0	0	17	0	13	0	8	0	AA
WB 16	Fiesta Resort	*	*	0	0	0	0	17	0	0	0	8	0	AA
WB 17	Drainage #1	*	*	0	0	0	0	17	0	0	0	0	0	AA
WB 18	Imperial Pacific Resort	*	*	0	0	0	0	0	17	13	0	8	0	AA
WB 19	GrandVrio Hotel	*	*	0	0	0	0	17	0	13	0	8	0	AA
WB 20	Drainage #2	*	*	0	0	0	20	0	0	13	0	0	0	AA
	SEGMENT 19C: WEST TAKPOCHAU (SOUTH)													
WB 21	Garapan Fishing Dock	*	*	0	*	0	80	0	33	0	30	25	25	AA
WB 23	Drainage #3	*	*	0	100	0	83	0	50	0	60	0	67	AA
WB 22	Garapan Beach	*	*	0	50	0	50	0	50	0	40	0	25	AA
	SEGMENT 20A: ACHUGAO (NORTH)													
WB 03	Kensington Hotel	*	*	0	0	0	0	17	0	13	0	18	9	AA
WB 04	San Roque School Beach	*	*	0	0	0	0	33	0	0	0	8	0	AA
WB 05	Plumeria Hotel	*	*	0	0	0	0	17	0	13	0	8	0	AA
WB 06	Aqua Resort Hotel	*	*	0	0	20	0	17	0	0	0	8	0	AA
	SEGMENT 20B: ACHUGAO (SOUTH)													
WB 07	Tanapag Meeting Hall	*	*	0	0	0	0	0	0	0	10	0	0	AA
WB 08	Central Repair Shop	*	*	0	0	0	0	0	0	0	0	0	0	**A**
WB 09	Sea Plane Ramp	*	*	0	0	0	0	0	0	0	0	8	0	**A**
	SEGMENT 21: AS MATUIS													
WB 01	Wing Beach	*	*	0	0	0	0	0	0	0	0	17	0	AA
CNMI-19	Wing Beach Reef Flat	0	0	0	0	0	0	0	0	*	*	0	0	AA
WB 02	Pau-Pau Beach	*	*	0	0	20	20	0	0	13	0	8	0	AA
	SEGMENT 22: BANADERU													
NEB 01	Grotto Cave	*	*	0	0	0	0	33	0	0	0	15	0	AA

TABLE II – s. 2022 Mañagaha Coastal Nutrient Exceedances of CNMI WQS

Sampling Station ID	Sampling Station Name	Coastal Marine Waters % Nutrient Exceedences												Segment Class
		2016		2017		2018		2019		2020		2021		
		PO4	NO3	PO4	NO3	PO4	NO3	PO4	NO3	PO4	NO3	PO4	NO3	
	SEGMENT 23: MANAGAHA													
MG 01	Dock	*	*	0	0	0	0	0	0	10	0	0	0	AA
MG 02	Swimming Area A	*	*	0	0	0	20	0	0	10	0	8	0	AA
MG 03	Swimming Area A	*	*	0	0	0	0	0	0	0	0	0	0	AA
MG 04	Swimming Area B	*	*	0	0	0	0	0	0	10	0	0	0	AA
MG 05	Managaha Beach	*	*	0	0	0	0	0	0	0	0	8	0	AA
MG 06	Managaha Beach	*	*	0	0	0	0	0	0	10	0	8	0	AA
MG 07	Managaha Beach	*	*	0	0	0	20	20	0	0	0	17	0	AA
MG 08	Beach Near Statue	*	*	0	0	0	0	0	0	0	0	0	0	AA
MG 09	Managaha Beach	*	*	0	0	0	0	0	0	10	9	0	8	AA
MG 10	Managaha Beach	*	*	0	0	0	0	0	20	10	0	8	0	AA
MG 11	Next to Dock	*	*	0	0	0	0	0	0	0	0	8	0	AA

TABLE II – t. 2022 Northern Islands Coastal Nutrient Exceedances of CNMI WQS

Sample Station ID	Sampling Station Name	Nutrients % Violations				Segment Class
		2020		2021		
		PO4	NO3	PO4	NO3	
	SEGMENT 24: FARALLON DE MEDINILLA					
*	Farallon de Medinilla	*	*	*	*	AA
	SEGMENT 25: ANATAHAN					
*	Anatahan	*	*	*	*	A
	SEGMENT 26: SARIGAN					
*	Sarigan	*	*	*	*	AA
	SEGMENT 27: GUGUAN					
*	Guguan	*	*	*	*	AA
	SEGMENT 28: ALAMAGAN					
*	Alamagan	*	*	*	*	AA
	SEGMENT 29: PAGAN					
PAG-01	North of Gold Beach	*	*	*	*	AA
PAG-02	Coast (west of Church)	*	*	0	0	AA
PAG-03	NE of the tip of the Southern volcanoes	*	*	*	*	AA
PAG-04	West coast across from Sanhalom	*	*	0	0	AA
PAG-05	West coast across from the Southern volcanoes	*	*	*	*	AA
PAG-06	Southern most beach of the Southern Volcanoes	*	*	*	*	AA
PAG-07	East of Ancient Village	*	*	*	*	AA
PAG-08	West coast of Maru Mt.	*	*	0	0	AA
PAG-09	Coastline east of North Beach	*	*	*	*	AA
PAG-10	Isthmus NW coast	*	*	*	*	AA
PAG-11	Eastern coastline of the Northern volcano	*	*	*	*	AA
PAG-12	South beach (of the Northern Volcano)	*	*	0	0	AA
PAG-13	SE beach of Northern volcano	*	*	*	*	AA
PAG-14	Coastline north of PAG-04 and south of PAG-15	*	*	0	0	AA
PAG-15	Northern most coast of the Norhern volcano	*	*	*	*	AA
PAG-16	NW of Togari Rock on the Northern volcano	*	*	*	*	AA
PAG-17	West coast of Togari Mt.	*	*	0	0	AA
PAG-18	Isthmus SW coast	*	*	0	0	AA
*	Green beach of Shomushon Bay (west of Village)	*	*	0	0	AA
*	Red beach (Apaan Bay's black sand beach)	*	*	0	0	AA
*	Blue beach (west of Laguna Sahniyong)	*	*	0	0	AA
*	North beach (northern most beach)	*	*	*	*	AA
*	Gold beach (shopping mall)	*	*	0	0	AA
*	South beach (of the Northern volcano)	*	*	0	0	AA
*	Palaksi "White Sands" (cut east of South Beach)	*	*	0	0	AA

