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

Bird Island, Saipan

Division of Environmental Quality
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Editor: Peter Houk

Authors: Brian Bearden, Frances Castro, Peter Houk, Jose Kaipat, and Clarissa Tanaka

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I. Abstract

The health and economic wellbeing of the people of the CNMI depend upon good water quality. Tourism is a major driving force behind the CNMI economy. Tourists come to see beautiful sandy beaches, clear blue water, and outstanding coral reefs and other marine environments. The CNMI has over 250 species of coral (Randall, 1995) over 850 species of fish (Myers, 2000), and many other marine invertebrates that make our corals reefs a highly sought after tourist destination. Healthy marine environments require clean water that remains within a narrow range of water quality parameters. Local residents rely on clean water to support fish stocks and provide recreation. In terms of groundwater, CNMI residents rely on clean, healthy drinking water for domestic use. Under the current development pressure, we are challenged to maintain and improve our water resources.

Both point and non-point source pollution are responsible for lowering the quality of the CNMI's surface and ground waters. Sewage out-falls, sewer system overflows, sedimentation from unpaved roads and poor erosion control practices during development, urban runoff, and reverse osmosis discharges are the most significant stressors on the CNMI's surface and marine water quality. The largest ground water problems in the CNMI are high chlorides resulting from over-pumping of the basal aquifer in an effort to keep up with the increasing population demand, and nutrient and bacteria input from septic systems. The raised limestone bedrock of the Southern Mariana Islands is porous, resulting in percolation of most rainfall that does not directly drain into the ocean. Wetlands comprise less than 5% of the land, and are patchily distributed around Saipan and Tinian Island.

Eighty beach locations are monitored for traditional surface water quality parameters and *Enterococci* bacteria levels. Unsurprisingly, most microbiological violations occurred in areas of stormwater discharge, particularly those drainages associated with urban, or other, development. Many of these sites are within the highly developed Garapan district (West Takpochau watershed). Other frequent violations occur within Saipan's marinas or small boat launching areas. Orthophosphate levels also follow these trends with highest levels in drainage regions adjacent to development. Significant regressions were found between rainfall and bacteria levels in most "impaired" water bodies on Saipan Island.

Two biocriteria monitoring programs have been established by the Division of Environmental Quality in conjunction with other local resource management agencies. The Saipan Lagoon monitoring program collects data regarding the abundances of fast growing macroalgae, seagrass, and corals for each lagoon habitat. This allows for evaluation of the benthic communities, which respond to changes in water quality. These data were logically manipulated to fit in with EPA guidance material for water body evaluation. The lagoon monitoring data are incorporated into a GIS system to spatially evaluate changes in benthos abundance over time as well.

DEQ has initiated a CNMI wide coral reef monitoring program (joint effort with DEQ, CRM, and DFW). The majority of stormwater discharge in the CNMI does not get filtered through a lagoon, rather travels over a small reef flat onto the adjacent coral reefs. An important component of understanding reef community responses to nutrient enrichment is the growth and spatial distribution of dominant benthic organisms such as turf algae, coralline algae, macroalgae, and invertebrates (Littler and Littler, 1985, Lapointe, 1997, Fabricius and De'ath, 2001). Again, benthic community data were logically manipulated to classify each water body according to EPA guidance material.

There are several other DEQ programs which deal with water quality and permitting issues. The DEQ Wastewater and Erosion Control Branch administers permitting programs for earthmoving and erosion control, wastewater treatment, land disposal of other wastewater, and Clean Water Act Section 401 Water Quality Certifications. The DEQ Non-Point Source Pollution Branch deals with stormwater runoff concerns at the watershed level. The NPS Branch also administers EPA 319 grants to help teach the community about NPS pollution and all available best management practices. The Safe Drinking Water Branch regulates public drinking water systems, well drilling, and underground injection wells. The DEQ Air and Toxic Management Branch deals with hazardous sources of pollution which may affect CNMI's waters. Finally, the DEQ Above and Underground Fuel Storage and Pesticide Branch also deals with hazardous sources of pollution which may affect CNMI's waters.

