2016
Commonwealth of the Northern Mariana Islands
303(d), 305(b) and 314
Water Quality Assessment Integrated Report

Photo: Scott Eck – Wing Beach

Bureau of Environmental and Coastal Quality
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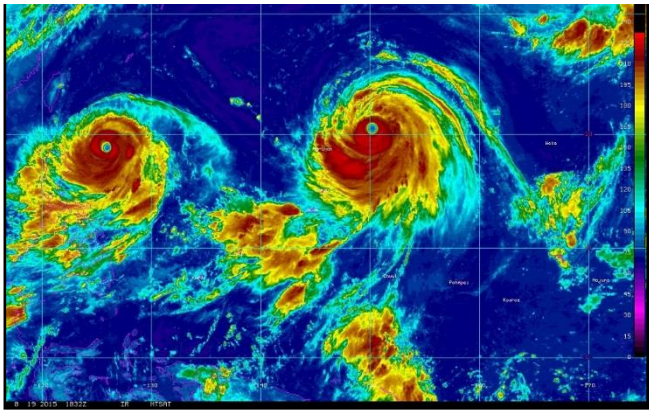
A. EXECUTIVE SUMMARY

The Late Governor of the Commonwealth of the Mariana Islands (CNMI), Eloy Inos, merged the Division of Environmental Quality and the Coastal Resources Management Office into one bureau in 2013. The Bureau of Environmental and Coastal Quality (BECQ) was officially established in early 2014. BECQ is responsible for monitoring, assessing, and protecting water quality within the CNMI. This responsibility is mandated by both U.S. Federal and Commonwealth legislation and regulation.

This integrated report and the enclosed list of impaired waters were prepared to satisfy the requirements of Sections 303(d), 305(b), and 314 of the Clean Water Act (CWA). The CNMI 303(d) list, and the 305(b) and 314 Water Quality Assessment Integrated Report (henceforth referred to as the "CNMI IR") is prepared every two years, in which the assessment of the previous two fiscal years' monitoring data is summarized. In this report, monitoring data collected from October 1, 2013 through September 30, 2015 is analyzed and compared to assessments published in previous CNMI IRs. The CNMI IR is the principal means by which the CNMI BECQ, Congress, and the public evaluate whether Commonwealth waters are meeting Water Quality Standards (WQS), the purpose of which is to ensure that all designated uses of these waters are attained. Designated uses are defined in detail in the CNMI WQS regulations, but in short include: recreation in and on the water; the support of aquatic life and coral reef conservation; fishing and the consumption of fish and shellfish; aesthetic enjoyment; and in the case of fresh waters, availability as a potable water supply.

As in previous years, the most common sources of water quality degradation are from: 1) Point sources such as failing sewer lines and other wastewater collection and treatment systems; 2) Illicit wastewater discharges from animal pens and outhouses; and 2) Non-point sources (NPS) such as sedimentation from secondary coral roads, uncontrolled erosion from construction sites, other pollutants carried in stormwater from paved roads, developments, and fecal bacterial from free range feral and domestic livestock.

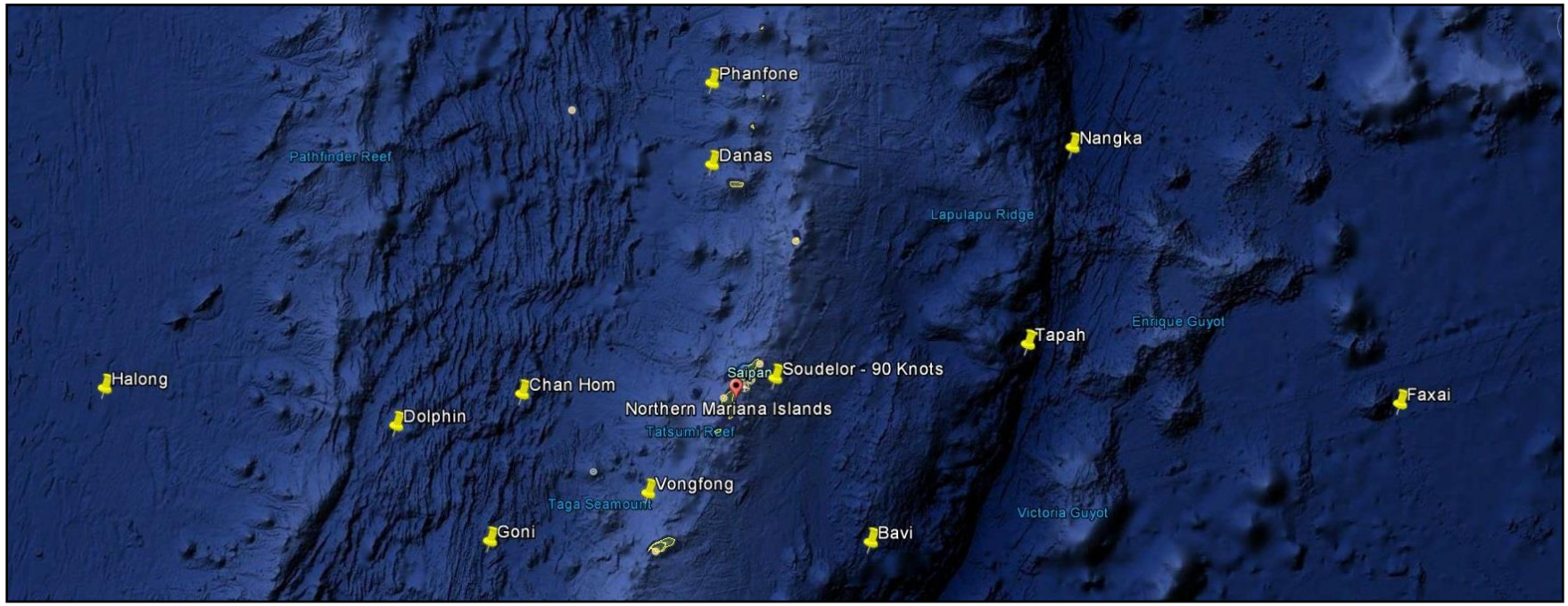
Figure A-1 NOAA imagery of Typhoon Soudelor & Goni



Surprisingly, most microbiological violations for this reporting cycle are not just in areas in close proximity to sewer lines, or large heavily populated drainages, but were also seen at remote coastlines with no source of fecal contamination. This appeared to be associated with high surf and storm events in association with El Nino.

Storm events are known to resuspend fecal indicator bacteria (FIB) in the sediment into the water column, thus causing Enterococci exceedences. In these instances, the exceedences would trigger a Public Beach Advisory even though there is little risk of actual fecal contamination of the waterbody.

Figure A-2 Significant Storm Events, ≥ 35 mph sustained winds passing within 250 nautical miles of CNMI



It is suspected that there were several of these instances in this reporting cycle due to the large number of powerful tropical storms and typhoons that passed through the Marianas Archipelago. The most powerful storms were within the last quarter of FY2015. Typhoon Chan Hom passed through the islands July 3rd through the 5th, 2015 with the nearest approach to Rota. This was followed by Typhoon Nang Ka on July 8th severing the fiber optic cable from Guam to Saipan, thus preventing phone and internet communication for over two weeks. Once the cable was repaired, a new Tropical Storm approached which increased in intensity to become a category 3 Super Typhoon named Soudelor, the eye of which passed directly over Saipan August 1st through the 3rd. Soudelor caused island wide power outages and the most devastating damage to the island since Typhoon Kim hit in 1986.

President Obama declared the Marianas in a state of emergency on Aug 5th; with approximately 800 power poles down and 600 damaged transformers. Most of Saipan remained without power for three months.

All BECQ personnel were tasked with assisting with recovery efforts at water distribution stations and green waste disposal sites. This disrupted regular water quality monitoring efforts by WQS/NPS staff.

After the devastation of Typhoon Soudelor further damage was sustained by Typhoon Goni passing the islands August 15th and 16th. While cleanup and recovery efforts were still ongoing, Super Typhoon Atsani past north of the inhabited islands of Saipan, Tinian and Rota and brushed the uninhabited island of Agrihan. By August 21st, Saipan only experienced strong sustained winds and high surf advisories from this Super Typhoon.

Due to a disruption in available electricity and limited fuel availability, weekly water quality sampling for Saipan was disrupted through August, while Tinian and Rota sampling was discontinued entirely due to hazards associated with high surf and wind shear. All of the frozen nutrient marine water samples, except those collected during the 2015 US EPA National Coastal Condition Assessment (NCCA) reef flat sampling, were compromised before they could be tested and were disposed.

It should be noted that though there were some Beach Advisories posted at sites unlikely to have fecal contamination, there were others at sites with *known* discharges of contaminated runoff and wastewater. These sites are often near older paved or unpaved coral roads, which lack best management practices (BMP) to capture contaminated runoff. Other sites are adjacent to poorly constructed aging businesses or apartments with failing wastewater collection systems, and some are near rural homes engaging in subsistence farming. These farms lack BMPs to capture waste from roaming domestic livestock. These long existing developments present a more fundamental natural resource management challenge and therefore, are more difficult to address and require attention.

BECQ, working in conjunction with the CNMI Department of Public Lands, Department of Public Works (DPW), and the USDA Natural Conservation Service (NRCS) continues to address these problems in four ways: 1) on-going training of local road crews to use better grading/maintenance techniques of coral roads; 2) assisting with planning improvement projects such as regional sedimentation basins, swales, rain gardens, storm water catchments, and other BMPs; 3) allowing farmers to trade their land near streams and wetlands with other lots located in locations better suited for farming; and 4) Instead of fining low income subsistence farmers with penalties for illicit discharges, WQS/NPS is assisting them to avail NRCS' Environmental Quality Incentive Program (EQIP) grants to incorporate farming BMPs such as dry litter piggeries, erect solar voltaic cattle fencing, and leaching fields to prevent contamination of CNMI waters.

Aside from funding needed to carry out remediation activities, convincing the public, business community, and political leadership of the value of dedicating land for BMPs has been the primary obstacle in implementing major improvements.

In conclusion, for this reporting cycle 140.4 miles of the CNMI's coastlines were found to be attaining all designated uses. The remaining 80.2 miles of the coastlines were found to be impaired for various reasons, either by pollutants exceeding the CNMI Water Quality Standards, and/or non-pollutants, e.g., diminished habitat function. Of the miles impaired by a pollutant, 2.1 miles are being addressed by pollution controls other than a TMDL, i.e., construction of roadway Best Management Practices, or implementation of community vetted interagency Conservation Action Plans. There is insufficient information to make a complete determination whether or not all designated uses are being supported for 14.7 of CNMI's coastal miles.

Of the economically important coasts of the three inhabited islands 80.2 miles were impaired due to Enterococci exceedences of the CNMI WQS, of which 38.1 miles surround Saipan, 17.8 miles surround Rota, and 24.3 miles surround Tinian. The North Susupe, South W. Takpochao, North Achugao, As Matuis, and Banaderu Watersheds on Saipan were added as impaired for this use designation. This is a return to the list for the Susupe and Achugao watersheds from last reporting cycle.

However, there were also improvements for the *Recreational* use Designation: Two on Saipan, Kagman and LaoLao Watersheds; One on Rota, Dugi/Gampapa/Chenchon watershed; and One on Tinian, Carolinas Watershed.

Detailed reasons for impairments and improvements for the various use designations will be discussed further in Section C.4., and the subsequent Watershed subsections of this report.

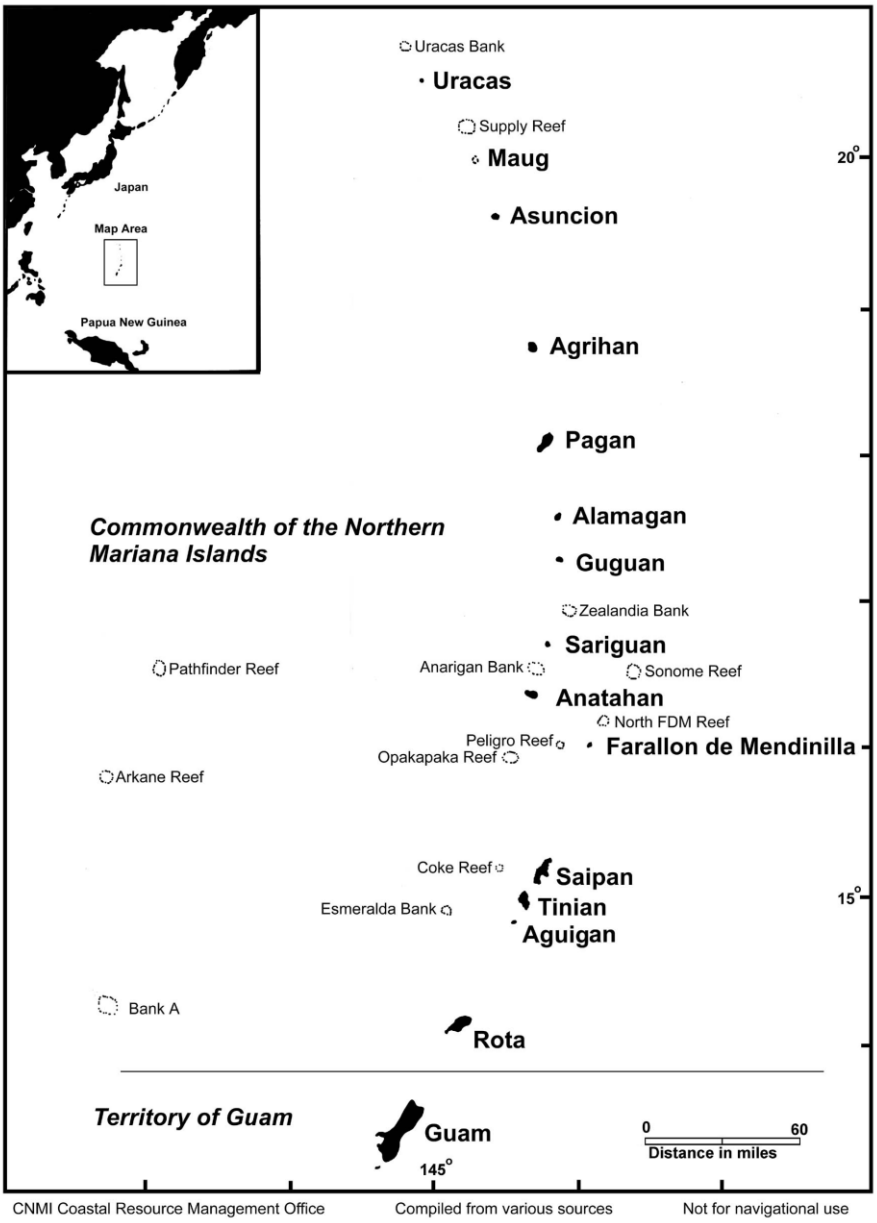
In regards to potable water, no surface waters within the CNMI are used as a potable water supply Source. Ground water is the primary source of potable water. In general, the quality of the groundwater used by Public Water Systems (PWS) meets EPA Primary Drinking Water Standards. Although there are a few isolated incidents of groundwater contamination from underground/aboveground storage tanks, or small manufacturing or repair shops, the threat of contaminants entering the general PWSs is minimized due to the large number of production wells producing relatively low flows spread out over the island's entire land surface. With that said, salt water intrusion, though not an EPA Primary Drinking Water concern remains a significant issue on Saipan in regards to the general palatability of drinking water.

B. BACKGROUND

B.1. Scope of Waters in the Integrated Report

The CNMI consists of two geologically distinct island chains located at 145º E, between 14º – 21º N. The Southern Mariana Islands are around 41 million years old and were initially formed by volcanic activity, which permanently ceased around 10 million years ago. The present composition and terraced appearance of the southern Marianas is the result of limestone reef deposition, geologic uplifting, and shifting sea levels. The Northern Islands lie to the northwest, residing on the still active Mariana Ridge.

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



This report contains information primarily for the three southernmost islands of Saipan (including Mañagaha), Tinian (including Aguigan), and Rota, where the vast majority of the population lives and recreates. Information is also provided about the Northern Islands, as Pagan has been targeted for development and militaristic exercises by the US Department of Defense, and the three northern most islands, were selected for further protection by US presidential proclamation. Together, Uracas (Pajaros), Maug, and Asuncion form the Marianas Trench Marine National Monument.

Table B-1 Atlas Description of the Commonwealth of the Northern Mariana Islands

Topic	Value
Surface area of CNMI	182.9 sq mi
Population of CNMI	53,883[1]
Total Miles of Streams	73.4[2] mi
Miles of Ocean Coast	235.3 mi
Acres of Lakes	255.2[3]
Acres of Wetlands	681.0

[1] Recent Population Trends for the US Island Areas 2000-2010, US Census (April 2015)
[2] Stream length does not include Northern Islands streams, based on current DCRM GIS data layers
[3] Lake length includes Northern Islands lakes, based on current GIS data layers. Three lakes are known to exist in the Northern Islands: two on Pagan, and one on Anatahan.

Saipan and Mañagaha

Saipan is the capital of CNMI, and the largest and most populated of the islands, with 48,220 inhabitants (CNMI Census, 2010). Saipan has five Marine Protected Areas (MPA) including: Mañagaha Marine Conservation Area (a small sand cay in Saipan's Lagoon, Watershed Segment #23); Bird Island Marine Sanctuary (Kalabera Segment #12); Forbidden Island Marine Sanctuary (Kagman Segment #14); Lau Lau Bay Sea Cucumber Sanctuary (Kagman, Lao Lao, and Dan Dan, Segments #14, #15, and #16 respectively); and the Lighthouse Reef Trochus Sanctuary (Susupe North Segment #18A). Therefore, threats to water quality are greatest on Saipan, especially to these Marine Protected Areas.

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

Rota and Tinian

Like Saipan's east beaches and Mañagaha, the less densely populated islands of Rota and Tinian, have their marine water monitored on a rotational eight (8) week sampling interval. 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).

Northern Islands

The other 10 northernmost islands, commonly referred to as the Northern Islands, are not routinely monitored. Only the islands of Agrihan, Pagan, and Alamagan are occasionally inhabited by a few families. As was mentioned above, the three most Northern Islands, Uracus (" Pajaros" Segment #33), Maug (Segment #32) and Ascuncion (Segment #31) were designated as a Marine

Protected Area, and named the *Marianas Trench National Marine Monument* in January 2009 through Presidential Proclamation. "The Monument encompasses 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 cooperation with the Department of Defense and the CNMI government." (www.fpir.noaalgov/MNM/mnm_marians-trench.html).

The 2010 CNMI IR, for the first time included an assessment of water quality in the Northern Islands, but based on considerably less data than is available for the southern islands. The 2014 CNMI IR reevaluated the Northern Islands based on new available marine water quality data collected during the Multi-agency Bottomfish Research Cruise aboard the NOAA R/V Oscar Elton Sette, which occurred in 2014 during the months of June and July. These data resulted in the Northern islands being categorized as fully supportive of all their use designations based on their remoteness, and their lack of development making any anthropogenic source of pollutants highly unlikely. These high quality islands have outstanding and valuable resources for the CNMI, and therefore are considered like waters of other National Parks, marine sanctuaries, and wildlife refuges, to have exceptional recreational or ecological significance.

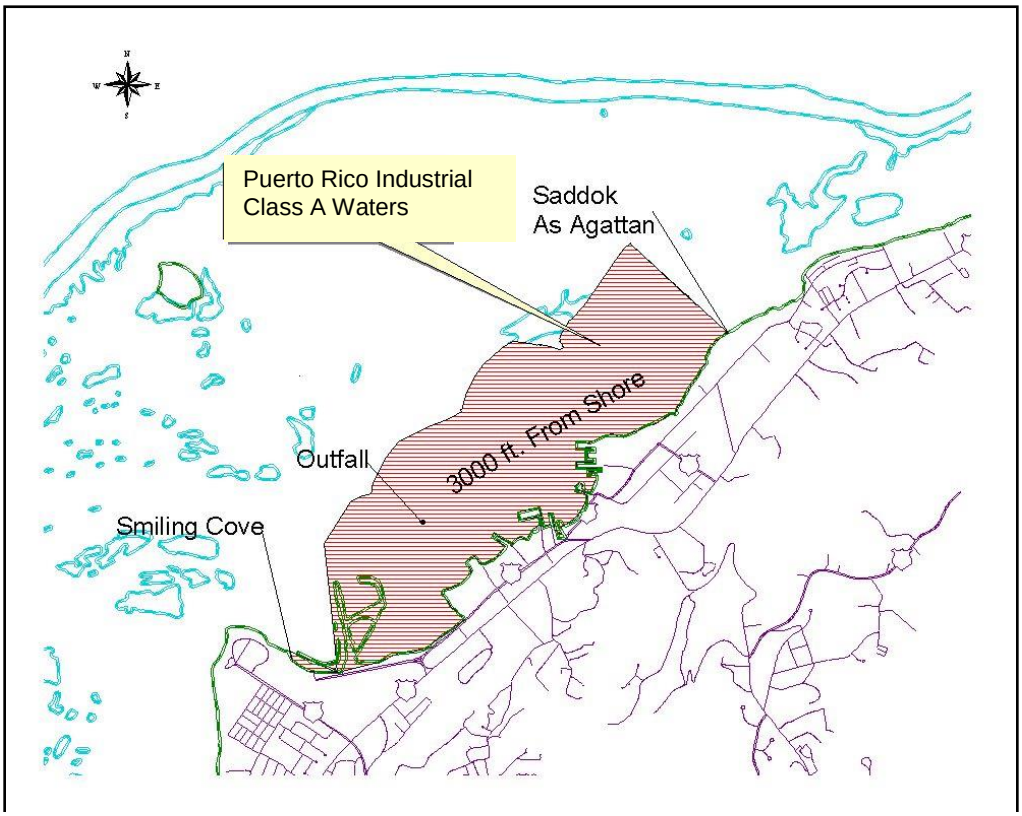
The CNMI antidegradation policy established in the 2014 CNMI WQS, provides for three tiers of protection for water based on the waterbodies attributes as specified in the 2012 EPA Recreational Water Quality Criteria. Tier 3 are high quality waters, which constitute an outstanding CNMI resource, such as the waterbodies of the Northern Islands, where lowered water quality is prohibited. 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. Finally, Tier 1 are all water bodies where the existing level of quality routinely falls below or just above the applicable water quality criteria for designated uses, which requires a minimum level of water quality necessary to protect its existing uses.

At this writing, water bodies of the Northern Mariana Islands have been designated as Tier 3. This is important to note as the present frequency of inhabitants on the Northern Islands and their population density could change in the future should the US expand military training exercises there. This poses a new threat, which requires further study to establish baselines and properly monitor and maintain these waterbodies as required by CNMI WQS.

B.1.1. CNMI Classification of Marine Water Uses

There are also two Classes of marine water uses designated for the CNMI in the WQS, Class AA, and A. The majority of which are Class AA meaning that these waters should remain in their natural pristine state as much as possible with an absolute minimum of pollution or alteration of water quality from any human-related source or actions. The uses protected in these waters are the support and propagation of marine life, conservation of coral reefs and wilderness areas, oceanographic research, and aesthetic enjoyment and compatible recreation inclusive of whole body contact (e.g. swimming and snorkeling) and other related activities.

Figure B-2 Class A Marine Waters of Tanapag Harbor, Saipan



Class A waters in the CNMI are limited to Saipan's Puerto Rico "Industrial" area containing the seaport, marinas, and Lower Base wastewater treatment plant outfall (Figure B-2), as well as the Agingan Point municipal wastewater treatment plant outfall on the southern tip of Saipan. The other Class A waters are limited to the existing harbors on Tinian and Rota.

Class A waters are protected for their *Recreational Use* and *Aesthetic Enjoyment*. Other uses are allowed as long as they are compatible with the *protection and propagation of fish, shellfish*, and wildlife, and *recreation* in and on the water with limited body contact. Table B-2 lists the Classification of marine water uses in the CNMI and their tier designation.

Table B-2 Classification of Marine Coastal Water Uses and Water Body Tier Designation

Island	Water Body	Segment	Class	Tier	Reason for Designation
Saipan	Puerto Rico Industrial Area	19A	A		Commercial port / Municipal wastewater outfall
	Agingan Point	17A, 18B	A		Municipal wastewater outfall
	All others	12-17B, 18A-19B, 20-23	AA		Support propagation of fish, recreation
Rota	East Harbor	3	A		Commercial port
	West Harbor	3	A		Commercial port
	All others	1-2, 4-5	AA		Support propagation of fish, recreation
Tinian	San Jose Harbor	9	A		Commercial port
	Aguigan "Goat Island"	6	AA		Support propagation of fish, recreation
	All others	7-8, 10-11	AA		Support propagation of fish, recreation
Northern Islands	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
	Medinilla	24	AA	3	High quality / Outstanding resource

B.1.2. CNMI Classification of Surface Water Uses

The raised limestone bedrock of the southern Mariana Islands is extremely permeable. Therefore, most rainfall that does not directly run off into the ocean percolates readily into the ground. Streams occur mostly in limited areas where less permeable volcanic basement materials have been exposed. The majority of CNMI surface water bodies are not tested for water quality on a regular basis due to limited rainfall in ephemeral streams, and the low abundance of wetlands and their use.

Wetlands occur primarily at low elevations where the water table intersects with the land's surface. Wetlands and perennial streams together comprise less than 5% of the land (based on current CNMI GIS data layers). Wetlands alone cover a mere 2% of the CNMI, the majority of which are patchily distributed around the islands of Saipan and Tinian with riparian systems also occurring on Rota, and two lakes on Pagan. The importance of wetlands as the primary treatment for polluted surface water runoff, and for their hydrological function, wildlife habitat, and marine nurseries establishes them as high quality waters, which constitute outstanding CNMI resources. Therefore, wetlands are also designated as Tier 3 waters.

Table B-3 Classification of Wetland Uses and Water Body Tier Designation

Island	Water Body	Segment	Class	Tier	Reason for Designation
Saipan	Talofofo	13WET	1	3	Hydrological Function/Outstanding Resource
	Kagman	14WET	1	3	Hydrological Function/Outstanding Resource
	DanDan	16WET	1	3	Hydrological Function/Outstanding Resource
	Isley	17WET	1	3	Hydrological Function/Outstanding Resource
	Susupe	18WET	1	3	Hydrological Function/Outstanding Resource
	West Takpochau	19WET	1	3	Hydrological Function/Outstanding Resource
	Achugao	20WET	1	3	Hydrological Function/Outstanding Resource
Tinian	Makpo	9WET	1	3	Hydrological Function/Outstanding Resource
	Puntan Diaplolamanibot	10WET	1	3	Hydrological Function/Outstanding Resource
	Puntan Tahgong	11WET	1	3	High Quality/High Hydrological Function/Outstanding Resource
Northern Islands	Pagan	29WET	1	3	High Quality/High Hydrological Function/Outstanding Resource

The CNMI WQS also defines two classes of fresh water uses, Class 1 and 2. However, there are no Class 2 fresh surface waters in the CNMI. All fresh surface water bodies including, intermittent streams, perennial streams, and wetlands are Class 1. Therefore, all fresh waters should 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 use designation.

Saipan has one lake, several isolated wetland regions, and numerous intermittent and ephemeral streams, some with segments, which are perennially wet, but none of which flow all year for their entire length. Most of the islands' streambeds are used for hiking, and training by recreational and professional athletes.

Rota has no lakes, but it has some created wetlands, riparian areas, seeps, and several lush streams.

Tinian has only one lake named "Hagoi", as well as created and natural wetlands in the northern US military lease area. There is a protected wetland area near the water supply for San Jose village on the southern side of the island, but no known streams.

Some of these fresh water resources on Tinian and Rota are used as potable water sources, but none of Saipan's fresh waters are used in such a manner.

B.2. Water Pollution Control Programs

B.2.1. Water Quality Surveillance/Nonpoint Source Program

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The BECQ Water Quality Surveillance (WQS) Branch was established in 2013 and merged with the Non-Point Source (NPS) Program in January 2014. Its new acronym is WQS/NPS. The WQS/NPS administers several programs, the first being the collection, monitoring, and assessment of CNMI marine waters, and fresh surface waters: lakes, ponds, wetlands, and streams. There are no rivers in the CNMI

The WQS/NPS Program receives funding from the CWA Section 106, 319, Beaches Environmental Assessment and Coastal Health (BEACH) Act grant, and US Coral Reef Initiative program grants to reduce the impact of pollution on waters of the CNMI. The funds provide support for: monitoring and assessment of CNMI marine and surface waters; sanitary surveys and mapping of watershed health; administration of the 401 Water Quality Certification Program; staff for DEQ's Environmental Surveillance Laboratory and reagents for water quality analyses; education and outreach activities; and demonstration projects to teach residents how to reduce human contribution to non-point sources of pollution.

CNMI Water Quality Standards

In May 2014 the WQS/NPS branch amended the CNMI WQS to: incorporate EPA's 2012 Recreational Water Quality Criteria; add an antidegradation review for wetlands and Lagoon Areas of Particular Concern; prohibit any source of human or animal wastewater or sewage discharge within 50ft of a water body or course (whether wet or dry) or 25ft if on a cliff line/embankment; and refers to the WQS implementation guidance manual.

The Guidance Manual contains biological monitoring criteria, which is an integral tool for evaluating coral reefs, seagrasses, and benthic habitats' health. This data augments water quality data to thoroughly assess a waterbody's ecosystem health.

The WQS/NPS branch uses the prevalence of WQS exceedences and sanitary surveys to identify chronic types and sources of pollution. The branch works in close coordination with the BECQ Marine Monitoring Team, and the Wastewater, and the Earthmoving, and Erosion Control Branches and the Environmental Surveillance Laboratory. Data from sanitary surveys, in conjunction with water quality and biological marine monitoring data, are used together with information collected from other government and non-government agencies to identify and prioritize sites for remediation. This information is compiled into the biennial CNMI IR, which contains the list of 303(d) impaired waters. The list steers policy decisions for better environmental resources management and is the basis for creating Conservation Action Plans (CAP) for implementing remediation and restoration activities. CAPs are developed by government agencies and NGOs through a collaborative process, utilizing the best available science and stakeholder input.

Section 401 Water Quality Certification Program

The CNMI administers a CWA Section 401 Water Quality Certification Program through provisions contained within the CNMI WQS. A Section 401 certification is required for every federal permit, which may result in a discharge of pollutants to waters of the CNMI. This includes National Pollutant Discharge Elimination System (NPDES) permits for Saipan's municipal separate storm sewer system; the municipal Commonwealth Utility Corporation (CUC) wastewater treatment plants on Saipan; the package treatment plant on Mañagaha Island; and for EPA General NPDES Permits, such as that for discharges from construction sites larger than 1 acre.

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

B.2.2. Marine Biological Monitoring Program

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The Marine Monitoring Team (MMT) was initially established in 1996 to better understand the current conditions of jurisdictional coral reef and seagrass assemblages. In recent years, the MMT membership has consisted primarily of BECQ staff whom have improved data collection techniques, the accuracy of data, methodology for analysis, staff training, and geospatial coverage mapping (Houk and Van Woesik, 2006, Houk and Starmer, 2008, www.cnmicoralreef.net/monitoring.htm).

In the case of the CNMI, as with all island nations, discussions about surface 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 water quality values are affected by rainfall or storm events, tidal fluctuations, and other atmospheric, climatic, and oceanographic conditions. This dynamic nature makes all water quality data very difficult to use for assessing a region, a project's impact on a water body, or a pollutant source, if there is not a sufficient sample size with which to make inferences. It is much more efficient for island nations to use biological monitoring criteria (also referred to as "biocriteria") coupled with water quality measurements to assess water bodies.

It is the goal of the MMT to better understand human population impacts and development as population growth and development continue by assessing the CNMI's reefs, and seagrass beds within the lagoon and around the islands long term. The MMT provides pertinent data to elicit appropriate natural resources management decisions and policy, and to develop site-specific permit requirements for the protection of resources during, and after construction is complete.

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

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Individual Wastewater Disposal Systems Program

The CWA Section 319 and US Coral Reef Initiative program grants also fund BECQ's Wastewater, Earthmoving, and Erosion Control (WEEC) Program, which produced the CNMI/Guam Stormwater Management Manual, Volume I and II. Funds are used to update field manuals for contractors and site inspectors, and to inventory and inspect Individual Wastewater Disposal Systems (IWDS) throughout the CNMI.

Whereas large numbers of CNMI residents currently rely, and will probably continue to rely, on IWDS for treatment of wastewater, CNMI Wastewater Treatment and Disposal (WTD) Regulations require permits for all new septic systems and "other" small IWDS. The WTD regulations also cover certain types of animal feed operations and sets limitations on, and prohibitions to, grazing near streams and other CNMI waters. The WTD regulations were amended in 2009 to include a certification program for percolation testers, and requirements for wastewater treatment and collection system operators. This enabled the CNMI to administer standard nationalized exams and issue operator certifications that are fully transferrable to other states.

BECQ administers a prescriptive septic system construction, inspection, and operation permitting program which specifies septic system sizes based on percolation rates measured for each individual site.

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

Wastewater Treatment Systems, which 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 the NPDES program.

Land Disposal of Wastewater Program

Part 5 of the 2014 CNMI WQS prohibits "any source of human or animal wastewater or sewage discharge within 50 feet of any waterbody, or within 25ft of the top of any cliff/steep embankment", noting that a waterbody is defined as any "…water course/conveyance including modified stream courses and or any storm water drainage system, whether perennially wet or intermittently wet and dry". This was to address illicit discharges from outhouses, subsistence farm lots, and other small animal feedlots not covered by the WTD regulations.

Part 11 of the WQS also established the permitting program for various other types of wastewater generation not mentioned in the WTD regulations by including the discharge of brine

from reverse-osmosis desalination equipment, discharges from oil/water separators, and anything else that may create a liquid waste stream not covered by the WTD regulations.

Earthmoving and Erosion Control Permitting Program

The Earthmoving and Erosion Control Permitting Program provides the overarching permitting structure for the CNMI's "One-Start" Earth Moving permitting program. Nearly all forms of development or construction within the CNMI are required to obtain a One-Start Earthmoving Permit prior to commencing the activity.

One-Start Permits include approvals and conditions from three CNMI regulatory agencies, including BECQ, Division of Fish and Wildlife (DFW), and Historic Preservation Office.

The One-Start Permit review assures compliance with the Earthmoving and Erosion Control Regulations, which is the primary mechanism by which erosion and sedimentation from new construction sites are regulated within the CNMI, as well as post-construction stormwater quantity and quality. The Earthmoving and Erosion Control Regulations dates back to 1993, when the "then" Division of Environmental Quality substantially updated the program in 2006 with the adoption of new site design and construction standards in the form of the joint CNMI/Guam Stormwater Management Manual, Volumes I and II. This manual added up-to-date standards for both construction and post-construction stormwater treatment and BMPs design. Additional material was added in 2009 with the addition of a field manual and training program aimed at educating construction field staff and erosion control inspectors. The improvements have so far proven a success. Both American Samoa and the Republic of Palau have incorporated the CNMI/Guam Stormwater Management Manual into their own regulations in 2010. The Earthmoving and Erosion Control Permitting Program continues to do research on the latest methods and technology for erosion control and stormwater management. The Program also promotes a low impact development approach to improve water quality treatment, and rainwater reuse and recharge.

B.2.4. Safe Drinking Water and Groundwater Management Program

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Well Drilling and Well Operations

The BECQ Safe Drinking Water and Groundwater Management Branch administers the CNMI Well Drilling and Well Operation Regulations. These regulations require that wells be drilled by a licensed well driller and specify well siting criteria including set back distances from potential sources of contamination. The regulations also designate geographic groundwater management zones on Saipan.

Semi-annual water samples are required from all active wells in the CNMI.

Safe Drinking Water Database

Semi-annual ground water monitoring has been required by the CNMI for years, especially for nitrate and salinity indicators. The Safe Drinking Water Information System database is used to store and retrieve ground water quality information. Methods for analyzing the collected data and actions to be taken based upon the data are still lacking, including a comprehensive ground water management plan.

Underground Injection Control

The BECQ Safe Drinking Water and Groundwater Management Branch also administers the CNMI Underground Injection Control (UIC) Regulations. These regulations only allow Class V UIC wells in the CNMI. Examples of Class V UIC wells include in-ground wastewater disposal systems (septic system leaching fields) that serve 20 or more people and drilled wells for the disposal of reverse-osmosis brine wastewater.

B.3. Special State Concerns and Recommendations

As in previous years, the most common sources of water quality degradation remain: 1) Stormwater runoff from existing roads and development causing sedimentation; 2) failing wastewater infrastructure; and 3) wastewater and sewage discharge from free roaming feral and domesticated animals from small and medium sized subsistence farmers. There has also been a significant fish kill in the water surrounding Tinian and Saipan this reporting cycle.

B.3.1. Erosion and Sedimentation

Erosion of, and sedimentation from, improperly designed secondary crushed coral roads remains of special concern as these are the primary source of coastal water turbidity and NPS pollution. During rainy season, the fill material on these secondary roads washes into the ocean. During the dry season, more material is added to repair these roads. Then in the following rainy season they erode away again, thus setting up a cycle of repair and erosion, which has been a hindrance to our water quality for the past few decades. Environmentally sound construction of even one roadways is extremely costly, but well worth the investment. Phase I and II of the Cross Island Roadway Reconstruction Project was completed through the Kagman and LaoLao watersheds. This has significantly improved coastal water quality in those watersheds. The reconstruction project continues. Phase IIb and is currently underway on Capitol Hill in the Talofofo watershed. This phase should be completed by next reporting cycle.

However, there are many more roadways requiring the same attention, most notably, Mt. Takpochao road, which reaches the highest elevation on Saipan. This roadway's runoff affects many watersheds. It is currently graded at least twice a year to maintain its access, as funding construction of a paved roadway with appropriate BMPs is cost prohibitive due to budgetary constraints, and remains the primary hindrance to its completion.

B.3.2. Illicit, and Permitted Wastewater Discharges

BECQ has made significant strides addressing the second source of water quality degradation, failing wastewater infrastructure through the regulation of new development using the "One-Start" Earth Moving permitting program and implementing new design standards. However, the problem of how to address older developments, in particular road systems and unpaved coral roads, requires further attention. BECQ continues to address the latter by education and outreach with road crews and assisting with infrastructure improvement plans. Dedicating land for BMPs has been the primary obstacle, aside from funding major improvements.