TABLE II – t. 2022 Northern Islands Coastal Nutrient Exceedances of CNMI WQS continued

Sample Station ID	Sampling Station Name	Nutrients % Violations				Segment Class
		2020		2021		
		PO4	NO3	PO4	NO3	
SEGMENT 30: AGRIHAN						
*	Agrihan	*	*	*	*	AA
SEGMENT 31: ASUNCION						
*	Asuncion	*	*	*	*	AA
SEGMENT 32: MAUG						
*	Maug	*	*	*	*	AA
SEGMENT 33: FARALLON DE PAJAROS						
*	Pajaros	*	*	*	*	AA

APPENDIX III: Stream Water Quality Criteria Data Used in 2022 Waterbody Assessments

TABLE III – a. 2022 Rota Talakhaya Stream Enterococci Exceedances of CNMI WQS

Enterococci Percent Violations						
Sample Station ID	2017	**2018	2019	2020	2021	Segment Class
SEGMENT 20B: TALAKHAYA						
TK0	*	100	71	45	*	1
TK1	*	100	81	50	*	1
TK2	*	91	88	27	*	1
TK3	*	100	76	64	*	1
TK4	*	100	65	27	*	1

* Not sampled, ** Badland revegetation project beings

TABLE III – b. 2022 Saipan Stream Enterococci Exceedances of CNMI WQS FY2013-FY2017

Sample Station ID	Sampling Station Name	Enterococci % Violations					Segment Class
		2013	2014	2015	2016	2017	
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

TABLE III – b. 2022 Saipan Stream Enterococci Exceedances of CNMI WQS FY2013-FY2017 continued

Enterococci % Violations							
Sample Station ID	Sampling Station Name	2013	2014	2015	2016	2017	Segment Class
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
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

APPENDIX IV: CNMI Lake Water Quality Criteria Data Used in 2022 Waterbody Assessments

TABLE IV – a. 2022 CNMI Lake Bacteriological % Exceedances of CNMI WQS

Sample Station ID	Sampling Station Name	Bacteriological % Violations														Segment Class
		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
	SEGMENT 18B: SOUTH SUSUPE															
18LAKB	Lake Susupe	52	8	10	16	5	19	11	0	44	29	36	19	23	9	1
	SEGMENT 25: ANATAHAN															
25LAKA	Hagoi Haya	*	*	*	*	*	*	*	*	*	*	*	*	*	*	1
25LAKB	Hagoi Lagu	*	*	*	*	*	*	*	*	*	*	*	*	*	*	1
	SEGMENT 29: PAGAN															
29LAKA	Laguna Sanhiyong	*	*	*	*	*	*	*	*	*	*	*	*	*	0	1
	Laguna Sanhiyong North	*	*	*	*	*	*	*	*	*	*	*	*	*	0	1
29LAKB	Sanhalom	*	*	*	*	*	*	*	*	*	*	*	*	*	0	1

TABLE IV – b. 2022 Lake Dissolved Oxygen % Exceedances of CNMI WQS

Sample Station ID	Sampling Station Name	D.O. % Exceedances												Segment Class
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
	SEGMENT 18B: SOUTH SUSUPE													
18LAKB	Lake Susupe	55	67	83	50	58	74	31	36	32	26	9	5	1
	SEGMENT 25: ANATAHAN													
25LAKA	Hagoi Haya	*	*	*	*	*	*	*	*	*	*	*	*	1
25LAKB	Hagoi Lagu	*	*	*	*	*	*	*	*	*	*	*	*	1
	SEGMENT 29: PAGAN													
29LAKA	Laguna Sanhiyong	*	*	*	*	*	*	*	*	*	*	*	0	1
	Laguna Sanhiyong North	*	*	*	*	*	*	*	*	*	*	*	0	1
29LAKB	Sanhalom	*	*	*	*	*	*	*	*	*	*	*	0	1

TABLE IV – c. 2022 Lake pH % Exceedances of CNMI WQS

Sample Station ID	Sampling Station Name	pH% Violations										Segment Class
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	
	SEGMENT 18B: SOUTH SUSUPE											
18LAKB	Lake Susupe	16	0	11	17	60	11	45	11	25	0	1
	SEGMENT 25: ANATAHAN											
25LAKA	Hagoi Haya	*	*	*	*	*	*	*	*	*	*	1
25LAKB	Hagoi Lagu	*	*	*	*	*	*	*	*	*	*	1
	SEGMENT 29: PAGAN											
29LAKA	Laguna Sanhiyong	*	*	*	*	*	*	*	*	*	0	1
	Laguna Sanhiyong North	*	*	*	*	*	*	*	*	*	0	1
29LAKB	Sanhalom	*	*	*	*	*	*	*	*	*	0	1

TABLE IV – d. 2022 Lake Nutrient % Exceedances of CNMI WQS

Sample Station ID	Sampling Station Name	Nutrient % Violations 2020		Nutrient % Violations 2021		Segment Class
		PO_4	NO_3	PO_4	NO_3	
SEGMENT 18B: SOUTH SUSUPE						
18LAKB	Lake Susupe	*	*	0	0	1
SEGMENT 25: ANATAHAN						
25LAKA	Hagoi Haya	*	*	*	*	1
25LAKB	Hagoi Lagu	*	*	*	*	1
SEGMENT 29: PAGAN						
29LAKA	Laguna Sanhiyong	*	*	*	0	1
	Laguna Sanhiyong North	*	*	*	0	1
29LAKB	Sanhalom	*	*	*	0	1