II. Background

A. Background of 305(b), 303(d), and CNMI

Section 305(b) of the Federal Water Pollution Control Act (Clean Water Act) requires States and Territories to monitor the quality of their surface and ground waters and produce a report portraying the status of their water quality. This report is referred to as the 305(b) which will be used by the United States Environmental Protection Agency (EPA), Congress, and the public, to evaluate (1) whether U.S. waters meet water quality standards, (2) the progress made in maintaining and restoring water quality, and (3) the extent of remaining problems. EPA requires all impaired waterbodies, from unknown pollution sources, to be placed on the 303(d) list for TMDL studies. The EPA Consolidated Assessment and Listing Methodology (CALM) categories were used to classify all assessed waterbodies in the CNMI during 2003. The Division of Environmental Quality under the Office of the Governor is responsible for preparing the Commonwealth of the Northern Mariana Islands (CNMI) 305(b) report, and subsequent 303(d) listing.

B. Background of CNMI and its Waters

The Commonwealth of the Northern Mariana Islands (CNMI) consists of two geologically distinct island chains located at 145º E, between 14º – 21º N (Figure 1). The Southern Mariana Islands were created between 5 – 20 million years ago, and have raised, limestone reef bedrock resultant from high sea level stands prior to the Holocene. Arc rifting has displaced these islands eastward during the formation of the Mariana Trough (Karig, 1975, Mrozowski and Hayes, 1980, Randall, 1995). The Northern Islands lie northwest on the still active Marianas Ridge. This report contains information from the Southern Mariana Islands only. The vast majority of the population lives on the southern three islands of Saipan, Tinian, and Rota (Table 1).

The three southern most islands are primarily limestone (uplifted coral reefs) with minor amounts of exposed volcanic rock. Saipan is the largest and most inhabited of the islands (Table 1). DEQ operations are based in Saipan which resulted in larger sampling sizes and efforts of these waters.

C. Surface Water Quality Background

The health and economic wellbeing of the people of the CNMI depend upon good water quality. Next to federal grants, tourism is the driving force behind the CNMI economy. Tourists come to see beautiful sandy beaches, clear blue water, and outstanding coral reefs and other marine environments. The CNMI has over 250 species of coral (Randall, 1995) over 850 species of fish (Myers, 2000), and many other marine invertebrates that make our corals reefs a highly sought after tourist destination. Healthy marine environments require clean water that remains within a narrow range of various water quality parameters. Local residents rely on good water quality to support fish stocks and provide recreation. Under the current development and fishing pressure, we are

Table 1. Statistics for the Southern Mariana Islands.