The rehabilitation of Saipan's wastewater infrastructure is progressing under the auspices of Stipulated Orders entered into by the CNMI and EPA in 2009, and is well underway. BECQ continues to use the water quality data presented in biennial CNMI IRs to focus CUC's efforts on a handful of severely degraded coastal sites that appear to be impaired primarily due to sewer issues. Traveling from south to north, the first sewer in need of improvement is the San Antonio Lift Station, which requires an upgrade for the system to meet peak flow demands. CUC was in the process of addressing this issue when Typhoon Soudelor hit. This created a setback in completion of the project, thus sewer overflows have continue to lead to Enterococci exceedences at this site. It is hoped that the upgrade will be completed by next reporting cycle.

The next sewer line in need of repair is near the Sugar Dock beach area. This was reportedly repaired in late 2013. However, Enterococci exceedences continue to date, making the Susupe South Watershed (Segment 18B) a high priority for CUC to address.

Last reporting cycle the S1 Lift station at DPW Channel Bridge was found to be failing resulting in frequent overflows. This was brought to CUC's attention by the WQS/NPS branch. The lift station underwent renovation in 2015 and is reportedly now operating properly. However, the water quality standard for Enterococci continues to be exceeded at this site especially during rain events, which may be associated with the Mangrove wetland upland of the location. WQS/NPS continue to closely watch this site for overflows and NPS pollution.

Further north in the Dogas stream outlet of the Achugao Watershed raw sewage was reportedly seen in late December 2013. The WQS/NPS team immediately set out to conduct sanitary surveys of the three stream systems. As a result two forgotten manholes were discovered in the stream, one of which was a gravity feed line that was still in service. CUC sealed off the manholes immediately. Further detail of this joint collaborative project between community and government is reported in detail in Section C C.4.1.3.

Finally, the northern most site requiring attention was the SR1 Lift station located south of the Palms Resort located in Segment 20A, in the North Achugao Watershed. The surrounding community reported foul smelling stormwater in a nearby drainage. WQS/NPS responded and located an over flowing manhole cover in a drainage. CUC was called, discovered the pump was insufficient for the flow, and replaced it this reporting cycle. CUC reported that the station will be completely renovated within Fiscal Year 2016.

B.3.3. Feral and Domesticated Animal Waste Discharge

The third source of water quality degradation listed above, is wastewater and sewage discharge from free roaming feral and domesticated animals and livestock. This reporting cycle BECQ amended and adopted the 2014 CNMI WQS which provide the WQS/NPS staff with the authority to give a "Notice of Violation" (NOV) to any farmer or other individual who discharges animal or human wastewater closer than the mandated setbacks to any waterbody. This amendment addresses a previous enforcement gap within the DEQ Wastewater regulations for small operations and outhouses. Individuals that wish to continue their operations must come into compliance with the CNMI WQS to avoid fines or penalties. Should violators be found to be unable to pay are directed to meet with the USDA Natural Resources Conservation Service (NRCS) agents to apply for assistance through the Environmental Quality Initiative Program (EQIP). EQIP grants may be used to construct BMPs to prevent further discharges and environmental impacts by farm operations. This new WQS regulation and partnership with NRCS has resulted in a successful remediation of three streams in the Achugao Watershed on Saipan.

Implementation of CAPs and continued collaborative enforcement actions by WQS/NPS, WEEC, and Zoning, coupled with financial and expert assistance from NRCS is the primary means now used to remediate pollution sources. This new approach is effective and less time intensive and costly, compared to first determining a TMDL before commencing remediation. Such is the case with the community supported LaoLao Bay CAP, which has been almost completely implemented, resulting in vast improvement in that watershed's water quality.

To date, the CNMI has CAPs for three priority watersheds: Talakhaya on Rota, and Garapan and LaoLao Bay on Saipan that are now being implemented on a priority basis as funding allows.

B.3.4. Fish Kills, Toxins and Heavy Metals in Fish and Biota

Starting in August through September 2014 there were several fish kills reported surrounding the island of Saipan and Tinian. Samples of dead and sick Surgeon fish (*Acanthurus lineatus*) were collected by CNMI DFW and sent to the USGS National Wildlife Health Center in Hawaii for analysis. Mr. Theirry Work found no evidence of infectious diseases, fungi, viruses, or infestation of any parasites. He reported, "…the widespread nature of the mortality and the fact that it affected a single species, argues against a manmade spill or toxin." However, clinical signs and laboratory findings (or lack thereof) pointed to a natural marine toxin as a possibility. Fish guts tested positive for water-soluble toxins, but were not identified. Trey Dunn, DFW Fish Biologist stated that further testing would be carried out in the coming fiscal year.

This reporting cycle no further information has been gathered about other toxins or metal levels in fish tissue and biota. Elevated levels of Mercury have been found near Garapan and around the island of Mañagaha as reported last reporting cycle, as well as heavy metal contamination associated with WWII wreckage and unexploded ordinance around Agingan Point wastewater outfall. The lack of new information is due to limited staffing to take the lead in creating a Fish

Monitoring and Advisory Program for the CNMI that would be tasked with providing timely public fish consumption advisories.

This highlights the need to retain dedicated and skilled staff to develop and/or implement other water quality surveillance programs, such as the Probabilistic Monitoring plan now being carried out by the WQS/NPS and MMT branches. The Probabilistic plan was developed in 2010 to fill data gaps in CNMI water quality data. Its implementation became possible in 2013 with the hiring of additional staff. As a result, this reporting cycle more data is being regularly captured for future development of ambient values. Sustainability of this program depends entirely upon the capability and availability of BECQ's professional staff.

C. MARINE AND SURFACE WATER MONITORING AND ASSESSMENT

C.1. Monitoring Programs

BECQ maintains several monitoring programs; the Safe Drinking Water Quality, Marine and Surface Water Quality, and Marine Biological Monitoring Programs together evaluate ecosystem health.

The Safe Drinking Water Monitoring Program is described in detail in the Groundwater Quality Section D below. Monitoring is a requirement of that branch's CNMI Well Drilling and Well Operation Operations Regulations.

A description of the Marine and Surface Water Monitoring and Biological Criteria Monitoring Programs follows.

C.1.1. Marine and Surface Water Quality Monitoring and Notification

The Beaches Environmental Assessment and Coastal Health (BEACH) Act was promulgated in 2000. Grant funding as a result of this act supports the WQS/NPS Marine and Surface Water Monitoring and Notification Program. The data collected is used to assess CNMI water bodies for compliance with *Aesthetic Enjoyment, Recreational Uses,* and *Propagation of Aquatic Life* uses, which support *Fish and Shellfish Consumption*. In the past surface water quality was limited to coastal waters and one lake. However, since the CNMI Surface Water Quality Monitoring Plan was completed, stream monitoring has been on-going since 2013. However, data collection is limited to storm events in the CNMI's ephemeral streams. Therefore, data is very limited this reporting cycle due the effect of El Nino on the volume of rainfall.

CNMI surface water monitoring sites are shown in APPENDIX I. On a weekly basis, 38 fixed marine water or "West Beach" sites are sampled along Saipan's most used west coast.

The less used northeast and southeast coasts of Saipan have only six (6) sites each which are monitored using an 8-week rotational schedule coupled with the island of Rota (n = 12). When these sites are being monitored weekly, Tinian and Mañagaha sites are only monitored once a month for the entire 8-week cycle. After the 8-weeks, the islands are swapped and Tinian (10 sites) and Mañagaha (11 sites) are sampled weekly, while Saipan's east beach sites and Rota sites

are sampled just once each month. In so doing all beach sites are sampled while meeting boat availability for transport there, staffing, and other budgetary constraints.

Samples are collected and given to the BECQ Environmental Surveillance Laboratory for analyses within allowable holding times as specified in the Quality Assurance Program Plan (QAPP). The Laboratory maintains, and rigorously follows the QAPP, which includes Standard Operating Procedures (SOP) for sampling, testing, and reporting. The QAPP has two primary functions: 1) to assure that proper quality control practices are implemented in day-to-day laboratory tasks; and 2) to assure that the reported data are valid, of known precision and accuracy, and therefore, scientifically defensible.

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

Orthophosphate (PO_4) and Nitrate (NO_3) levels have been tested in drinking water since 2007 using a Flow Injection Analyzer (FIA) method. Refinement of the FIA method for marine water began in 2013, but interference from salinity has continued to be an issue as well as lack of trained staff to perform the analysis. It is hoped that with the hiring of new laboratory personnel in 2015, that the method will be well established to provide reliable nutrient data on a regular basis by the next reporting cycle.

C.1.2. Marine Biological Monitoring Program

Water Monitoring Programs that rely only on water quality data to assess ecological health may not be statistically rigorous enough to detect change over time due to low sample number compared with the high rates of change in pertinent water quality parameters. 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 when considering the high number of water bodies 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. For tropical marine waters, near shore coral reef assemblages and seagrass assemblages both show predictable shifts in response to nutrients, sediment loads, turbidity, and other proxies to 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 biological criteria for water body evaluation as described herein.

BECQ's WQS/NPS branch and the MMT collect marine water quality samples for laboratory analysis. This data used in conjunction with MMT biological survey data from seagrass, back reef, patch reef, reef flat and reef slope sites are used to evaluate water body health in accordance with EPA guidance materials.

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

The Saipan Lagoon *Halodule uninervis* assemblages were initially evaluated by assessing coverage of seagrass to turf and macroalgae coverage based upon replicated benthic assessment transects during each year (2012 CNMI IR). Only *H. uninervis* seagrass habitats were considered in this evaluation because they show the greatest sensitivity to watershed population and development (Houk and van Woesik 2008) and are widely distributed throughout the lagoon. In 2010, Houk and Camacho statistically quantified different cycles of seagrass and macroalgae growth due to annual seasonal cycles (i.e., temperature and sunlight), high pollutant loading (i.e., watersheds), 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 the 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); successfully out-competing the seagrass for sunlight and nutrients, and eventually space. Where high disturbance regimes and pollutant loading were noted persistent macroalgae growth would occur until wintertime when large-swell events increased lagoon surface currents beyond the threshold for macroalgae attachment. Thus, seagrass remains as the dominant canopy where disturbance regimes were high, even in the face of tainted water quality.

C.1.2.1 Seagrass Assemblages as Indicators of Aquatic Life Use Support

In accordance with these findings, Seagrass Assemblages surveyed between October 2013 and September 2015 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 based upon average of estimates between October 2011 and September 2013.

Fair Natural seasonal changes are apparent, existing assemblage has statistically similar abundances of *H. uninervis* and macroalgae based upon average of estimates between October 2011 and September 2013.

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.

Coral reef assemblages were initially evaluated by calculating a ratio of coral/crustose coralline algae (CCA)/branching coralline algae, which are favorable attributes for sustainable coral assemblages, to turf/macroalgae/fleshy crustose algae, which are unfavorable attributes (CNMI's 2008 IR; supported by Rogers, 1990, Richmond, 1997, Fabricius and De'ath, 2001, Houk and van Woesik 2010). A second metric of the coral assemblages was simultaneously considered: coral species richness per unit area, which is supported by 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 integrated report, CNMI benthic assemblage ratio's and

coral richness estimates were compared to global mean values to come up with a final ALUS evaluation status.

For this reporting period, the knowledge base presented above is utilized in conjunction with recent analyses of the long term monitoring dataset for the southern islands to make ALUS assessments. CNMI-wide, natural disturbances were evident in the CNMI from 2003-2006 (high populations of the coral eating starfish, *Acanthaster planci*, reported in Houk et al., 2007). Large declines in coral cover were universally noted, and impacts to the two metrics discussed above (benthic substrate ratio and coral richness) were also apparent, although less severe. Golbuu, et al., wrote in a 2007 report, that recovery from similar large-scale impacts was evident within five (5) years in Palau, thus agreeing with yet unpublished data from numerous MMT sites. However, where water quality is poor, and/or herbivory rates are low, slowed or halted recovery has been noted, and is expected (Hughes et al. 2007).

C.1.2.2 Seagrass Assemblages as Indicators of Aquatic Life Use Support

In accordance with these findings ***Coral Assemblages*** surveyed between October 2013 and September 2015 were evaluated as indicators of aquatic life use support (ALUS) as follows:

Good Minimal or significant impacts reported from disturbance events. If natural disturbances impacted coral assemblage metrics then *statistically significant recovery is currently underway*. If no significant impacts from natural disturbances then metrics were evaluated relative to those expected from 2012 reporting and *found to be higher than the mean average.*

Fair Minimal or significant impacts reported from disturbance events. If natural disturbances impacted coral assemblage metrics then *non-significant recovery trends are currently apparent.* If no significant impacts from natural disturbances then metrics were evaluated relatively to those expected from 2012 reporting and *found to be similar to the mean average.*

Poor Minimal or significant impacts reported from disturbance events. If natural disturbances impacted coral assemblage metrics then *no recovery trends are currently apparent.* If no significant impacts from natural disturbances then metrics were evaluated relatively to those expected from 2012 reporting and *found to be lower than the mean average.*

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.

Given that there is now existing data for water quality surrounding reef flats and about the benthic habitats from several sampling periods, assessments could be carried out this reporting cycle about these water bodies meeting their use designations.

In 2010, the CNMI partnered with US EPA Region 9, Guam EPA, and American Samoa EPA to carry out the first National Reef Flat Probabilistic Monitoring project as part of the Environmental Monitoring and Assessment Program for the Pacific Territories. Each island territory was provided with 50 randomly selected reef flat sites generated by EPA Office of Research and Development using a compatible probabilistic design and common set of survey indicators. Of the 50 randomly selected sampling sites assigned to the CNMI, 19 were assigned to Rota, 16 to Tinian, and the remaining 16 to Saipan. Each site was tested for pH, temperature, DO, salinity, turbidity, depth, Photosynthetically Active Radiation, chlorophyll-a, dissolved nutrients (ortho-phosphates, 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, as described above.

This same Probabilistic Monitoring was repeated this reporting cycle as part of the 2015 National Coastal Condition Assessment (NCCA) in July. This time logistics were made much more challenging due to CNMI's fiber optic cable being severed, which resulted in no communication to the outside world for two weeks prior to sampling. Transportation of staff and samples to and from the three islands was also exacerbated due to frequent and intense storms and typhoons during this period causing high surf hazards, wind shear, and power outages. Yet, all 50 samples were successfully frozen, shipped out, and received by the Corvallis laboratory in Oregon before Super Typhoon Soudelor hit the islands on August 3rd, 2015.

C.1.3. Other Information and Data Used

In addition to using the regular monitoring data provided by the WQS/NPS, MMT, Environmental Surveillance Laboratory, WEEC, and Safe Drinking Water Quality Programs, data from other sources have also been used in the assessments: 1) Data collected on fish tissue and biota contaminants by Dr. Gary Denton of the University of Guam, Water and Environment Research Institute (UOG-WERI); 2) Reports by Dr. Peter Houk of the University of Guam and the National Oceanic and Atmospheric Administration Coral Reef Ecosystem Division (NOAA-CRED) summarizing their findings on the remote volcanic northern islands; 3) Water quality data for the LaoLao Bay watershed restoration project; 4) a Stream Aquatic Survey conducted by the CNMI DFW; and 5) The NOAA Reef Resiliency Assessment Report.

C.1.3.1. UOG-WERI Fish Tissue and Biota Contaminant Studies:

UOG-WERI has collaborated with CNMI agencies to investigate contaminant levels in sediments and marine life found in portions of the Saipan Lagoon, and to attempt to identify sources of these contaminants since 2000. Data summarized in a 2008 report by Denton, indicated that most species sampled in most locations throughout the Saipan lagoon *were free of contaminants at any levels of concern*, although some species of bivalves in the Puerto Rico Dump area (coastal water segment 19A – W. Takpochau (North)) had levels of lead that exceeded US FDA standards. However, the use of these bivalves as an edible species is unlikely.

Fish tissue contaminant data was used in making fish consumption determinations. UOG-WERI found elevated levels of mercury (Hg) in more commonly consumed fish species that exceeded US EPA limits for unrestricted fish consumption from Hafa Adai Beach and Micro Beach area

(coastal water segment 19B – Central W. Takpochau) located some distance from known sources of Hg contamination. A follow up investigation aimed at identifying additional land-based sources of Hg identified the former site of Commonwealth Health Center's medical waste incinerator as the primary source of Hg enrichment. The incinerator was used for the destruction of medical waste from the hospital and other medical clinics on island for about 20 years before it was closed down in January 2006. Stormwater runoff from the facility entered a drainage network that discharged into the ocean at the southern end of Hafa Adai Beach. More recently published data from fish species analyzed in 2007 revealed that mercury concentrations in fish tissues from Hafa Adai Beach area are significantly lower than those determined in fish species analyzed in 2004-2005.

A more recent study by UOG-WERI on the Environmental Impacts of Formerly Used Defense Sites and Brownfield Sites on Aquatic Resources (Denton, et al, 2014) found that "Agingan Point (Isley West Segment 17A) is clearly a 'hot spot' that requires additional research on metal uptake in resident biota. Local people frequently harvest seaweeds and mollusks for food from the adjacent back reef area. The submerged metallic debris and demolition material littering the fore reef also serves as a fish aggregation site and is a favored fishing spot by many. Other such submerged dumpsites exist around the island and likewise encourage fish to congregate. Considering the impact of such submerged sites on the edible quality of these fish is clearly of major importance from a public health standpoint. Denton will be completing future fish tissue studies as funding is secured.

C.1.3.2. PMRI and NOAA-CRED Surveys of the Northern Islands

Ecological surveys and limited water quality sampling were conducted on three occasions in the remote, volcanic northern islands during the past decade. This research was conducted using a federal research vessel from the NOAA-CRED program and included both local and federal scientists and resource managers. The scientific cruises took place in the spring of 2003, fall of 2005, and spring of 2007. Each lasted approximately 30 days. Generally, the data summaries show that fish populations surrounding the remote islands are much larger compared with the populated southern islands (Starmer et al. 2008). The recent establishment of the Marianas Trench Marine Monument is expected to further these general findings. 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 aquifer. All of these natural, 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 watersheds, 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 sampling

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 island aquifers.

Based upon these reports, there is a firm basis for the classification of the water bodies and the Tiered antidegradation policy, both marine and fresh, in the northern islands to be considered fully supportive of the *Propagation of Aquatic Life* criteria for use designation.

These monitoring cruises continued through the summer of 2014. Water quality samples were collected throughout the northern islands and tested on ship for salinity, pH, temperature, DO, turbidity, nutrients, and Enterococci. This was the most robust water quality sampling effort carried out in the Northern Islands by BECQ to date. Data was used to support attainment of use designations in these waters.

C.1.3.3. LaoLao Bay Watershed Restoration Project

The Laolao Bay Watershed Restoration Project began in 2010 with the objective of reducing sedimentation in the lower near shore marine environment. Activities taken to meet this objective included upland reforestation of bare soil and grasslands, paving coral roads, constructing culverts and concrete stream crossings. Construction was completed in late 2014. Removal of sediment in the culverts and stream crossings was carried out by BECQ staff, volunteers and Micronesian Islands Nature Alliance (MINA) Rangers as part of community outreach and education efforts. Monthly monitoring data for Enterococci, salinity, pH, temperature, DO, and turbidity collected at six reef flat sites for this reporting cycle was compared to baseline water quality data to evaluate the effectiveness of these activities overtime. The efficacy is discussed in Section C.4.1.8.

C.1.3.4. CNMI Division of Fish & Wildlife Fresh Aquatic Survey

The CNMI DFW conducted a fresh water aquatic survey in August of 2008. Specimens from various stream systems in eight watersheds on Saipan were collected using dip net, trap and electrofishing during the course of the survey. This 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 Propagation of Aquatic Life use designations for the sampled watersheds. Details may be found under each watershed heading in Section C.4.1 .

NOAA Coral Reef Conservation Program, in conjunction with USGS, University of Guam, BECQ, and many other research institutes and laboratories, studied the ecological resilience of coral reef systems on the reef slope (approximately 30ft contour) near Saipan, Tinian, Aguigan, and Rota to stressors in the face of an ever rapidly changing climate. These findings are an important tool for natural resource managers to create and implement Resilience-based management CAPs to provide the most benefit for coral reef ecosystems with limited available resources. Unsurprisingly data showed, “…sites remote from the human population centers have the highest resilience scores….” Connectivity for receiving coral larvae, as well as producing coral larvae for self-recruiting, and herbivore biomass are key elements for reef resiliency. This work will be expanded upon in coming years to study ecosystems in shallowing waters near the coast,

which will be used as additional criteria for determining if waterbodies were meeting their *Propagation of fish / Fish consumption use designation* in future CNMI IRs.

C.2. Assessment Methodology

C.2.1. Water Body Segmentation - Watershed Approach

Since 2010 CNMI water quality has been assessed in terms of water body segments based on established watershed units. Streams, lakes, and wetlands are reported solely by watershed. Coastal water segments are also reported by watershed, but some coastal waters on Saipan have been split into two or more sub-segments, in order to take better advantage of the larger quantity of data and to better differentiate between areas with known sources of pollutants. Aguigan ("Goat Island") and each of the Northern Islands are assigned only one watershed segment. APPENDIX I contains detailed maps showing all assigned watersheds and water body segments used in this report.

C.2.2. CNMI Designated Uses

Although the language of the CNMI WQS differs somewhat from the terminology used in the CWA the basic guaranteed use designations are the same. The 2012 CNMI IR stated that the "fish consumption" designation was not clearly stipulated in the CNMI WQS. This was addressed during the 2013 WQS Triennial review. BECQ requested EPA Region 9 to review the WQS language that reads, "support/protection and propagation of shellfish and other marine life" to see if further "fish consumption" language was needed. EPA determined that the present wording incorporated "fish consumption" by the fact that the fish consumption criteria are included in the list of Priority Toxic Pollutants in the CNMI WQS (Part 8.11). However, in the interest of maintaining consistency with other states, the standard CWA terminology "fish consumption" is also used in this report and uses additional criteria for determining whether or not the use designation is being attained (see Table C-1).

The CNMI WQS established criteria designed to protect the designated uses for each Class of waters. Select criteria are shown in Table C-2. The manner in which water quality data are used to assess attainment of each designated use is discussed in more detail on the pages that follow.

The 2014 CNMI WQS incorporated numeric marine biological monitoring criteria that have been used by the MMT for years. The methodology is discussed in the Implementation Guidance Manual that was published with the amended CNMI WQS in the Commonwealth Register. These methods are described in Section C.1.2 above, and were used to determine compliance with the *Propagation of Aquatic Life* use designations.

Table C-1 Designated Use Terminology as used in this report

Designated Use Categories used in this report	Designated Uses 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, see above	(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, groundwater recharge"	(not applicable – no class 2 waters in CNMI)
Aesthetic Enjoyment/Others	"Aesthetic enjoyment"	(not applicable – no class 2 waters in CNMI)
WETLANDS		
Propagation of Aquatic and Terrestrial Life	"shall be protected to support the propagation of aquatic and terrestrial life"	

Table C-2 Selected 2014 CNMI WQS "Water Quality Criteria"

PARAMETER	CLASS AA Marine Waters	CLASS A Marine Waters	CLASS 1 Fresh Waters	CLASS 2 Fresh Waters
Enterococci (CFU/ 100 ml)	GM[1] < 35 <130 Single Sample	GM[1] < 35 <130 Single Sample	GM[1] < 35 ‹130 Single Sample	GM[1] < 35 ‹130 Single Sample
E. coli (CFU/100 ml)			GM[1] < 126 <410 Single Sample	GM[1] < 126 <410 Single sample
pH	7.5 – 8.6 <0.5 from ambient	7.5 – 8.6 <0.5 from ambient	6.5-8.5 <0.5 from ambient	6.5 - 8.5 <0.5 from ambient
NO_3 - N (mg/L)	< 0.20	< 0.50		
Total Nitrogen (mg/L)	< 0.4	< 0.75	< 0.75	< 1.50
Orthophos (mg/L)	< 0.025	< 0.05	< 0.10	< 0.10
Total Phos(mg/L)	< 0.025	< 0.05	< 0.10	< 0.10
Ammonia (mg/L) (un-ionized)	< 0.02	< 0.02	< 0.02	< 0.02
Dissolved O_2 (%)	≥75	≥75	≥75	≥75
Total Filterable uspended Solids (mg/L)[2]	5	40	5	40
Salinity (‰)[2]	10	10	20‰ or above 250 mg/L Chlorides	20‰ or above 250 mg/L Chlorides
Temperature (°C)[2]	±1.0 from ambient	±1.0 from ambient	±1.0 from ambient	±1.0 from ambient
Turbidity (NTU)[2]	±0.5 from ambient	±1.0 from ambient	±0.5 from ambient	±1.0 from ambient
Radioactive Materials	Discharge prohibited	Discharge prohibited	Discharge prohibited	Discharge prohibited
Oil & Petroleum	ND[3]	ND[3]	ND[3]	ND[3]

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

C.2.3 Criteria and Assessment of Marine Coastal Waters Designated Uses

Attainment or impairment of each designated use was determined for CNMI Waters based on available data from the WQS/NPS, MMT, and other biological monitoring programs, in addition to sanitary surveys, DPW and CUC field observations and activities, and other available studies as indicated in Section C.1.3., above. The marine and surface water quality and marine biological monitoring data was collected during fiscal years 2014 and 2015.

At present, Saipan's coastal waters receive by far the greatest attention from the Monitoring Programs and has the most data. Therefore, BECQ has high confidence in these assessments, and

is gaining a clearer understanding of the other islands as more data is being gathered from the islands of Rota, Tinian and the Northern Islands.

Table C-3 summarizes the criteria used to assess attainment of a Coastal Water's designated uses. A discussion of each use and the water quality parameters associated with it follows.

Table C-3 Assessment Criteria for Coastal Waters

Designated Use	Criteria for Attainment
Propagation of Aquatic life	• Habitat suitability: biomonitoring criteria (ALUS) score of "fair" or "good" for all sites within segment and other study results • Dissolved oxygen: less than 10% of samples exceeding criteria for all sites within segment • Nutrients (Nitrate and/or Orthophosphate): less than 10% of samples exceeding criteria for all sites within segment. • Ambient water quality criteria met (where data is available) • General provisions met: floating/settleable solids, pH, radioactive substances
Fish consumption	• Fish tissue data shows fish collected within segment to be free of contaminant concentrations exceeding USEPA standards, or very low likelihood of fish tissue contamination due to current or historic land use patterns in adjacent watersheds.
Recreation	• Enterococci bacteria: less than 10% of sample events resulting in beach advisory for all sites w/in segment • General provisions met: floating/settleable solids, pH, radioactive substances
Aesthetic Enjoyment/Other	• Empirical evidence • Student findings, published research, studies, tourist surveys, editorials, etc.

C.2.3.1. Propagation of Aquatic Life

Biological Monitoring Criteria, Dissolved Oxygen and pH

Dissolved Oxygen (DO%) results are used along with biological monitoring assessments to determine whether a water body supports *Propagation of Aquatic Life.* 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 to obtain accurate and scientifically defensible results. In the Fiscal year 2008-2009 reporting cycles it was noted that staff collecting data on the islands of Rota and Tinian had provided inaccurate DO% results due to improper calibration. Therefore, the results were erroneous and not reflective of water body health. In response, BECQ

successfully conducted staff training in 2011 and all YSI measurements of DO% since that time are accurate and have been used for making assessments. Results for DO% are provided in APPENDIX IX.

Additional studies were published in 2015 by a consortium of collaborators concerning reef resiliency for the islands of Saipan, Tinian/Aguigan ("Goat Island"), and Rota (Maynard, J., et al). This document augments the biological monitoring assessments conducted by BECQ's MMT on reef flats and seagrass beds. The assessments are used to determine habitat suitability and which waterbody segments met the *Propagation of Aquatic Life* Use Designation, and which were impaired.

Nutrients (Orthophosphate and Nitrate)

Orthophosphate (PO_4) was last monitored in 2004 and found to exceed CNMI WQS in all waters that were assessed. However, BECQ simply adopted its nutrient WQS from another state. Therefore, it may not be representative of natural conditions for CNMI waters. Some data collected in the past from sites that have no known anthropogenic sources of PO_4 could be considered as ambient for CNMI coastal waters. The fact that PO_4 concentrations found at these sites exceeded the current WQS makes the present concentration somewhat suspect. Moreover, the spectrophotometer method used at that time is now known to be inaccurate for marine water.

Therefore, one staff was hired to train and run a new Flow Injection Analyzer (FIA) method for marine water in 2013. However, that staffer has since retired. A new staff was hired to replace the outgoing staff. Although, they have now mastered the FIA method for *fresh* water, they had not yet completed the initial capability studies for marine water by the time of this writing. It is hoped that the Environmental Surveillance Laboratory will have accurate marine water nutrient data for the next reporting cycle.

General Provisions

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

Radioactive substances are also an obvious health risk to most designated uses. The CNMI WQS prohibit any level of radioactivity.

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

To date, pH levels at regular monitoring sites, and site specific monitoring sites for NPDES permit compliance, show little variance from the allowable levels set forth in the CNMI WQS and Implementation Guidance Manual. However, a couple of sites in heavily developed areas next to

shallow collection sites have shown exceedences for pH. These exceedences are specified and discussed in the subsequent Watershed Subsections for each island in this report.

All water quality samplers are given regular training in YSI operation and calibration methods, to prevent further inaccuracies in in-situ measurements.

C.2.3.2. Fish and Shellfish Consumption

Mercury contamination of fish tissue has been associated with Saipan's Central W. Takpochau water body segment 19b, and other metals within the Agingan outfall in the West Isley Watershed. However not at levels of concern according to the study's author, Dr. Denton, a toxicologist with UOG WERI.

These previous studies raise the possibility that fish tissue and other biota contamination may exist in other water bodies as well. However, there is not sufficient data available at this time to assess other water bodies. Fish tissue testing continues to be conducted by UOG/WERI staffing, as funding and resources are made available.

C.2.3.3. Recreational Use

Fecal Indicator Bacteria

Enterococci, concentrations exceeding CNMI WQSs *may* pose a public health threat for individuals fishing or swimming in waters should this be indicative of the presence of fecal contamination (rather than resuspended sediment containing naturally occurring Enterococci not associated with wastewater). As a conservative measure, a Public Beach Advisory for marine waters is issued whenever Enterococci WQS criteria are exceeded.

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

The two criteria levels require that the Single Sample Result from that day be compared to 1) The Statistical Threshold Value (STV) (which is an approximation of the 90th percentile or confidence interval of the data distribution with an outcome risk of illness for 3.6% of recreational users); and 2) The Geometric Mean (GM) over a 30 day period.

Given that, Public Beach Advisories for *Recreational Use* of said waters are calculate as follows:

> 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 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 uses are being attained for those locations that are 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 a 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 safe recreational use 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 would be a better means for deciding when a Public Beach Advisory is needed to protect human health.

In the interest of investigating the effect of using a more robust GM, the percent of Beach Advisories were recalculated for both fiscal years using a GM calculated from data for the full two year reporting cycle, instead of for just a 30-day increment. Table C-4 below shows that there would be an 18% reduction in Beach Advisories for the islands of Saipan and Mañagaha, a 7% decrease for Rota, and a 9% decrease for Tinian.

Table C-4. % Decrease in Yearly Advisories if GM is based on 2 years of data instead of 30 days

Average % Difference			
Island	**2014**	**2015**	**Ave for Reporting cycle**
Saipan	18	18	18
Rota	14	-1	7
Tinian	3	14	9
Managaha	36	0	18
	Overall % Decrease		**13**
Note: negative indicates an increase			

Unsurprisingly, only sites located in areas that are highly developed or near heavily populated drainages saw increases in Beach Advisories. This is because those sites would more frequently have high concentrations of Enterococci, thus a high GM level. This is of interest, but it would not substantially change the list of impaired Waterbody segments for the *Recreational* use designation this reporting cycle. The only changes would be that the Susupe North (18A) and W. Takpochau South (19C) segments on Saipan would not revert to impaired status, and Tinian's Harbor (T9) would not be added to the 303(d) list.

Since the previous list of waterbody segments impaired for Recreational use weigh heavily in determining this reporting cycle's list, Susupe North and W. Takpochao remained on the list.

Tinian's Harbor was also added to the list as it is known to be in a heavily populated and developed "industrial" area.

It was also important to investigate if the large number of significant storm events passing the Marianas the past two fiscal years had any effect on the percent of Beach Advisories. This was of interest as storm waves re-suspend sediment carrying naturally occurring enterococci causing WQS exceedences; and consequently unnecessary Public Advisories when no fecal contamination has actually occurred at a site. Consequently, some "red flags" are merely precautionary, as no known discharges of fecal contamination has actually occurred at the site; only non-point sources of pollution from drainages as ground-truthed from sanitary surveys. 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" (A. Abdelzaher, et al., 2010).

Table C-5. Significant Storm Events in the Marianas (≥ 35 mph & ≤ 250 nautical miles)

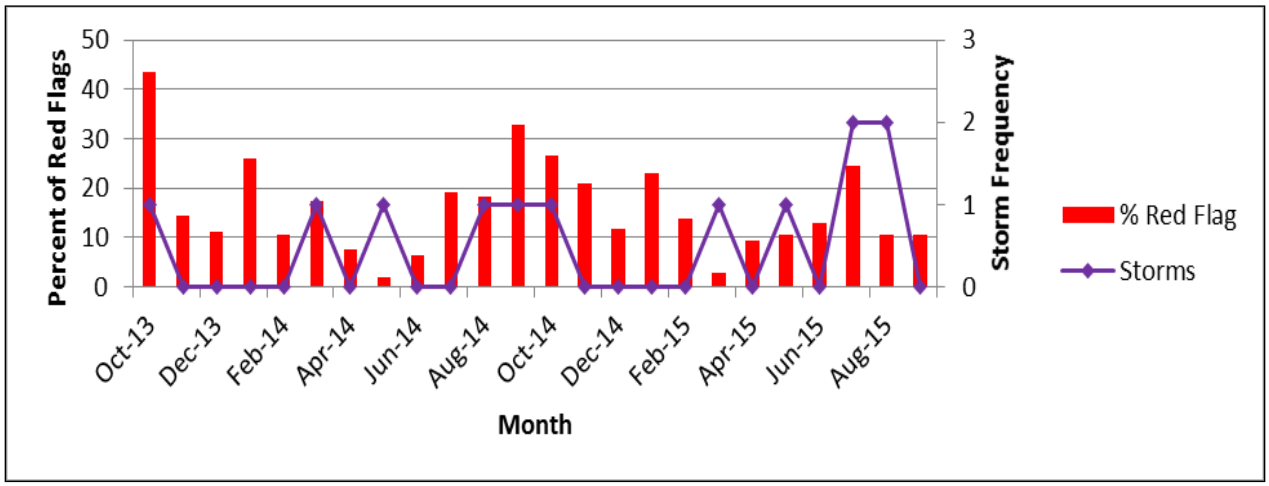
					Proximity		Winds	
Date	**Name**	**Category**	**Lat**	**Long**	**kM**	**Miles**	**Knots**	**MPH**
10/04/13	**Danas**	Tropical Depression	16.4	145.5	140	**76**	30	**35**
03/04/14	**Faxai**	Tropical Storm	14.9	149.9	450	**243**	55	**63**
04/29/14	**Tapah**	Tropical Storm	15.3	147.5	190	**103**	35	**40**
07/31/14	**Halong**	Tropical Storm	15	141.6	450	**243**	45	**52**
09/30/14	**Phanfone**	Tropical Storm	16.9	145.5	190	**103**	45	**52**
10/05/14	**Vongfong**	Typhoon 2	14.4	145.1	110	**59**	90	**104**
03/15/15	**Bavi**	Tropical Storm	14.1	146.5	140	**76**	50	**58**
05/15/15	**Dolphin**	Typhoon 3	14.8	143.5	250	**135**	110	**127**
07/05/15	**Chan Hom**	Tropical Storm	15	144.3	160	**86**	50	**58**
07/09/15	**Nangka**	Typhoon 4	16.5	147.8	270	**146**	120	**138**
08/02/15	**Soudelor**	Typhoon 2	15.1	145.9	95	**51**	105	**121**
08/16/15	**Goni**	Typhoon 1	15.6	143.5	210	**113**	65	**75**

Data source: www.weather.unisys.com/hurricane/w_pacific/2013/index.php and for 2014 & 2015

In order to evaluate storm impacts, a list of those storms considered significant based on their intensity (sustained wind speeds ≥ 35 mph or 30 Knots) and proximity to the islands (≤ 250 nautical miles or 463 kM) was created from data provided by the NOAA Weather website (: www.weather.unisys.com/hurricane/w_pacific/2013/index.php and for 2014 & 2015). Twelve (12) intense storms passed by the islands of Saipan, Tinian and Rota from October 2013 through August 2015, Table C-5 above.

A linear regression was plotted of percent "Red Flags" versus the month and number of storms that passed as shown in Figure C-1.

Figure C-1. Effect of Significant Storm Events on the Percent of Beach Advisories on Saipan



However, there does not appear to be a close correlation between storm events and Public Beach Advisories. Perhaps if samples were collected immediately after the storms had passed a more evident pattern would have immerged.

Therefore, the method for determining whether a waterbody meets it *Recreational* Use Designation this reporting cycle, as in the past, was based on Public Beach Advisories derived from the 30-day GM and the single sample STV exceedences. An entire waterbody segment is listed impaired when there is more than 10% Public Beach Advisories in a given year, for any single monitoring site within the segment.

Tables containing each Island's attainment of designated uses and 305(b) CALM assessments are contained in APPENDIX III through V. Enterococci results are provided in APPENDIX IX.

General Provisions

See discussion in Section C.2.3.1 above.

C.2.3.4. Aesthetic Enjoyment and Other Uses

The attainment of *Aesthetic Enjoyment and Other Uses* of a water body is not systematically defined in the CWA, but by anecdotally applying the general definition of *Aesthetic Enjoyment* as "appreciation of beauty", one may draw a conclusion as to whether or not this designated use has been attained for each waterbody based on reported uses and surveys.

The Marianas Visitor Authority (MVA) with the assistance of Market Research and Development, Inc. began conducting tourist exit surveys in 2011, which continue to date. MVA survey results this reporting cycle show that the majority of visitors report satisfaction with different aspects of their trip including enjoyment of CNMI coastal waters. Their satisfaction is based on a 7-point scale ranging from "very dissatisfied/strongly disagree" to "very satisfied/strongly agree". These

data, along with other anecdotal information, and professional judgement were used to assess whether or not *Aesthetic Enjoyment* had been attained.

As to *Other Uses*, which refers to oceanographic research, the many white papers, research documents and publications available to assess its attainment in CNMI waters is evidence onto itself.

C.2.4 Criteria and Assessment of Surface Waters' Designated Uses

Table C-6 below summarizes the criteria used to assess attainment of a fresh surface water's designated uses. A Surface Water Quality Monitoring Plan for fresh water, lakes and streams was established in late 2013. Implementation of the plan began last reporting cycle. However, there is insufficient water quality data at this time for assessing all surface water bodies for every use designation. Some sanitary survey stream assessments have been completed for the Achugao and LaoLao watersheds, with preliminary work completed on a portion of the Talofofo watershed. This visual assessment of habitat by field personal is the foundation of determining whether use designations are being met or are impaired this reporting cycle.