APPENDIX V: CNMI Coastal Biological Monitoring Criteria Data

TABLE V – a. 2022 Rota Aquatic Life Use Support Values for Benthic Substrate and Coral Diversity

Rota ALUS Ranking for FY2020-2021							Aquatic Life Use Support Values								5Yr Overall Ranking
Site ID	Beach location	Seg ID	Benthic Substrate Ratio Trends		Coral Diversity 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	2022 IR FY20-21	
SEGMENT 1: DUGI/GAMPAPA/CHENCHON															
22	ROT 1	1	Non-significant	↔	Non-Significant	↔	No ranking	No ranking	No ranking	Fair	Fair	Fair	Fair	Fair	*Fair*
SEGMENT 2: SABANA/TALAKHAYA/PALIE															
23	Talakhaya	2	Non-Significant	↔	Non-Significant	↔	Fair	Fair	Fair	Fair	Fair	Fair	Poor	Poor	***Poor***
24	Talakhaya Stream		Non-Significant	↔	Non-Significant	↔	Fair	Fair	Fair	Fair	Fair	Poor	Poor	Poor	
25	Coral Garden		Non-significant	↔	Non-Significant	↔	Good	Good	Good	Good	Good	Good	Good	Good	
SEGMENT 3: SONGSONG															
26	East Harbor	3	Significant	↑	Significant (In Coral Diversity)	↑	Fair	Fair	Good	Good	Good	No New Data	Poor	Fair	*Fair*
27	West Harbor		Non-Significant	↔	Non-Significant	↔	Poor	Poor	Fair	Fair	Fair	Fair	Fair	Fair	
SEGMENT 4: UYULANHULO/TETETO															
28	Rota Dump	4	Non-Significant Change	↔	Non-Significant	↔	No ranking	Fair	Fair	Good	Fair	No New Data	Fair	Fair	*Fair*
29	Sunset Villa		Non-Significant Change	↔	Non-Significant	↔	No ranking	No ranking	No ranking	Good	Good	No New Data	Fair	Fair	
SEGMENT 5: CHALIAT/TALO															
30	Swimming Hole	5	No New Data	*	No New Data	*	Fair	Fair	Good	Fair	No New Data	Fair	Poor	No New Data	*Poor*
31	Rota Resort		No New Data	*	No New Data	*	No ranking	No ranking	No ranking	Poor	Fair	Poor	Poor	No New Data	

TABLE V – b. 2022 Aguigan and Tinian Aquatic Life Use Support Values for Benthic Substrate and Coral Diversity/Seagrass Trends

Tinian ALUS Ranking for FY2020-2021							Aquatic Life Use Support Values								5 Yr Overall Ranking
Site ID	Beach location	Seg ID	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	2022 IR FY20-21	
SEGMENT 6: AGUIGAN															
21	Aguigan	6	No New Data	*	Significant (In Coral Diversity)	↑	Good	Good	No New Data	Fair	No New Data	No New Data	Poor	Fair	Poor
SEGMENT 7: MASALOK															
16	Unai Dangkolo	7	Significant	↑	Significant (In Coral Diversity)	↑	Fair	Good	Good	No New Data	Good	No New Data	Fair	Good	Fair
SEGMENT 9: MAKPO															
17	South of Tachogna	9	Significant	↑	Non-Significant (In Coral Diversity)	↔	No ranking	Fair	Poor	Poor	No New Data	No New Data	Poor	Fair	Poor
18	Taga Beach	9	Non-Significant	↔	Non-Significant (In Coral Diversity)	↔	Poor	Poor	No New Data	Poor	Poor	No New Data	Poor	Poor	
SEGMENT 9: PUNTAN DIAPLOMANIBOT															
19	Leprosarium Beaches	9	Significant	↑	Significant (In Coral Diversity)	↑	Fair	Fair	No New Data	Fair	Poor	No New Data	Poor	Fair	Poor
SEGMENT 11: PUNTAN TAHGONG															
20	Unai Babui	11	Non-Significant	↔	Significant (In Coral Diversity)	↓	Poor	Poor	Poor	No New Data	No New Data	No New Data	Poor	Poor	Poor

TABLE V – c. 2022 Saipan Aquatic Life Use Support Values for Benthic Substrate and Coral Diversity/Seagrass Trends

Saipan ALUS Ranking for FY2020-2021							Aquatic Life Use Support Values								5 Year Overall Ranking
Site ID	Beach location	Seg ID	Changes in Benthic Substrate Ratio Trends		Changes in Coral Diversity or 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	2022 IR FY20-21	
SEGMENT 12: KALABERA															
1	Bird Island forereef	12	Significant	↑	Significant (In Coral Diversity)	↑	Fair	Fair	Good	Fair	Fair	Fair	Poor	Fair	***Poor***
SEGMENT 13: TALOFOFO															
CNMI-104	Jeffrey's Beach Reef Flat	13	No New Data	*	No New Data	*	*	*	*	*	*	*	*	*	*
SEGMENT 14: KAGMAN															
2	Tank Beach forereef	14	Significant	↑	Significant (In Coral Diversity)	↑	No Ranking	No Ranking	No Ranking	Good	No New Data	Good	Poor	Fair	Fair
CNMI-29	Tank Beach Reef flat		New Data	*	New Data	*	*	*	*	*	*	*	*	Good	
SEGMENT 15: LAOLAO															
3	North LaoLao Dive Site forereef	15	Non-Significant	↔	Non-Significant	↔	Fair	Fair	Fair	Fair	No New Data	Fair	Fair	Fair	Poor
4	LaoLao South forereef		Non-Significant	↔	Non-Significant	↔	Poor1,2	Poor1,2	Poor1,2	Poor1,2	Poor1,2	Poor1,2	Poor1,2	Poor	
CNMI-21	Central LaoLao Reef flat		New Data	*	New Data	*	*	*	*	*	*	*	*	Fair	
SEGMENT 16: DAN DAN															
CNMI-72	DanDan reef flat	16	New Data		New Data	*	*	*	*	*	*	*	*	Good	***Good***
SEGMENT 17b: ISLEY (EAST)															
6	Obyan Beach forereef	17b	Non-Significant	↔	Non-Significant (in coral diversity)	*	Fair	Fair	Good	Good	Good	Good	Poor	Fair	***Fair***
CNMI-30	Obyan beach Reef flat		New Data		New Data		*	*	*	*	*	*	*	Good	
5	Boy scout Beach reef flat		Significant	↑	Significant (In Coral Diversity)	↑	Fair	Poor1,2	Fair	No New Data	Fair	Fair	Fair	Good	
SEGMENT 17a: ISLEY (WEST)															
7	Unai Dangkulo reef flat	17a	Non-Significant	↔	Non-Significant	↔	Good	Poor2	Poor2	Poor2	Poor2	No New Data	Poor	Poor	Poor
SEGMENT 18b: SUSUPE (SOUTH)															
55	Sugar Dock Seagrass	18b	Significant	↑	Significant (In Seagrass Trends)	↑	No Ranking	No Ranking	No Ranking	Fair	Good	Poor	Fair	Good	***Good***
56	San Antonio Beach Seagrass		Non-Significant	↔	Non-Significant	↔	Good	No New Data	No New Data	Fair	Fair	Good	Good	Good	
57	San Antonio Beach seagrass		Significant	↑	Significant (In seagrass Trends)	↑	Good	No New Data	Good	Fair	No New Data	No New Data	Fair	Good	
SEGMENT 18a: SUSUPE (NORTH)															
8	Kanoa Resort seagrass	18a	No New Data	*	No New Data	*	Good	Good	Good	Good	No New Data	Good	No New Data	No New Data	Good
53	Civic Center Beach seagrass		No Significant	↔	Non Significant	↔	No Ranking	Fair	Fair	Fair	Good	No New Data	Good	Good	