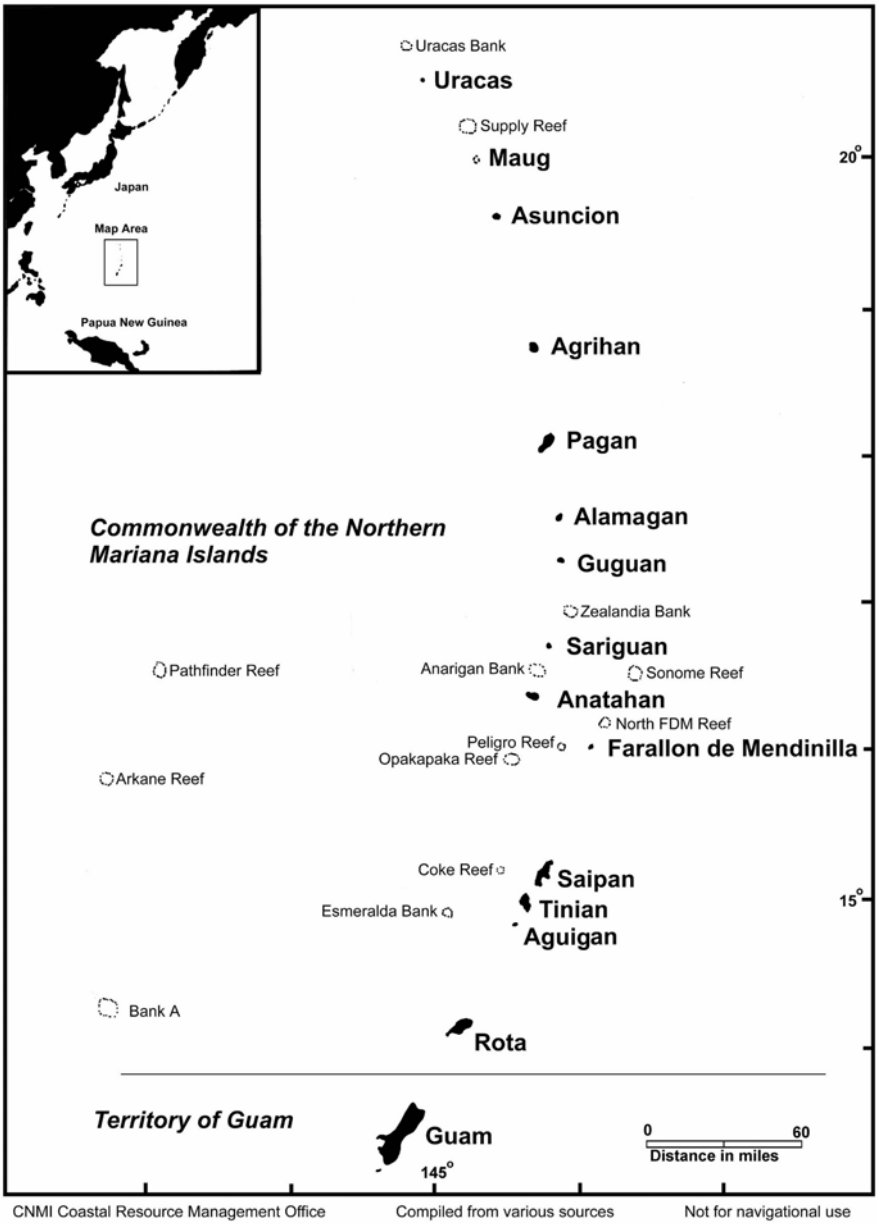
Resource	Value
Surface area of CNMI	457.1 sq km
Surface area of Saipan	120.4 sq km
Surface area of Tinian	101.5 sq km
Surface area of Rota	85.0 sq km
Population (total)	69,221 (in 2000)
Saipan Population	62,392 (in 2000)
Rota Population	3,282 (in 2000)
Tinian Population	3,540 (in 2000)
CNMI Residents	21,306 (in 1995)
Alien workers	37,540 (in 1995)
Tourists	497,601 (in 2001)
Length of perennial and intermittent streams on Saipan	95.5 km
Area of freshwater and tidal wetlands on Saipan	2,808 sq km
Area of Saipan lagoon	30,750 sq km
Length of Saipan coastline	75.52 km
Length of Rota coastline	55.84 km
Length of Tinian coastline	58.65 km
Area of bays (Lau Lau Bay, Saipan)	10,662 sq km
Area of Saipan marina (Smiling Cove)	0.1 sq km
Area of CNMI EEZ	414,398 sq km (approximate)

CNMI Department of Commerce Statistical Yearbook 1996 (based on 1995 census)

CNMI Geographic Information System

CNMI Department of Commerce

Figure 1. The Mariana Islands.



challenged to maintain and improve the quality of our water resources. The CNMI will need to increase monitoring and management activities to include all aquatic ecosystems in order assess regions and make recommendations for our decision makers to follow.

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 (e.g. water quality impairment) (Littler and Littler, 1985, Lapointe, 1997, Fabricius and De'ath, 2001). Similarly, changes in temperature, salinity, pH, Dissolve Oxygen, and other water quality criteria will also affect coral reef environments (Valiela, 1995). At any particular time, water quality measurements are affected by rainfall or storm events, tidal fluctuations, and other atmospheric and oceanographic conditions. This dynamic nature makes all water quality data very difficult to properly assess a region, project, or pollutant source, without appropriate sample sizes. It is much more efficient for island nations to use bio-criteria data coupled with water quality measurements to help assess waterbodies.

The CNMI has two classes (AA and A) for marine water use and two classes (1 and 2) for fresh surface water use. All fresh surface water bodies in the CNMI (wetlands, intermittent streams, and perennial streams) are Class 1 (Figure 2 and 3), meaning that these waters should remain in their natural state with an absolute minimum of pollution from any human-caused source. On Saipan Island there are approximately three perennial streams, one lake, and several isolated wetland regions. On Rota there are several streams, no lakes, and no wetlands. On Tinian there are several wetlands, no lakes, and no streams. Some of these resources are used for drinking water and recreation. The raised limestone bedrock of the Southern Mariana Islands is porous, resulting in percolation of most rainfall that does not directly drain into the ocean. Wetlands and perennial streams comprise less than 5% of the land, and are patchily distributed around Saipan and Tinian Island. The majority of these water bodies are not tested by the DEQ Lab on a regular basis due to their low abundance and use.