Table C-6 Assessment Criteria for Surface Waters

Designated Use	Criteria for Attainment
Propagation of Aquatic life	• DO: less than 10% of samples exceeding criteria for all sites within segment • General provisions met: floating/settleable solids, pH, radioactive substances • Habitat suitability: biocriteria (ALUS) score of "fair" or "good" for all sites within segment and other study results
Fish consumption	• Fish tissue data shows fish collected within segment to be free of contaminant concentrations exceeding USEPA standards; or very low likelihood of fish tissue contamination due to current or historic land use patterns in adjacent watersheds; or lack of edible fish species present in water.
Recreation	• E. coli bacteria: less than 10% of sample events resulting in exceedence of criteria • General provisions met: floating/settleable solids, pH, radioactive substances
Potable Water Supply	• E. coli bacteria: less than 10% of sample events resulting in exceedence of criteria • General provisions met: floating/settleable solids, pH, radioactive substances
Aesthetic Enjoyment & Other Uses	• General provisions met: floating/settleable solids, pH, radioactive substances • Self-reporting by users • Research papers, documents, tourist surveys, studies, etc.

Lake Susupe, the only lake on Saipan is tested for bacteriological, chemical and physical parameters on a regular basis. A discussion of each Use Designation therein and the water quality parameters associated with it follows in the specific Watershed subsection C.4.1.7.

C.2.4.1 Propagation of Aquatic Life

The CNMI does not have an established biological monitoring program for aquatic life in fresh water bodies. However, sanitary survey data collected on stream systems by WQS/NPS staff were used to map locations of fresh water pools that contained aquatic life.

Additionally, McKagan, et al, 2008, study was also used. The DFW on Saipan completed a two-week survey. Eight different watersheds were studied to assess native and introduced freshwater species using a dip net, and where possible, electrofishing to collect samples for identification and accessing aquatic life. Although, this study provides data on some streams within Saipan there is insufficient data on the remaining stream systems to determine if all are supporting aquatic life.

C.2.4.2 Fish/Shellfish Consumption

At present, no contaminants have been tested in fresh water fish tissue or other biota to determine if our surface waters are attaining the fish consumption use designation. However, in the case of the northern islands and other remote locations on the inhabited islands, their remoteness from any potential anthropogenic sources of pollution is taken into consideration for assessment purposes.

C.2.4.3. Recreational Use

There were few water quality data collected this reporting cycle for assessing the *Recreational* Use Designation of fresh surface waters. This was due to El Nino causing limited rain events resulting in low or non-flowing ephemeral streams. However, as new data becomes available exceedences of the WQS for the fecal indicator bacteria, *Enterococci* and *E. coli*, are calculated as follows:

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

Due to the lack of available water quality data, professional judgment and anecdotal information collected during visual field sanitary surveys and stream mapping are used this reporting cycle to assess whether or not surface waters support the *Recreational Use Designation*.

C.2.4.4. Potable Water Supply

At present, there is not enough data available to assess whether streams are impaired or have attained the *Potable Water Supply* Use designation. However, surface water lakes, ponds, or

streams on Saipan are not used as potable water supplies. Those on Tinian and Rota are monitored for quality by CUC before treatment

C.2.4.5. Aesthetic Enjoyment/Other Uses

As stated for the *Recreational* Use designation, there has been no data systematically collected concerning visitor or residents aesthetic enjoyment of fresh surface waters. However, professional judgment, anecdotal information, and visual field assessments, are used to determine whether or not surface waters provide *Aesthetic Enjoyment* for users.

C.3. US EPA CALM Assessment Categories for Marine and Surface Waters

The Consolidated Assessment and Listing Methodology (CALM) Categories were utilized as described in the 2005 *EPA Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the CWA,* and in the recent *2016 USEPA Memorandum from US EPA containing information concerning 2016 Clean Water Act Sections 303(d), 305(b), and 314 Integrated Reporting and Listing Decisions.*

Table C-7 EPA "CALM" Reporting Categories

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

[1] Should WQS data not be available due to hydrological alteration (not a pollutant); assign 4c

[2] CWA defines "pollution not caused by a pollutant" as "the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water" (Section 502(19))

Each water body type has been assigned a CALM Category based on the descriptions in Table C-7 above. Each class of coastal marine and surface waters were assessed and assigned a CALM Category as further described in the following sections.

C.3.1. *Category 1*: Attaining all designated uses and water quality standards, and no use is threatened.

Category 1 represents the highest level of attainment. A water body classified as Category 1 meets all applicable WQS and criteria throughout the entire water body. 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 biocriteria 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. Waters of the northern islands and Aguigan, for example, are assumed to be Category 1 in part due to the fact that they are mostly uninhabited and undeveloped, in spite of limited available monitoring data.

C.3.2. *Category 2*: Attains some of the designated uses; no use is threatened or impaired; and insufficient data or no data and information is available to determine if the remaining uses are attained, threatened, or impaired (with presumption that all uses are attained).

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.3.3. *Category 3*: Insufficient data and information to determine if designated uses are attained.

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

Category 3 water body 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 designated uses;
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 showing the potential presence of stressors that may cause impairment of one or more uses; however, no quantitative water quality information confirms the presence of impairment-causing stressors. For example, fish tissue data is not available for most water body segments of the CNMI, but the contamination that has been found in other biota has occurred only in water bodies where either current or previous land uses include potential sources of contaminants. Therefore, most CNMI water bodies that have been contaminated from war time ammunitions, dumps, or abandoned equipment, or are adjacent to current or previously developed areas, are listed as Category 3 for the fish consumption designated use;
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.3.4. *Category 4*: Impaired or threatened for one or more designated uses, but does not require development of a TMDL.

A water body 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 predicted 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 indicates 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 Sub-Categories when:

C.3.4.1. Category 4a: *TMDL is completed,* but insufficient new data exists to determine that attainment has been achieved.

C.3.4.2. Category 4b: *Other pollution control requirements are reasonably expected to result in attainment of standards 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, CAPs are in place and being implemented, or contracts for hazardous waste remediation projects.

C.3.4.3. 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 approached to address source of impairment.

C.3.5. *Category 5*: Waters impaired or threatened for one or more designated uses by a pollutant(s) and a TMDL is required.

Waters 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 standard, 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 waters 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 use.

C.4 305(b) Assessment Results for ALL CNMI Marine and Surface Waters

This section gives a general overview of the assessment results for all waters of the Commonwealth. The following sections discuss findings based on each type of water body.

Coastal Marine Waters

Almost all coastal marine waters of the southern inhabited islands are not supporting at least one Use Designation, except for the Carolinas watershed on Tinian, and the Dugi/Gampapa/Chenchon watershed on Rota. Both watersheds are remote, undeveloped and surrounded by coastal waters too hazardous for regular access. Based on this and professional judgement they are now listed as fully supported for all use designations (CALM Category 1).

This is also true for the Northern Islands and Tinian's neighboring island Aguigan ("Goat Island"), which also fully supports all use designations (CALM Category 1).

Both LaoLao and Kagman watersheds on Saipan were removed from the impaired list for the *Recreational Use* Designation this reporting cycle due to improved bacteriological water quality. This is associated with the completion of road improvements in both these watersheds and implementation of the LaoLao Bay CAP (a community based and supported plan) in the LaoLao Watershed.

However, there were watersheds returned to impaired status. This was true for the North Susupe and the North Achugao watersheds on Saipan, which again experienced Enterococci exceedences. It is hoped that the municipal wastewater utility improvements underway and BECQ's ongoing collaboration with homeowners to discontinue illicit discharges and other NPS of pollution, that water quality will improve.

As was reported in the previous reporting cycles, there was interference encountered with the past testing method for nutrients. Unfortunately, nutrient data using the new FIA method was not available this reporting cycle, due to: 1) Unavailability of trained staff; and 2) All stored frozen nutrient samples were lost (thawed) as a result of island-wide power outages after Typhoon Soudelor.

Therefore, the *Propagation of Aquatic Life* Use Designation could not be fully reassessed using all criteria. However, DO%, pH, and biological monitoring data were available for its assessment. Overall, biological conditions for the southern islands generally receive a "fair" to "good" ranking when situated some distance away from large, populated watersheds. For instance, all sites on the outer barrier reef of Saipan have consistently high or fair rankings. Similarly, most sites on the less populated islands of Tinian, Aguigan, and Rota also show ecologically resilient assemblages, with notable maintenance or improvement in coral metrics since the 2003 through 2006 natural disturbance event (i.e., coral eating starfish predation).

A few sites have consistently received poor ratings over time. Biological monitoring suggests that degradation at these sites is likely due to a reduction in herbivory and/or water quality. This coincides with Enterococci water quality violations that are consistently higher in the more populated watersheds and those with piggeries and cattle near streams and shorelines.

It is the goal of BECQ MMT to continue to utilize coral and seagrass trend data to provide estimates of the direction, positive or negative, that biological assemblages are headed, and rank the associated water bodies in accordance with those trends for the assessment of the *Propagation of Aquatic Life*. However, some adjustments to the biological rating protocol may be necessary in the future, especially for the island of Rota.

In general, it is thought that Rota "naturally" has lower coral cover than the islands of Saipan and Tinian. This stems from geological and hydrological differences between the islands, rather than anthropogenic impacts. Rota may have received a low biological rating relative to Saipan and Tinian in this report. However, given that Rota's biological monitoring sites are those with the lowest level of anthropogenic stressors compared to Saipan and Tinian, the present reef and seagrass biological ratings should 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 results, and professional judgement when it comes to the current rating 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 has begun watershed sanitary surveys at these sites to identify the type and source of pollutants driving these poor rankings. This information is used to directly address violations, and prioritize impaired watersheds for remediation or restoration actions in community supported CAPs.

This is the second CNMI IR to assess *Aesthetic Enjoyment* using anecdotal information and Tourist Exit Survey data collected by the MVA. Responses from October 2013 through September 2015 found that 80% of those surveyed said their primary reason for visiting the CNMI was for pleasure/vacation and their secondary reasons were tropical climate, sea, or beach, followed by snorkeling and nature activities.

Figure C-2 2015 MVA Tourist Exit Survey Results

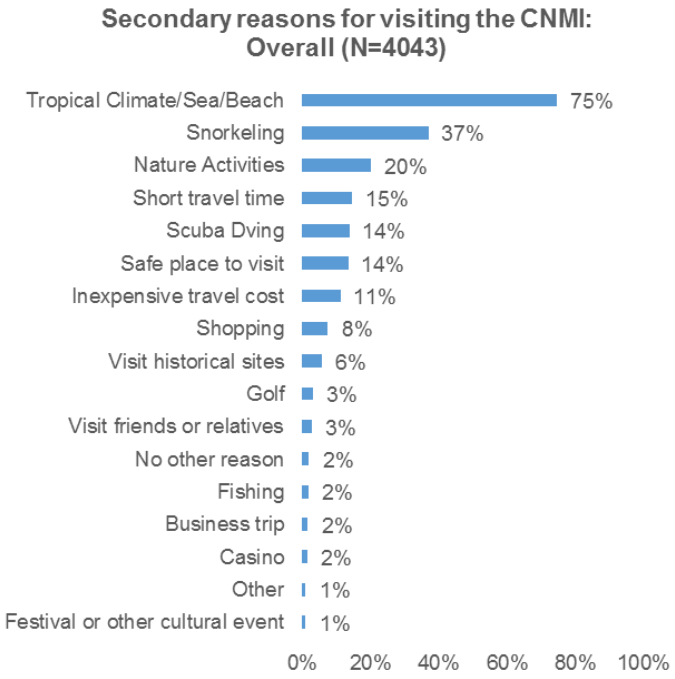
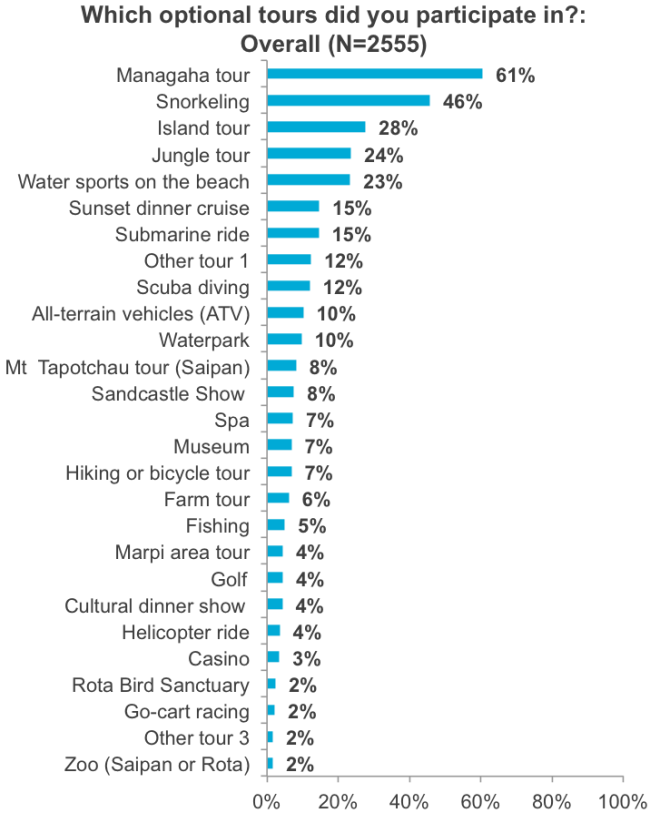


Figure C-3 2015 MVA Tourist Exit Survey Results, continued



Furthermore, Survey results also show that no matter the visitor's home of origin, China, Korea, Japan, or other, their satisfaction with snorkeling, SCUBA, and water sports received a satisfaction score of better than 80 (1 being lowest, and 100 being highest). Scenery / Parks and Beaches similarly received a Satisfaction Score of 83 or over.

Given these results, and the fact that island residents enjoy these same beaches every day, especially on weekends, it is assumed that all coastal waters of the CNMI are presently attaining the *Aesthetic Enjoyment* use designation.

The "*Other Uses*" of this designation includes oceanographic research, of which there has been a pronounced increase since the designation of the National Marine Monument. Students, scientists and hobbyists have been allowed to study CNMI coastal waters, coral reefs, fishes and other marine life for decades as proven by the many published scientific papers referenced herein, editorials elsewhere, and school reports by local students. Therefore, it is assumed that all waters of the CNMI are presently attaining the "*Other Uses*" designation as well.

Tables C-8 through C-10 provide the total miles of coastal waters attaining, not attaining, or with insufficient information to determine as to whether or not each use designation supported.

Table C-8 Coastal Marine Waters - Designated Use Support Summary

Designated Use	Size of Surface Waters in Linear Miles				
	Total in State	Total Assessed	Supporting / Attaining WQS	Not Supporting / Not Attaining WQS	Insufficient Data and Information
ALL COASTAL WATERS: (Class A & AA)					
Support and propagation of shellfish and other marine life	235.3	227.3	140.4	86.9	8.0
Fish/shellfish consumption	235.3	149.6	145.0	4.6	85.7
Recreation with risk of waterborne illness	235.3	229.9	151.8	78.1	5.4
Aesthetic enjoyment/other uses	235.3	235.3	235.3	0.0	0.0

Table C-9 Size of Coastal Marine Waters Impaired by Causes

Cause/Impairment Type	EPA Cause ID	Size of Waters Impaired (miles)
Orthophosphate	340	89.5
Enterococci	215	83.3
Dissolved Oxygen	205	24.1
Bio-indicators of nutrient enrichment	448	35.1
Heavy metals (Co, Pb, Hg) in fish tissue	163 / 267 / 467	4.6

Table C-10 Size of Coastal Marine Waters Impaired by Sources

Source Category	EPA Source ID	Size of Waters Impaired (miles)
Upland Erosion/Sedimentation	21	37
Unknown Source	140	138
On-site treatment systems	92	34.7
Urban Runoff/Storm Sewers	177	37.7
Livestock (grazing or feeding operation)	143	24.2
Sanitary Sewer Overflows	115	23.6
Unspecified non-point source	141	11.9
Municipal Point Sources	85	5.7
Landfills	69	4.1
Waterfowl	134	7.4
Illegal Dumps or Other Inappropriate Waste disposal	54	4.6
Impervious Surface/Parking Lot Runoff	164	3
Marina Boat Maintenance	75	1.2
NPS from Military Base (Other than Port)	89	1.6

Surface Waters - Streams

The WQS/NPS staff has begun implementing the CNMI Surface Water Quality Monitoring Program in earnest, collecting water samples as rain events permit, and conducting sanitary surveys of stream systems. The resulting maps are included in this report, as are details of visual field findings. In some instances, streams systems do not appear to contain sufficient surface pools to sustain any aquatic life, as their flow is too infrequent or their flow is subterraneous to the coast. This is the case for the Kalabera, DanDan, Susupe, As Matuis, and Banaderu watersheds on Saipan; the Dugi/Gampapa/Chenchon, Songsong, Uyulanhulo/Teteto, Chaliat/Talo watersheds on Rota; and all watersheds on Tinian. In the case of the Susupe watershed, a report by the USGS service in 2000 stated that, “Stream channels on the western coastal plain … are not discernible in the field or on topographic maps.” There does appear to be “Some surface runoff from the southwest flank of Mount Tagpochau (sp), which does have discernable stream channels on the topographic maps.” However, during “dry years, surface runoff into the lake is probably negligible.” This makes sufficient data collection here unfeasible.

At the time of this writing there has been insufficient water quality and fish tissue and/or biota data collected to make scientifically defensible assessments of the *Recreational* and *Fish Consumption* use designations.

An assessment of some stream systems for *Propagation of Aquatic Life* support was possible using visual field sanitary surveys and the McKagan 2008 study. A re-evaluation of the *Aesthetic Enjoyment/Other Uses* designation was also conducted this reporting cycle based on anecdotal self-reporting by island residents (See Section C.3., below for a detailed discussion of each watershed).

Therefore, most of the streams in the southern inhabited islands are listed as CALM Category 2, except for Saipan's Central West Takpochao watershed, which has known impairment of most use designations. Therefore, it retains a CALM Category of 5. The Isley Watershed retains a CALM Category of 3.

As was explained in the Coastal Marine section above, the Northern Islands are listed as CALM Category 1 due to their remoteness and lack of any consistent anthropogenic stressors or pollutants at this writing. However, should military exercises be expanded to these islands, impacts cannot be practicably avoided in total. Therefore, further study of these Tier 3 waters is of utmost importance.

Table C-11 provides the total miles of fresh surface waters attaining, not attaining, or needing further data to make a determination as to whether or not each use designation is being met.

Table C-11 Rivers and Streams Designated Use Support Summary

Designated Use	Size of Surface Waters				
	Total in State (miles)	Total Assessed (miles)	Supporting – Attaining WQ Standards (miles)	Not Supporting- Not Attaining WQ Standards (miles)	Insufficient Data and Information (miles)
CLASS 1 WATERS (All CNMI Surface Waters)					
Propagation of aquatic life	73.4	44.5	37.4	7.1	27.9
Fish/shellfish consumption	73.4	7.1		7.1	66.3
Recreation	73.4	0.0			73.4
Domestic water supplies & food processing	73.4	0.0			73.4
Groundwater recharge	73.4	0.0			73.4
Aesthetic enjoyment	73.4	73.4	66.3	7.0	0.0

Surface Waters - Wetlands, Lakes and Ponds

The CNMI WQS states that all wetlands are subject to the provisions of the standards, but does not provide dedicated wetland water quality criteria beyond a brief narrative statement and inclusion in the anti-degradation policy implementation rules. The narrative simply states that "point or non-point sources of pollution shall not cause destruction or impairment of wetlands" and "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 anti-degradation policy implementation rules require demonstration of compliance with the CWA Section 404(b)(1) rules regarding placement of fill, i.e., wetlands may not be filled unless it can be shown that the proposed action is the "least environmentally damaging practicable alternative", and all current mitigation guidelines are applied.

Since there is no regular monitoring of wetlands, implementation of the WQS for wetlands is currently limited to permitting provisions through the Section 401 water quality certification program, and enforcement of the anti-degradation policy implementation requirements described above.

Wetlands are found on the islands of Saipan, Tinian, Rota, and Pagan. However based on current CNMI GIS datalayers they cover less than 2% of the CNMI. The CNMI's "National Wetland Inventory" document states that wetlands comprise a total land area of approximately 600 acres (US Fish and Wildlife, 1989) more recent measures using DCRM's 2004 GIS database layers support this finding. The "Commonwealth of the Northern Mariana Islands Wetlands Conservation Plan" states that only 36% of the original wetland acreage still exists (DCRM Office). DCRM began mapping efforts to ground-truth and update geospatial data for wetlands in 2014, and newly mapped jurisdictional wetlands have been added to the GIS database for Saipan and Tinian.

Although no current monitoring data exists, previous efforts have resulted in limited assessment of individual wetlands. A draft CNMI Hydrogeomorphic ("HGM") Functional Assessment manual was developed in 2001. The HGM method evaluated wetlands against a "reference" wetland that has had very little impact from development or pollution. The reference wetland for the CNMI is the "Hagoi" wetland on Tinian. The draft manual included "functional" assessments for eight major wetlands on Saipan. Function is measured by evaluating invasive species, hydrologic function, soil integrity, etc. For example, a wetland with overgrowth of the reed *Phragmites,* which occurs throughout most CNMI wetlands, may rate a lower score in terms of plant community and wildlife habitat. Similarly, wetlands scoring as "impaired" for hydrological reasons are often scored that way due to construction of roads, easements, channelization, input from freshwater or sea level rise and other development, which has altered the hydrology of the wetland.

A Wetland Task Force was created in 2004 to finalize the HGM method, which reviewed the draft manual with wetland specialists from EPA. The task force provided recommendations as participants felt that the HGM method could be a valuable tool with further revision (Davis, M.M., (2005). DCRM attempted to finalize the manual or develop a similar Rapid Assessment Methodology (RAM) for the CNMI in 2007. However, by this time, the HGM method had fallen out of favor with US EPA and the project was cancelled. Resource managers felt that the remaining wetlands in the CNMI would be protected from any further degradation by improving CRM Regulatory protection (CRMO monthly report, March 2007).

Of note, in 2015 DCRM picked up where they had left off and worked with consultants to develop a new field-tested RAM for the valuation of wetlands. The new RAM has since been adopted and

is being used to establish baseline data and ground-truth existing GIS data layers on Saipan, as well as to recalibrate and assess Rota's perennial streams. The RAM may also be used to determine existing conditions on Tinian's federal leased land and on Pagan so BECQ can assess impacts from expansion of US military exercises and live firing ranges proposed in the Department of Defense's Joint Military Training EIS, should proposed activities come to fruition.

BECQ continues to assess wetlands and report their findings in the Section 309 Program Improvements Assessment and Strategy Report. CRMO Planners and Technical staff calculate acres of wetlands based on previous assessments and the most recently complied Wetland GIS data layers. The report lists the degree of potential risk to each of the islands' wetlands from low to high, based on perceived anthropogenic threats.

Table C-12 Wetlands Threats (2006 Section 309 Assessment & Proposed Military Exercises)

Threat	Significance (Low – Med – High)			
	Saipan	**Tinian**	**Rota**	**Pagan**
Development/fill	High	Low	Low	**Med-High
Alteration of hydrology	High	Medium	Medium	Low
Erosion	High	Medium	Low	**Med-High
Pollution	High	**Med-High	Low	**Med-High
Channelization	Low	Medium	Medium	Low
Nuisance or exotic species	High	Medium	low	Medium
Freshwater input	Low	Low	Low	Low
Sea/Lake level rise	Low	Low	Low	Low
Other				**Med-High

** NOTE: Proposed US military exercises on Tinian and live fire ranges adjacent to lakes on Pagan, pose a significant threat to wetlands from Development/fill, Erosion, Pollution, and "Other"

There has been some loss of wetlands since 2001 and risk of further loss remains high due to public demand for land for homesteads, private business and/or its expansion, and the necessary easements associated with each.

Although, no overall assessment of each designated use in wetlands has been undertaken, the cumulative findings from the previous HGM assessment method, the DCRM 309 Report, and the current RAM were used for purposes of this report's 303(d) listing.

BECQ hopes to add more detail to its wetland monitoring and assessment program in the future. Table C-13 below provides the CALM Category methodology used for Wetland assessment.

Table C-13 Assessment Method for Wetlands (HGM, RAM & Section 309 Report findings)

EPA CALM CATEGORY:	DESCRIPTION	HGM Functional Values
1	All designated uses are supported, no use is threatened	All Functions ≥ 0.7
3	There is insufficient available data and/or information to make a use support determination	[No HGM assessment or other data]
4c	Some functions are impaired, but not by a pollutant, for example hydrological modification, invasive species, low veg. diversity. Based on professional judgment.	Some functions < 0.7, due to non-pollutant causes
5	Available data and/or information indicate that at least one designated use is not being supported or is threatened, because of a pollutant, a TMDL is needed	At least 1 function < 0.7 due to a pollutant

Table C-14 provides a Summary of the acres of wetlands attaining, not attaining, or needing further data to make a determination as to whether or not each use designation is being met.

Table C-14 Wetland Designated Use Support Summary

Designated Use	Acres of Wetlands				
	Total in State	Total Assessed	Supporting / Attaining WQS	Not Supporting / Not Attaining WQS	Insufficient Information
CLASS 1 WATERS (All CNMI Fresh Waters)					
Support and propagation of aquatic and terrestrial life	681	*681	43.3	577.3	60.4

***** Pagan's and Bateham wetlands have not been fully assessed and delineated.

Table C-15 on the next page contains the list of impaired CNMI Wetlands.

Table C-15 303(d) List of Wetlands (2001 HGM, 2006 Section 309, & 2004 GIS data)

Segment ID	Wetland Name	Acres	Function				CALM
			Hydro	Bio Chem	Veg	Wild	
SAIPAN							
19WET West Takpochau	American Memorial Park	61.4	*0.2*	*0.6*	*0.3*	*0.4*	4c
20WET Achugao	Falig Mitigation	61.1	*0.5*	*0.7*	*0.7*	*0.6*	4c
14WET Kagman	Kagman South	5.1	*1.0*	*0.9*	*0.9*	*0.8*	1
18WET Susupe	McDonalds	35	*0.8*	*0.8*	*0.7*	*0.7*	1
18WET Susupe	Power Center mitigation	3.7	*0.7*	*0.3*	*0.8*	*0.5*	4c
18WET Susupe	Susupe North	257	*0.7*	*0.8*	*0.7*	*0.8*	1
18WET Susupe	Susupe Potholes	106	*0.4*	*0.7*	*0.6*	*0.6*	4c
18WET Susupe	Susupe South	53	*0.6*	*0.8*	*0.7*	*0.7*	4c
TINIAN							
11WET Puntan Tahgong	Hagoi	38.2	*1.0*	*1.0*	*1.0*	*1.0*	1
10WET Puntan Diaplolamanibot	Bateham	9.7					
TOTAL Water Segments Not attaining 4c		**577.3**					

Table C-16 provides a Summary of the acres of Lakes attaining, not attaining, or needing further data to make a determination as to whether or not each use designation is being met.

Table C-16 Lake Designated Use Support Summary

Designated Use	Size of Surface Waters				
	Total in State (acres)	Total Assessed (acres)	Supporting – Attaining WQ Standards (acres)	Not Supporting- Not Attaining WQ Standards (acres)	Insufficient Data and Information (acres)
CLASS 1 WATERS (All CNMI Surface Waters)					
Support and propagation of aquatic life	255.2	255.2	210.0	45.2	0.0
Fish/shellfish consumption	255.2	255.2	210.0		45.2
Recreation with risk of waterborne illness	255.2	255.2	210.0	45.2	0.0
Domestic water supplies & food processing	255.2	255.2	210.0		45.2
Groundwater recharge	255.2	210.0			45.2
Aesthetic enjoyment	255.2	255.2			0.0

The following subsections will go into further detail about each use designation for each island and their watersheds beginning with Saipan.

C.4.1 305(b) Assessment Results for Saipan

Saipan - Coastal Marine Waters

Presently, none of the coastal waters surrounding the island of Saipan fully support *all* designated uses, as the Banaderu Watershed has been added to the impaired list this reporting cycle for *Recreational* uses due to Enterococci levels exceeding the CNMI WQS.

Table C-17 Assessment of Saipan's Watersheds Use Designations - Coastal and Surface Waters

		Bird Island Beach	Hidden, Jeffreys, and Old Man by the Sea	Marine, Tank beach	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 San Jose Beach	Chalan Laulau Beach to Garapan Beach	Garapan Beach Drain to Micro & AMP	Smiling and OuterCove Marinas to Seaplane Ramp	Central repair shop to Tanapag meeting hall	Aqua Resort to Nikko Hotel	Pau Pau beach to Wing Beach	Grotto Cave	
		NEB02	NEB03-04 NEB07	NEB05-06	SEB02-03	CNMI 72	SEB04-05 SEB08	SEB06	WB30-37	WB25-29	WB24 WB22	WB14-23	WB9-13	WB7-8	WB3-6	WB1-2	NEB01	MG01-11
WATER BODY SEGMENT ID		12	13	14	15	16	17 Isley		18 Susupe		19 W. Takpochau			20 Achugao		21	22	23
		Kalabera	Talofofo	Kagman	Lao Lao	Dan Dan	B (East)	A (West)	B (South)	A (North)	C (South)	B (Central)	A (North)	B (South)	A (North)	As Matuis	Banaderu	Managaha
Designated Use																		
Coastal Waters	Aquatic Life	***Good Habitat*** No new Nutrient Data	No new Nutrient Data, ***pH exceed***	***Good Habitat*** No new Nutrient Data	Poor Habitat	i	***Fair Habitat***	Poor Habitat, No new Nutrient Data	Good Habitat DO exceed No new Nut	***Good Habitat DO exceed***	***Fair Habitat*** No new Nut, DO & ***pH exceed***	Fair Habitat No new Nut, ***DO exceed***	No new Nutrient data, DO & ***pH exceed***	Poor Habitat, No new Nut, DO	***Good Habitat*** No new Nutrient Data	***Good Habitat*** No new nut, ***DO exceed***	F	Fair Habitat, No new Nutrient data
	Fish Consumption	i	i	i	i	i	i	Heavy metals	i	i	i	Hg in Fish tissue	i	i	i	i	F	i
	Recreation	Entero exceed	Entero exceed	***Entero improv***	***Entero improv***	i	Entero exceed	Entero exceed	Entero exceed	***Entero exceed***	***Entero exceed***	Entero exceed	Entero exceed	Entero exceed	***Entero exceed***	***Entero exceed***	***Entero exceed***	F
	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	***3***	5	2	5	5	5	5	5	5	5	5	5	5	***5***	***3***
Rivers and Streams	Aquatic Life	i	Native Habitat	Native Habitat	i		i	i	X	X	i	Intro species	i	Native Habitat ***Sanitary survey***	***Sanitary survey***	i		
	Fish Consumption	i	i	i	i		i	i	X	X	i	***Hg in biota***	i	i	i	i		
	Recreation	i	i	i	i		i	i	X	X	i	i	i	i	i	i		
	Potable Water Supply	X	X	X	X		X	X	X	X	X	X	X	X	X	X		
	Aesthetic Enjoyment/others	F	F	F	F		i	i			F	N	F	F	F	F		
	CALM Assessment Category	2	2	2	2		3	3	X	X	2	5	2	2	2	2		

F - Fully support Use Designation; I - Insufficient Information; N - Not Attaining Use Designation; ***Changes in bold italics***; X - Not Assessable

Notably, the biological criteria are ranked as "Good" to "Fair" for the *Propagation of Aquatic Life* Use Designation in the central western part of Saipan that is watershed segments 18 and 19 in the W. Takpochao Watershed. This is an upgrade from last reporting cycle, for this, the most developed watershed on island. This ranking is based upon the contemporary and previous seagrass assemblage rankings for Aquatic Life Use Support (ALUS). Detailed biological monitoring results for each watershed are discussed in detail below and presented in APPENDIX IX-4.

However, as was mentioned, there is a lack of new nutrient data this reporting cycle to make a reassessment of the water quality for the *Propagation of Aquatic Life* Use Designation. Those

watersheds that maintained a “Good” to “Fair” rating were upgraded from “Not Attaining Use Designation” to “insufficient Information” to reflect the insufficiency of available data to make a use support determination.

As to *Fish and Shellfish Consumption*, there is insufficient fish tissue and biota data to determine whether or not it is attained for most of Saipan, save for the West Isley (17A) and Central W. Takpochao (19B) Watersheds where elevated levels of some heavy metals have been detected in past studies by Denton at the WERI institute.

The DanDan Watershed is the only Watershed on Saipan that *appears* to meet all of its designated uses. All water quality and biological monitoring results from this very remote and undeveloped site are of very high quality. This paired with visual field evaluation of the surrounding area found no point sources or NPSs of pollution, nor any other anthropogenic stressors to impair this water body. However, the data sample size is too small to make a fully supported determination at this time.

All other Watersheds on Saipan, as in last reporting cycle, were determined to be impaired for at least one *Use Designation*.

Several segments of the western shoreline of Saipan consistently show non-attainment of *Recreational Use* due to Enterococci contamination, the source of which is unknown for some remote areas, but contamination from human and animal waste is suspected for populated sites and animal feed lots.

Known sources of the bacterial contamination are overflows and leaks from wastewater collection systems, and runoff from densely populated areas. These degraded areas most often surround major storm drains. Notably, Enterococci exceedences resulted in five segments being added to the impaired list for *Recreational Use* (Segments 18A – Susupe, and 20A – N. Achugao, were returned to the impaired list after improving last reporting cycle) and Segments 19C, 21, and 22 were added.

However, as was noted in the Executive Summary, there was a significant increase in the number and intensity of storm events impacting the Marianas Archipelago this reporting cycle. This led to high surf advisories and resuspension of shoreline sediment containing naturally occurring Enterococci FIB. At this time, there is no other method in use in the Environmental Surveillance Laboratory to determine if Enterococci levels exceeding the WQS is due to true fecal contamination events or false positives from resuspended FIB.

Portions of the eastern coastline of Saipan also show consistent non-attainment for *Recreational Use* due to Enterococci contamination. This includes the Grotto Cave within the northern most watershed of Banaderu (Segment 22). This watershed was added to the impaired list for the first time. The suspected source is discussed in detail in Section C.4.11 below, but is thought to be due to lack of available restroom facilities.

Impairment of the *Recreational* use designation continues down through Kalabera (Segment 12) and Talofofo (Segment 13) watersheds. Watershed sanitary surveys in Talofofo indicate that

uncontrolled livestock grazing in this remote and under-developed watershed is almost solely responsible for the impairment.

However, two Segments did show improvement in Enterococci levels, Kagman (Segment 14), and Lao Lao (Segment 15). These improvements began to appear last reporting cycle and were associated with the completion of Phase II of the Cross Island Road Reconstruction project, which includes BMPs to capture stormwater runoff and sediment from entering coastal waters.

As mentioned above in Section C.3., all coastal waters of the CNMI have attained their *Aesthetic Enjoyment and Other Uses* designation based upon professional opinion and the MVA Tourist Exit Survey results.

Saipan - Surface Water Streams

There are no rivers within the CNMI, although there are several stream systems. There has been some data collected this reporting cycle to allow assessment of the *Propagation of Aquatic Life* use designation through visual sanitary surveys conducted within the Achugao (Segment 20), Talofofo (Segment 13) and Lao Lao (Segment 15) watersheds. These data, in conjunction with a fish classification study conducted by McKagan in 2008, on the Talofofo, Kagman, West Takpochao, and Achugao streams provided sufficient information to complete an initial assessment. All other watersheds have insufficient data to make similar assessments.

No data were collected on fish tissue or other biota contaminants within Saipan's surface waters. Therefore, the attainment of the *Fish and Shellfish Consumption* use designation is unknown.

There also is insufficient FIB data to assess the attainment of the *Recreational Use* designation for the majority of Saipan's streams. More information will be available next reporting cycle after the El Nino season passes and ephemeral streams are once again flowing during rainy season. However, visual sanitary surveys provided the WQS/NPS branch with sufficient information to identify sources of Enterococci contamination and begin community outreach and remediation of streams in the Achugao Watersheds (see details in Section C.4.1.9 below).

Likewise, there has been no systematic collection of data concerning visitor or resident's *aesthetic enjoyment* of streams. However, many residents and visiting tri-athletes on Saipan hike near, and around many of the islands' streambeds, as part of training for athletic competitions, exercise, or for general recreation in the tradition of the "Hash House Harriers". For over 30 years, Saipan residents have set a "Hash" trail every Saturday, and on other occasions (i.e. full moon events), for a non-competitive hiking/running event. Trails are made through various pristine forested areas and many times in intermittent streams due to the sheer beauty of these locations. Tourists and visiting tri-athletes have been known to take part in the "Hash" as well.

Based solely on this anecdotal evidence, and professional judgment, the *Aesthetic Enjoyment* for the vast majority of Saipan's streams has been attained except where little is known, or there has been vast construction of concrete conveyances, which detract from their natural beauty.

Table C-18 Assessment of Saipan's Watersheds Use Designations – Lakes and Wetlands

WATER BODY SEGMENT ID		12	13	14	15	16	17		18		19			20		21	22	23
							Isley		Susupe		W. Takpochau			Achugao				
							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
Lakes	Aquatic Life								N									
	Fish Consumption								i									
	Recreation								N									
	Potable Water Supply								*i*									
	Aesthetic Enjoyment/others								F									
	CALM Assessment Category								5									
Wetlands	Aquatic Life		i	F		i	i		N	N	N			N				
	CALM Assessment Category		3	1		3	3		4c	4c	4c			4c				

Saipan - Wetlands, Lakes and Ponds

Numerous small areas of open water exist within wetland areas of Saipan. Data is still lacking for most all surface water bodies. However, gains have been made this reporting cycle with the implementation of the CNMI Surface Water Quality Monitoring Plan.

The only lake on Saipan, Lake Susupe, in the South Susupe Watershed is monitored regularly and discussed at length in Section C.4.1.7, below.