TABLE V – c. Saipan Aquatic Life Use Support Values for Benthic Substrate and Coral Diversity/Seagrass Trends Continued

Saipan ALUS Ranking for FY2020-2021							Aquatic Life Use Support Values								5 Year Overall Ranking
Site ID	Beach location	Seg ID	Changes in Benthic Substrate Ratio Trends		Changes in Coral Diversity or 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	2022 IR FY20-21	
SEGMENT 19c W. TAKPOCHAO (SOUTH)															
46	13 Fishermen Beach seagrass	19c	Signifcant	↑	Signifcant (In Seagrass Trends)	↑	Poor1	Poor1	Poor1	No New Data	Fair	Fair	Poor	Good	Poor
49	Chalan Laulau Beach seagrass		Non-Significant	↔	Non-Significant	↔	Good	Good	No New Data	Poor1	No New Data	No New Data	Poor	Poor	
SEGMENT 19b: W. TAKPOCHAO (CENTRAL)															
9	Garapan Beach seagrass	19b	No New Data	*	No New Data	*	No Ranking	Poor1	Fair	No New Data	Fair	Fair	Fair	No New Data	Poor
42	Fiesta Resort seagrass		No New Data	*	Significant (In Seagrass Trends)	↑	No Ranking	No Ranking	No Ranking	Good	Good	No New Data	Poor	Good	
43	Drainage #3 seagrass		Non-Significant	↔	Non-Significant	↔	No Ranking	No Ranking	No Ranking	Fair	Fair	No New Data	Poor	Poor	
SEGMENT 19a: W. TAKPOCHAO (NORTH)															
None	DPW Channel Bridge seagrass	19a	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	No New Data	Poor
SEGMENT 20b: ACHUGAO (SOUTH)															
41	Tanapag Meeting Hall seagrass	20b	No New Data	*	No New Data	*	Poor1	Poor1	Poor1	No New Data	Poor1	No New Data	No New Data	No New Data	Poor
SEGMENT 20a: ACHUGAO (NORTH)															
36	San Roque School seagrass	20a	Non-Significant	↔	Non-Significant	↔	Poor1	Fair	Good	Good	No New Data	No New Data	Good	Good	Fair
37	Plumeria Hotel seagrass		No New Data	*	New Data	*	No Ranking	No Ranking	No Ranking	Fair	Fair	No New Data	No New Data	Good	
38	Aqua Resort seagrass		New Data	*	New Data	*	Poor1	No New Data	Poor1	Fair	No New Data	No New Data	No New Data	Good	
39	Aqua Resort		No New Data	*	New Data	*	No Ranking	No Ranking	No Ranking	Fair	No New Data	No New Data	No New Data	Fair	
SEGMENT 21: AS MATUIS															
15	Wing Beach forereef	21	Non-Significant	↔	Non-Significant	↔	Good	Good	Good	Good	No New Data	Good	Poor	Poor	Poor
CNMI-19	Wing Beach Reef flat		New Data		New Data	*	*	*	*	*	*	*	*	Fair	
34	Pau Pau Beach seagrass		No New Data	*	New Data	↑	Good	No New Data	Good	Poor1	Poor1	No New Data	No New Data	Fair	

TABLE V – d.   Mañagaha Aquatic Life Use Support Values for Benthic Substrate and Coral Diversity

Managaha ALUS Ranking for FY2020-2021							Aquatic Life Use Support Values								5 Year Overall Ranking
Site ID	Beach location	Seg ID	Changes in Benthic Substrate Ratio Trends		Changes in Coral Diversity or 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	2022 IR FY20-21	
SEGMENT 23: MANAGAHA															
11	Managaha Patch Reef	23	Significant	↑	Signficant (In Coral Diversity)	↑	No Ranking	No Ranking	No Ranking	Good	Good	Good	Poor	Fair	Fair
12	Managaha MPA forereef		Non-Significant	↔	Non-Significant	↔	Good	Good	Good	Good	Good	Good	Good	Good	
13	Outside Managaha back reef		Significant	↓	Significant (In Coral Diversity)	↓	No Ranking	Good	Good	No New Data	Fair	No New Data	Fair	Poor	

APPENDIX VI: CNMI Coastal Waterbodys Reported by Assigned CALM Categories

TABLE VI-a. **Category 1: 2022 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				
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	Farallon De Pajaros "Uracas"	AA	4.2	
			82.5	**TOTAL**