The majority of the coastal marine waters are Class AA (Figure 4), meaning that these waters should remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-related source or actions. 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 related activities (Table 2, Figure 4). 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 these waters of a limited body contact nature.

Both point and non-point source pollution are responsible for lowering the quality of the CNMI's surface waters. Sewage out-falls, sewer collection overflows, sedimentation from unpaved roads and development, urban runoff, reverse osmosis discharges, and nutrients from golf courses and agriculture are the most significant stressors on the CNMI's surface and marine water quality. Decreased water quality threatens all marine

environments as well, as coral reefs and other marine systems rely on good water quality for life.

Table2. Class A Waters, CNMI.

Water Body	Reason for Class A designation
Puerto Rico Industrial, Saipan	Commercial port and municipal waste outfall
Agingan Point, Saipan	Municipal waste outfall
East Harbor, Rota	Commercial port
West Harbor, Rota	Commercial port
San Jose Harbor, Tinian	Commercial port

D. Groundwater Background

The islands of the Northern Marianas formed as the result of arc volcanism west of the Pacific and Philippine plate junction. The geology of the southern islands suggests they were once submerged below sea-level, allowing a layer of coral reef to form over the volcanic rock. As a result of the most recent ice age when sea levels were much lower than the present, exposed surfaces of the southern islands of Saipan, Tinian, Rota, Aguijan, and Farallon de Medinella are predominantly limestone (Randall, 1995). The geological nature of the southern islands influences the groundwater characteristics, where two types of aquifers are dominant. In isolated areas, the geology has created a situation where high-level limestone fresh water aquifers overlie an impermeable volcanic layer, which creates a good and relatively protected supply of drinking water. However, the majority of the fresh water is found in the basal aquifer with a fresh water lens sitting on top of sea water, separated as a result of differences in density of the fluids.

The location and distribution of the fresh water aquifers are of extreme importance in the CNMI because the vast majority of drinking water comes from aquifers. The largest ground water problem in the CNMI is high chlorides resulting from over-pumping of this basal aquifer in an effort to keep up with the increasing population demand. Over-pumping of groundwater can result in saltwater intrusion of the basal aquifer. The thickness of the freshwater lens on top of the saltwater is related to several factors, including extent of recharge areas, geology, and proximity to the coastline. Saltwater intrusion is reversible and does not cause permanent damage to the surrounding aquifer. The CNMI needs to focus on alternative sources of drinking water to relieve these issues. The chloride problem only exists on the island of Saipan, due to the large population, but new development initiated on Tinian and Rota may affect the basal aquifers there if future well drilling is not monitored or managed properly.

To protect the basal aquifer from saltwater intrusion, this would require limiting the drilling of new water wells, particularly in areas of thin water lenses. Therefore, new well explorations should be considered in areas where the thickness of the freshwater lens is identifiable and adequate. Other means of protecting the basal aquifer from saltwater