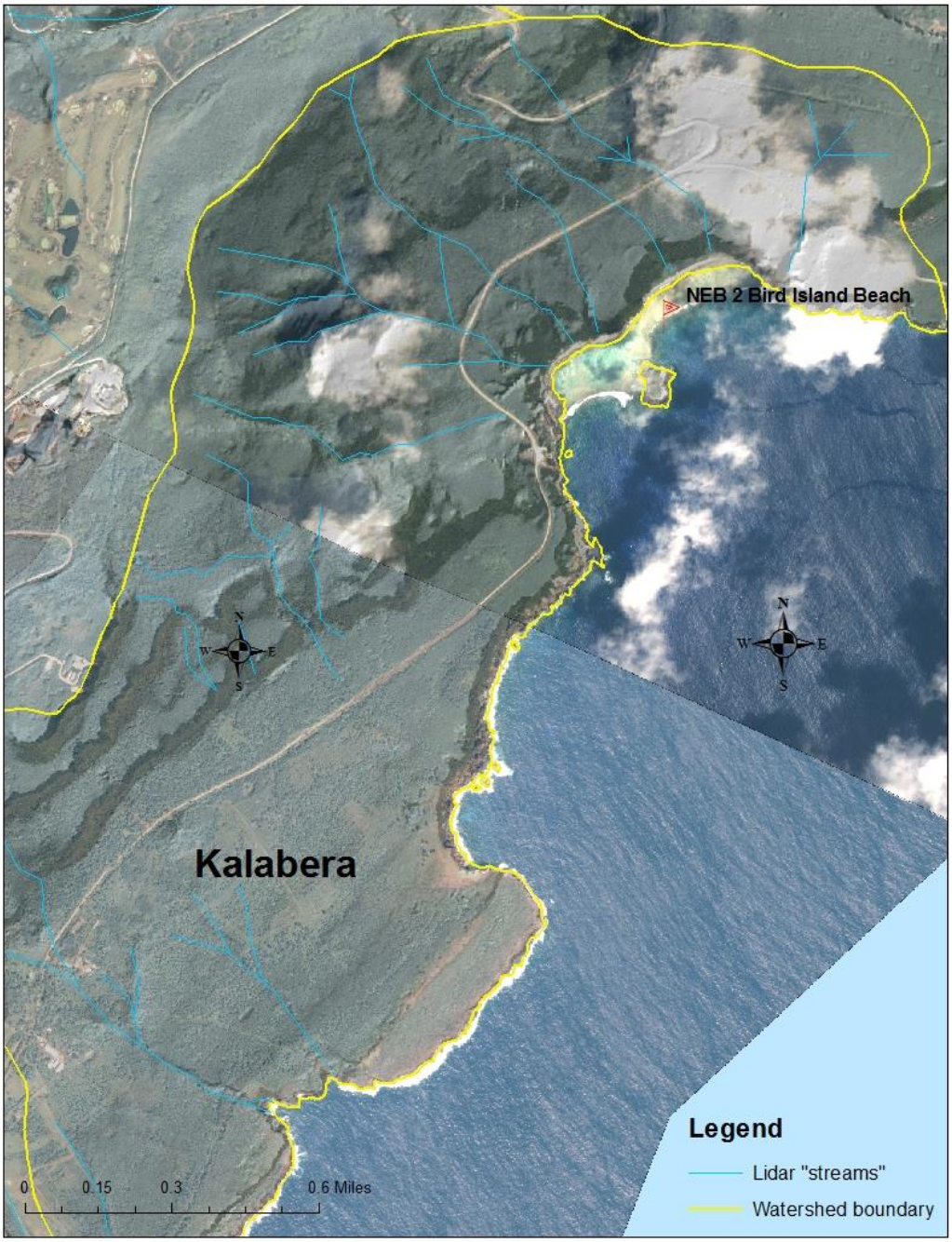
There is insufficient data for most wetlands on Saipan, which therefore have been assigned a CALM Category 3. The wetlands of Susupe, W. Takpochau, and the Achugao watersheds have been studied a bit more and have a CALM Category 4c.

To address this lack of information a primary focus next reporting cycle will be the Susupe complex where the open water systems are currently considered to be limestone potholes or pools. BECQ wetland delineators have begun ground-truthing other wetlands on Saipan and Tinian to update the existing GIS data layers by next reporting cycle. BECQ will also be developing additional GIS data layers for Rota and Pagan as staffing and resources allow.

Wetlands now cover less than 2% of the CNMI based on current CNMI GIS layers. Historical (pre-CWA) losses are as follows: 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 filling for U.S. military development following the 1944 invasion probably accounts for some losses, as well as some more recent permitted fills. Once mapping data have been standardized, BECQ will be able to more accurately report on changes in land cover and wetland conversion trends throughout the CNMI.

There is vastly more information available about the island of Saipan than any other island in the CNMI. Therefore, the following subsections will provide a more comprehensive picture of the sources and causes for impairments, remediation efforts therein, and any recoveries that may have occurred within the watersheds during this reporting cycle.

Figure C-4 Kalabera Watershed (Segment 12)



C.4.1.1 Kalabera Watershed (Segment 12) – Bird Island

Marine Coastal Waters

Kalabera is the least developed watershed on Saipan's east coast, and is located the furthest north. It receives very little rainfall compared to other watersheds. It is known for the isolated Bird Island Sanctuary, a rookery for nesting swiftlets and other seabirds. An outlook on the upper cliff line allows for panoramic scenic views of the clear coastal waters below, which is often used as a backdrop for tourist photos; especially for newlyweds. Therefore, Kalabera's coastal waters easily attain the *Aesthetic Enjoyment* uses designation.

Although, the benthic habitat of Kalabera Watershed received a "Good" rating in support of the *Propagation of Aquatic Life* use designation, as was mentioned, there has been insufficient new data collected to re-assess the nutrient water quality. Therefore, phosphate may or may not be at heightened levels. If indeed it is, bird guano could potentially be a source for this pollutant. However, until new data is available, there is insufficient information to make a full assessment of the *Propagation of Aquatic Life* use designation.

There has been insufficient data collected on fish tissue and/or biota contamination of coastal waters to assess attainment of the *Fish and Shellfish Consumption* use designation.

Kalabera's coastal waters remain impaired for the *Recreational Uses* due to Enterococci exceedences. Based on visual field assessments, the fecal contamination is most likely due to bird guano washing in from Bird Island's cliffs, as there are no roaming domesticated livestock seen in the upper watershed.

Surface Waters - Rivers and Streams

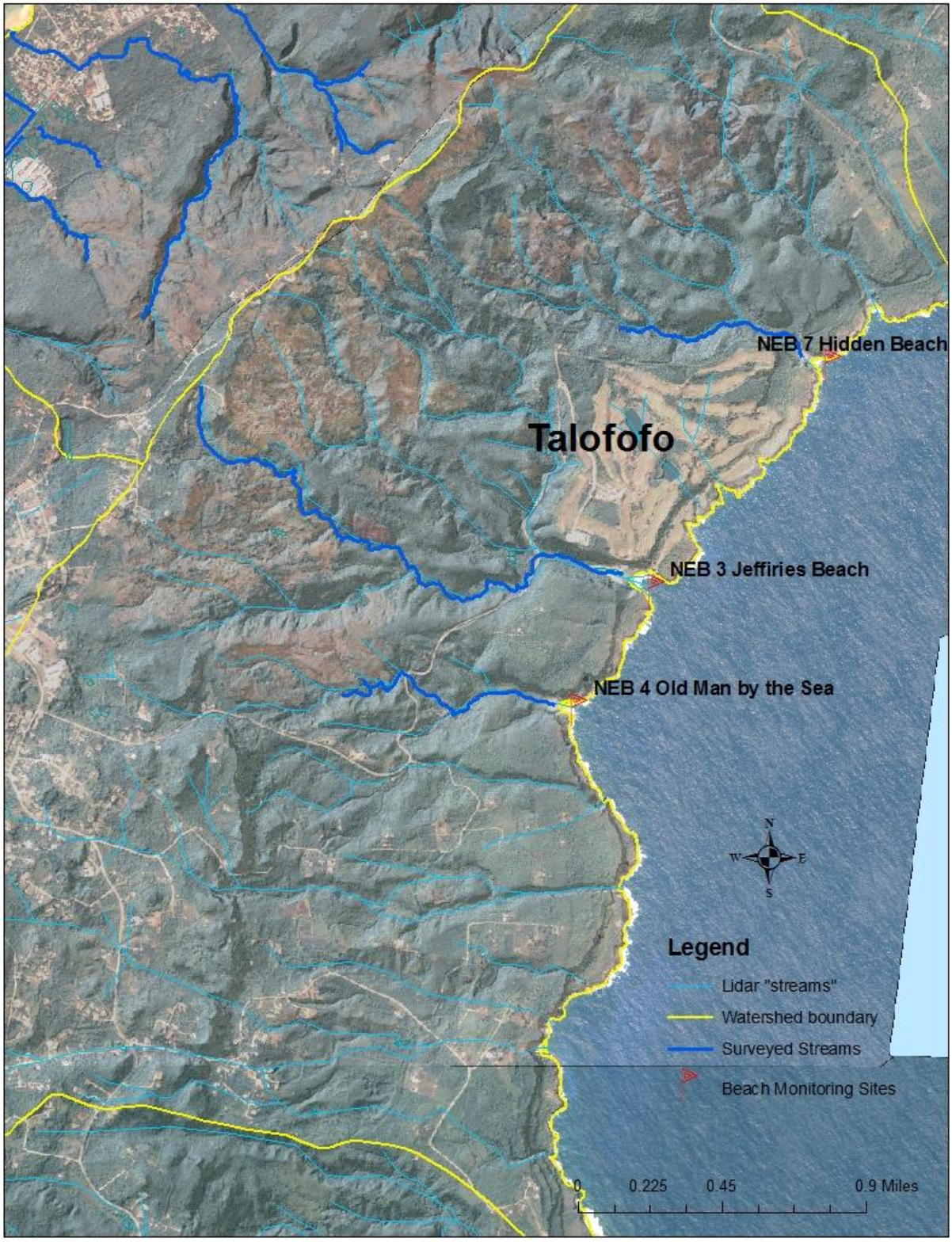
Kalabera's stream systems are ephemeral and only flow during strong rain events. A visual field assessment of the northern half of the watershed revealed no fresh water pools. There is no information about the southern half of the watershed, but based on available aerial imagery and GIS data layers, the stream watercourses appear to be more limited than in the northern half. Therefore, there is insufficient data collected on fish tissue and/or biota contamination of coastal waters to assess attainment of the *Fish and Shellfish Consumption* use designation.

Kalabera's ephemeral streams in the north have not been monitored for Enterococci due to their remoteness and limited flow for collection samples. Therefore, there is insufficient information for the *Recreational* use designation. However, these same streambed systems are used by "hashers", hikers, and professional athletes for exercise and training. Therefore, Kalabera Watershed's streambeds continue to meet the *Aesthetic Enjoyment* use designation.

The ephemeral streams flow too infrequently to provide a stable and sufficient *Potable Water Supply*. Therefore, they have not been assessed for this use designation.

The cumulative findings above resulted in Kalabera's coastal waters retaining a CALM Category 5 and the surface waters a Category 2.

Figure C-5 Talofofo Watershed (Segment 13)



C.4.1.2 Talofofo Watershed (Seg 13) - Jeffrey, Hidden & Old Man by the Sea

Marine Coastal Waters

The coast of Talofofo Watershed contains Jeffrey's, Hidden, and The Old Man by the Sea beach areas, all of which are popular "off-the-beaten-path" tourist destinations for visitors wishing to enjoy the ruggedness of this unspoiled terrain, and the isolation of its far-off beaches.

There is no biological monitoring data collected from Talafofo's coastal waters. This is due to surf hazards for the MMT. There were two exceedences of the pH WQS at Hidden beach with no trend towards acidity or alkalinity. There is no new nutrient data. Therefore, there is insufficient information to provide insight to the source of impairment or to remove Talofofo from the impaired list for the *Propagation of Aquatic Life* use designation.

Data is also unavailable on fish tissue and/or biota contamination in coastal waters. Therefore, no assessment could be made of Talofofo's *Fish and Shellfish Consumption* use designation.

Talofofo coastal waters once again did not attain the *Recreational* use designation due to Enterococci exceedences. The source has been linked to both roaming domestic and feral animals, and increase in tourists to these remote beaches, which lack public restrooms.

It should also be noted that Phase IIb of the Cross Island Road Reconstruction project is ongoing and additional segments of the roadwork is currently underway at the top of the Talofofo watershed. This could have impacts to water quality in the next reporting cycle.

Based on the consistent visitors hiking in to see this watershed's spectacular rock formations, Talofofo coastal waters continue to support the *Aesthetic Enjoyment* use designation.

Surface Waters - Rivers and Streams

The Talofofo Watershed has the most abundant surface water flow of all of Saipan's Watersheds. It's upper and mid watershed stream systems run nearly year round, although with limited volume during dry season (December through June). Mckagen's 2008 fish survey of Talofofo's surface waters found 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 of the lower watershed have good species diversity as well and contain three species of shrimp and two native fish, "fock flagtails (*Kuhlia rupestris*) and gobies (*Stiphodon elegans*). These streams flow into Jeffry's beach and are considered "pristine". Based on these findings and preliminary results of the sanitary surveys conducted by the WQS/NPS of this priority watershed, Talofofo's surface waters are considered supportive of the *Propagation of Aquatic Life* use designation.

No data is available about fish tissue and/or biota contamination in surface water streams. Therefore, no assessment could be made of Talofofo's *Fish and Shellfish Consumption* use designation.

There is insufficient water quality data available on surface water streams to make a definitive assessment for the *Recreational* Use Designation. However, preliminary data show elevated Enterococci levels, which would impair these waters. Sanitary surveys (Royal Blue lines in Figure C-5 above) conducted by the WQS/NPS branch found animal waste from free roaming cows and

pigs. Many hoof prints from feral pigs were recorded along and in the stream systems. Therefore, livestock are considered the source of the Enterococci contamination.

However, “Hashers”, hikers and triathletes continue to use the Talofofo Watershed for exercise and training for which this watershed retains the *Aesthetic Enjoyment* use designation.

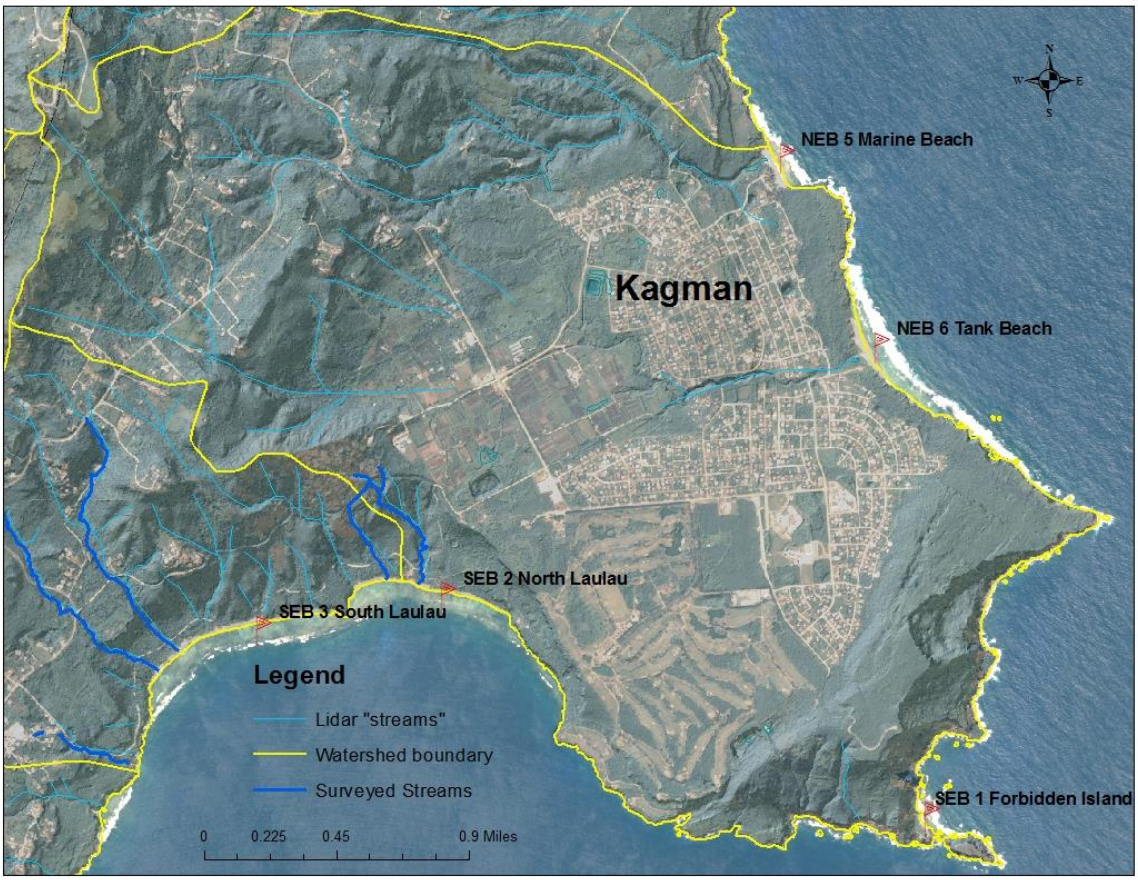
As was said above for the Kalabera Watershed, the Talofofo streams have not been considered a reliable and sufficient *Potable Water Supply*. Therefore, they have not been assessed for this use designation.

Surface Waters - Wetlands

No information is available on the Talofofo wetland (Segment 13WET). Current GIS data layers from BECQ, and USGS do not show an existing wetland in this watershed. However, there are open artificial waterbodies in the Kingfisher Golf Course. It is hoped that more information will be gathered by BECQ on Saipan’s wetlands for the next reporting cycle.

The findings above resulted in Talofofo’s coastal waters retaining CALM Category 5, and its surface waters a Category of 2.

Figure C-6 Kagman Watershed (Segment 14)



C.4.1.3 Kagman Watershed (Segment 14) - Marine and Tank Beaches

Marine Coastal Waters

Kagman Watershed contains Marine Beach and the Tank Beach Conservation Area. It attains the *Aesthetic Enjoyment* use designation based on its dynamic shorelines, turtle nesting sites, sandy beaches and scenic views frequently visited by both tourists and residents.

Although, the biological monitoring data on Kagman watershed was rated as "good", as was mentioned earlier, there has been insufficient new data collected to re-assess the nutrient water quality. Therefore, until new data is available there is insufficient data to do a full assessment of the *Aquatic Life Support and Propagation* use designation.

There has been insufficient data collected on fish tissue and/or biota contamination of coastal waters to assess attainment of the *Fish and Shellfish Consumption* use designation.

Results collected this reporting cycle show a marked decrease in Enterococci exceedences resulting in Kagman Watershed attaining the *Recreational Use* Designation. This improvement is thought to be the result of improvements being made to the roadway as part of Phase IIb of the Cross Island Road Reconstruction project. Road designs included engineered BMPs, e.g., sediment basins, culverts, etc., to collect stormwater and prevent it from directly entering coastal waters.

Surface Waters - Rivers and Streams

Only one stream within the Kagman watershed has been ground truthed. Full sanitary surveys have not yet been completed by the WQS/NPS branch as other impaired watersheds took precedent. However, streams in the upper watershed were studied by McKagan, et. al., in 2008. They were considered "fairly pristine", and contained two species of shrimp. Based on these findings, the surface water streams of Kagman Watershed retain the *Propagation of Aquatic Life* use designation this reporting cycle.

There is insufficient data concerning fish tissue or biota contamination in Kagman's surface waters to be able to assess attainment of the *Fish and Shellfish Consumption* use designation.

However, Kagman's ephemeral streams did have sufficient flow during rainy season to collect water samples this reporting cycle. Presently, the data is insufficient to make a definitive assessment for the *Recreational* Use Designation. However, preliminary data show elevated Enterococci levels, which would impair these waters should the trend continue. The source of Enterococci contamination is thought to be from free roaming domestic and feral animals.

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

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

Surface Waters - Wetlands

The Kagman Watershed contains a created mitigation wetland (Segment 14WET). The mitigation was to offset wetland loss due to the construction of the NRCS Kagman Reservoir for agricultural purposes. The mitigated wetland is called "Education Island" and is used for educating schoolchildren about the importance of wetlands and their functions. The wetland is regularly maintained by NRCS.

The cumulative findings above resulted in Kagman's coastal waters being upgraded from CALM Category 5 to Category 3, due to insufficient nutrient data to remove the *Propagation of Aquatic Life* use designation it from its impaired status. However, Kagman's streams retain a CALM Category 2 and a Wetland Category 1 (see Table C18 above).

Figure C-7 LaoLao Watershed (Segment 15)

C.4.1.4 LaoLao Watershed (Segment 15) - LaoLao Bay

Marine Coastal Waters

LaoLao Watershed contains LaoLao Golf Resort that overlooks LaoLao Bay, home to two of Saipan's most popular snorkel and SCUBA sites. For these attributes, LaoLao easily attains the *Aesthetic Enjoyment* use designation

The LaoLao Watershed did not attain the *Propagation of Aquatic Life* use designation due to a significant decline in biological monitoring data for which it was give a "Poor" rating. There does not appear to be any recovery from previous disturbances last reporting cycle. Degradation at biological monitoring site 2 in LaoLao Bay is likely due to a reduction in herbivory and water quality. The LaoLao Bay study conducted in 2010 detected many exceedences of the CNMI WQS for ammonia, total filterable suspended solids, temperature, turbidity, and Enterococci.

Although, there is no new nutrient data available, bacteriological water quality results show a marked decrease in Enterococci exceedences resulting in LaoLao Watershed attaining the *Recreational* Use Designation. This improvement is thought to be due to the completion of Phase IIa of the Cross Island Road Reconstruction project, which included engineered BMPs to collect stormwater and prevent it from directly entering coastal waters, as well as implementation of the multidimensional, community supported, integrated LaoLao Bay CAP.

The LaoLao Bay CAP was developed in 2009 and updated in 2012 as a cooperative effort between community members, organizations and CNMI resource agencies. Major successes from the CAP include 1) Volunteer and school supported revegetation projects in the upper watershed; 2) Field trips led by Micronesia Islands Nature Alliance (MINA) Volunteer Rangers whom educate students about human adverse impacts to the LaoLao watershed; and 3) The completion of the Laolao Bay Drive improvement project. Road improvements include BMPs to reduce erosion and sediment transfer to the Bay. Volunteers from BECQ, DPW, and Mayor's Office staff regularly maintain the roadway culverts and basins by removing trash and sediment before it enters coastal waters. The successful use of this CAP to improve LaoLao's water quality is a model for restoration efforts in other watersheds.

CAPS are an alternative restoration approach being used by CNMI resource agencies to foster community stewardship to improve water quality within their watersheds, in the interim while TMDLs remains undeveloped.

There is insufficient data concerning fish tissue or biota contamination in LaoLao's coastal waters to be able to assess attainment of the *Fish and Shellfish Consumption* use designation.

Surface Waters - Rivers and Streams

As an impaired and priority listed Watershed, sanitary surveys were completed by the WQS/NPS branch within and around the surface water stream systems in LaoLao. Royal blue lines represent the streams that were ground-truthed and mapped using GPS and GIS. These lines very closely match the model currently being updated by the US Geological Survey based on elevation, watershed boundaries, and major infrastructure, like that collected by WQS/NPS staff.

Based on these sanitary surveys and visual field observations by other professionals, there is limited precipitation, topographical or geological features in the upper LaoLao Watershed to sustain fresh water pools for *Propagation of Aquatic Life*.

However, these ephemeral streams have sufficient flow during rainy season to pool in the lower watershed for collecting water samples. With the implementation of the Surface Water Quality Monitoring Plan this reporting cycle, there were several samples collected. However, they were two few in number to make a definitive assessment of the *Recreational* Use Designation. Preliminary data show elevated Enterococci levels, which would impair these waters should the trend continue. The source of Enterococci contamination is thought to be free roaming domesticated and feral animals in the upper watershed, as there are no homes or animal pens located adjacent to the stream watercourses.

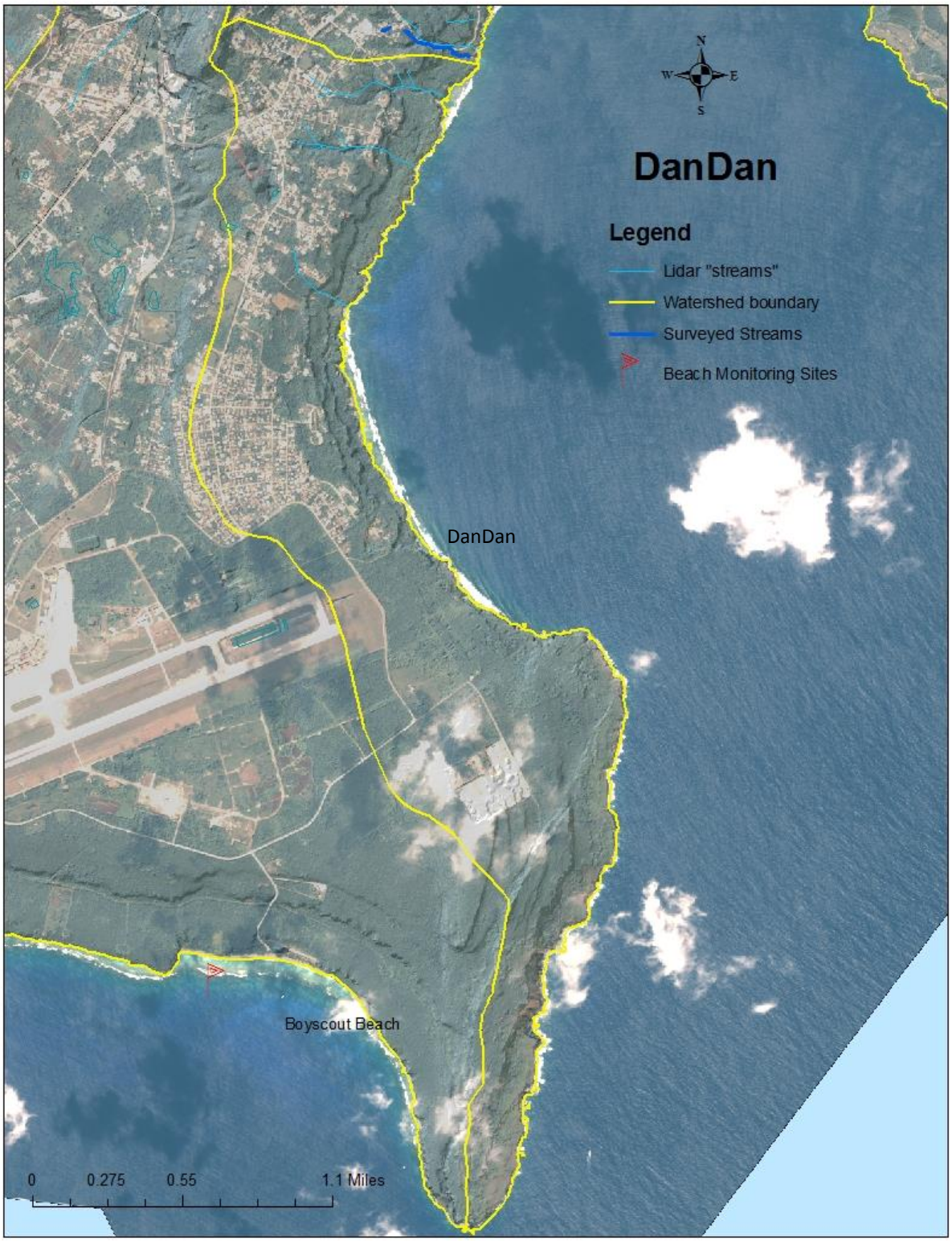
There is insufficient data concerning fish tissue or biota contamination in LaoLao's surface waters to be able to assess attainment of the *Fish and Shellfish Consumption* use designation.

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

LaoLao's ephemeral streams flow too infrequently to provide a stable and sufficient volume to support a *Potable Water Supply*. Therefore, they have not been assessed for this use designation.

Although, the Recreational Use designation of LaoLao's coastal waters is now being attained due to reduced Enterococci levels as a result of road improvements and other NPS remediation projects contained in the LaoLao CAP, the ***Propagation and Support of Aquatic Life*** use designation remains listed. Therefore, the cumulative findings above resulted in coastal waters retaining a CALM Category of 5. At this writing, LaoLao's surface water streams retain a CALM Category 2.

Figure C-8 DanDan Watershed (Segment 16)



C.4.1.5 DanDan Watershed (Segment 16) – Remote Cliff Line Beaches

Marine Coastal Waters

DanDan Watershed contains small isolated beaches that require permission to access by adjacent landowners. They are also hazardous to reach from coastal waters due to the watershed's steep cliff line. Their remoteness has left them unspoiled and for this reason, DanDan attains the *Aesthetic Enjoyment* use designation for the beauty of its coastal waters.

This reporting cycle the WQS/NPS branch began monitoring water quality at a newly designated reef flat site within the DanDan watershed. Although few in number, all samples easily met CNMI WQS. However, there was insufficient data to fully assess attainment of the *Propagation of Aquatic Life,* or *Recreational* use designations, but the remoteness of this watershed from any development provides it with substantial protection from anthropogenic sources of pollution. Based on the preliminary water quality data collected thus far; DanDan is expected to attain all use designations next reporting cycle.

There is insufficient data concerning fish tissue or biota contamination in DanDan's coastal waters to be able to assess attainment of the *Fish and Shellfish Consumption* use designation.

Surface Waters - Rivers and Streams

The DanDan Watershed has insufficient precipitation, topographical or geological features to support surface water stream systems. Water precipitation flows by subterranean transport from land to sea.

Surface Waters - Wetland

No information is available on the DanDan wetland (Segment 16WET). Current GIS data layers from BECQ do not show an existing wetland in this watershed. It is hoped that more information will be gathered by BECQ on Saipan's wetlands for the next reporting cycle.

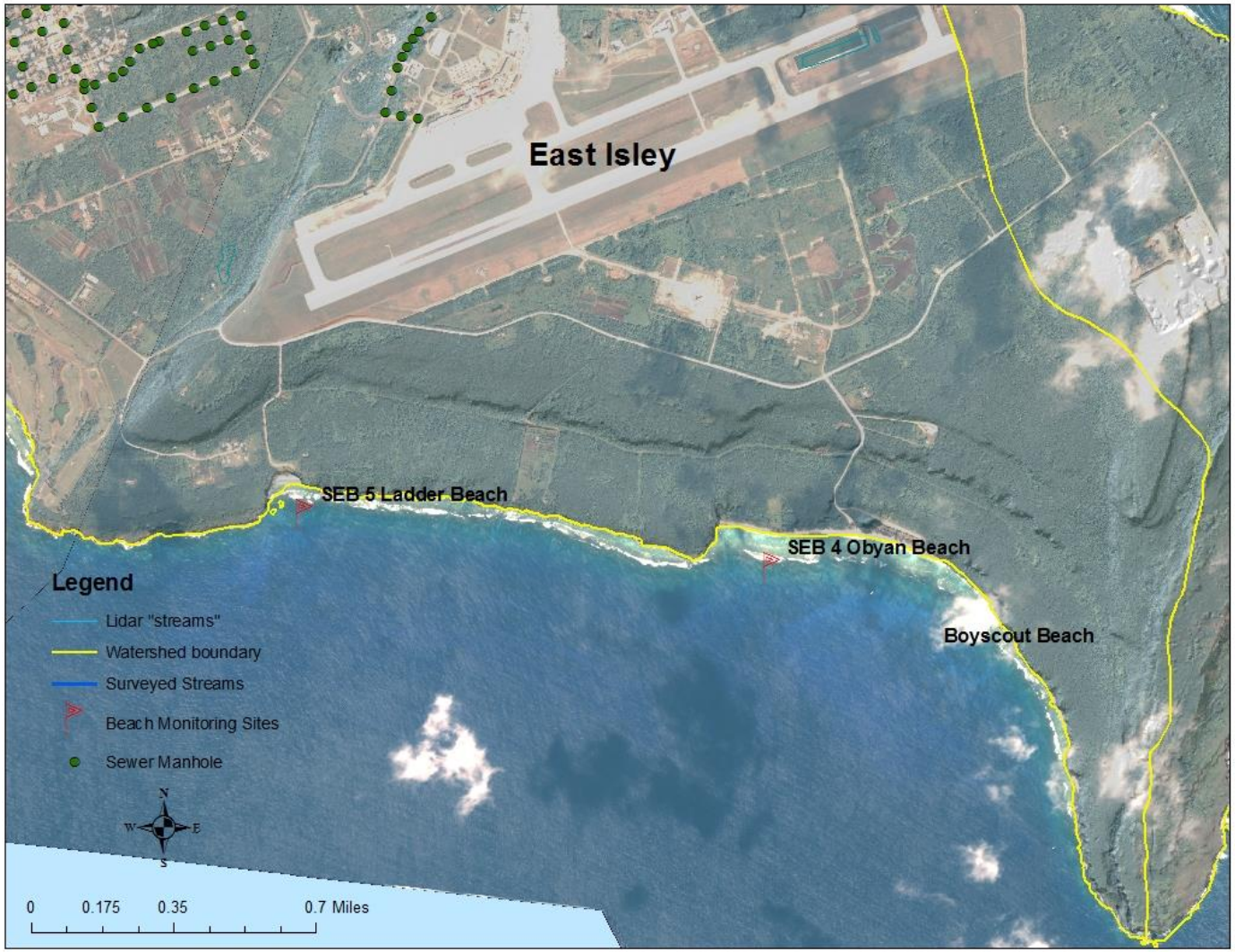
The cumulative findings above resulted in DanDan coastal waters retaining a CALM Category 2. There are no rivers or streams within the watershed.

C.4.1.6 Isley Watersheds (Segment 17)

The Isley Watershed is a narrow watershed starting from near the center of Saipan at its peak and flowing south down to Ladder, Obyan, Boyscout beaches on the east coast and Unai Dangkulo on the west coast. It also contains the remains of the WWII Isley and Koblerville Airfields, and Saipan's Francisco C. Ada International Airport.

Figure C-9 Isley Watershed (Segment 17A and 17B)

Figure C-10 East Isley Watershed (Segment 17B)



East Isley (Segment 17B) – Ladder, Obyan and Boyscout Beaches

Marine Coastal Waters

The East Isley watershed contains the WWII Isley Airfield and Saipan's Francisco C. Ada International Airport. The watershed also contains Ladder, Obyan, and Boyscout beaches.

Ladder beach is a sandy remote pocket beach surrounded by cliffs, undercuts, and caves. This overlook is a favorite site for weddings and other photo opportunities.

Obyan is a large public beach and popular SCUBA and camping site. Boyscout beach to the east of Obyan is more remote and harder to access, thus providing further protection to its unique *Porites rus* interstitial reef from anthropogenic stressors. This popular watershed attains the *Aesthetic Enjoyment* use designation for its coastal waters based on this and its scenic views and diving opportunities.

The two biological monitoring sites in East Isley received one "good" and one "poor" rating resulting in the coastal waters being assessed as "Fair". There has been insufficient new data collected to re-assess the nutrient water quality. Therefore, until new data is available, there is insufficient data to do a full assessment of the *Propagation and Aquatic Life* use designation.

East Isley has insufficient data collected on fish tissue and/or biota contamination in its coastal waters to assess attainment of the *Fish and Shellfish Consumption* use designation.

This reporting cycle, Ladder Beach once again had Enterococci levels exceeding the WQS. This is attributed to the lack of restroom facilities at this remote beach, which is now more heavily visited by growing tourist numbers. This was brought to the attention of the MVA, and DLNR Parks and Recreation Directors who provide and maintain public restroom facilities for the tourist industry. For this reason, East Isley watershed is again listed as impaired for the *Recreational* use designation. This recent uptick in Public Advisories has spurred discussions with CNMI agencies about constructing public compost toilets for CNMI's popular beach sites that are located far from any potable waters supplies or wastewater treatment facilities.

Surface Waters - Rivers and Streams

No biological or bacteriological data is available concerning East Isley's surface water stream systems. Sanitary surveys have not been completed in this watershed. However, based on visual field observations, and evaluation of available GIS data layers, there are very limited topographical and geological features to support stream systems. The exception is the area between Boyscout Beach and Naftan Point. Although, most precipitation in the watershed appears to flow by subterranean transport from land to sea, more information is needed about conditions around Naftan point to make further assessments of the surface water use designations.

The one use designation that can easily be assessed for this watershed is for *Aesthetic Enjoyment*. The many people that hike down the dry watercourses of the watershed for snorkeling, to enjoy sunset, or for camping at the secluded Boyscout beach, is testimony to East Isley's attainment of the *Aesthetic Enjoyment* use designation.

Surface Waters - Wetland

No information is available on the Isley wetland (Segment 17WET). Current GIS data layers only show existing open artificial waterbodies in the Coral Ocean Point Golf Course and some emergent wetlands in the north of the watershed. It is hoped that more information will be gathered by BECQ on Saipan's wetlands before the next reporting cycle.

The cumulative findings above resulted in the East Isley Watershed coastal waters retaining a CALM Category 5. East Isley's surface waters retain a CALM Category of 3.

West Isley (Segment 17A) – Unai Dankulo

Marine Coastal Waters

West Isley Watershed contains the WWII Koblerville Airfield, Coral Ocean Point Golf Course and Resort, and Unai Dankulo Beach. This popular beach is a local favorite for picnicking, fishing, and snorkeling. The West Isley watershed fully attains the *Aesthetic Enjoyment* use designation for its coastal waters based on this and its scenic views.

Biological assessments conducted this reporting cycle rated West Isley as "Poor". No new water quality data is available to reassess nutrient levels. For this reason, the *Propagation of Aquatic Life* use designation for coastal waters remains impaired.