TABLE VI-b. Category 2: 2022 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				
25	Anatahan	AA	17.3	No fish tissue data, excellent water quality, very remote.
29	Pagan	AA	28.2	No fish tissue data, excellent water quality, very remote.
		TOTAL	**51.8**	**Miles**

Table VI-c. Category 4c: 2022 Coastal Waters with Insufficient Information to Assess All DUs

Coastal Miles CALM Category 4c				
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 water quality data to make a final assessment
Saipan and Managaha				
	N/A			
Northern Islands				
	N/A			
		TOTAL	**8.2**	**Miles**

Table VI-d. Category 5: 2022 Coastal Waters with Impaired DUs by Pollutants, TMDL Required

Seg ID	Segment Name	Class	Coastal Miles CALM Category 5 Size (Miles)	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
5	Chaliat/Talo	AA	2.6	pH Low, NO3,
Aguigan			**21.3**	
6	N/A	AA		
Tinian			**0**	
7	Masalok	AA	3.5	Enterococci, pH no trend, PO4, NO3,
9	Makpo	AA	3.0	Enterococci, pH Low, PO4, NO3,
9H	Makpo Harbor	A	1.5	Enterococci, DO%, PO_4
10	Puntan Diaplolamanibot	AA	9.9	Enterococci, PO4, NO3, DO%,
11	Puntan Tahgong	AA	6.4	Enterococci, pH no trend, PO4, NO3, DO%,
Saipan			**24.3**	
12	Kalabera	AA	4.1	Enterococci, PO4, NO3, Cd,
13	Talofofo	AA	5.4	Enterococci, pH no trend, PO4, NO3,
14	Kagman	AA	6.7	Enterococci, pH no trend, PO_4, NO_3
15	LaoLao	AA	1.4	Enterococci, PO4, NO3,
17A	Isley (West)	A	1.7	Enterococci, pH Low, PO4, Cu & Pb in biota,
17B	Isley (East)	A	4.2	Enterococci, , pH no trend, PO_4
18A	Susupe (North)	AA	2.4	Enterococci, 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, PO4, NO3, Pb in bivalves,
19B	W. Takpochau (Central)	A	4.4	Enterococci, DO%, pH Low, Hg Fish, Pb & Cu bivalves, PO_4, NO_3
19C	W. Takpochau (South)	AA	1.9	Enterococci, DO% and pH Low, NO3, PO4,
20A	Achugao (North)	AA	1.9	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, PO4, NO3,
22	Banaderu	AA	5.1	Enterococci, PO_4
Managaha			**47.6**	
23	Managaha	AA	0.6	pH Low, PO_4, NO_3
Northern Islands			**0.6**	
24	Farallon de Medinilla	A	4.2	altered
			4.2	
		TOTAL	**98.0**	**Miles**

APPENDIX VII: CNMI Freshwater Streams Reported by Assigned CALM Categories

Table VII-a. Category 1: 2022 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	Very remote, lack of anthropogenic stressors.
27STR	Guguan	1	Unknown	Very remote, lack of anthropogenic stressors.
28STR	Alamagan	1	Unknown	Very remote, lack of anthropogenic stressors.
30STR	Agrihan	1	Unknown	Very remote, lack of anthropogenic stressors.
31STR	Asuncion	1	Unknown	Very remote, lack of anthropogenic stressors.
32STR	Maug	1	Unknown	Very remote, lack of anthropogenic stressors.
33STR	Farallon De Pajaros	1	Unknown	Very remote, lack of anthropogenic stressors.
		Total Miles	**Unknown**	

Table VII-b. Category 2: 2022 Streams Attaining Some DUs, Insufficient Information about Remaining DUs

Seg ID	Segment Name	Segment Class	Segment Size (Miles)	Comments
		Stream Miles CALM Category 2		
Rota				
	N/A			
Saipan			**0**	
12STR	Kalabera	1	7.8	No monitoring data
14STR	Kagman	1	12.2	very limited monitoring data
15STR	Lao Lao	1	6.7	very limited monitoring data
16STR	Dan Dan	1	0.8	No monitoring data
17STRA	Isley (West)	1	3.5	No monitoring data, Fish tissue data not available
17STRB	Isley (East)	1	0.3	No monitoring data, Fish tissue data not available
18STRA	Susupe (North)	1	7.0	Fish tissue data not available, very limited monitoring data
18STRB	Susupe (South)	1	1.4	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
19STRB	W. Takpochau (South)	1	1.3	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			**50.2**	
25STR	Anatahan		?	No monitoring data, Fish tissue data not available
29STR	Pagan		?	Fish tissue data not available, *very limited* monitoring data
		Total Miles	**50.2**	**Miles**

Table VII-c. Category 5: 2022 Streams with Impaired DUs by Pollutants, TMDL Required

Stream Miles CALM Category 5				
Segment ID	**Segment Name**	**Segment Class**	**Segment Size (Miles)**	**Comments**
Rota				
2STR	Sabana/Talakhaya/Palie	1	6.1	*Enterococci*
Saipan			**6.1**	
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			**44.2**	
	N/A			
		Total Miles	**50.3**	

APPENDIX VIII: CNMI Lakes Reported by Assigned CALM Categories

Table VIII-a. Category 2: 2022 Lakes Attaining Some DUs, Insufficient Information about Remaining DUs

Lakes Acres CALM Category 2				
Seg ID	Segment Name	Class	Size (Acres)	Comments
Saipan				
	N/A			
Northern Islands				
25LAK A	Anatahan (Hagoi Haya)	1	149.0	lacking fish tissue and water quality data
25LAK B	Anatahan (Hagoi Lagu)	1	?	newly formed, lacking fish tissue and water quality data
29LAK A	Pagan (Lagona Sanhiyong)	1	34.0	lacking fish tissue data, very limited water quality data
29LAK B	Pagan (Sanhalom)	1	27.0	lacking fish tissue data, very limited water quality data
		Total Acres	**210.0**	

Table VIII-b. Category 5: 2022 Lake with Impaired DUs by Pollutant(s), TMDL Required