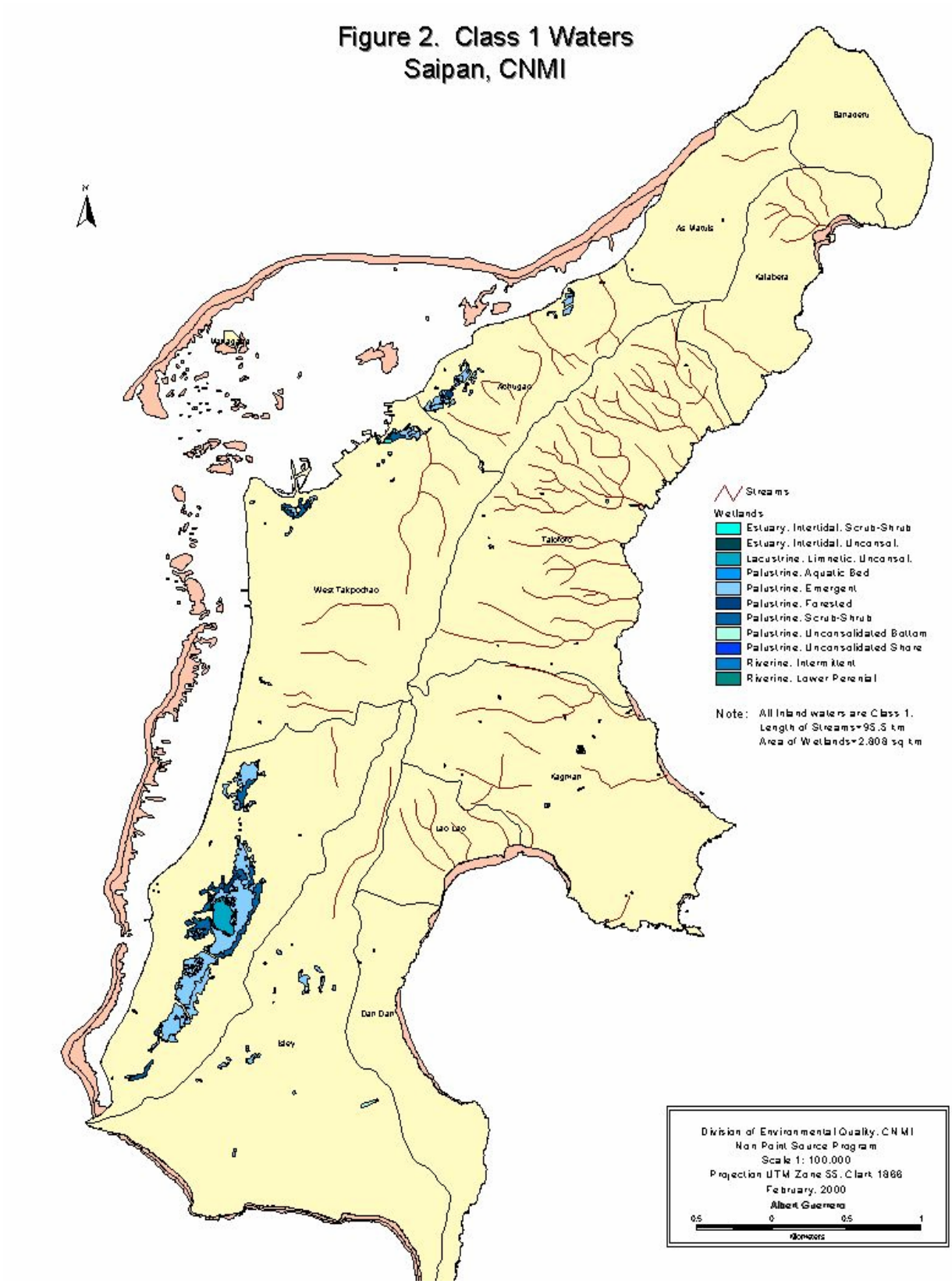