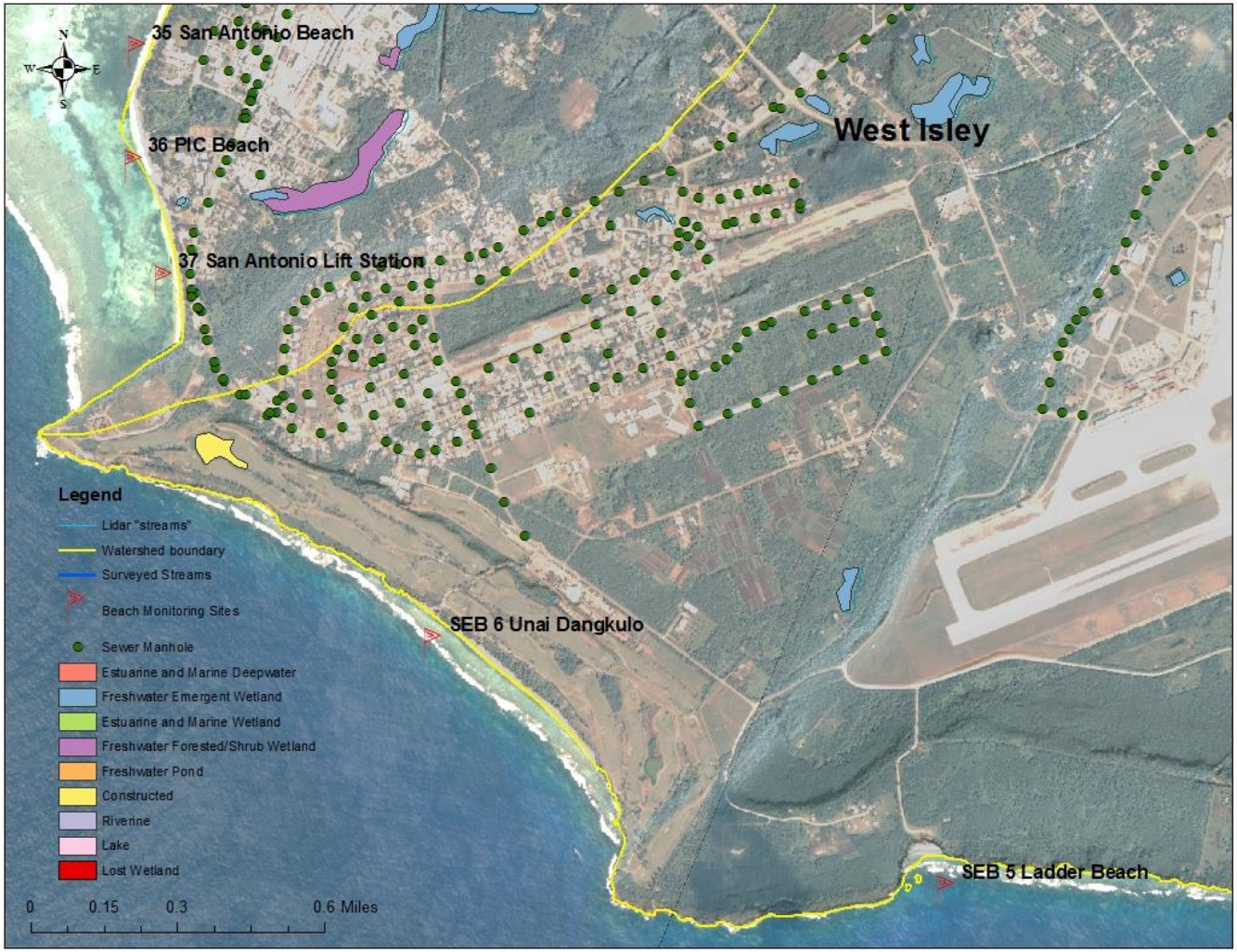
A study by Denton, et al., (2013) reported copper and lead contamination of biota within the West Isley Watershed. This has resulted in the *Fish and Shellfish Consumption* use designation of its coastal waters being listed as impaired. The heavy metal contamination is thought to be associated with a former WWII debris dumpsite at Agingan point. Denton states that the former dump site "was extensively contaminated with several elements that could conceivably induce adverse biological effects in sensitive species."

The *Recreational* Use designation also remains impaired this reporting cycle due to Enterococci exceedences. The source of contamination is unknown, but the sewer overflows from the upland sewer line is a suspected source.

Surface Waters - Rivers and Streams

Like the East Isley Watershed, sanitary surveys have not been completed in the West Isley Watershed, as it has not been listed as a priority watershed. However, based on visual field observations, there is insufficient precipitation, topographical or geological features in the mid to lower watershed to support surface water stream systems and their use designations. All precipitation appears to flow by subterranean transport from land to sea. More information is needed about conditions in the upper watershed to make further assessments of the use designations.

Figure C-11 West Isley Watershed (Segment 17A)



The East Isley watershed also contains the remains of the WWII Koblerville Airfield. US EPA tests monitoring wells here at least annually for VOCs and other water contaminants thought to be the result of fuel spill(s) from wartime activities.

The cumulative findings above resulted in the West Isley Watershed coastal waters retaining a CALM Category 5 and the surface waters retain a CALM Category of 3.

C.4.1.7 Susupe (Segment 18)

Figure C-12 Susupe Watershed (Segment 18A and 18B)

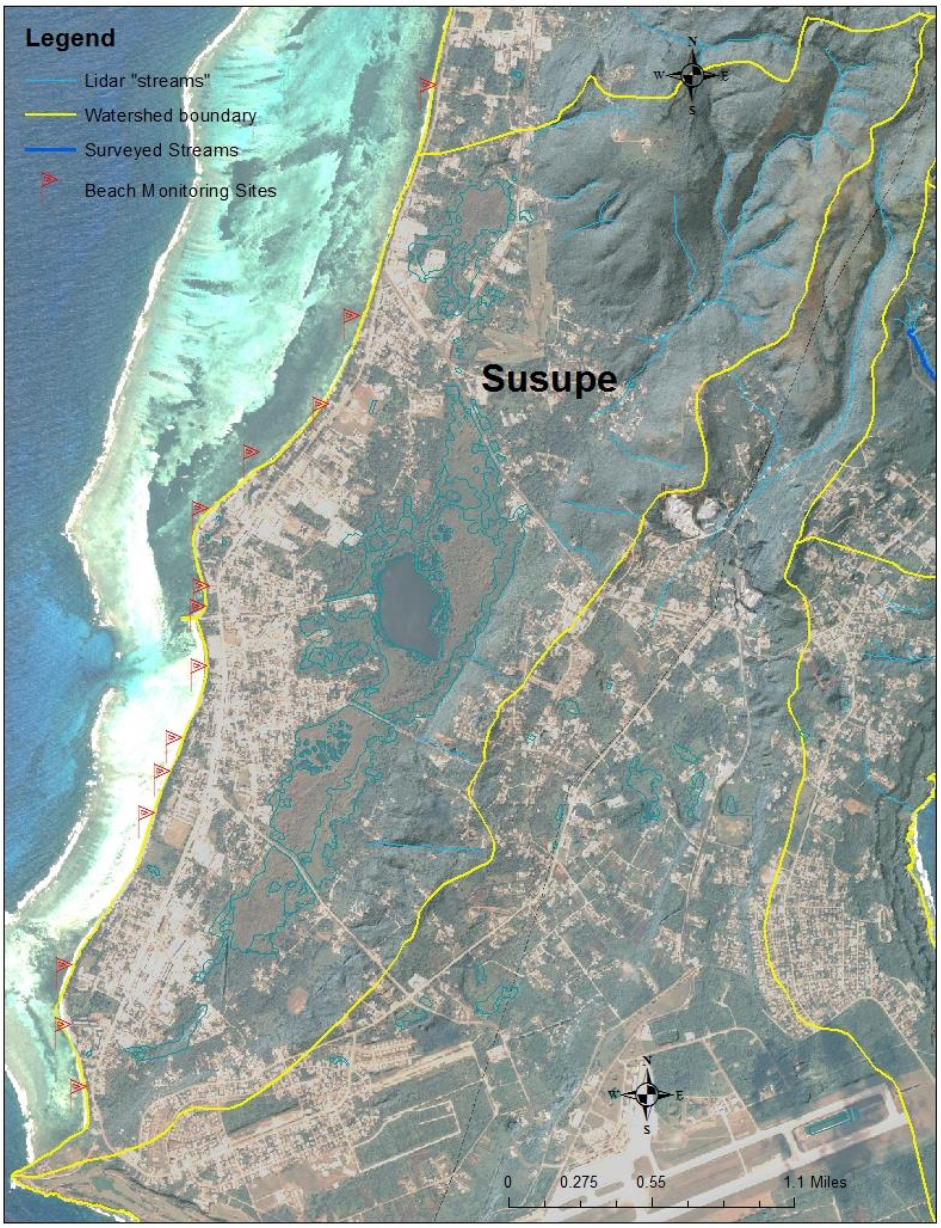
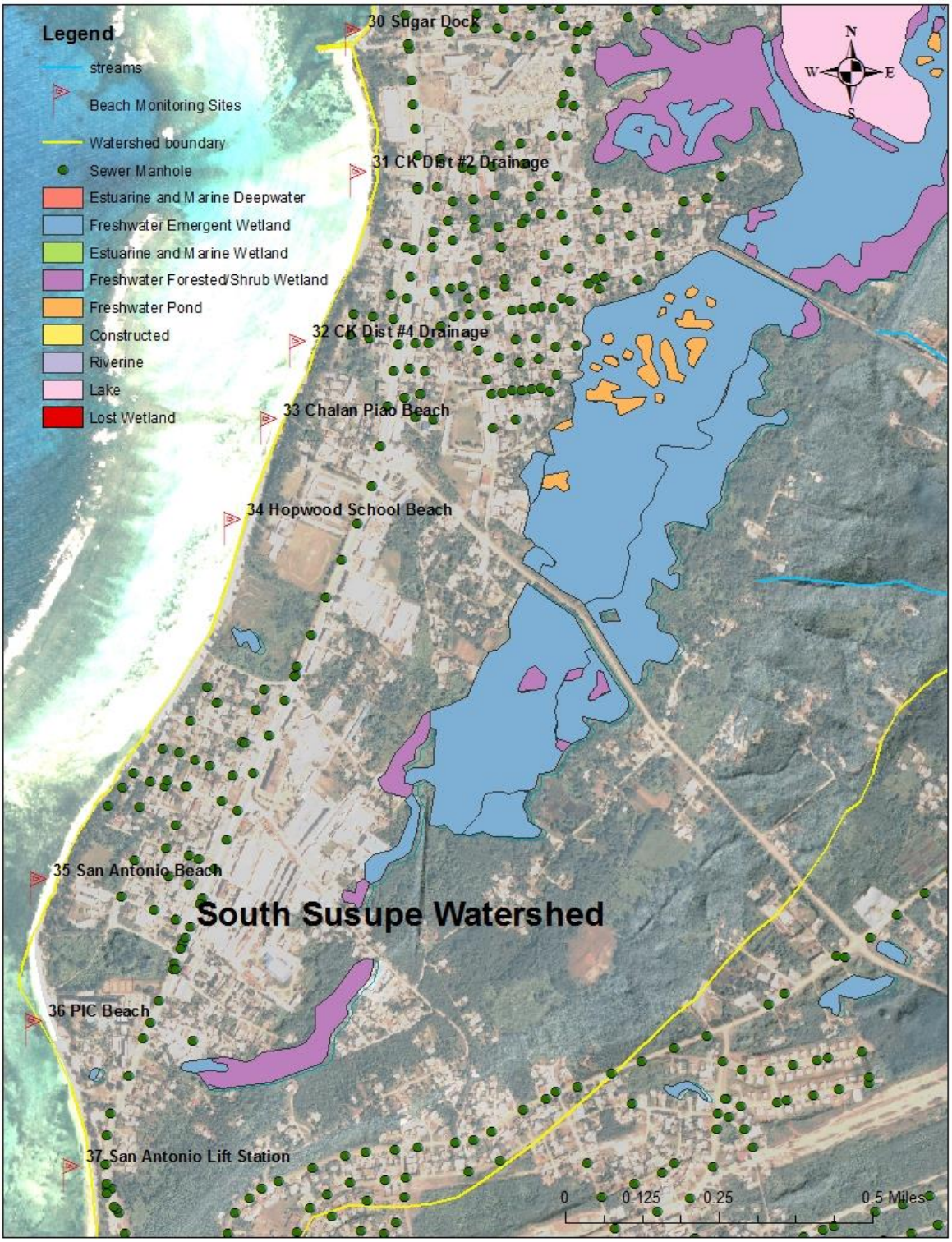


Figure C-13 South Susupe Watershed (Segment 18B)



South Susupe (Segment 18B) - San Antonio Lift Station to Sugar Dock

Marine Coastal Water

South Susupe Watershed contains Sugar Dock, which is the northernmost site; a popular boat launch, swimming and platform dive site. There are also several picnic sites strung along this sandy shoreline including Lally and Chalan Piao Beaches, which are very popular picnic sites for local residents on weekends. The southernmost beach is San Antonio or "Pak Pak beach", just north of the San Antonio CUC Lift Station and south of the Pacific Islands Club (PIC) Resort. Tourists and residents use these beach sites daily. Therefore, this watershed easily attains the *Aesthetic Enjoyment* use designation for its coastal waters.

The southern lagoon was reported to have improving water quality conditions in 2008 in comparison with previous CNMI IR reports (years 2002 and 2004). Based on the three biomonitoring sites this reporting period, South Susupe was given a "Good" ranking. However, this watershed remains impaired for the *Propagation of Aquatic Life* Use designation due to DO exceedences of WQS and past elevated nutrient levels.

There has been insufficient data collected on fish tissue and/or biota contamination of coastal waters to assess attainment of the *Fish and Shellfish Consumption* use designation.

The South Susupe coastal waters remain impaired for the *Recreational* use designation this reporting cycle due to Enterococci exceedences. The source of contamination is from overflows and leaks from the CUC sewage collection system. The San Antonio Lift Station in the watershed has required an upgrade to the system to meet peak flow demands. CUC was in the process of addressing this when Typhoon Soudelor hit. This created a setback in the completion of lift station improvements. The upgrade is expected to be completed by next reporting cycle.

Surface Water – Wetlands, Lakes and Ponds

Saipan's only lake, Lake Susupe and the adjoining wetland complex, is located primarily in the South Susupe Watershed. Although, the WQS/NPS branch has not completed sanitary surveys in this watershed, there have been a plethora of visual field work by CNMI agencies due to the presence and importance of the Lake and the surrounding wetland and potholes. Wildlife samples taken from the surrounding banks of Lake Susupe and other streams during the 2008 McKagan study captured three types of non-native snails, mangrove prawns, Tilapia, sailfin molleys, and mosquitofish. There is also a prevalence of introduced Red-eared slider turtles. Diminished DO and pH concentrations continue to exceed WQS. Therefore, although Susupe South supports aquatic life of many forms, many are introduced non-natives, resulting in this water body being listed as impaired for the *Propagation of Aquatic Life* use designation, but not because of a pollutant.

There is no data on fish tissue and/or biota contamination levels to make an assessment of the *Fish Consumption* use designation. However, bacteriological, chemical, and physical water quality parameters are analyzed bi-weekly. Based on the frequent Enterococci exceedences, these surface waters remain impaired for *Recreational use.*

Several studies have evaluated the feasibility of using Lake Susupe as a *Potable Water Supply* dating back to as early as 1958. Environet, Inc in 2006 completed the most recent study entitled "Assessment of Toxicity and Water Quality of Lake Susupe". It was prepared for the US Army Corps of Engineers. The study concluded that Susupe Lake "consists primarily of rainfall with minimal ground water influence" and is "isolated from surrounding groundwater and seawater systems". Chloride levels also have "quite pronounced" seasonal variations, as due the other constituents. "No organochlorine pesticides, PCBs, volatile or semi-volatile compounds were detected." The study went on to conclude that Lake would require treatment to be a potable water supply due to chloride (effect on palatability) and enterococci levels, which exceed the CNMI Drinking Water Quality standards. Therefore, Lake Susupe could support the *Potable Water Supply* use designation given appropriate water quality analysis and with appropriate treatment. However, as stated above no surface water in Saipan is used as a potable water supply.

Lake Susupe is enjoyed by the residents living near the lake, whom boat, kayak and 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 South Susupe watershed attains its *Aesthetic Enjoyment* use designation.

The findings above resulted in South Susupe's coastal waters retaining a CALM Category 5 and its surface water Lake a Category 5. The Susupe wetlands and potholes (Segment 18WET) retain a CALM Category of 4c.

North Susupe (Segment 18A) – Saipan Community School to San Jose Beach

Marine Coastal Waters

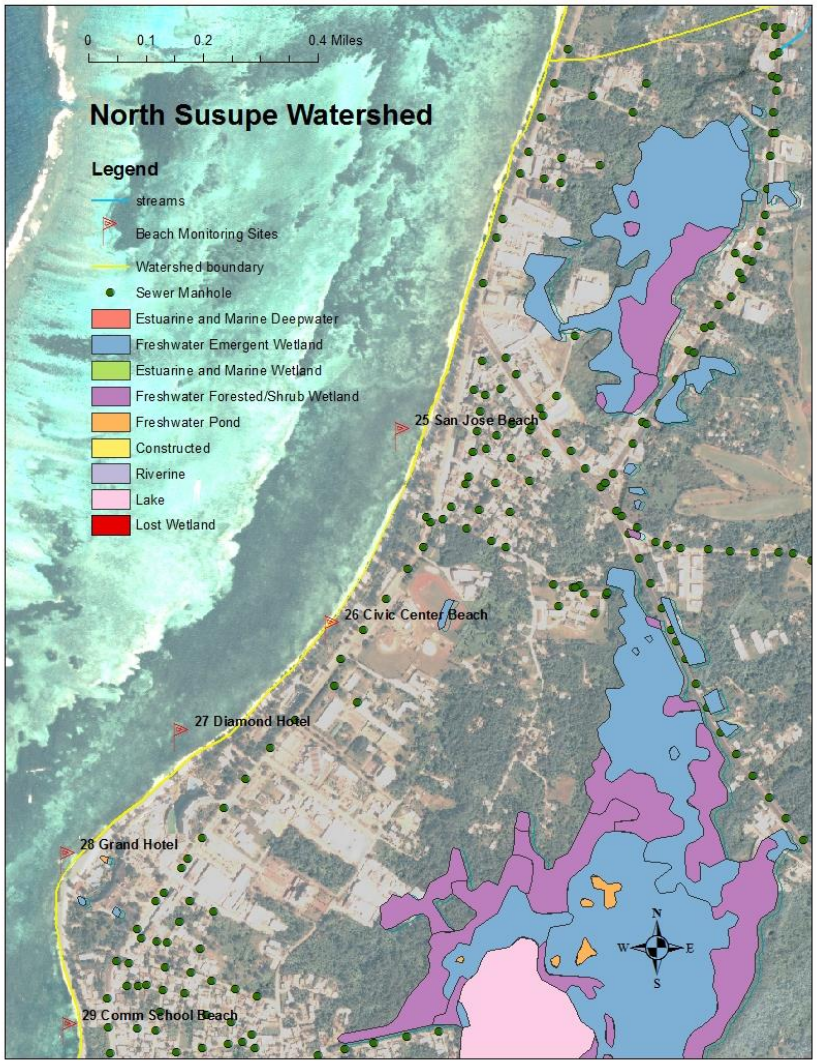
North Susupe Watershed on Saipan's western shore is home to several large resorts, hotels, and public beaches, which line Saipan's southern lagoon. Tourists and residents frequently use these beaches. This watershed attains the *Aesthetic Enjoyment* use designation for its coastal waters based on its scenic views, marine sports, swimming, fishing, and breathtaking sunsets.

The benthic habitat of North Susupe's coastal waters received a "Good" rating this reporting cycle. However, no new nutrient data is available for analysis. Interestingly, DO concentrations that had improved last reporting cycle remained stable throughout FY2014 only to diminish suddenly in FY2015. The source of this impairment remains unclear. Therefore, coastal waters remain impaired for the *Aquatic Life Support and Propagation* use designation.

There has been insufficient data collected on fish tissue and/or biota contamination of coastal waters to assess attainment of the *Fish and Shellfish Consumption* use designation.

Although, Enterococci levels were greatly reduced in coastal waters last reporting cycle, there were three sites in the North Susupe Segment that had over 10% exceedences this cycle, thus impairing the *Recreational Use* designation.

Figure C-14 North Susupe Watershed (Segment 18A)



Surface Waters - Rivers and Streams

Sanitary surveys have not been completed in the North Susupe watershed, as it has not been listed as a priority. However, the 2000 USGS report stated that, “Stream channels on the western coastal plain … are not discernible in the field or on topographic maps.” There does appear to be, “Some surface runoff from the southwest flank of Mount Tagpochau (sp), which does have discernable stream channels on the topographic maps.” However, during “dry years, surface runoff into the lake is probably negligible.” Therefore, collecting a sufficient number of annual water samples from the streams to provide statistically defensible water quality parameters is unlikely given the lack of consistent flow in these streams.

Therefore, there is insufficient data to assess the *Aquatic Life, Fish Consumption*, *Recreational*, and *Potable Water Supply* use designations for Susupe's stream systems.

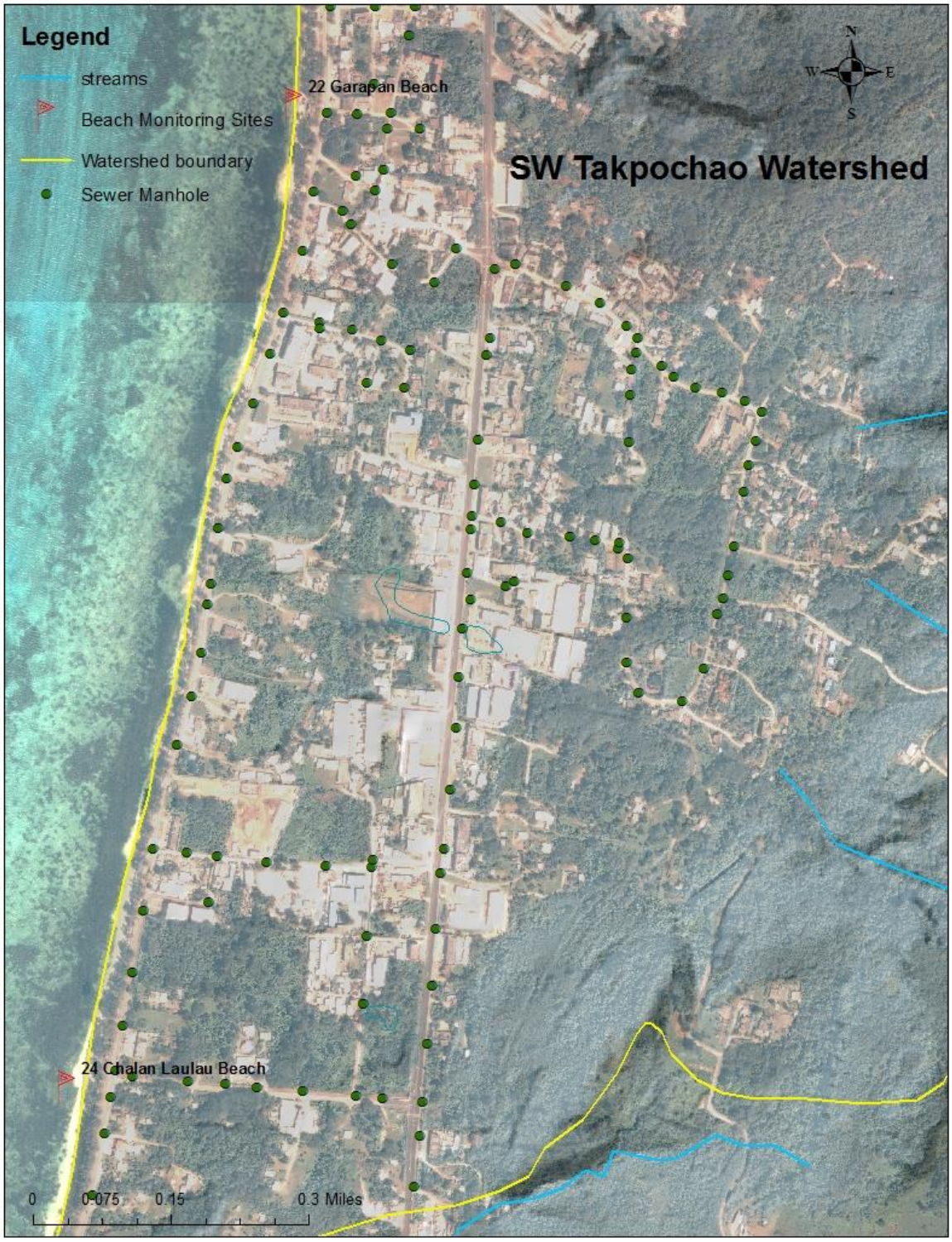
The cumulative findings above resulted in North Susupe's coastal waters retaining a CALM Category 5 and the 18STR waterbody segment being removed as it lacks consistent flow for assessment.

C.4.1.8 West Takpochao Watersheds (Segment 19)

West Takpochao is the most developed and urbanized watershed in the CNMI. This Segment is where sub-watersheds are largest. It is by far the most challenging watershed to address NPSs of contamination on Saipan due to both population density and its diversity. More than 15 languages and dialects are spoken within the Central Garapan tourist district.

Figure C-15 West Takpochau Watershed (Segments 19A, 19B, and 19C)

Figure C-16 South West Takpochau Watershed (Segment 19C)



South W. Takpochao (Segment 19C) – Chalan Laulau "13 Fishermen Monument" Beach

Marine Coastal Waters

South W. Takpochao Watershed contains Chalan LauLau and Garapan ("13 Fishermen Monument") Beaches. Currently no hotels or homes occupy the shoreline. However, the Saipan Beach Pathway runs from here north through Garapan and into American Memorial Park. Walkers, bikers, joggers, and dog walkers can be seen enjoying the path every morning and evening taking advantage of the cooling ocean breeze while capturing a sunrise or sunset. For this reason, South W. Takpochao attains the *Aesthetic Enjoyment* use designation.

There are two water quality and two biological sites regularly monitored within segment 19C. The ALUS rankings of its coastal waters based on seagrass assemblages, was "Fair" for *Aquatic health*; up from last reporting cycle. However, this water body is associated with a large paved populated area, which is degraded by runoff that that drains into the lagoon during storm events. The runoff transports a variety of pollutants that contribute to poor water quality including a number of DO% and pH exceedences. The source of the lower DO% is likely caused by an excess of aerobic bacteriological activity, the source being runoff carrying waste from failing wastewater collection systems. However, the specific source of the diminished pH is unknown at this writing.

There is no new nutrient data available at this writing. Therefore, the South W. Takpochao coastal waters remains impaired for the *Aquatic Life Support and Propagation* use designation.

There is also insufficient data collected on fish tissue and/or biota contamination of coastal waters to assess attainment of the *Fish and Shellfish Consumption* use designation.

This reporting cycle Enterococci levels again exceeded the WQS and South W. Takpochao coastal waters were returned to impaired status for the *Recreational Use* designation. This may be an artifact of the rash of storm events resuspending sediment containing naturally occurring bacteria. However, the analysis was inconclusive due to lack of timely water quality sampling (see discussion in Section C.2.3.3 Recreational Use).

Surface Waters - Rivers and Streams

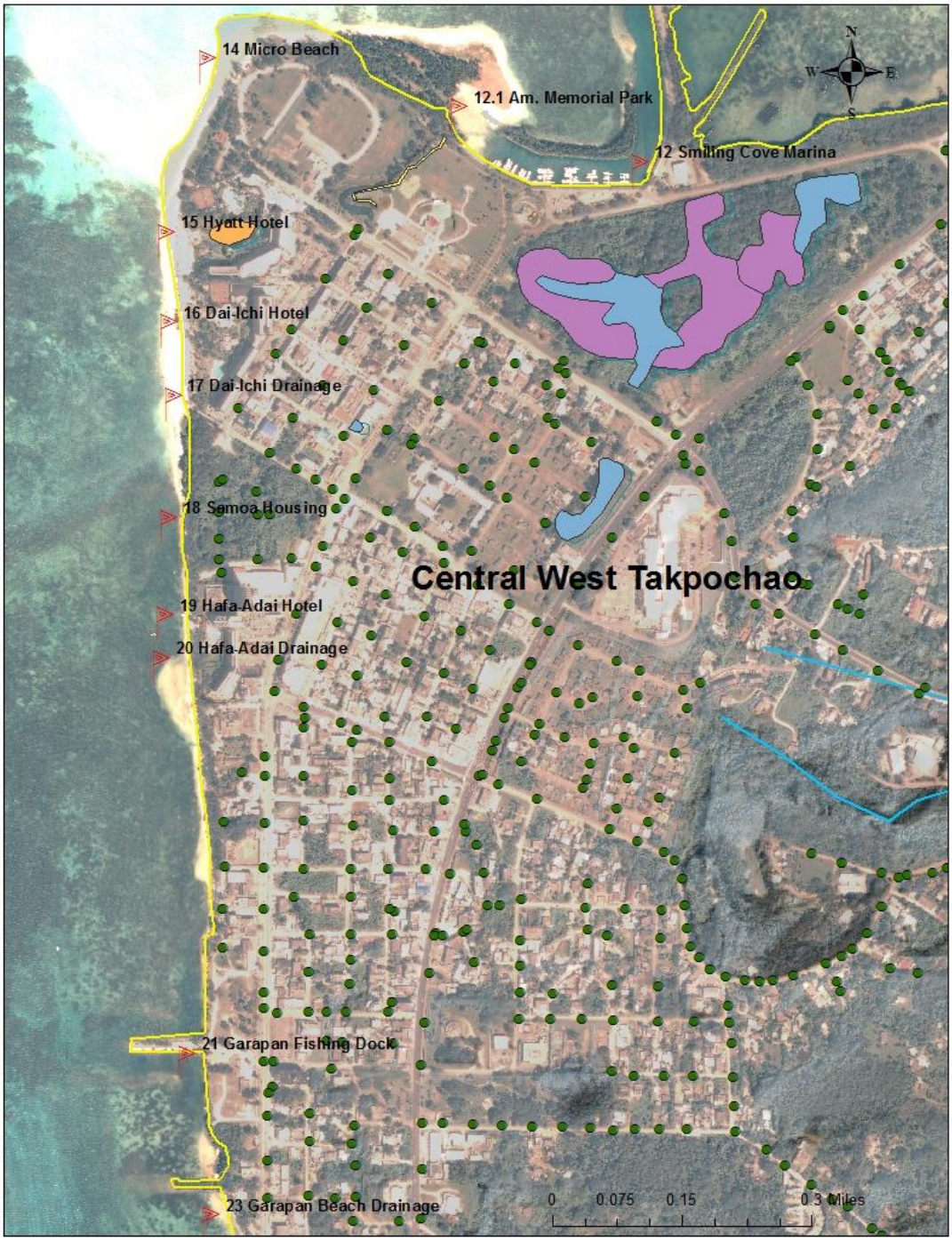
At this writing, sanitary surveys have not been completed in the South W. Takpochao watershed, as it was not listed as a priority watershed. Therefore, there is insufficient data to establish whether or not the surface waters contained therein attain the *Aquatic Life Use Designation*. Data is also lacking on fish tissue and/or biota contamination for the *Fish Consumption* use designation.

There is no available data for the *Recreational* or *Potable Water Supply* use designations. However, the stream systems continue to meet the *Aesthetic Enjoyment* use designation based on their continued use by hikers, "hashers", and recreational and professional athletes.

The ephemeral flow in South W. Takpochao is too infrequent to provide a stable and sufficient *Potable Water Supply* for this densely populated watershed, and would not be considered for use.

The cumulative findings above resulted in South W. Takpochao's coastal waters retaining a CALM Category 5 and its surface waters streams a Category 2.

Figure C-17 Central West Takpochau Watershed (Segment 19B)



Central West Takpochao (Segment 19B) – Garapan Beach Drainage to Micro Beach

Marine Coastal Waters

Central W. Takpochao Watershed contains Micro Beach, American Memorial Park, and the Garapan Tourist District, Saipan's busiest shopping and dining district. Many large-scale resort hotels, nightclubs, restaurants and duty free stores are located here. Tourists and residents are a constant fixture on Micro Beach's sandy shore sunbathing, swimming, wind and kite surfing, and jogging along Saipan's Beach Pathway. For this reason, South W. Takpochao attains the *Aesthetic Enjoyment* use designation for its coastal waters.

Although the biological monitoring result for two coastal sites in Segment 19B, was ranked as "Good" for near shore coral reefs, the other site was ranked "Poor" resulting in an overall "Fair" ranking this reporting cycle. The DO% levels remain diminished in this water segment. Therefore, it remains impaired for the *Propagation of Aquatic Life* use designation.

Fish tissue samples were collected in 2004 and 2005 as part of a WERI study on heavy metal accumulation. Fish samples taken from the coastal outlet of Garapan Drainage 3 were found to have elevated levels of Mercury. The source of the contamination was traced back to the drainage leading from the Commonwealth Hospital, "a few meters down gradient of an old incinerator site", which was subsequently closed. For this reason, Central W. Takpochao's coastal waters are listed as impaired for the *Fish and Shellfish Consumption* use designation.

Central Takpochao's coastal waters remain impaired for the *Recreational* Use designation due to continued Enterococci exceedences, the sources of which are many.

Surface Waters - Rivers and Streams

As to the surface water stream systems, sanitary surveys have begun in the central Garapan district, but not yet completed through the upper watershed. However, some information is available. McKagan's 2008 study did survey the lower part of the watershed. Fishermen living nearby the streams in the mid watershed have reported the presence of fresh water shrimp, and eels to resource agency staff. These streams drain into constructed concrete conveyances that eventually flow out of Garapan Drainage number 1. This drainage which was found to contain Thiarid snails and Sailfin Molleys (*Poecilia latipinna*) as the predominant species, along with juvenile milk fish, and "one Tilipia specimen". This resulted in the Central W. Takpochao Watershed streams having the most introduced and disturbed systems surveyed. Therefore, these surface waters are considered impaired for the *Propagation of Aquatic Life* use designation.

Due to the presence of heavy metal contamination sourced back to the lower watershed's drainages, the Central W. Takpochao watershed is considered impaired for the *Fish Consumption* use designation as well.

There is insufficient water quality data available on the streams to make a similar assessment for the *Recreational Use* designation, however preliminary data show elevated Enterococci levels, which would impair these waters. The source of Enterococci contamination is thought to be piggeries that were in the upper watershed operating without appropriate BMPs or wastewater collection systems. Some were in close proximity to ephemeral streams.

The considerably altered mid and lower stream watercourses are highly urbanized. The constructed concrete conveyances that channel the streams from ridge to reef do not support the *Aesthetic Enjoyment* use designation.

The ephemeral flow in Central W. Takpochao is too infrequent to provide a stable and sufficient *Potable Water Supply* for this densely populated watershed, and would not be considered for this use.

Surface Waters - Wetland

The wetland in American Memorial Park (Segment 19WET) was refurbished in the mid-1990s to act as a stormwater catchment basin and to allow planted mangrove trees to trap nutrients and sediment from the flow before discharging into the Saipan Lagoon. There has been significant introduction of invasive water hyacinth and hydrologic alterations here. Although the wetland is home to a few moorhens and fish, it is still considered impaired for the *Propagation of Aquatic Life* use designation.

The cumulative findings above resulted in Central W. Takpochao's coastal and surface waters retaining a CALM Category 5, and the Wetland retaining a CALM Category of 4c due to invasive plants, and hydrological changes.

It should be noted that, an inter-agency Garapan CAP is being gradually implemented through multi-agency efforts to identify and address point source (illicit discharges) and NPS pollution. Additionally, efforts are being made to identify funding to complete a TMDL for these waters.

North West Takpochao (Segment 19A) – Outercove Marina to Seaplane Ramp

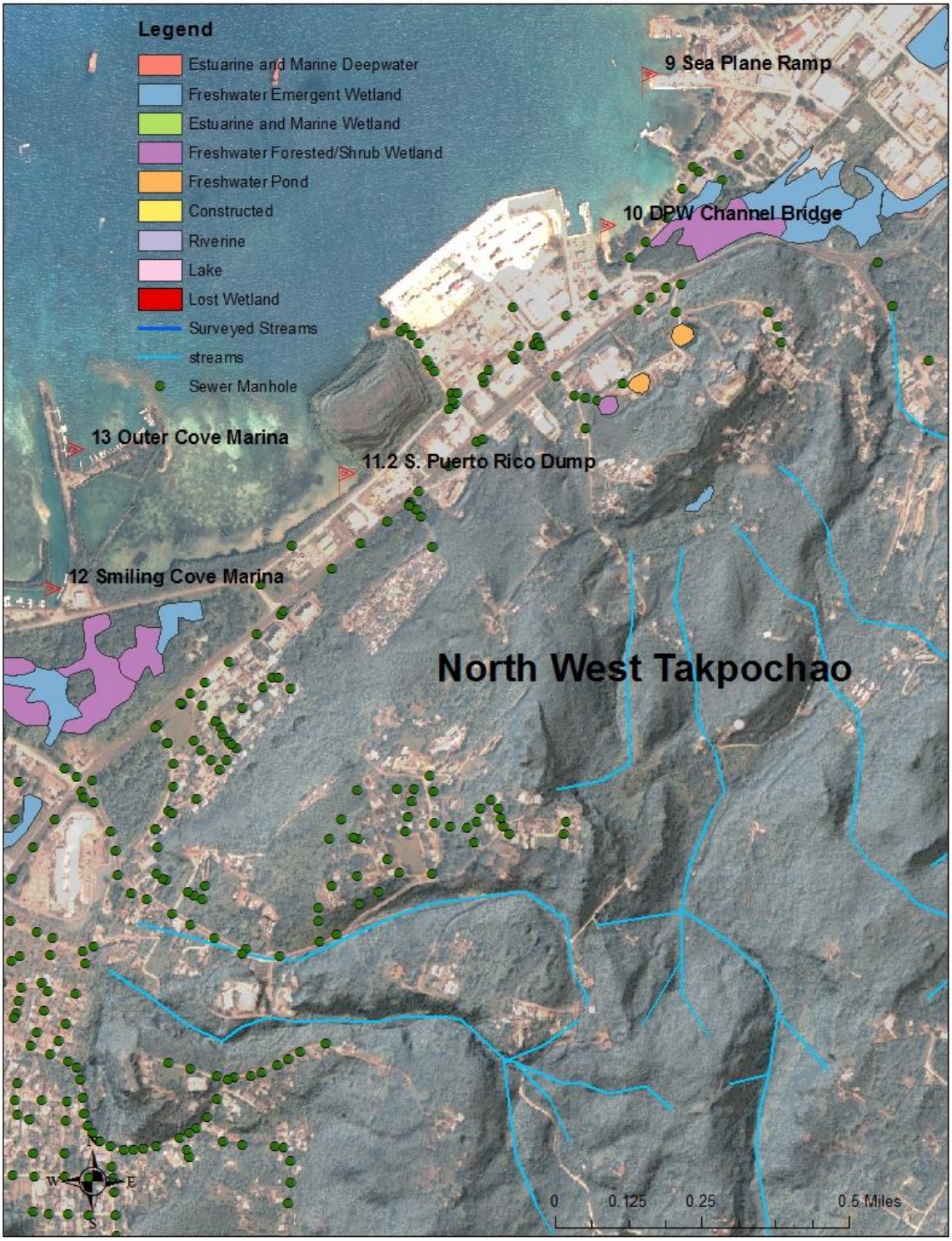
Marine Coastal Waters

The North W. Takpochao Watershed contains Saipan's "industrial area", which are Class A Waters including the Smiling Cove and Outer Cove Marinas, the closed municipal dump, DPW Channel Bridge, and the Sea Plane Ramp (see Figure B-2 above).