Lakes Acres CALM Category 5				
Seg ID	Segment Name	Class	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 Acres	**57.4**	

APPENDIX IX: CNMI Wetlands Reported by Assigned CALM Categories

Table IX-a. Category 1: 2022 Wetlands Attaining All Designated Uses

Seg ID	Segment Name	Class	Size (Acres)	Comments
				Wetland Acres CALM Category 1
Rota				
	N/A			
Tinian				
10WET	Puntan Diaplolamanibot	1	12.9	Limited data . However, remote, lack of anthropogenic sources of pollution and stressors
11WET	Puntan Tahgong	1	40.6	Hagoi Wetland is pristine and used as the high quality reference wetland for Wetland RAM
Saipan			**53.5**	
14WET	Kagman (Education Island)	1	5.1	Deliniation completed, Limited data available. However, maintained by USDA NRCS staff.
Northern Islands			**5.1**	
	N/A			
	Total Acres		**58.6**	

Table IX-b. Category 3: 2022 Wetlands with Insufficient Information to Determine Attainment of Designated Uses

Seg ID	Segment Name	Class	Size (Acres)	Comments
				Wetland Acres CALM Category 3
Rota				
	N/A			
Tinian				
9WET	Makpo	1	28.4	Lacking data
Saipan			**28.4**	
13WET	Talofofo	1	2.6	Surrounded by homes, potential habitat alterations.
16WET	Dan Dan	1	2.8	potential anthropogenic stressors from nearby residents
17WETA	Isley (West)	1	26.4	presence of anthropogenic stressors from urban development
17WETB	Isley (East)	1	2.0	located near agricultural plots and sewer line infrastructure
Northern Islands			**33.8**	
29WET	Pagan	1	27.0	threats from WWII activities, potential expansion of military exercises.
			27.0	
	Total Acres		**89.2**	

Table IX-c. Category 4c: Wetlands with Impairment, not a Pollutant (TMDL) Not Required

SegID	Segment Name	Class	Size (Acres)	Comments
				Wetland Acres CALM Category 4c
Tinian				
	N/A			
Saipan				
18WETA	Susupe (North)	1	197.3	Flow regime, Habitat Alterations, Non-native Aquatic Plants
18WETB	Susupe (South)	1	292.4	Flow regime, Habitat Alterations, Non-native Aquatic Plants
19WETA	W. Takpochao (North)	1	20.2	Flow regime, Habitat Alterations, Non-native Aquatic Plants
19WETB	W. Takpochao (Central)	1	20.5	Flow regime, Habitat Alterations, Non-native Aquatic Plants
20WETA	Achugao (North)	1	12.9	Flow regime, Habitat Alterations, Non-native Aquatic Plants
20WETB	Achugao (South)	2	25.1	Alteration in habitats, Non-native Aquatic Plants, flow regime alterations
Northern Islands				
	N/A			
	Total Acres		**568.4**	

APPENDIX X: Public Comment Period Announcements

Public Notice of 30-Day Comment Period - Press Release to Newspapers & Social Media

Commonwealth of the Northern Mariana Islands
OFFICE OF THE GOVERNOR
Bureau of Environmental and Coastal Quality
DEQ: P.O. Box 501304, DCRM: P.O. Box 10007, Saipan, MP 96950-1304
DEQ Tel.: (670) 664-8500/01; Fax: (670) 664-8540
DCRM Tel.: (670) 664-8300; Fax: (670) 664-8315
www.deq.gov.mp and www.crm.gov.mp

Eli D. Cabrera
Administrator

Zabrina S. Cruz
DEQ Director

PRESS RELEASE

PUBLIC NOTICE

BECQ RELEASES CNMI 2022 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 2022 305(b) and 303(d) Water Quality Assessment Integrated Report and supporting documents have been made available for public review on DEQ's web page www.deq.gov.mp.
URL: https://www.deq.gov.mp/water-quality-surveillance-non-point-source.html.

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 2022 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 "2022 IR Comments" or similar. All comments must be received by BECQ no later than **October 19th, 2022**, in order for the comments to be considered by BECQ in the preparation of the final Integrated Report.