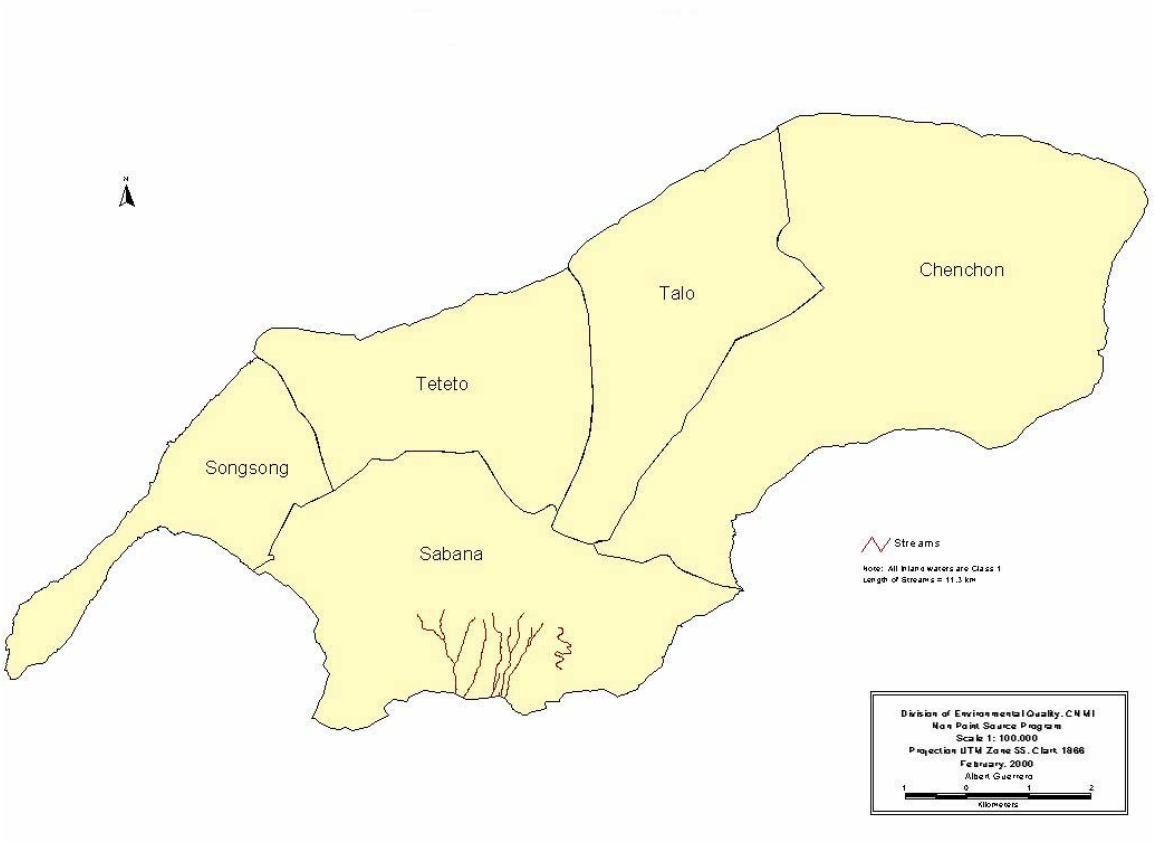