No biological assessments were carried out in the North W. Takpochao watershed. However, the water quality was found to be impaired due to diminished DO% levels near the closed Puerto Rico dump and the Smiling Cove Marina sites. In 2015 pH levels at one site, the DPW Channel Bridge, exceeded the WQS but showed no trend toward acidity or alkalinity. The source of this may be boat repair activities at this site. There is no new nutrient data available this reporting cycle. Therefore, the *Propagation of Aquatic Life* use designation for coastal waters remains impaired.

There has been insufficient data collected on fish tissue and/or biota contamination of coastal waters to assess attainment of the *Fish and Shellfish Consumption* use designation.

Figure C-18 North West Takpochau Watershed (Segment 19A)



As was the case for the Takpochao's southern watershed, the northern watershed remains impaired for *Recreational* uses due to Enterococci exceedences.

Surface Waters - Rivers and Streams

Although this watershed is the most industrialized in the CNMI, it still attains the *Aesthetic Enjoyment* use designation for its coastal waters due to its scenic views.

Sanitary surveys of the streams in the North W. Takpochao watershed have not yet begun. Therefore, there is insufficient data to establish whether or not these surface waters attain the *Propagation of Aquatic Life* Use Designation. Data is also lacking on fish tissue and/or biota contamination for assessing the *Fish Consumption,* and for assessing the *Recreational* Use Designations. However preliminary bacteriological water quality data show elevated Enterococci levels, which would impair these waters.

North W. Takpochao stream systems continue to meet the *Aesthetic Enjoyment* use designation based on their continued use by hikers, "hashers", and recreational and professional athletes.

The ephemeral flow in North W. Takpochao is too infrequent to provide a stable and sufficient *Potable Water Supply* for this densely populated watershed, and is not considered for use.

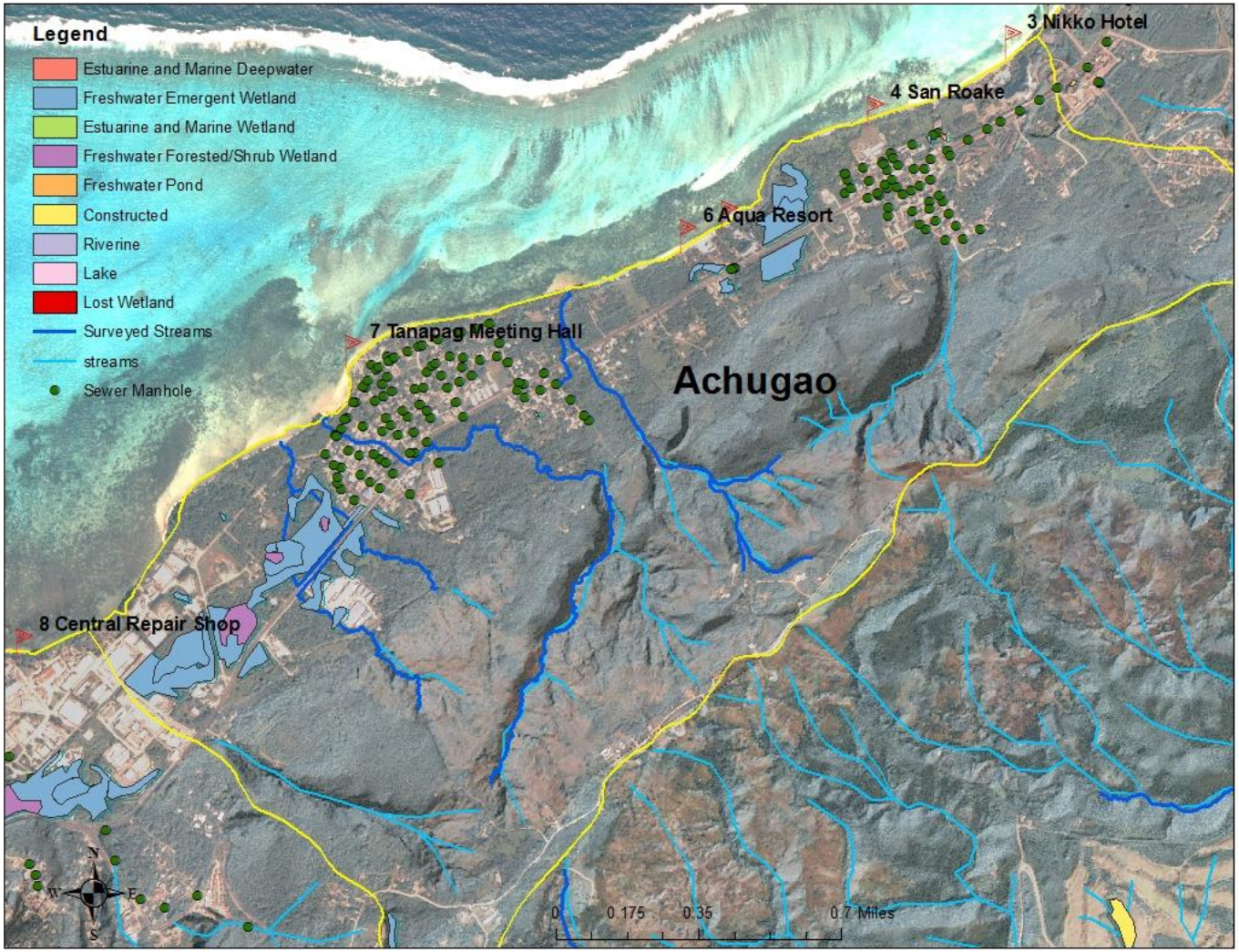
The cumulative findings above resulted in North W. Takpochao's coastal waters retaining a CALM Category 5, and its surface water a Category 2. As is being done for the Garapan District in the Central watershed, efforts are being made to identify funding to complete a TMDL for the North W. Takpochao watershed.

C.4.1.9 Achugao Watersheds (Seg 20) – Tanapag Lagoon

The Achugao Watershed contains three major intermittent stream systems that run from Wireless *Ridge* through Tanapag village and out to Tanapag Lagoon. However, none of these streams are considered for use as *Potable Water Supplies*.

"Agatan" stream is located in the south, "Dogas" stream splits between the two watersheds, and "Achugao" stream is in the north watershed. The upper watersheds have small pristine waterfalls, and beautiful bamboo stands.

Figure C-19 Achugao Watershed (Segment 20)

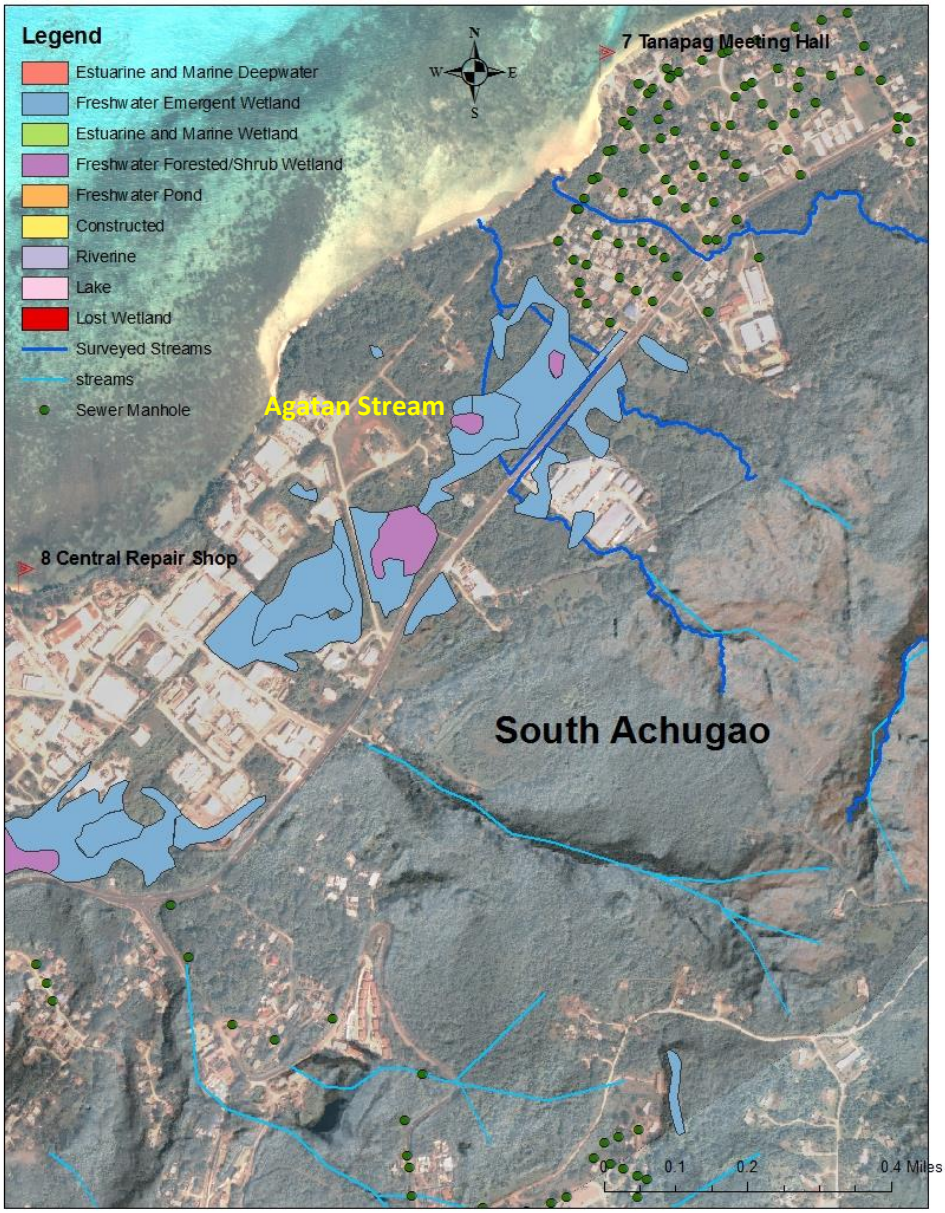


South Achugao (Segment 20B) – Central Repair Shop to Tanapag Meeting Hall

Marine Coastal Waters

South Achugao Watershed contains the Agatan and part of the Dogas stream systems, which flow out to Tanapag Lagoon. This reporting cycle the biological monitoring data ranked South Achugao as "Poor". Additionally, there is no new nutrient data, and DO% levels remain low near the Central Repair Shop site, a Class A Water.

Figure C-20 South Achugao Watershed (Segment 20B)



Based on visual field examinations, it is thought that the diminished DO% levels are likely caused by runoff from the marine Central Repair Shop ramp where boats are dry docked for repair and painting. An excess of aerobic bacteriological activity may also cause diminished DO% levels from sewer overflows upland. Therefore, South Achugao coastal waters remain impaired for the *Propagation of Aquatic Life* use designation.

There has been insufficient data collected on fish tissue and/or biota contamination of coastal waters to assess attainment of the *Fish and Shellfish Consumption* use designation.

South Achugao's coastal waters did not attain the *Recreational* Use Designation due to continued Enterococci exceedences from a variety of sources; on-site wastewater treatment systems, urban runoff, and from roaming livestock upland.

However, the local community continues to frequent the Tanapag Meeting hall, playground, boat launch, and sandy beach areas to enjoy, fishing, swimming and picnicking, thus fully attaining the *Aesthetic Enjoyment* Use Designation.

Surface Waters - Rivers and Streams

The WQS/NPS branch completed sanitary surveys within the Achugao watershed. The Agatan stream is deep enough near shoreline for homeowners living adjacent to the stream to kayak, or boat and fish year round, thus supporting the *Aesthetic* Use Designation. Survey information for the Dogas stream will be reported in the *North* Achugao watershed section that follows.

McKagan's 2008 study took biological samples from the Agatan stream. It was found to be relatively pristine upland with *Macrobrachium lar* shrimp present, although no eels were observed. This was substantiated by WQS/NPS staff findings. Therefore, South Achugao's fresh waters attains the *Propagation of Aquatic Life* use designation.

However, there is no available data on the stream's fish tissue and/or biota contamination levels to evaluate the *Fish Consumption* use designation.

Illicit discharges from nearby residences were not found during surveys. However, failing septic systems and feral pigs may be a source of elevated Enterococci levels in the few samples collected during rain events. However, there is insufficient data at this time to make a definitive assessment of the *Recreation* Use Designation for this watershed's stream systems.

Surface Waters - Wetland

The Agatan stream was assessed and mapped from the mid-watershed into the wetland area that re-immerges into an open stream in the lower watershed near the coastline. The wetland's hydrology has been altered. However, little else is known about the quality of this wetland.

The findings above resulted in South Achugao coastal waters retaining a CALM Category 5, its surface waters a Category 2, and the wetlands a Category 4c due to alteration of the habitat, observation of non-native plants, and hydrological changes from roadways and fill.

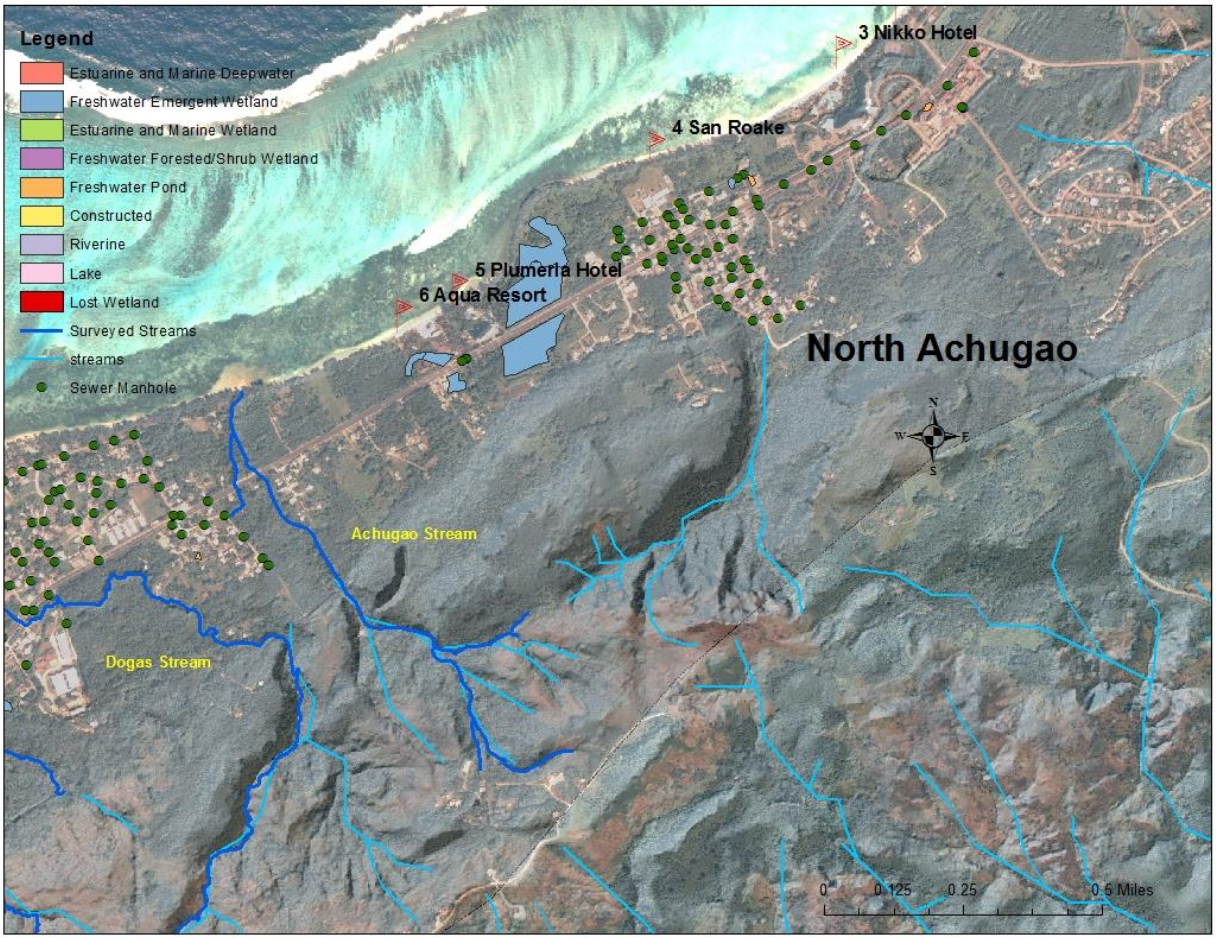
North Achugao (Segment 20A) – Aqua Resort to Nikko Hotel

Marine Coastal Waters

The North Achugao Watershed contains three hotel complexes, two of which have been out of operation since last reporting cycle, but are currently being renovated as new hotel franchises. The Palms Resort (nee Nikko Hotel) will now be managed under the Kensington Hotel franchise.

The biological ALUS rankings, based upon metrics of seagrass assemblages, received a healthy ranking of "Good" this reporting cycle. Improving conditions are thought to be due to a halt in development and a mass vacancy in resorts. The closure substantially decreased the number of beach goers using, and thereby adversely effecting, coastal waters in this segment of the watershed. However, there is no new nutrient data. Due to this lack, a reassessment of water quality for the *Propagation of Aquatic Life* use designation could not be made.

Figure C-21 North Achugao Watershed (Segment 20A)



There has been insufficient data collected on fish tissue and/or biota contamination of coastal waters to assess attainment of the *Fish and Shellfish Consumption* use designation.

Although North Achugao watershed did see improvement in its bacteriological marine water quality last reporting cycle, it once again has Enterococci exceedences of the WQS, thus returning coastal waters to impaired status for the *Recreational* use designation. This is thought to be connected with the renovations for the hotel complexes, which has increased workers and wastewater flow during peak hours.

The surrounding community alerted BECQ of the problem by reporting foul smelling stormwater. WQS/NPS staff investigated and located an over flowing manhole cover in a drainage that flows to the lagoon. CUC was called and reported that the SR1 lift station pump was insufficient to handle peak hour volume. The pump was replaced this reporting cycle and a new design has been created to upgrade the station within Fiscal Year 2016.

Although, there are not as many tourists frequenting area beaches in the northern watershed, the local residents continue to enjoy the sandy beach areas for fishing, swimming, and picnicking, thus fully attaining the *Aesthetic Enjoyment* Use Designation.

Surface Waters - Rivers and Streams

As an impaired and priority listed Watershed, sanitary surveys were completed by the WQS/NPS branch within and around the North Achugao stream systems. Both the Achugao and Dogas streams run from Wireless Ridge through the pristine upper watershed down through the lower Tanapag village and out to Tanapag Lagoon. The streams and NPS of pollution were mapped using GPS and ArcGIS. Fresh water shrimp and eels were observed in the upper and mid watershed. Families living next to the Dogas stream also reported fishing for shrimp, thus supporting the *Propagation of Aquatic Life* Use Designation.

However, there has been no data collected on fish tissue and/or biota contamination of coastal waters to assess attainment of the *Fish and Shellfish Consumption* use designation.

There were water quality samples collected from the streams this reporting cycle as a result of the implementation of the Surface Water Quality Monitoring Plan. However, samples were two few in number to make a definitive assessment of the *Recreational* Use Designation. Preliminary data show elevated Enterococci levels, which would impair these waters should this trend continue. The source of Enterococci contamination is thought to be associated with a number of sources: a few homes were not connected to the sewer line and had failing septic systems; free roaming animals were observed, a few livestock pens were discharging animal waste into the streambeds; and some homes had outdoor kitchen sinks discharging grey water into the streambeds.

Realizing that these homesteads are owned by low or zero income families, the WQS/NPS branch created a community based NPS educational and outreach campaign in 2014. Homeowners were invited to coffee klatches to learn about survey findings, and to an after-office-hours Village Assistance Forum. The Forum brought government agencies to the village rather than having homeowners take time off work to apply for financial assistance to upgrade their living conditions

to come into compliance with WQS. This approach gained community buy-in and homeowners cooperated with cleanup efforts by moving their animals away from streams, building sanitary animal pens with appropriate BMPS, and discontinuing grey water discharges. By March 2015, all NPS of pollution had been addressed. However, continued Enterococci violations led WQS/NPS to reinvestigate the village sewer line. BECQ's Safe Drinking Water technical advisor located "as built" CUC blue prints that showed two forgotten sewer manholes in the lower stream outlet. CUC was contacted and found a leaking line, which they addressed by capping it off. A three-minute video of this successful remediation effort, entitled, "Stream Restoration, it takes a Village", may be viewed on youtube: https://www.youtube.com/watch?v=ZmmHE0Lf-ZY.

Many "Hashers", hikers, and tri-athletes that enjoy training throughout the jungle areas and within dry streambeds use North Achugao's pristine upper and mid-watershed. The residents living adjacent to the streams also report their enjoyment of living alongside the streams. This provides sufficient anecdotal evidence that the *Aesthetic Enjoyment* Use Designation is fully supported.

The cumulative findings above resulted in the North Achugao coastal waters retaining a CALM Category 5 and its surface water streams a Category 2.

C.4.1.10 As Matuis Watershed (Segment 21) – Wing and Pau Pau Beaches

Marine Coastal Waters

Proceeding up the west coast of the island, the As Matuis Watershed contains Wing Beach, a popular camping and SCUBA site. It is also a very important nascent nesting site for the endangered green sea turtle. This feature caused resource managers to close off the beach area to vehicular traffic in 2004, which resulted in the return of the shoreline's natural beach profile and native vegetation. Divers and bloggers alike have called it the "Jewel of Saipan".

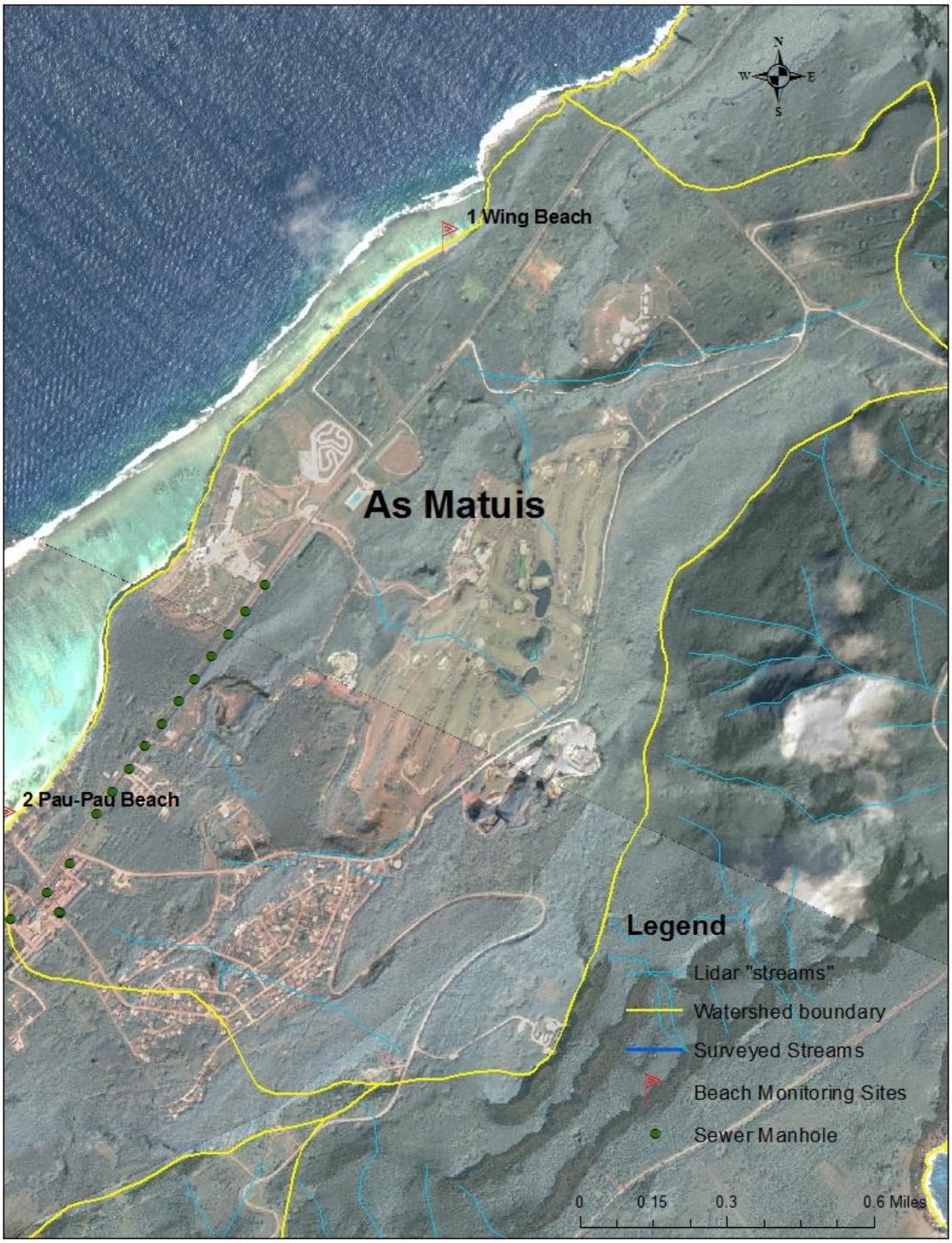
Further south lies PauPau Beach, which is a very popular picnic and swimming training area especially for aspiring athletes. For this reason, As Matuis coastal waters fully support the *Aesthetic Enjoyment* use designation.

The biological data continues to rank As Matuis coral reefs as "good". However there were DO% exceedences in 2015 at PauPau beach and there is still no new nutrient data available to reassess these coastal waters for the *Propagation of Aquatic Life* use designation.

There has been no data collected on fish tissue and/or biota contamination of coastal waters to assess attainment of the *Fish and Shellfish Consumption* use designation.

As Matuis had more than 10% Enterococci exceedences this reporting cycle, which resulted in it being listed as impaired for *Recreational* Use designation for the first time. This may be associated with overflows of the public wastewater collection system. However, Wing Beach, in the northern half of the watershed is sparsely populated with no sewer lines. Therefore, these exceedences are thought to be associated with grazing cattle that are raised in the area.

Figure C-22 As Matuis Watershed (Segment 21)



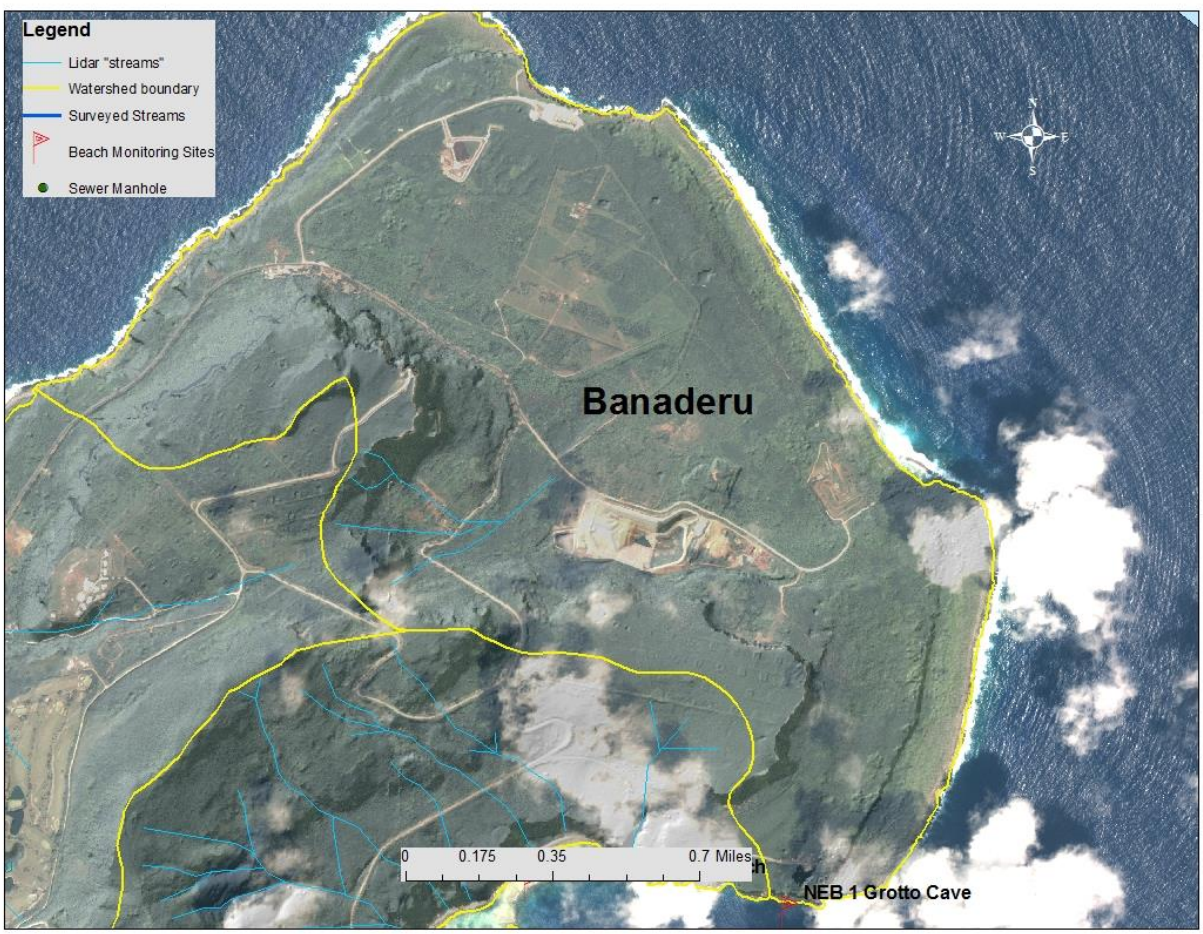
Surface Waters - Rivers and Streams

All of the stream systems in As Matuis watershed are ephemeral and rarely flowing. Visual field assessments have revealed no fresh water pools to support aquatic ecosystems during dry season. However, there is insufficient information on the stream system to determine if this watershed receives enough sustained precipitation to support *Recreational Use, Propagation of Aquatic Life* use designations. However, many "Hashers", hikers, bikers, and tri-athletes enjoy exercising and training throughout the jungle areas and within the dry streambeds in the mid and upper watershed, which demonstrates that the *Aesthetic Enjoyment* Use Designation is fully supported.

The ephemeral flow in Achugao is too infrequent to provide a stable and sufficient *Potable Water Supply* and is not considered for use.

The cumulative findings above resulted in As Matuis coastal waters retaining a CALM Category 5, and the surface water a Category 2.

Figure C-23 Banaderu Watershed (Segment 22)



C.4.1.11 Banaderu Watershed (Segment 22) – Grotto Cave

Marine Coastal Wates

The Banaderu Watershed contains the Grotto Cave. The Cave is a naturally formed grotto with deep clear waters for cliff diving, snorkeling and SCUBA. It is often featured in international dive publications. It is for this reason that Banaderu attains the *Aesthetic Enjoyment* use designations for its coastal waters.

Presently, there is no biological monitoring site for this watershed. However, DO% and pH water quality parameters are excellent. Therefore, Banaderu fully supports the *Propagation of Aquatic Life* Use Designation.

There has been no data collected on fish tissue and/or biota contamination of coastal waters to assess attainment of the *Fish and Shellfish Consumption* use designation. However, due to its remote location, lack of development, Banaderu attains the *Fish and Shellfish Consumption* use designation based on professional judgment.

In fiscal year 2015, the percent of Public Advisories for Grotto Cave abruptly increased due to Enterococci exceedences. As a result, for the first time the Banaderu Watershed was added to the list of impaired waters for the *Recreational* Use Designation. The exact cause has not been established through testing. However, as there is no sewer infrastructure or free roaming livestock in the area, the public restrooms are suspected to be the source. The restrooms are designed with a septic holding tank that is maintained by regular pump out. The BECQ WEEC branch inspected the site at the time of this writing and found the tank in good working order. However, it was noted that the restrooms are *closed* when the rainwater catchment system has an insufficient volume of water to provide flushing or handwashing. This has resulted in visitors choosing alternative sites to relieve themselves when the public restrooms are closed in this very remote location. In response, BECQ met with MVA, and Department of Lands and Natural Resources to request that they use additional funding to truck in water supplies to keep the restrooms open during all hours of operation.

Surface Waters - Rivers and Streams

There is insufficient precipitation, topographical or geological features in the Banaderu Watershed to support stream systems. Water precipitation flows by subterranean transport from land to sea.

Therefore, the cumulative findings above resulted in Banaderu's coastal waters being reduced to a CALM Category 5 this reporting cycle. There are no surface waters in Banaderu to support streams systems.

Figure C-24 Mañagaha (Segment 23)

C.4.1.12 Mañagaha Watershed (Seg 23)

Marine Coastal Waters

Mañagaha Watershed contains Mañagaha Island, a small sand cay in the Saipan Lagoon, which is a conservation area and a shearwater bird nesting site. Its wide sandy beaches, panoramic views, and recreational activities draw the largest number of tourists than any other tourist site in the CNMI. For this reason, Mañagaha Watershed attains the *Aesthetic Enjoyment* use designations for its coastal waters.

Biological monitoring results ranked Mañagaha as “fair”. There is no new nutrient data available to reassess coastal water quality for this parameter, but past values are not thought to be accurate due to interferences with the methodology. Therefore, there is insufficient information to reassess Mañagaha’s support of the *Propagation of Aquatic Life* use designation.

There is also insufficient data collected on fish tissue and/or biota contamination to assess attainment of the *Fish and Shellfish Consumption* use designation.

Mañagaha has public restrooms and showers with a septic system and leaching field. The leaching field was completely upgraded in Fiscal Year 2014 to address nutrient and Enterococci exceedences observed in previous years. Exceedences in the FIB WQS were associated with storm events re-suspending naturally occurring Enterococci rather than wastewater discharge based on statistical analysis and professional judgement. Therefore, Mañagaha fully supports the *Recreational Use* designation this reporting cycle. However, as visitor numbers increase, it will continue to be closely monitored for exceedences in the future.

Surface Waters

Mañagaha is a small sand cay. It has insufficient precipitation, topographical and geological features to support surface water stream systems. Water precipitation flows by subterranean transport from land to sea. There are no fresh surface waters on this small sand cay.

The cumulative findings above resulted in Mañagaha 's coastal waters now attaining a CALM Category 3 as new nutrient data is needed to make a new assessment of the *Propagation of Aquatic Life* use designation.

C.4.2 305(b) Assessment Results for Rota

Marine Coastal Waters

There is limited data about Rota because of: 1) limited BECQ staffing on the island to collect water quality samples, and 2) A truncated 8-week rotational cycle for water quality monitoring due to limited resources for air travel and boat availability. However, what is well established is that Rota has the lowest population of the three southern islands of the archipelago with only 2,527 residents (CNMI Census, 2010). It is developed to a far lesser degree than Saipan or Tinian and its terrestrial flora has also been less altered. This is partially due to its being less devastated from the impacts of the WWII conflict, leaving vast canopies in the upper and lower watersheds.

Rota's coastlines are relatively untouched and provide tourists and visitors with beautiful tide pools and vistas to enjoy, thus attaining the *Aesthetic Enjoyment and Other Uses* designation for all its coastal waters.

There is no new nutrient data available to reassess this water quality parameter's effect on *Propagation of Aquatic Life*. However, the past testing method is known to be unreliable for marine water. Using the current ALUS biological assessment, Rota's watersheds ranking ranges with two sites receiving a "fair" ranking and three sites receiving a "poor" ranking. Therefore, Rota's overall ranking would appear to fall toward the "poor" side of the range, or not supporting the *Propagation of Aquatic Life* use designation. This is in contrast to Saipan's overall rating of "good" to "fair". However, if the potential environmental stressors that increased populations have on marine biological communities are considered, one would expect that the communities of the sparsely populated island of Rota would be in better condition relative to the populated island of Saipan. However, using the current ALUS analysis Saipan's reefs are determined to be in better condition than Rota's.

Table C-19 Assessment of Rota's Use Designations

			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
Coastal Waters	Aquatic Life	***F***	***Poor Habitat***	***Poor Habitat DO% exceed***	Fair Habitat	***Fair Habitat***
	Fish Consumption	F	i	i	i	i
	Recreation	***F***	N	N	F	N
	Aesthetic enjoyment/others	F	F	F	F	F
	CALM Assessment Category	***1***	5	5	***3***	5
Streams	Aquatic Life		i			
	Fish Consumption		i			
	Recreation		i			
	Potable Water Supply		i			
	Aesthetic Enjoyment/others		F			
	CALM Assessment Category		2			

Not Attaining Use Desigr	Fully supporting Use Designation
Insufficient Information	No fresh surface water

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 Crown of Thorns Sea Star, while Maynard et al. (2016) determined that *Saipan's* reefs are more resilient to the threats caused by climate change. 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. This will be further investigated prior to the next reporting cycle. For now, Rota's *Propagation of Aquatic Life* remains impaired for the Sabana/Talakhaya/Palie and Songsong watersheds, and requiring more data on nutrient levels for the Uyulanhulo/Teteto and Chaliat/Talo watersheds. Only the remote Dugi/Gampapa/Chenchon watershed fully supports the *Propagation of Aquatic Life* use designation.

Further discussion of each watershed and their attainment of the *Fish Consumption*, and *Recreational Use* designation will follow in the subsequent subsections.

Surface Waters – Rivers and Streams

The Sabana/Talkakaya/Palie watershed is the only watershed on Rota that provides sufficient precipitation, topographical and geological features to support stream systems. All other watersheds' precipitation flows through subterranean transport from land to sea.

Surface Waters – Wetlands

There are no wetlands, lakes or ponds on Rota. However, numerous seeps and several riparian wetlands are present.

The next subsections will discuss each of Rota's watersheds in detail.