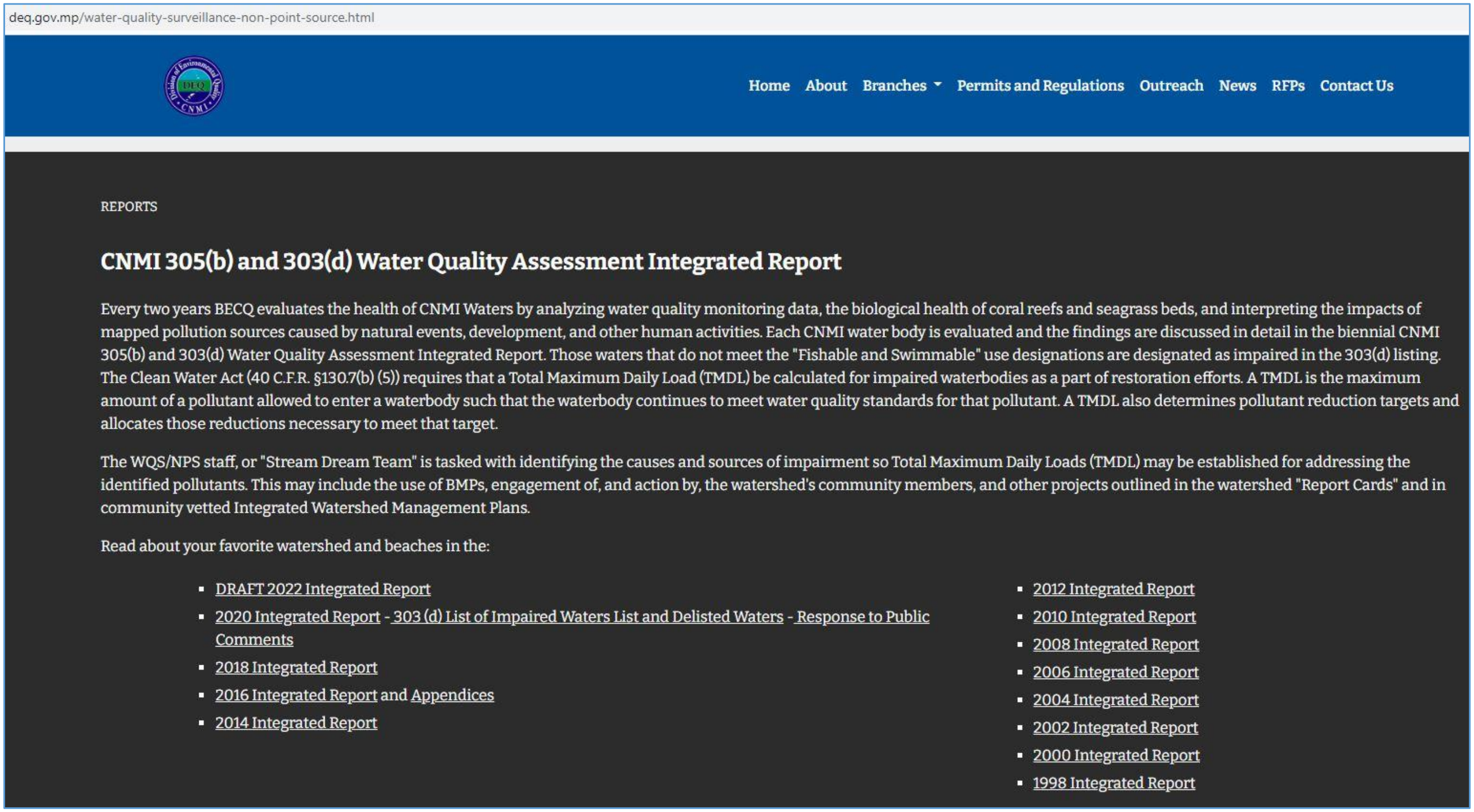
REPORTED BY: ______________________ DATE: 9/19/22

Ian A. Iriarte
Acting WQS/NPS Manager

APPROVED BY: ______________________ DATE: 09/19/2022

Zabrina S. Cruz
DEQ Director

Public Notice of Draft 2022 IR Posted on DEQ Website BRANCHES webpage on September 19th, 2022



deq.gov.mp/water-quality-surveillance-non-point-source.html

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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 Clean Water Act (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 Integrated Watershed Management Plans.

Read about your favorite watershed and beaches in the:

- DRAFT 2022 Integrated Report
- 2020 Integrated Report - 303 (d) List of Impaired Waters List and Delisted Waters - Response to Public Comments
- 2018 Integrated Report
- 2016 Integrated Report and Appendices
- 2014 Integrated Report
- 2012 Integrated Report
- 2010 Integrated Report
- 2008 Integrated Report
- 2006 Integrated Report
- 2004 Integrated Report
- 2002 Integrated Report
- 2000 Integrated Report
- 1998 Integrated Report

Public Notice of Draft 2022 IR snt to cnmi.waterquality@gmail.com Email Listserv on September 19, 2022

1 of 382

30-Day Public Comment Period for the DRAFT 2022 Water Quality Assessment Integrated Report

b

becq waterquality <cnmi.waterquality@gmail.com>

14:48 (1 minute ago)

to bcc: staff, bcc: Brianna, bcc: Carusoe, bcc: Mary, 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: Geri, bcc: James, bcc: Jeannee,

PRESS RELEASE

PUBLIC NOTICE

BECQ RELEASES CNMI 2022 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 2022 305(b) and 303(d) Water Quality Assessment Integrated Report and supporting documents have been made available for public review on DEQ's web page www.deq.gov.mp.

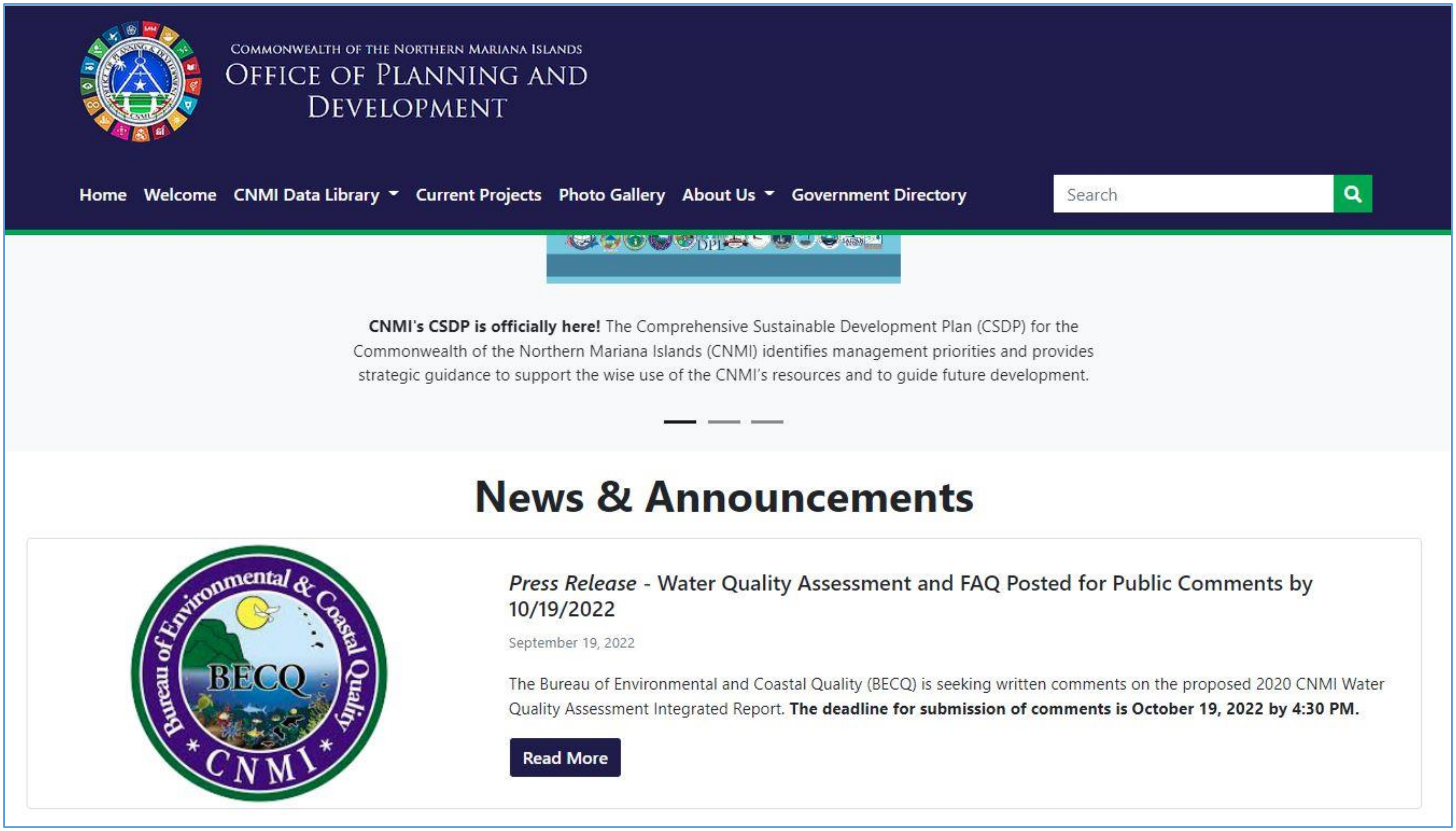
URL: https://www.deq.gov.mp/assets/wqs/draft-2022-cnmi-ir-for-public-comment.pdf