Figure 2. Class 1 Waters
Saipan, CNMI
N
Banaderu
As Matuis
Kalabera
Achugao
Takpochao
West Takpochao
Kagman
Lao Lao
Dan Dan
Idoy
Streams
Wetlands
Estuary. Intertidal. Scrub-Shrub
Estuary. Intertidal. Unconsol.
Lacustrine. Limnetic. Unconsol.
Palustrine. Aquatic Bed
Palustrine. Emergent
Palustrine. Forested
Palustrine. Scrub-Shrub
Palustrine. Unconsolidated Bottom
Palustrine. Unconsolidated Shore
Riverine. Intermittent
Riverine. Lower Perenial
Note: All Inland waters are Class 1.
Length of Streams=95.5 km
Area of Wetlands=2.808 sq km
Division of Environmental Quality. CNMI
Non Point Source Program
Scale 1: 100,000
Projection UTM Zone 55. Clark 1866
February. 2000
Albert Guerrero
0.5 0 0.5 1
Kilometers

Figure 3. Class 1 Waters of Rota, CNMI



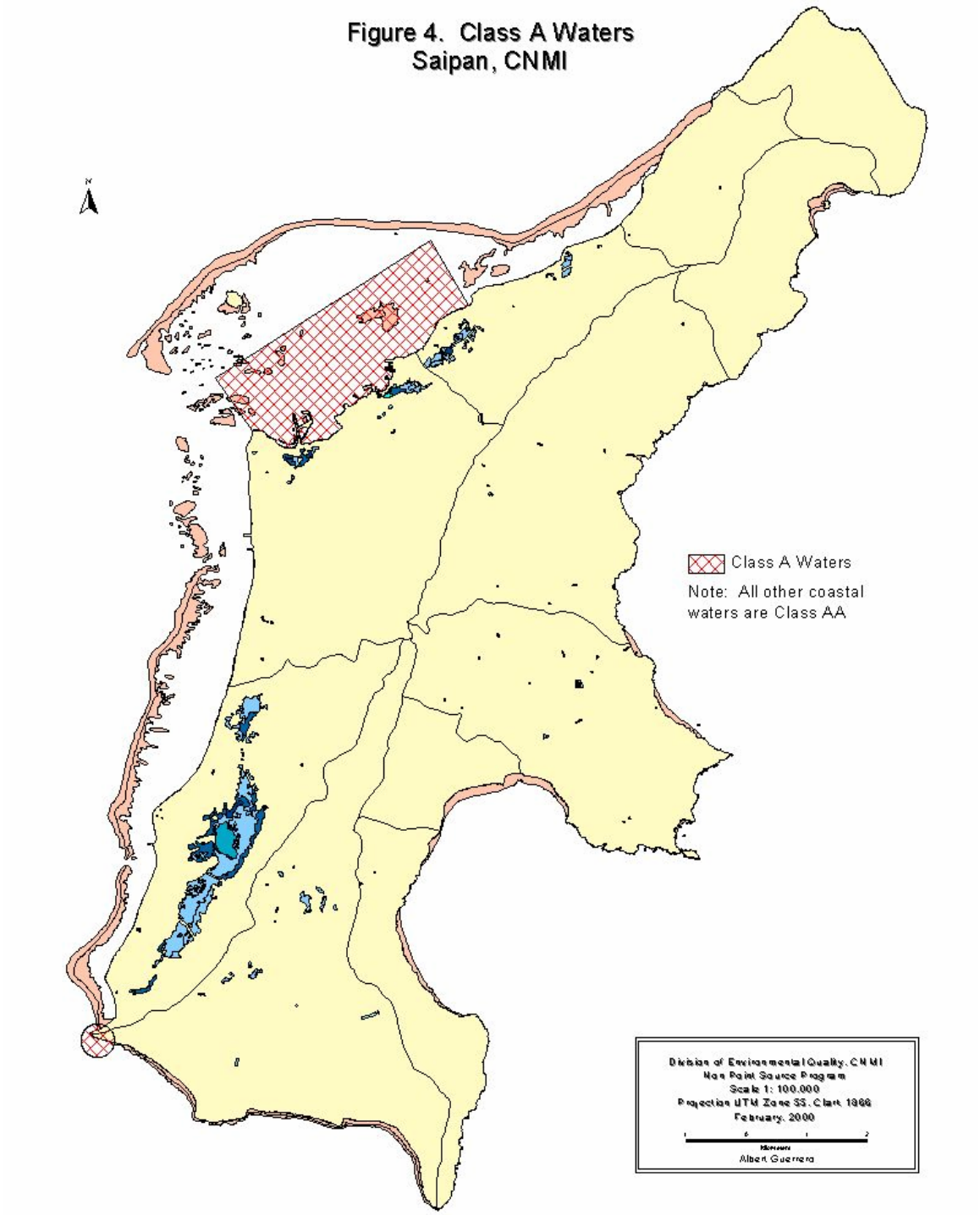


Figure 4. Class A Waters
Saipan, CNMI
Class A Waters
Note: All other coastal waters are Class AA
Division of Environmental Quality, CNMI
Non Point Source Program
Scale 1: 100,000
Projection UTM Zone 55, Clark 1866
February, 2000
Albert Guerrero

intrusion are to control and limit the pumping rate of existing wells, and closely monitor the sample results of existing well for chlorides, conductivity and total dissolved solids.

On Saipan, there are several users of ground water. The CNMI is heavily dependent on tourism and garment factories for the local economy. Due to the high level of chlorides in the public water system, major hotels and factories along the coast drill seawater wells and use reverse osmosis treatment for their private water supply. It has been proposed that large-scale desalination of seawater should be explored, and the government is exploring the costs associated with this.

The problem of saltwater intrusion of aquifers is limited to the island of Saipan. Saipan with a population of 71,912 (2000) has had a tremendous stress on the aquifers and ground water supply. The majority of the population resides on the western side of the island. The villages of Garapan, Chalan Laulao, Susupe, Chalan Kanoa, and San Antonio are estimated to have concentrated sixty percent of the total island's population within twenty percent of the available landmass on Saipan. The majority of the municipal water supply wells are located in the southern part of the island. These municipal wells operated by the Commonwealth Utilities Corporation (CUC) are pumping from the basal aquifer. There is a smaller concentration of municipal wells located at higher elevations in the central part of the island, and a few springs, that serve the other forty percent of the population of Saipan.

At the present time the island of Rota, with a population of about 3,000, receives its municipal water from two springs (Water Cave and Onan Cave) and three newly drilled wells. Due to slightly different geologic formation the Rota municipal water is more palatable than that of Saipan's. These wells are drawing water from the high level aquifers and are not susceptible to salt water intrusion. However, the springs on Rota are suspected to be ground water under direct influence of surface water (GUDI). Presently, DEQ is initiating monitoring of turbidity changes in accordance with the seasonal changes in order to determine if further filtration should be required.