C.4.2.1 Dugi/Gampapa/Chenchon (Seg 1) – East of Airport

Marine Coastal Waters

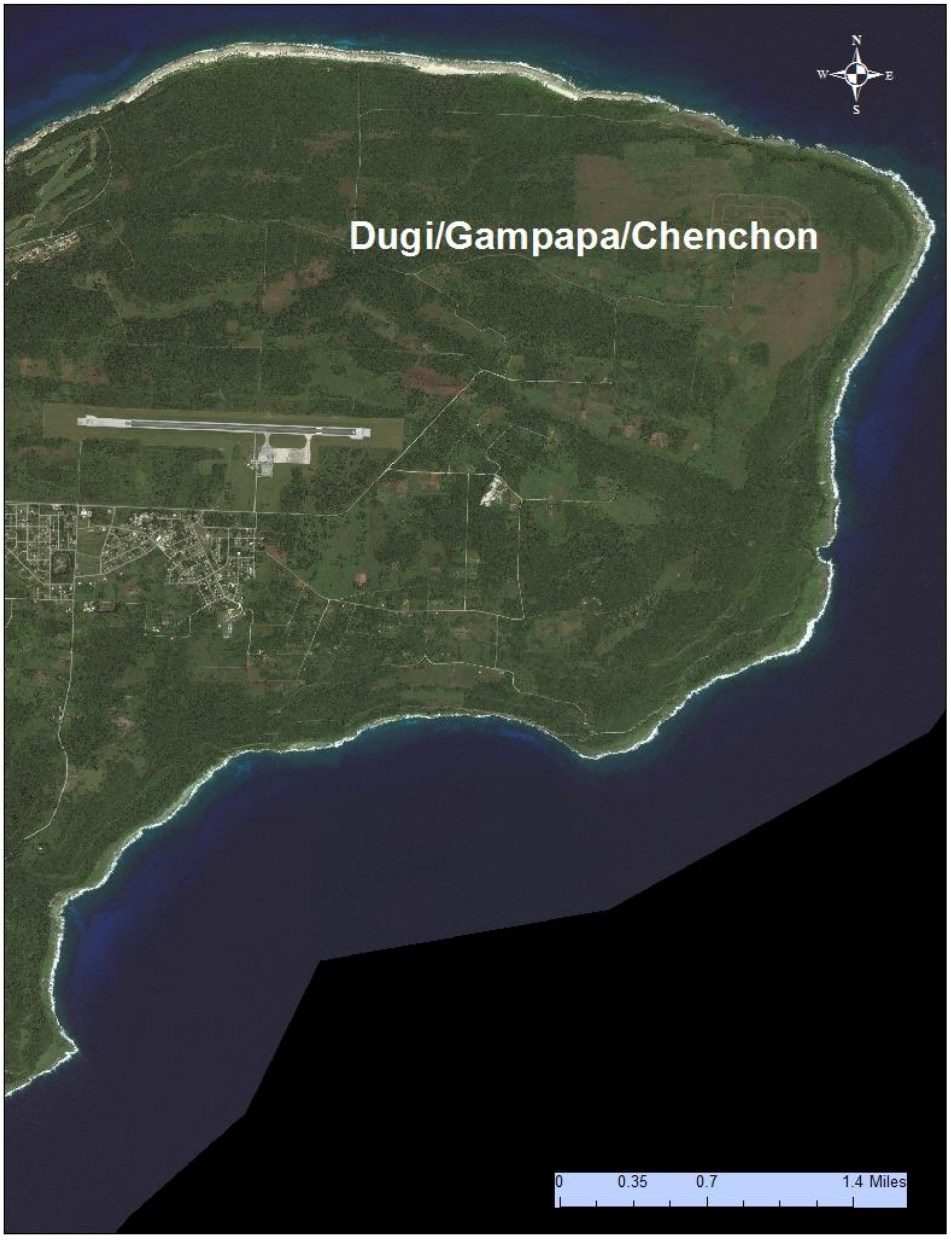
Water quality data is not collected from the remote Dugi/Gampapa/Chenchon Watershed, due to the lack of roads or maintained trails to the cliff line, and inability to easily access this hazardous surf area.

Biological monitoring data is collected via boat by the MMT. This reporting cycle the coastal habitat ranked as "Poor" for this watershed.

However, the lack of any anthropogenic sources of pollution in this undeveloped remote area, suggests that the condition of this watershed's reef system is the ambient condition, and not is not affected by pollutants or other anthropogenic stressors. Therefore, this watershed attains the *Propagation of Aquatic Life* use designation based on professional judgement.

For this same reason, the Dugi/Gampapa/Chenchon watershed also attains the *Fish Consumption*, and *Recreational* use designations based on visual field observations and professional judgement.

Figure C-25 Dugi/Gampapa/Chenchon (Segment 1)

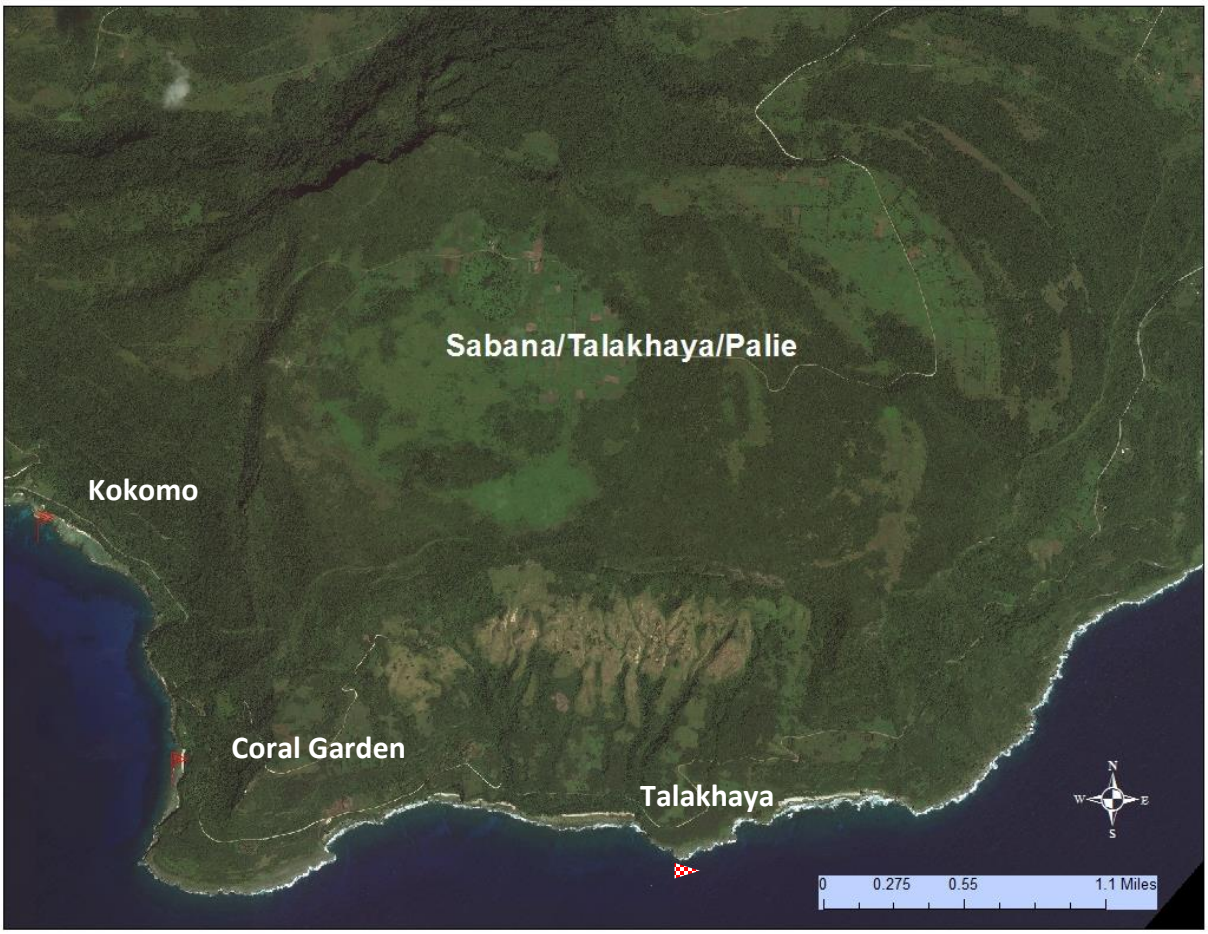


Surface Waters – Rivers and Streams

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.

The cumulative findings above resulted in the Dugi/Gampapa/Chenchon watershed being upgraded to a CALM Category 1 this reporting cycle.

Figure C-26 Sabana/Talakhaya/Palie (Segment 2)



C.4.2.2 Sabana/Talakhaya/Palie (Seg 2) – Talakhaya and Kokomo Beach

Marine Coastal Waters

The Sabana/Talakhaya/Palie watershed now has two water quality monitoring sites. The Coral Garden site monitoring was discontinued in fiscal year 2010 due to hazards associated with accessing the shoreline for collecting samples. This reporting cycle WQS/NPS staff began regular water quality monitoring of the Talakhaya coastal waters. However, at this writing there is insufficient data from this site, so assessments for this watershed are being based solely on water quality data from the Kokomo beach site, and visual field observations and professional judgement.

Biological monitoring data ranked the coastal habitat as “poor” this reporting cycle. This decline and the lack of new nutrient data results in the Sabana/Talakhaya/Palie watershed remaining on the impaired list for *Propagation of Aquatic Life* use designation.

There is no data collected on fish tissue and/or biota contamination for the Sabana/Talakhaya/Palie watershed. Therefore, there is insufficient data to make an assessment of the *Fish Consumption* use designation.

Bacteriological data had exceedences of the WQS for Enterococci and therefore, this watershed remains impaired for the *Recreational* use designation. It is thought that the source of the Enterococci contamination may be fresh water seeps carrying human waste from failing septic systems and free roaming livestock.

Surface Waters - Rivers and Streams

A hike to Rota's "Water Cave" within the Sabana/Talakaya/Palie Watershed provides residents, "Hashers", and those training for athletic competitions, a glimpse of several small but beautiful waterfalls, thus attaining the *Aesthetic Enjoyment and Other Uses* designation for its surface waters. This is the only watershed with surface waters on Rota.

There is insufficient data collected about biological conditions, fish tissue and/or biota contamination, and general water quality parameters of its fresh water streams to assess attainment of the *Propagation of Aquatic Life, Fish and Shellfish Consumption, and Recreational Uses.* However, it is hoped that with available resources, stream water quality data will be collected by next reporting cycle.

There is insufficient information to make an assessment of the streams *Potable Water Supply* use designation.

The cumulative findings above resulted in Sabana/Talakaya/Palie coastal waters retaining a CALM Category 5, and the streams a Category 2.

C.4.2.3 Songsong (Seg 3) – Harbors, Mobil drainage, Teweksberry beach

Marine Coastal Waters

Songsong Watershed is the most densely populated and developed watershed on Rota. Residents and tourists visit the beaches adjacent to the harbors, Mobil fuel depot, and Teweksberry beaches daily for picnics, fishing and to enjoying sunsets. For this reason, the *Aesthetic Enjoyment* use designation is easily attained.

The habitat in the Songsong Watershed ranked as "Poor" this reporting cycle, with 11% DO% exceedences of the WQS at the West Harbor site. There is also no new nutrient data available to reassess this water quality parameter's impact. Therefore, Songsong watershed remains impaired for the *Propagation of Aquatic Life* use designation.

There is no data collected on fish tissue and/or biota contamination to assess attainment of the *Fish and Shellfish Consumption* use designation.

Only Teweksberry and the beach in front of the district #1 storm drain met WQS for Enterococci. The other sites within the harbor areas exceeded the WQS, thus Songsong remains impaired for

Figure C-27 Songsong (Segment 3)

the *Recreation* use designation. The source is thought to be failing on-site wastewater treatment systems and other NPS.

Surface Waters – Rivers and Streams

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

Therefore, the cumulative findings above resulted in Songsong coastal waters retaining a CALM Category 5.

Figure C-28 Uyulanhulo/Teteto (Segment 4)

C.4.2.4 Uyulanhulo/Teteto (Seg 4) – Veterans and Teteto beaches

Marine Coastal Waters

The Veterans Memorial and Teteto Beaches are located in the Uyulanhulo/Teteto Watershed. These vast sandy beaches overlook remarkable volcanic rock formations rising out of the coastal waters. These are ideal beaches for sunsets. For this reason, Uyulanhulo/Teteto easily attains the *Aesthetic Enjoyment* use designation.

The biological monitoring data resulted in Uyulanhulo/Teteto being ranked once again as "Fair" for *Aquatic* habitat. Given that there is no new nutrient data to reassess the water quality for this use designation, Uyulanhulo/Teteto cannot be determined to be fully attaining the *Propagation of Aquatic Life* use designation. However, since the past testing method results are known to be unreliable, this watershed has been upgraded from "Not Attaining" to "Insufficient Information" for this use designation.

There is insufficient data collected on fish tissue and/or biota contamination to assess attainment of the *Fish Consumption* use designation.

The Songsong watershed bacteriological water quality is good, thus it attains the *Recreational Use* designation as it did last reporting cycle.

Surface Waters – Rivers and Streams

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

Therefore, the cumulative findings above resulted in Uyulanhulo/Teteto coastal waters being upgraded to a CALM Category 3, based on this sparsely populated watershed lacking any substantial anthropogenic sources for nutrient loading or fecal contamination based on professional judgement.

C.4.2.5 Chaliat/Talo (Segment 5) – Swimming Hole

Marine Coastal Waters

The Swimming Hole, a natural tide pool with fresh water seeps is located in the Chaliat/Talo Watershed. It is a picturesque setting providing a favorite location for visitors to enjoy a dip in the water and observe marine life there, thus attaining the *Aesthetic Enjoyment* use designation.

The biological monitoring data resulted in the Chaliat/Talo watershed being ranked as "Fair" for *Aquatic* habitat this reporting cycle. Given that there is no new nutrient data to reassess the water quality for this use designation, Chaliat/Talo cannot be determined to be fully attaining the *Propagation of Aquatic Life* use designation. However, since the past testing method results are known to be unreliable, this watershed has been upgraded from "Not Attaining" to "Insufficient Information" for this use designation.

Figure C-29 Chaliat/Talo (Segment 5)

There is insufficient data collected on fish tissue and/or biota contamination to assess attainment of the *Fish Consumption* use designation.

There were Enterococci exceedences at the Swimming Hole site, the source of which remains unknown, but may be associated with fresh water seeps bringing contaminants from upland on-

site wastewater treatment systems from the Rota Resort and Golf Course. This resulted in the the Chaliat/Talo Watershed once again being listed as impaired for the *Recreational Use* designation.

Surface Waters – Rivers and Streams

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

Therefore, the cumulative findings above resulted in the Chaliat/Talo watershed's coastal waters retaining a CALM Category 5.

Table C-20 Assessment of Tinian's Use Designations Based on Type of Coastal Water Body

		Goat Island	Unai Masalok, Dangkolo		Tachogna, Taga, Kammer	Harbor	Leprosarium I & II	Unai Babui, Chulu
			T1-T2		T7, T8, T10	T9	T5-T6	T3-T4
		Tinian						
WATER BODY SEGMENT ID		6	7	8	9		10	11
	Designated Use	Aguigan	Masalok	Carolinas	Makpo		Puntan Daiplolamanibot	Puntan Tahgong
Coastal Waters	Aquatic Life	Fair Habitat	Good Habitat No new Nut data	***F***	Poor Habitat, ***DO% Good***, No new Nut data	Poor Habitat & DO, No new Nut data	Fair Habitat No new Nut data	***Poor Habitat*** No new Nut data
	Fish Consumption	F	i	F	i	i	i	i
	Recreation	F	N	***F***	N	N	N	N
	Aesthetic enjoyment/others	F	F	F	F	F	F	F
	CALM Assessment Category	1	5	***1***	5	5	5	5
Streams	Aquatic Life							
	Fish Consumption							
	Recreation							
	Potable Water Supply							
	Aesthetic Enjoyment/others							
	CALM Assessment Category							
Changes in bold italics		Not Attaining Use Design		Fully supporting Use Designation			***Changes in bold italics***	
		Insufficient Information		No fresh surface water				

C.4.3. 305(b) Assessment Results for Tinian

Marine Coastal Waters

As was discussed about Rota above, there is limited data available for the island of Tinian. What is known is that Tinian has a small population of only 3,136 residents (CNMI Census, 2010), which provides tourists with plenty of open spaces to enjoy isolated views and small hidden beaches. Tinian Harbor is particularly popular for residents and tourists alike to jump into the ocean, explore the reefs and near shore shipwrecks, glimpse turtles, or recline and watch the sunset. For this reason, it has attained the *Aesthetic Enjoyment and Other Uses* designation for all its coastal waters.

Table C-21 Assessment of Tinian's Use Designations Based on Type of Surface Water Body

		Tinian					
WATER BODY SEGMENT ID		6	7	8	9	10	11
Water Body Type	Designated Use	Aguigan	Masalok	Carolinas	Makpo	Puntan Daiplolamanibot	Puntan Tahgong
Lakes							
	Aquatic Life						
	Fish Consumption						
	Recreation						
	Potable Water Supply						
	Aesthetic Enjoyment/others						
CALM Assessment Category							
Wetlands							
	Aquatic Life				I		F
CALM Assessment Category					3		1

Surface Waters – Rivers and Streams

There is insufficient topographical and geological features on Tinian to support stream systems. Precipitation flows through subterranean transport from land to sea.

Surface Waters – Wetlands

Tinian is home to the Hagoi Wetland and numerous small areas of open water, but none of which are considered a lake or pond. The Hagoi Wetland is the reference wetland used in the RAM method (see Section C.4 above).

The next subsections will discuss each of Tinian's watersheds in detail.

Figure C-30 Aguigan (Segment 6)

C.4.3.1 Aguigan (Seg 6) – Goat Island

Marine Coastal Waters

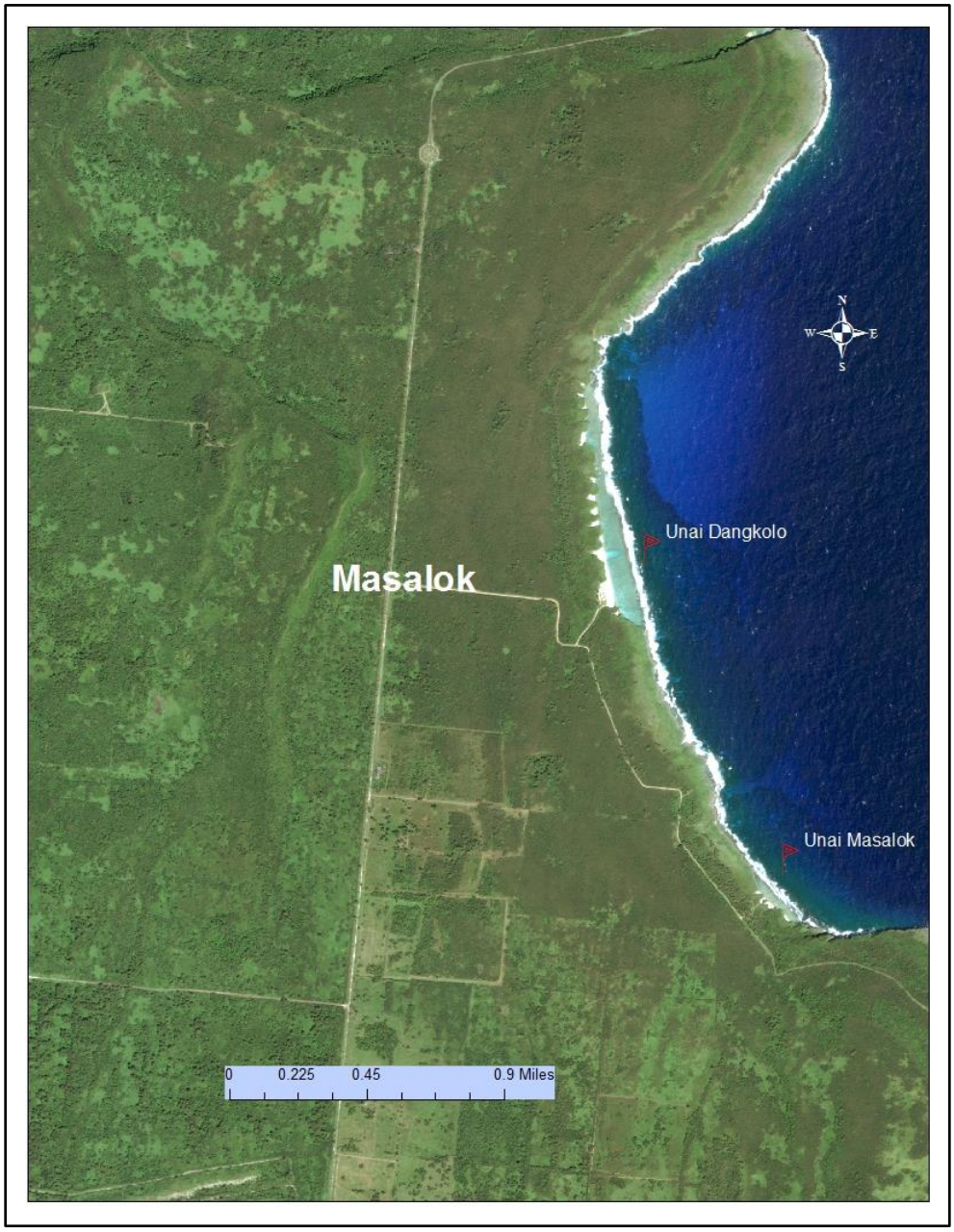
Aguigan is a small, uninhabited coralline island located southwest of Tinian. It is designated as a conservation area that is used for seasonal hunting of coconut crabs and for goats year-round. However, access to the island requires obtaining a permit from CNMI DFW.

There was no new biological monitoring data collected from Aguigan's coastal waters this reporting cycle. This is due to difficulty in reaching the island and unpredictable strong currents making SCUBA access a challenge. There is also no new coastal water quality data available. Therefore, Aguigan's biological "health" is again rated as "fair".

Due to the island's lack of development and any anthropogenic stressors, Aguigan continues to fully attain the *Propagation of Aquatic Life, Fish Consumption*, *Recreational* and the *Aesthetic Enjoyment* use designations.

Therefore, these cumulative findings resulted in Aguigan's waters retaining a CALM Category 1.

Figure C-31 Masalok (Segment 7)



C.4.3.2 Masalok (Seg 7) – Unai Masalok and Unai Dangkulo

Marine Coastal Waters

Unai Masalok and Unai Dangkulo ("long beach") are the only easily accessible beaches on the east coast of Tinian. They lie within the Masalok Watershed.

Unai Masalok consists of three small pocket beaches, and Unai Dangkulo is a white sandy beach with a small shallow lagoon. They are frequented by beach goers for swimming, snorkeling, and to visit the ancient latte stone sites nearby, for which Masalok attains the *Aesthetic Enjoyment* use designation.

Biological monitoring data ranked the Masalok Watershed's *Aquatic* habitat as "Good" again this reporting cycle. Given that there is no new nutrient data to reassess the water quality for this use designation, Masalok cannot be determined to be fully attaining the *Propagation of Aquatic Life* use designation. However, since the past testing method results are known to be unreliable, this watershed has been upgraded from "Not Attaining" to "Insufficient Information" for this use designation.

There is insufficient data collected on fish tissue and/or biota contamination to assess attainment of the *Fish Consumption* use designation. However, ever effort should be made to collect baseline data. This is especially important should US military exercises be expanded on Tinian's military leased land. Any exceedences of WQS would require immediate action to prevent impairment to the island's natural resources.

Water quality data shows that once again the two monitoring sites in the Masalok watershed had exceedences of the Enterococci WQS and therefore remain impaired for the *Recreational* use designation. The source is unknown as these locations are far from any developments or other potential sources of fecal contamination.

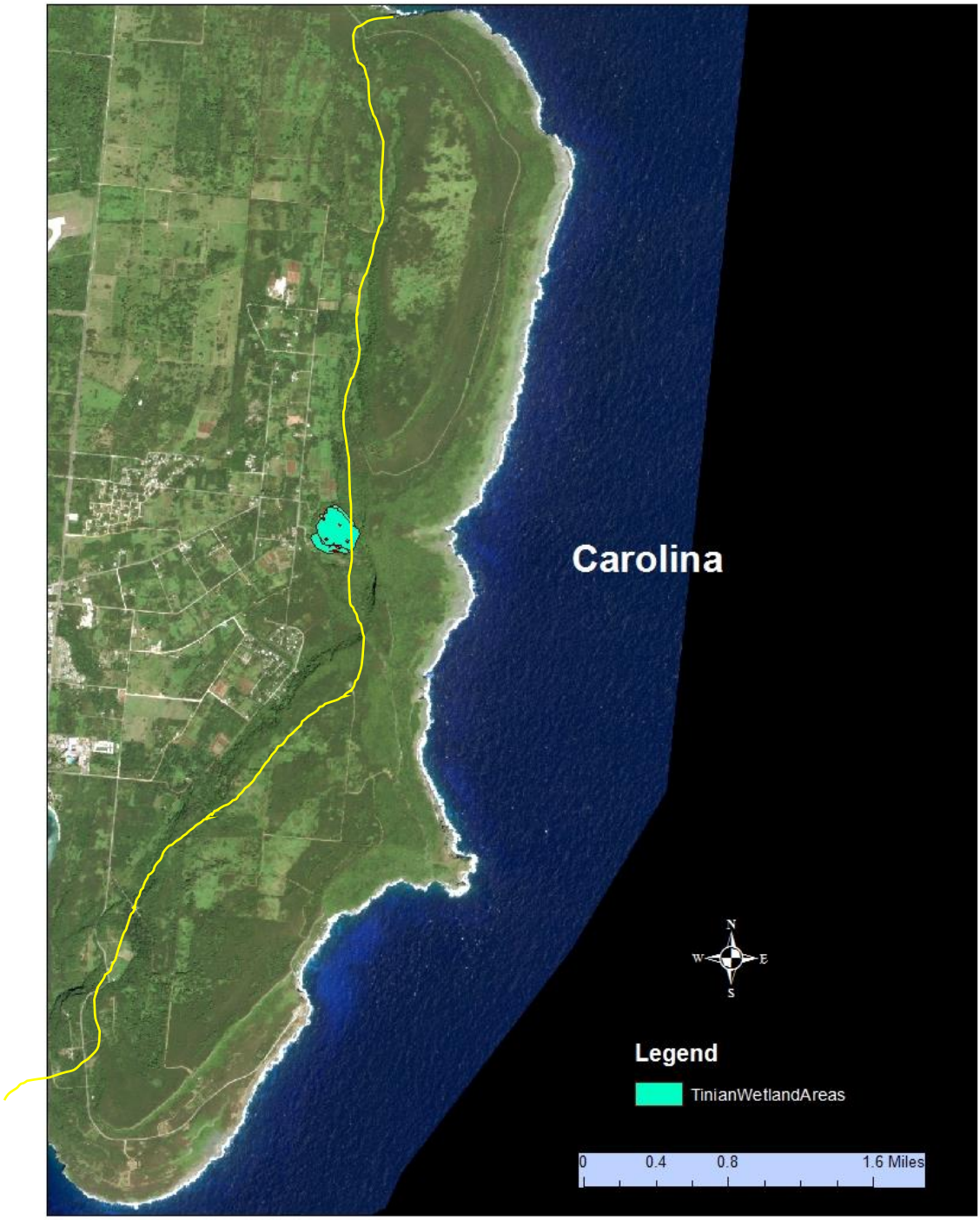
The cumulative findings above resulted in Masalok coastal waters retaining a CALM Category 5.

C.4.3.3 Carolinas (Segment 8) – Remote cliff line

Marine Coastal Waters

The Carolinas watershed is comprised of steep cliff lines to the ocean. At present, there are no developments in the area. Due to the lack of roads or maintained trails to the cliff line, and inability to easily access this hazardous surf area, there are no biological monitoring or water quality monitoring sites from which to collect data regularly and safely. However, these very features provide the Carolinas' coastal waters with protection from potential pollutants and other anthropogenic stressors. Therefore, this watershed has been determined to fully attain the *Propagation of Aquatic Life, Fish Consumption*, *Recreational,* and the *Aesthetic Enjoyment* use designations. This is based on visual field observations and professional judgement.

Figure C-32 Carolinas (Segment 8)



Therefore, the cumulative findings above resulted in Carolinas coastal waters being upgraded to a CALM Category 1.

Figure C-33 Makpo (Segment 9)

C.4.3.4 Makpo (Seg 9) – Tachogna, Taga, Kammer Beaches and Harbor

Marine Coastal Waters

Four of Tinian's most popular beach sites, Tachogna, Taga and Kammer Beaches and the harbor lie within the Makpo watershed and near what was the island's largest resort, Tinian Dynasty.

Both residents and tourists frequent these beaches for picnics, watersports, snorkeling and photo opportunities. Makpo fully attains the *Aesthetic Enjoyment* use designation.

Outside of Tinian's harbor, all of Makpo's beach sites met WQS for DO% this reporting cycle, and were delisted for this pollutant. However, the Harbor remains impaired for DO%. The cause for DO% improvements is uncertain, but may be associated with the closure of the Dynasty Hotel.

Additionally, biological monitoring data ranked this watershed as "Poor" for its *Aquatic* habitat. Given this, the Makpo watershed remains listed as impaired for the *Propagation and Support of Aquatic Life* use designation.

There is insufficient data collected on fish tissue and/or biota contamination to assess attainment of the *Fish Consumption* use designation.

This reporting cycle only one water quality monitoring site was impaired for the *Recreational* use designation due to Enterococci exceedences, this is in the Class A waters of the Harbor. The exact source of the Enterococci contamination remains unknown. However, it is thought that the source maybe fresh water seeps carrying wastewater from failing septic systems in this developed area.

Surface Waters - Wetlands

The "Makpo Complex" is the wetland area from which the San Jose village's freshwater supply is sourced. At the time of this writing, there is insufficient information to assess whether or not this waterbody attains all its use designations. However, it is hoped that more information will be available next reporting cycle as efforts are currently underway to further delineate and assess CNMI wetlands.

Therefore, the cumulative findings above resulted in the Makpo coastal waters retaining a CALM Category 5. Due to lack of information about the wetlands, they do not appear in the wetlands' CALM Categories Table C-18 in Section C.4.1.

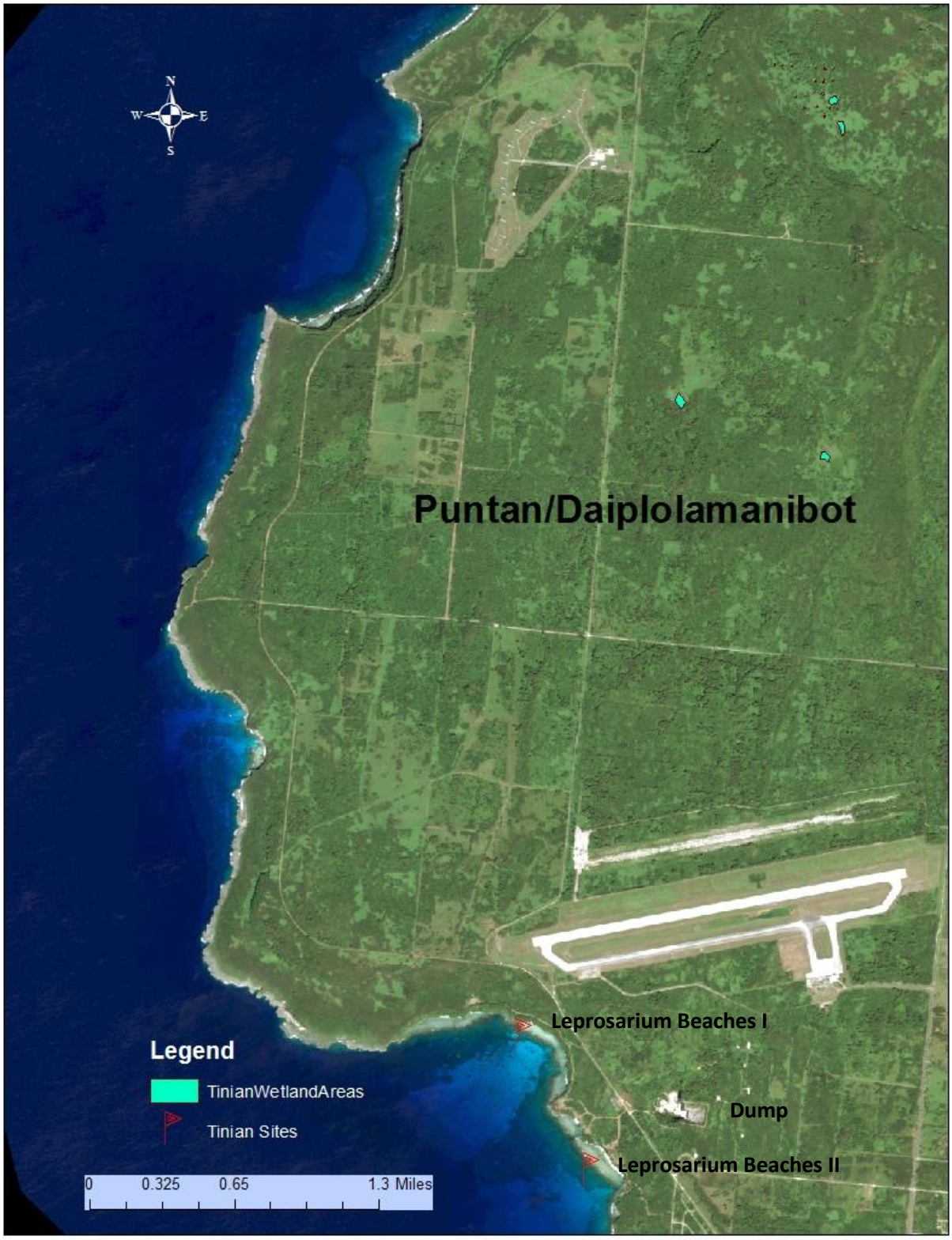
C.4.3.5 Puntan/Daiplolamanibot (Seg 10) – Leprosarium Beaches I & II

Marine Coastal Waters

Two beaches in the Puntan/Daiplolamanibot watershed were used as Leprosarium colonies during the Spanish occupation. The shallow beach areas are located within a small bay. Cuts were made in the fringing reef for boats to access the shore to provide supplies to the people residing there. These beaches are nicely shaded by trees, which make them ideal locales for picnics. Their remote location away from homes and businesses make them great locations to camp, watch sunsets, and star gaze at night.

Biological monitoring data ranked this watershed as "Fair" for its *Aquatic* habitat. However, there is insufficient new nutrient water quality data to reassess the water quality for the *Propagation of Aquatic Life* use designation. These beaches are also located in the lower watershed from Tinian's open dump, which may result in nutrient loading to these waters.

Figure C-34 Puntan/Daiplolamanibot (Segment 10)



There is insufficient data collected on fish tissue and/or biota contamination to assess attainment of the *Fish Consumption* use designation.

Water quality data continues to exceed WQS for Enterococci at this watershed. Therefore, the *Recreational* use designation also remains impaired this reporting cycle.

Surface Waters - Wetlands

This reporting cycle BECQ began further wetland delineations and assessments on Tinian in order to gather baseline data and provide the US Department of Defense with comments on their EIS for proposed expansion of military exercises on Tinian leased federal land. During this assessment, smaller wetlands named the "Bateha Complex" were explored. This area also has a series of depressional wetlands that occur in rows and appear to have been formed by large explosions. Several of these depressional areas exhibit wetland hydrology, vegetation, and in some cases, wetland soils.

The cumulative findings above resulted in the Puntan/Daiplolamanibot coastal waters retaining a CALM Category 5. However, wetland delineations were not completed at the time of this writing so these wetlands do not appear in the wetlands' CALM Categories Table C-18 in Section C.4.1.

C.4.3.6 Puntan/Tahgong (Seg 11) – Unai Babui and Chulu

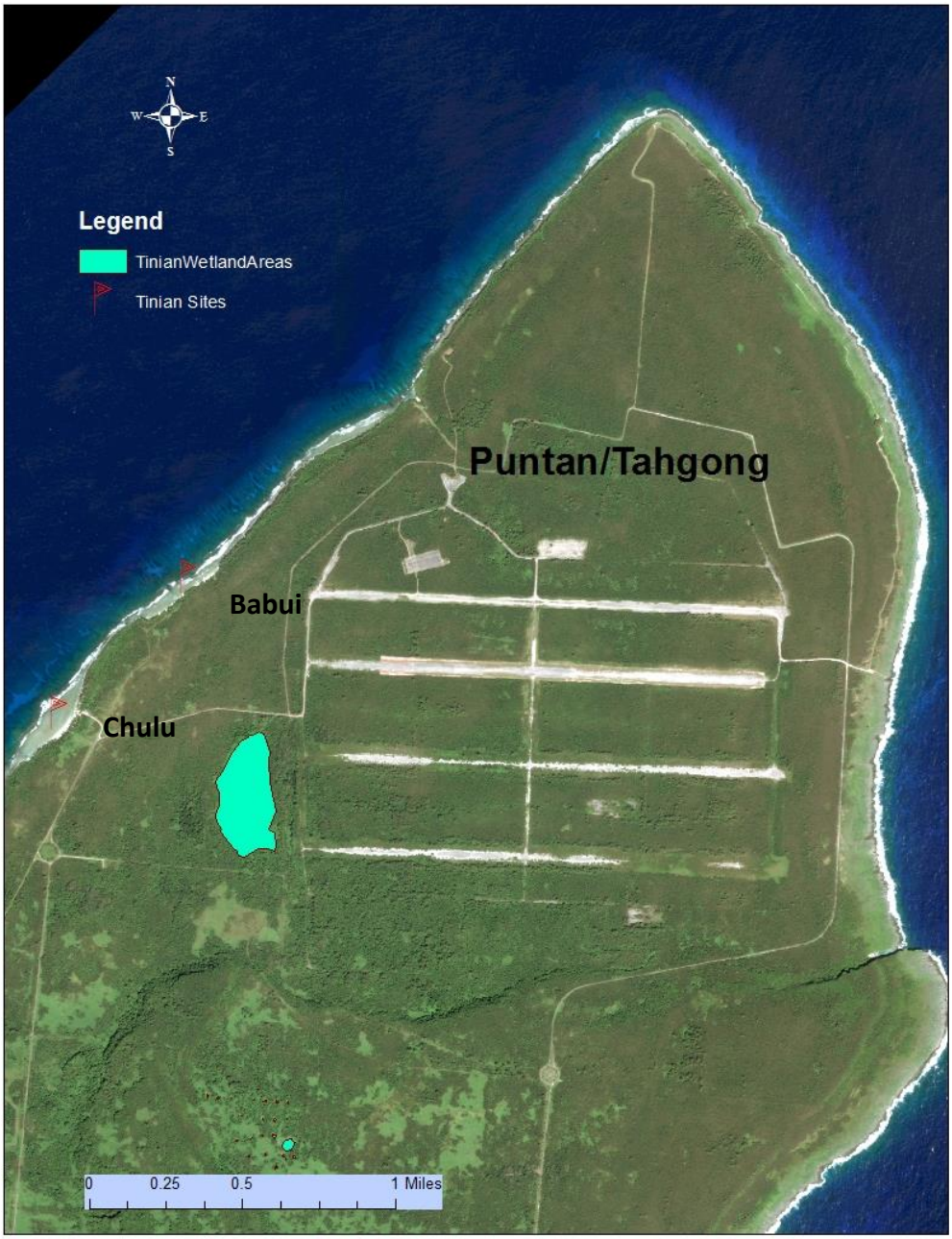
Marine Coastal Waters

Unai Babui ("Pig Beach") and Unai Chulu beach are located far north on military leased land in the Puntan/Tahgong Watershed. They both have energetic surf that can make them hazardous for incautious swimmers. They are undeveloped, remote, and not frequented by tourists or locals as other beaches, which leaves them in a nearly pristine state with no regular anthropogenic stressors.