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 2022 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 "2022 IR Comments" or similar. All comments must be received by BECQ no later than **October 19th, 2022**, in order for the comments to be considered by BECQ in the preparation of the final Integrated Report.

Fact_Sheet.pdf

Public Notice of Draft 2022 IR Posted on Office of Planning and Development website, www.opd.gov.mp on September 19, 2022



Public Notice of Draft 2022 IR Posted on CNMI Waters Facebook Page on September 20, 2022

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P R E S S R E L E A S E
PUBLIC NOTICE

BECQ RELEASES CNMI 2022 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 2022 305(b) and 303(d) Water Quality Assessment Integrated Report and supporting documents have been made available for public review on DEQ's web page www.deq.gov.mp.
URL: https://www.deq.gov.mp/.../draft-2022-cnmi-ir-for-public...

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DEQ.GOV.MP
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Public Notice of Draft 2022 IR Published in Marianas Variety Newspaper September 20, 2022

LOCAL

MARIANAS VARIETY NEWS AND VIEWS | TUESDAY, SEPTEMBER 20, 2022 | 7

Air Force Master Sgt. Tiona Jones displays CNMI flag in Greenland

Air Force Master Sgt. Tiona Jones displays the CNMI flag for the first time in Greenland, right before taking the traditional "polar plunge" into arctic waters. **Contributed photos**

(Press Release) — Island girls cannot resist going to the beach, wherever it is.

Master Sgt. Tiona Jones of the United States Air Force, daughter of Richard and Celina Farrell and a graduate of Tinian High School, has been assigned to Thule Air Base, Greenland, 750 miles north of the Arctic Circle and 947 miles from the North Pole.

Thule Air Base is now part of the United States Space Force and is the northernmost installation of the U.S. Armed Forces.

As the first sergeant, Tiona is responsible for advising leaders on any adverse trends affecting the readiness, health, morale, resiliency, welfare, and discipline of Airmen and Guardians on Thule. Basically, her job is to take care of people!

Tiona said the hardest part of adjusting to life in Thule Greenland is learning how to sleep while it is currently daylight 24-hours a day.

Air Force Master Sgt. Tiona Jones and friends in Greenland.

BECQ invites public to comment on water quality assessment report

(Press Release) — The Bureau of Environmental and Coastal Quality, Division of Environmental Quality, under the Office of the Governor, hereby notifies the public that the Draft 2022 305(b) and 303(d) Water Quality Assessment Integrated Report and supporting documents have been made available for public review on DEQ's web page www.deq.gov.mp/.

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Public Notice of Draft 2022 IR Published in Saipan Tribune Newspaper September 21st, 2022

SAIPAN TRIBUNE LOCAL WEDNESDAY, SEPTEMBER 21, 2022 7

Public comment sought for BECQ water quality report

The CNMI Bureau of Environmental and Coastal Quality, Division of Environmental Quality, under the Office of the Governor, is seeking public comments on the draft of the 2022 Water Quality Assessment Integrated Report and supporting documents.

These have been made available for public review on DEQ's web page www.deq.gov.mp. URL: https://www.deq.gov.mp/water-quality-surveillance-non-point-source.html.

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Kagman to have water interruption this Saturday

The Commonwealth Utilities Corp. would like to inform the general public that there will be a scheduled water service interruption for customers in Kagman on Saturday, Sept. 24, 2022, from 8:30am to 4:00pm.

The scheduled water service interruption is to allow CUC water operators to repair a leak on the 50,000-gallon water tank in Kagman. Customers should expect restoration of water services soon after the repairs.

CUC appreciates the public's cooperation and understanding as we continue to provide reliable service to the people of the CNMI. CUC encourages customers in the Kagman area to store water in advance of this interruption and to practice water conservation measures such as closing the faucet while washing hands or brushing teeth, reducing toilet flushes, and delaying bathing and clothes washing until after the interruption.

CUC continues to work diligently to minimize any inconvenience to its customers. For more information, contact the CUC Hotline (236-4333) or monitor our Facebook page for the latest updates (https://www.facebook.com/CommonwealthUtilitiesCorporation/). *(PR)*

Public Notice of Draft 2022 IR Posted on DEQ website's NEWS page September 27th, 2022

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News

PRESS RELEASE

BECQ RELEASES CNMI 2022 DRAFT 305(b) and 303(d) WATER QUALITY ASSESSMENT INTEGRATED REPORT

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You can view the Fact Sheet info **here**.