Biological monitoring data ranked this watershed as "Poor" for its coastal habitat. However, not due to anthropogenic impacts in this far removed coastline, but more likely caused by high wave action that may limit the development of highly rugose coral reef structure. Additionally, ground water seeps may also play a role in creating this unique marine habitat, which is essential for some marine species. Given this, Puntan/Daiplolamanibot remains listed as impaired for the *Propagation of Aquatic Life* use designation at this writing. However, all effort should be made to prevent further anthropogenic stressors from causing stress to the ambient reef ecosystem.

There is insufficient data collected on fish tissue and/or biota contamination to assess attainment of the *Fish Consumption* use designation. However, ever effort should be made to collect baseline data. This is especially important should US military exercises be expanded on Tinian's federally leased land. Any exceedences of WQS would require immediate action to prevent impairment to the island's natural resources.

Figure C-35 Puntan/Tahgong (Segment 11)



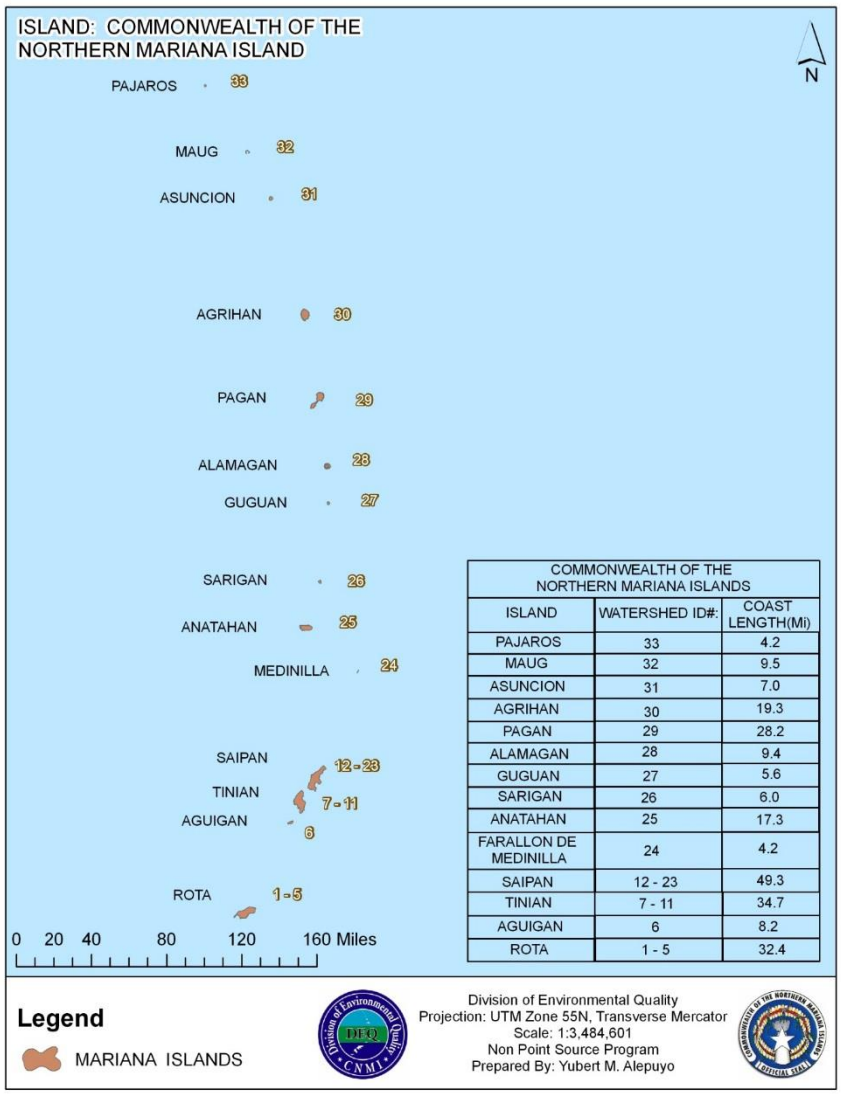
Water quality data shows that Babui and Chulu had exceedences of the Enterococci WQS and therefore remain impaired for the *Recreational* use designation. However, the source is unknown, and suspect, as these locations are far from any developments or other potential sources of wastewater contamination.

Surface Waters - Wetlands

"Lake Hagoi" is the only significant open surface water body on Tinian, but is rather small and not considered a lake or pond, but rather, a wetland. In the past Lake Hagoi and the surrounding wetland was used as a "reference" wetland for HGM, and now RAM assessments. This is due to the Hagoi wetland having had very little impact from development or pollution. Therefore, due to the wetland's remote location, lack of nearby development and anthropogenic sources of pollution, Lake Hagoi continues to fully attain all use designations.

Therefore, the cumulative findings above resulted in the Puntan/Tahgong coastal waters retaining a CALM Category 5 and the Wetlands a Category 1.

Figure C-36 Map of the 10 Northern Islands and the Southern Inhabited Islands of the CNMI



COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS		
ISLAND	WATERSHED ID#:	COAST LENGTH(Mi)
PAJAROS	33	4.2
MAUG	32	9.5
ASUNCION	31	7.0
AGRIHAN	30	19.3
PAGAN	29	28.2
ALAMAGAN	28	9.4
GUGUAN	27	5.6
SARIGAN	26	6.0
ANATAHAN	25	17.3
FARALLON DE MEDINILLA	24	4.2
SAIPAN	12 - 23	49.3
TINIAN	7 - 11	34.7
AGUIGAN	6	8.2
ROTA	1 - 5	32.4

C.4.4. 305(b) Assessment Results for the Northern Islands

Due to the limited availability of information about the Northern Islands, the following section will discuss assessments of use designations for each type of water body, rather than for each watershed as was done for the inhabited islands of Saipan, Rota and Tinian.

However, should the US Military expand the frequency and type of military exercises within the Northern Islands, this places the islands' natural resources at risk of potential impacts from those practices. Every effort should be made to gather baseline data for the *Propagation of Aquatic Life, Fish and Shellfish Consumption*, and *Recreational* use designations for these islands. Again, any exceedences of WQS would require immediate action to prevent impairment to these valuable natural resources.

Table C-21 Assessment of the Northern Islands Use Designations Based on Type of Coastal Water Body

		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	Asumcion	Maug	Farallon De Pajaros
Coastal Waters	Aquatic Life	F	F	F	F	F	F	F	F	F	F
	Fish Consumption	F	F	F	F	F	F	F	F	F	F
	Recreation	F	F	F	F	F	F	F	F	F	F
	Aesthetic enjoyment/others	F	F	F	F	F	F	F	F	F	F
	CALM Assessment Category	1	1	1	1	1	1	1	1	1	1
Surface Waters	Aquatic Life		F	F	F	F	F	F	F	F	F
	Fish Consumption		F	F	F	F	F	F	F	F	F
	Recreation		F	F	F	F	F	F	F	F	F
	Potable Water Supply		F	F	F	F	F	F	F	F	F
	Aesthetic Enjoyment/others		F	F	F	F	F	F	F	F	F
	CALM Assessment Category		1	1	1	1	1	1	1	1	1

Marine Coastal Waters

The uninhabited Northern Islands, due to their lack of development, or when inhabited, having minimal development, have negligible anthropogenic impacts. It is unlikely that contaminants or other pollutants pose a threat to coastal waters. The Islands' remoteness, lack of easy

accessibility, and the recent listing of the three northernmost islands as a US National Marine Monument, make them fully supportive of all coastal water use designations based on visual field assessments, available biological and water quality data as well as professional judgment.

Surface Waters - Rivers and Streams

Little is known of the Northern Islands' stream systems and/or watercourses. However, due to their remoteness from any potential anthropogenic impacts, they are listed as fully supporting all designated uses. Farallon De Medinilla (FDM) is the exception in that there is insufficient topographical and geological features on FDM to support stream systems. Precipitation flows through subterranean transport from land to sea.

Table C-21 Assessment of the Northern Islands Use Designations Based on Type of Surface Water Body

		Northern Islands									
WATER BODY SEGMENT ID		24	25	26	27	28	29	30	31	32	33
Water Body Type	Designated Use	Farallon De Medinilla	Anatahan	Sarigan	Guguan	Alamagan	Pagan	Agrihan	Asumcion	Maug	Farallon De Pajaros
Lakes	Aquatic Life		F				F				
	Fish Consumption		F				F				
	Recreation		F				F				
	Potable Water Supply		F				F				
	Aesthetic Enjoyment/others		F				F				
CALM Assessment Category			1				1				
Wetlands	Aquatic Life						*F*				
CALM Assessment Category							*1*				

Surface Waters - Wetlands, Lakes and Ponds

There are two lakes on Pagan and one lake within the active volcanic crater on Anatahan. The two lakes on Pagan are located on the northern part of the island's west coast and are called Sanhalom, "inner lake" and Laguna Sanhiyong (PPDC, 1978). These are rather young undeveloped marshes with emergent vegetation. In previous years the biggest threat to these lakes and the

surrounding wetlands were grazing by free roaming ungulates, goats, pigs and cows, and from fallen ash due to volcanic eruptions (CNMI DFW, Oceana, 1990).

At this writing, there is insufficient water quality data available to make statistical analyses. However, due to the remoteness of these islands, and the fact that only a few individuals occasionally reside on Pagan and Anatahan, there is little risk from anthropogenic stressors.

However, it should be noted that any development in the Northern Islands or expansion of military training would pose serious risk to all use designations due to hydrological alterations, sedimentation caused by erosion from heavy equipment, and live fire from military exercises, as well as surface and ground water pollution from munitions.

The cumulative findings above resulted in the Northern Islands' coastal and surface waters retaining a CALM Category 1.

C.5. Cumulative 305(b) Assessment Results for All CNMI Waters

Taking into account all the information discussed in Section C above, for this reporting period 80.2 miles of Commonwealth coastline assessed were found to be impaired for various reasons. This includes impairment of 38.1 miles of Saipan's shoreline, 17.8 of Rota's shoreline and 24.3 of Tinian's shorelines for *Recreation Use* due to microbiological contamination as measured by the presence of the indicator bacteria Enterococci.

Table C-22 Length of All CNMI Waters Assigned CALM Categories

Water body Type	Category 1	2	3	4a	4b	4c	5	Total in State	Total Assessed
River/stream miles		64.2	2.2				7.1	73.4	73.4
Lake/pond acres	210.0						45.2	255.2	255.2
Ocean coast miles	140.4	9.3	5.4				80.2	235.3	235.3
Wetland acres	43.3		49.1			577.3		681	669.7

* Total acres for Pagan's Wetlands is unknown. Derived from subtracting that assessed from previously reported Total is state.

C.5.1. Cumulative Coastal Marine Water Quality

A total of 16 years of monitoring data were reviewed in the preparation of the 2016 assessment, including monitoring data from previous Integrated Reports prepared in years 2002, 2004, 2006, 2008, 2010, 2012 and 2014. Based on available data, professional judgment, and using the

methodology described in the previous sections, the CNMI's waters were assessed and categorized as shown in the Table above.

C.5.1. TMDL Development Status

Based on the present assessment, CNMI is responsible for 62 individual water body/pollutants Total Maximum Daily Load assessments (TMDLs). The TMDL list, ranked by priority, is contained in Appendix VIII.

The CNMI has not completed any TMDLs to date. A TMDL study was initiated in 1999 for a portion of what is now called the Central W. Takpochau coastal water body segment (19B). The Load was for bacterial contamination only, but was never completed. The TMDL was canceled shortly after it was initiated due to plans to install a major stormwater treatment BMP, which would have treated runoff from the source watershed. This project, the Garapan Water Quality Restoration Project, was canceled in 2006 shortly after the completion of the design and permitting stage. The project was revived in late 2009, although as a conceptual design only. The land that had been designated for the BMP was no longer available so further work on the project was suspended indefinitely. This reporting cycle the Best Sunshine Casino project is now developing a large scale stormwater system, which will be required to incorporate BMPs to prevent further flooding in Garapan and contaminants from flowing into Saipan Lagoon.

Water bodies included in the proposed TMDL schedule were ranked using professional judgment on the basis of 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;
- known sources of pollutants.

MEDIUM Priority:

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

LOW Priority:

- isolated location and/or very infrequent recreation use;
- Impaired for only PO4 (suspected data quality issues – see Section C.1.1.);
- few or unknown sources of pollutants.

Given available funding two High priority TMDLs will be initiated by next reporting cycle in the W. Takpochao and Achugao Watersheds. The Medium and Low priority TMDLs will be initiated as soon as resources allow, or alternative pollution control requirements will be employed in the interim while a TMDL remains undeveloped, e.g., CAP implementation.

C.5.2. Removal of Waters from the 303(d) List

Last reporting period, waterbody Segments 20A, North Achugao, 18A, Susupe North, on Saipan were removed from the 303(d) list based on improved bacteriological water quality, specifically for Enterococci. They are placed back on the list this reporting cycle due to Enterococci exceedences.

Although both segment 14, Kagman, and 15, LaoLao had a considerable drop in Enterococci violations supporting their *Recreational Use* designation, there were still no new nutrient data for the *Propagation and Support of Aquatic Life* use designation to be fully supported. Even though the previously reported nutrient data was of known inaccuracy. Therefore, Kagman was upgraded in the 303(d) listing to 3. However, LaoLao retained its CALM category of 5.

BECQ continues to evaluate these and the remaining water bodies removed from the list to ensure that water quality criterions are continually met (see Tables C-3 and C-6).

De-listing decisions are made using criteria developed by American Samoa. They are as follows.

C5.2.1. Criteria for Removal of Water Segment/Pollutant Combinations from the 303(d) List

BECQ shall remove a pollutant of a surface water from the 303(d) list 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 surface water meets the applicable numeric or narrative surface water quality standard. All historical data is considered, with a greater weight placed on more recent (last 3 – 5 years) data, except for Coastal Waters (beaches for swimming), with a greater weight placed on the last 2 years because of the large number of samples collected;
3. The surface water no longer meets the criteria for impairment based on a change in the applicable water quality standard or a designated use approved by USEPA;

4. 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;
5. 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
6. Pollutant loadings from naturally occurring conditions alone are sufficient to cause a violation of applicable WQS.

BECQ shall remove a surface water from the 303(d) List if all pollutants for the surface water or segment are removed from the list.

Table C-23 23 lists all water body segment/pollutant combinations, which are being delisted as a result of the 2016 assessment, along with the rationale for each delisting, using USEPA's terminology.

Table C-23 Segment/Pollutant Combinations Removed from CNMI's Previous Section 303(d) List

Segment/ Pollutant Combination On Previous CNMI Section 303(d) List					Summary Rationale for Delisting of Segment/Pollutant Combinations *(identify number of reason)* 3 TMDL Alternative (4B) 4 Not caused by a pollutant (4C) 5 TMDL approved or established by EPA (4A) 8 Applicable WQS attained; due to restoration activities 9 Applicable WQS attained; due to change in WQS 10 Applicable WQS attained; according to new assessment method 12 Applicable WQS attained; threatened water no longer threatened 13 Applicable WQS attained; reason for recovery unspecified 11 Applicable WQS attained; original basis for listing was incorrect 14 Data and/or information lacking to determine water quality status; original basis for listing was incorrect (Category 3)	
Seg ID	**Segment Name**	**Pollutant**	**Seg size**	**First Listed**	Reason No.	Comments
SAIPAN:						
14	Kagman	Enterococci (215)	5.2	2004	8	Improved water quality, due to completion of Cross Island road improvement BMPs
15	LaoLao	Enterococci (215)	2.1	2004	8	Improved water quality, due to completion of LaoLao Bay Dr and Cross Island road Reconstruction, BMPs, and LaoLao CAP
TINIAN:						
9	Makpo	DO% (205)	1.5	2010	13	Applicable WQS attained; reason for recovery unspecified
***TOTAL MILES REMOVED:* 8.8 Miles**						

C.6. Public Health Issues

C.6.1. Beach Water Quality Issues

Microbiological Contamination:

One of the primary purposes of the BECQ Surface Water Monitoring Program is to evaluate compliance with the *Recreational Use* Enterococci WQS criteria. Advisories are published and posted to the general public specifying not to swim within 300 feet of a sampling site for the next 48 hours whenever:

1. A single sample result exceeds the Enterococci criteria of 130 MPN/100ml for that Class of waterbody; or
2. The geometric mean for Enterococci criteria over the past 30 days exceeds the criteria of 35 MPN/100 ml, unless the most recent single sample result at this site is 35 MPN/100ml or less, in which case an advisory is not issued.

Beach advisory signboards are posted at 10 sites on Saipan's shoreline with internationally recognizable symbols for "no swimming" or "no fishing". Red Placards are posted at these locations whenever results call for a Public Advisory.

Figure C-37 Public Beach Advisory Sign Boards

Due to the frequency with which some beaches exceed the *Recreational Use* criteria, an elevated risk to public health exists for several beaches within the CNMI, and many of BECQ's programs are aimed at reducing this risk. Along Saipan's western shoreline most of the Enterococci contamination in densely populated areas are suspected to be indicative of contamination with human waste. Known sources of the bacterial contamination are overflows and leaks from sewage collection systems, and runoff from densely populated areas. Sample sites are commonly

placed in areas frequently used by the public, which have been listed as impaired for *Recreational Use*. These have been prioritized for TMDL development.

Enterococci contamination observed on some of Saipan's remote western and eastern beaches are likely due to livestock rather than human waste. Unrestricted cattle grazing has 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. BECQ has begun conducting water quality monitoring and detailed sanitary survey assessments of these watersheds by implementing the 2013 CNMI Surface Water Quality Monitoring Plan.

The continued observance of Enterococci exceedences, along with a handful of suspected and highly publicized leptospirosis infections resulting in one death in 2000, has resulted in these eastern beaches being ranked as a priority for TMDL development. It is likely that restrictions on grazing in these watersheds could significantly reduce the problem, although the source of the leptospirosis remains unknown, and may be carried by wildlife in addition to livestock.

Mercury in Fish Tissue

The discovery of elevated levels of mercury in fish tissues harvested from the near shore Garapan region has highlighted the lack of a fish tissue monitoring and consumption advisory system within the CNMI. BECQ continues to work with University of Guam's WERI Lab to carrying out testing in biota and fish tissue as resources permits.

C.6.2. Public Water Supply/Drinking Water Use Reporting

The Guidelines for Preparation of the Comprehensive State Water Quality Assessments 305(b) Reports recommends that the use of surface water in public water supplies for drinking be discussed. The Guidelines recommend reporting three tables including:

1. A list of water bodies used as surface water sources (including a list of contaminants assessed for each water body);
2. A summary of drinking water use assessments for rivers and streams (including the total miles of rivers and streams designated for drinking water use); and
3. A summary of drinking water use assessments for lakes and reservoirs (including the total water body area designated for drinking water use).
4.

In general, no surface water bodies are officially designated as water supplies for PWSs in the CNMI, so the three recommended tables to report for this section would contain no data if they were presented here. However, if one queried the Safe Drinking Water Branch one would find two PWSs listed in the Safe Drinking Water Information System (SDWIS) as having a surface water source. A brief discussion of these two PWSs and their sources is 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 a cave. The "Water Cave" collects spring water in a pool at the mouth of the cave which is open to the atmosphere and potentially subject to contamination from local fauna visiting or living in the cave. Therefore, the cave is classified as a surface water source. In June 2015 CUC finalized a Drinking Water and Wastewater Master Plan for the island of Rota. As part of that Master Plan a Groundwater Under the Direct Influence of Surface (GWUDI) study was conducted from September 2012 through January 2014 on the water from the Main Water Cave. In October 2014 EPA and BECQ agreed with CUC that the Main Water Cave on Rota is not GWUDI based on the results from MPA analysis, on-line water quality monitoring for turbidity and conductivity, and bacteriological analysis. The MPA results for the Rota Main Cave during the GWUDI study 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. No surface water in the CNMI PWS is considered "navigable water". To date, there has been no assessment of the airport's catchment system water. The Saipan Airport Runway Rainwater Catchment system was not in use during the reporting period for this report.

D. GROUND WATER MONITORING AND ASSESSMENT

This section describes known sources of ground water contamination, existing ground water protection programs, and summarizes the quality of the ground water in the CNMI.

D.1 Overview of Ground Water Contamination Sources

There have been only a few documented incidents of ground water contamination attributable to an identifiable source in the CNMI. There are no known groundwater contamination problems on the island of Rota. There was one documented leaking above ground fuel storage tank on the island of Tinian, which has since been addressed. There are several locations with known groundwater contamination on Saipan, but most of the occurrences have not been linked to a specific identifiable source (although there are suspected sources of contamination).

EPA guidance for preparation of this document suggests using Table D-1 below, and checking off the 10 highest priority sources of ground water contamination from the list of contaminant sources in the first column. Since there are not 10 sources of known ground water contamination in the CNMI, only the confirmed sources and highly suspected sources (based on professional judgment) are checked off in the second column. The third column is used to identify the factors used in considering the selection of a contaminant source.

The fourth column lists the contaminants/classes considered to be associated with each of the sources that were checked. Contaminants/classes are selected based on data indicating that certain chemicals or classes of chemicals may be originating from an identified source.

The following codes are used in this column for **Contaminant Sources**:

- **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.** State findings, other findings
- **G.** Documented from mandatory reporting
- **H.** Geographic distribution/occurrence
- **I.** Other criteria

The contaminants/classes of contaminants are denoted by the codes (A - M) below:

- **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

Table D-1 Major Sources of Ground Water Contamination

Contaminant Source	Suspected Sources	Factors Considered in Selecting a Contaminant Source	Contaminants
Agricultural Activities			
Agricultural chemical facilities			
Animal feedlots			
Drainage wells			
Fertilizer applications			
Irrigation practices			
Pesticide applications			
On-farm agricultural mixing and loading procedures			
Land application of manure unregulated			
Storage and Treatment Activities			
Land application (regulated or 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 and repair shops	X	A, C, D, E, H	C, D, H

A more detailed discussion of contamination sources is provided in section D.3 below.

D.2. Overview of State Ground Water Protection Programs

DEQ within the CNMI BECQ is the State agency with the primary responsibility for protecting and managing the ground water resources for the CNMI. DEQ operates under several sets of regulations that have the effect of protecting ground water resources, including the Well Drilling and Well Operation Regulations, the Wastewater Disposal Regulations, Underground Storage Tank Regulations, Underground Injection Control Regulations, and the Safe Drinking Water Regulations.

Table D-2 Summary of State Ground Water Protection Programs

Programs or Activities	Check (X)	Implementation Status	Responsible Agency
Active SARA Title III Program			
Ambient ground water monitoring system			
Aquifer vulnerability assessment			
Aquifer mapping			
Aquifer characterization			
Comprehensive data management system			
EPA-endorsed Core Comprehensive State Ground Water Protection Program (CSGWPP)			
Ground water discharge permits			
Ground water Best Management Practices			
Ground water legislation			
Ground water classification	X	continuing efforts	DEQ
Ground water quality standards			
Interagency coordination for ground water protection activities			
Nonpoint source controls	X	fully established	DEQ
Pesticide State Management Plan			
Pollution Prevention Program			
Public Water System Supervision Program	X	fully established	DEQ
Resource Conservation and Recovery Act (RCRA) Primacy	X	For RCRA-D (solid waste) only	DEQ
Source Water Assessment Program			
State Superfund			
State RCRA Program incorporating more stringent requirements than RCRA Primacy			
State septic system regulations	X	fully established	DEQ
Underground storage tank installation requirements	X	fully established	DEQ
Underground storage tank remediation fund			
Underground Storage Tank Permit Program	X	fully established	DEQ
Underground Injection Control Program	X	fully established	DEQ
Vulnerability assessment for drinking water/wellhead protection			
Well abandonment regulations	X	fully established	DEQ
Wellhead Protection Program (EPA-approved)	X	continuing efforts	DEQ
Well installation regulations	X	fully established	DEQ

D.2.1. Well Drilling and Well Operation Regulations

The Well Drilling and Well Operation Regulations define the qualifications of individuals and firms allowed to drills wells, designate setback distances for potential sources of contamination, allows DEQ to set maximum pump withdrawal rates to minimize salt water intrusion, and requires semi-annual water quality analysis of all active wells. A revision to the regulations in 2005 added Ground Water Management Zones for Saipan which are used in other DEQ regulations to set additional restrictions on activities that may contaminate groundwater including wastewater disposal systems and above ground storage tanks.

In addition, the Ground Water Management Program maintains a database on wells in the CNMI. As of September 2015 the program has documented the locations of 660 wells in the CNMI (606 on Saipan, 33 on Tinian, 22 on Rota, and 1 on Pagan). The majority of these wells are used for drinking water sources (357), while some are used for irrigation (27). There are also monitoring wells (110), exploratory wells (21) which have not been designated for another use yet, injections wells (18), wells where the water is used for industrial purposes (12) and wells that have been destroyed (115).

D.2.2. Wastewater Disposal Regulations

The Wastewater Disposal Regulations describes how in-ground wastewater disposal systems are to be constructed when no available community sewer collection system is available.

D.2.3 Underground Storage Tank Regulations

The Underground Storage Tank Regulations describe how underground storage tanks are to be constructed and monitored for integrity.

D.2.4 Underground Injection Control Regulations

The Underground Injection Control Regulations define under what conditions the injection of wastewater or other substances may be injected into the ground.

D.2.5 Safe Drinking Water Regulations

The Safe Drinking Water Regulations require that PWSs conduct regular monitoring for potential contaminants based on a schedule set by DEQ. PWSs that use groundwater must monitor for any contaminant that may be present in their raw ground water as well if the system does not provide treatment for that specific contaminant at the entry point.

D.2.6. Other Monitoring Events/Programs

In addition to the regulatory Groundwater Protection Programs, there have been other ground water monitoring activities in the CNMI, most notably on the island of Saipan.

In May 2000, EPA Region 9 and DEQ conducted an island-wide ground water study on the island of Saipan. A total of 178 ground water samples were collected from 160 private drinking water supply wells. This included private wells that do not serve public water supplies. The objective of the ground water study was to determine the extent of Volatile Organic Compound (VOC) contamination of ground water on the island of Saipan. 156 samples were analyzed for VOC and

34 of these samples detected VOCs. 11 of the 34 samples detected VOCs exceeding the Maximum Contaminant Level (MCL) for Trichloroethylene (TCE), Vinyl Chloride (VC), Dichloroethylene (DCE), and Tetrachloroethylene (PCE). The remaining 23 were below the MCL for a certain VOC. The samples that were detected to have VOCs over the MCL were localized in four areas of Saipan, namely, San Antonio, As Lito, Lower Base, and Puerto Rico.

In 2004, DEQ generated an inventory list of potential sites associated with the 34 samples with detected VOCs for preliminary assessment/site investigation activity. The list consisted of 28 sites, each of which was issued a joint DEQ and EPA Request for Information Letter pursuant to Section 104e of CERCLA. Based on the results of the May 2000 sampling event, and information provided by the 28 facilities, DEQ recommended 6 facilities for CERCLIS listing for potential investigation under the EPA Superfund program.

In 2009 DEQ conducted a ground water testing of 64 privately operated wells, and 12 publicly operated wells, within a 1 mile radius of the respective areas of San Antonio/Koblerville, Susupe, Gualo Rai, and Lower Base/Puerto Rico. The primary objective of the testing was to follow up the May 2000 testing to collect more current data on contaminants. Although the final validation of the data package was still under review by the US EPA at the time this report was prepared, it appears that there is no potential threat identified in the results, based on DEQ's preliminary review of the data package.

DEQ and CUC conducted a study on spatial and temporal nitrate variations in groundwater from southern Saipan from April 2008 through April 2009. DEQ and CUC collected groundwater samples from 20 wells every week and analyzed the samples for combined nitrate-nitrite, coliform/E/ Coli bacteria, turbidity, temperature, conductivity, pH, and hardness. DEQ and CUC also collected rainfall data from 4 rain gauges in the study area to compare variations in groundwater quality to rainfall events. DEQ and CUC found that the concentration of nitrates varied spatially across southern Saipan from an average of 10.6 mg/l at one well to an average of 0.66 mg/l at another. However, the nitrate concentrations at each well did not vary much over time or with rainfall. DEQ concluded that additional groundwater nitrate monitoring due to heavy rainstorms was probably not needed.

In 2010 through 2011 DEQ conducted a study on baseline groundwater quality for areas of Saipan that had high concentrations of homes, but did not have community sewer collection systems. Groundwater samples were collected quarterly from 16 wells in Kagman homestead and 30 wells near DanDan homestead for one year. The samples were analyzed for combined nitrate-nitrite, coliform and E. Coli, turbidity, temperature, conductivity, and pH. While the quality of the groundwater varied spatially across each of the two well fields the quality of the groundwater at each particular well did not change very much during the course of the study (temporally). The bacterial quality of the groundwater in both homesteads was good with few to no detections, and the nitrate-nitrite concentration was below 10 mg/L for all but one of the wells. This data is available for decision makers, planners, and regulators to use when planning for changes in the infrastructure of these homesteads.

Between August 2012 and November 2013, the CUC conducted a study of groundwater under the direct influence of surface water on Saipan, Tinian and Rota. 11 sites on Saipan were selected, as well as one site each on Tinian and Rota respectively. Groundwater at each of the sites was monitored continuously for turbidity, temperature, pH, and conductivity. Rainfall data was also collected at each site. Samples from each site were collected after large rain events and evaluated for bacterial contamination and multi-particulates. As a result of the study, one well on Saipan was determined to be under the influence of surface water. There were obvious changes in turbidity and conductivity immediately following rain events. That well was removed from service. The other sites did not have obvious influences from rain events, and no official determination has been made on their status as of the publishing date of this report.

D.3 Summary of Ground Water Contamination Sources (all CNMI)

There are no known groundwater contamination issues on the island of Rota. Table D-3 below summarizes ground water contamination sources on the islands of Saipan and Tinian.

Table D-3 Ground Water Contamination Summary

Source Type	Total Sites (n =)	Listed and/or have confirmed releases	Confirmed ground water contaminates (n =)	Contaminants	Investigations (optional) (n =)	Stabilized or source removed (optional) (n =)	Corrective action plans (optional) (n =)	Active remediation (optional) (n =)	Cleanup completed (optional) (n=)
NPL	0								
CERCLIS	1	1	1	PCB					
DOD/DOE	13	13	2	SVOCs, VOCs Metals, UXO	13	3	0	0	3
LUST*	0								
LAST**	0								
RCRA Corrective action	2	2	0	Petroleum products	0	2	2	0	2
Underground Injection	37	0	0						
State Sites	0								
NPS	0								

* For this reporting period there are no new leaking underground storage tank sites (LUSTs). There have been LUST sites in previous periods, but all sites have been cleaned up.

** For this reporting period there are no new leaking above ground storage tank sites.

Agricultural activity on Saipan is somewhat limited in scope except in central Kagman. There have been no inorganic or organic pesticides detected in samples tested per the Safe Drinking Water regulations. There are no large scale feed lots or land application of manure. However, there are many free grazing cattle in Marpi and on the eastern watersheds.

There are 18 underground injection wells on Saipan used for the disposal of reverse-osmosis (reject) brine water. The injection wells are primarily associated with tourist hotels located along the coast line. The wells terminate well below the freshwater/saltwater interface. The injection wells do not pose a contamination risk to the groundwater withdrawn for consumption. There are 20 shallow wastewater disposal leaching fields that serve more than 20 people, and are therefore considered underground injection wells. There have been no known contamination events from these sources.

D.4 Summary of Ground Water Quality

Table D-4 summarizes ground water quality monitoring results conducted as required under: the Well Drilling and Well Operation Regulations; Annual Well Operating Permit requirements for private wells; the Safe Drinking Water Regulations; required periodic monitoring for regulated contaminants; and special water quality studies for public wells of interest. Data for each of the three populated islands of Saipan, Tinian, and Rota are reported in separate rows in in the table. The islands themselves are not divided up into smaller aquifers for this report.

30 PWSs in the CNMI (20 on Saipan, zero on Tinian, and one on Rota) tested their water for VOCs and Synthetic Organic Carbons (SOC) during this reporting period. PWSs do not test their raw untreated well water for VOCs and SOCs. They test the treated water that is being delivered to their customers. These systems collect the sample at what is called the entry point to the distribution system, which may combine water from many different sources including groundwater, rain water, or filtered sea water. For this reason, detection of VOCs in 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-4.

Groundwater from 115 wells in the CNMI, 112 in Saipan, 2 Rota, and 1 on Tinian were analyzed for nitrates during this reporting period. Two wells had water that exceeded the MCL of 10 mg/l, but they were not removed from service because their water is blended with water from wells with lower concentrations of nitrates. The breakdown of the number of wells that were sampled for nitrates is presented in Table D-4.

Table D-4 Aquifer Monitoring Data - Saipan, Tinian and Rota 10/01/2009 to 09/30/2015

Monitoring Data Type	Total no. wells Used in Assessment	Parameter Groups	Number of Wells						
			No detections of parameters above MDLs or background levels (ND)	Nitrate concentrations ranges from background levels to ≤5 mg/l No detections of parameters other than nitrate > MDLs or background levels	Nitrate ranges from > 5 to ≤10 mg/l. Other parameters are detected at concentrations exceeding MDL but ≤ MCLs.	Parameters are detected at concentrations > MCLs	Wells removed from service	Wells requiring special treatment	Background parameters > MCLs.
Untreated Water Quality Data from Wells **(ROTA)**	0	VOC							
	0	SOC							
	13	NO_3	0	13	0	0	0	0	0
		Other							
Untreated Water Quality Data from Wells **(SAIPAN)**		VOC							
		SOC							
	225	NO_3	20	147	56	2	0	0	0
		Other							
Untreated Water Quality Data from Wells **(TINIAN)**	0	VOC							
	0	SOC							
	1	NO_3	0	0	1	0	0	0	0
		Other							

D.5. Summary of Ground Water-Surface Water Interactions

Ground water to surface water interactions, as well as surface water to ground water interactions, exist in the CNMI, but the effects of one contaminating the other are not well documented; that is with the exception of salt water intrusion affecting the basal lens aquifers on Saipan. Nutrient laden ground water emerging in near shore underwater seeps in the Saipan lagoon is suspected of contributing to periodic algal blooms and DO deficits.

Salt water intrusion (upcoming) is arguably the most significant ground water contamination issue on Saipan and the CNMI as a whole. Even though the water supplied by the large public utility on Saipan complies with all EPA regulated contaminants, and is considered safe for human consumption, it is unpalatable due to the high chloride concentration (an unregulated contaminant). Therefore most people on Saipan do not drink the water provided by the public utility. Instead they rely on treated bottled water produced locally or rain water. There are several reasons for the high chloride concentration in the water from these aquifers. Older wells in these areas were completed and screened into the freshwater/saltwater transition zone, or near the bottom of the freshwater layer. They are spaced relatively close together and/or are pumped at relatively high rates. Due to these practices the underlying salt water is drawn upward in the vicinity of these wells and mixes with the fresher water at the ground water surface. Therefore, chloride concentrations in these well range from just beyond the Secondary MCL of 250 mg/l to as high as 2,000 mg/l and above [Carruth 2003].

The salt water intrusion issue is being addressed primarily by CUC which owns and operates most of the wells affected. In years past the demand for water was so great that the utility could not produce enough to provide 24-hour service to all utility customers on Saipan. A vigorous leak detection and repair program over the past reporting period has reduced the demand significantly such that nearly every CUC customer has 24-hour water. CUC is now beginning the process of developing a 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 depth relative to sea level, well spacing, and pumping rates for newer wells constructed since about the year 2000.

As mentioned above in Section D.2.6., CUC discontinued use of one well when it was discovered that it was under the direct influence of surface water. Water quality analysis of the groundwater from this well showed changes in turbidity and conductivity immediately following rain events.

E. PUBLIC PARTICIPATION

The draft 2016 Integrated Report was placed on the front page of the BECQ website on October 3rd, 2016. Public Notices were placed in the two local English Papers on October 4th, 12th, 19th, and 25th announcing that public comments would be accepted until November 4th (see APPENDIX X). No comments were received during this period.

F. Changes to Final Integrated Report

F.1. Report Format

This reporting cycle the CNMI IR was enhanced by providing ArcGIS maps of water body segments for each of the inhabited islands of Saipan, Rota and Tinian. Additionally, Rota and Tinian were discussed in detail by breaking out each waterbody in a separate subsection, as Saipan was discussed last reporting cycle.

F.2. Water Body Tier Designation

The waterbodies of the Northern Islands have been designated as Tier 3 waters. This classification provides these pristine waters within and that surrounds these remote islands with the highest level of protection as defined in the CNMI WQS Antidegradation Policy (Section Part 3.1 §65-130-100). These waters contain the Marianas Trench National Marine Monument, which is comprised of the three most northern islands of the CNMI archipelago.

Wetlands due to their important hydrological, and ecological functions are also designated as Tier 3 waters.

F.3. Propagation and Support of Aquatic Life

This reporting cycle WQS/NPS began regularly sampling water quality at probabilistic sites, e.g, reef flat sites and MMT Lagoon sites as part of BECQ's long term monitoring program. This provided new data on the quality of the DanDan watershed for the first time.

Additionally, the fact that the previous nutrient water quality data is of known unreliability, it weighed less importantly in determining the *Propagation and Support of Aquatic Life* use designation. Therefore, some sites with "good" or "fair" biological monitoring data were upgraded from "Not Attaining" to "Insufficient Information" to make a determination on this use designation.

F.3. CALM Category designation

Fiscal Year 2015 brought changes to the way that the WQS/NPS branch set about addressing specific impairments caused by a pollutant rather than waiting for a TMDL to be developed. After completing sanitary surveys of a watershed's stream systems the WQS/NPS staff worked with government agency partners, and residents living adjacent to the streams to prevent further point-source and NPS of pollution from impairing water quality. This was accomplished through door to door collaboration with families living next to streams and conducting Village Assistance Forums in the Achugao Watershed. In Addition, phase I and II of the Cross Island Road Reconstruction Project and the LaoLao Drive Improvement Project was completed. A lot of work was done towards the implementation of existing community vetted CAPs in the LaoLao Watershed on Saipan and the Talakhaya Watershed on Rota.

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