Tinian on the other hand, with a population of about 3,200, gets its municipal water from two Maui type wells also suspected of GUDI and three deep wells. Both Tinian and Rota have not had water demands that lead to over-pumping of the aquifers.

E. Wetland Background

Wetlands can be found on the islands of Saipan, Tinian, Rota, and Pagan, however they cover less than 2% of the CNMI at the present time (based on current CNMI GIS layers) (Figure 2). The wetlands provide habitat for unique and endangered plants and animals present in CNMI. Wetlands also serve other functional purposes such as storm runoff water storage and pollutant uptake. For a more detailed look at CNMI's wetlands and their functional roles one can refer to CNMI's "National Wetland Inventory" document (Prepared by US Fish and Wildlife, 1989, CRM Office). This document states there are approximately 600 acres of wetlands in CNMI. The "Commonwealth of the Northern Mariana Islands Wetlands Conservation Plan" states that only 36% of the original

wetland acreage still exists (CRM Office). Further, this document states that 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. Saipan was heavily farmed during Japanese times (pre-World War II), which resulted in filling of wetland areas to make them suitable for farming. Increasing development continues to threaten wetlands on all of the islands.

F. Background on DEQ Programs to Correct Impairments

The CNMI Division of Environmental Quality has implemented several programs that address and regulate development and associated pollutants. All programs are mentioned below. Further information regarding present status and findings for each program are located in sections III and IV of this report.

There are three programs that collect data regarding CNMI's water quality status. The DEQ Lab has monitoring programs for Class 1, 2, A, AA waters. DEQ has initiated and leads two marine monitoring (e.g. biocriteria) programs; The Saipan Lagoon Monitoring Program and the Nearshore Coral Reef Monitoring Program.

There are several other DEQ programs which deal with water quality and permitting issues. The DEQ Wastewater and Erosion Control Branch administers permitting programs for earthmoving and erosion control, wastewater treatment, land disposal of other wastewater, and Clean Water Act Section 401 Water Quality Certifications. The DEQ Non-Point Source Pollution Branch deals with stormwater runoff concerns at the watershed level. The NPS Branch also administers EPA 319 grants to help teach the community about NPS pollution and all available best management practices. The Safe Drinking Water Branch regulates public drinking water systems, well drilling, and underground injection wells. The DEQ Air and Toxic Management Branch deals with hazardous sources of pollution which may affect CNMI's waters. Finally, the DEQ Above and Underground Fuel Storage and Pesticide Branch also deals with hazardous sources of pollution which may affect CNMI's waters.

III. Surface Water Assessment

A. Beach Water Quality Monitoring Program

1. Background and Methodology

The Division of Environmental Quality Surveillance Laboratory was established by the Commonwealth of the Northern Mariana Islands to provide monitoring data required under the Safe Drinking Water Act (P.L. 93-523) and other environmental programs. The data generated by the laboratory are used to evaluate the quality of drinking water and recreational waters in the Commonwealth. Therefore, a quality assurance plan is essential in the generation of these data and is an important part of the day-to-day activities of the laboratory. The DEQ Environmental Surveillance Laboratory Quality Assurance Manual includes Standard Operating Procedures (SOPs) for sampling, testing, reporting, and providing quality assurance for traditional water quality parameters.

The laboratory has a quality assurance plan with two primary functions: 1) It assures that proper quality control practices are implemented in day-to-day laboratory task, and 2) It assures that the reported data are valid, and are of a known precision and accuracy. The elements of a basic quality control program are well defined by federal statute. Although the success of the program depends upon the training, professional pride and awareness of each individual technician, final responsibility for the reliability of reported analytical results rest with the Environmental Surveillance Laboratory Supervisor.

The Environmental Surveillance Laboratory is responsible for measuring the quality of water that is used by the public for drinking, recreational and/or other purposes. It is the objective of DEQ's Environmental Surveillance Laboratory to assure that the data reported are valid, and of known precision and accuracy.

On a weekly basis, DEQ monitors 39 fixed stations along Saipan's most used West coast beaches for microbiological and chemical parameters (Table 3 and Figure 5). Six beaches on the Northeast coast and six beaches on the Southeast coast are monitored only on a quarterly basis because the quality of the water is consistently good and a smaller population uses these less developed areas. Eleven sites around Managaha Island, a small (~1.5 km coastline) island located within the Saipan Lagoon, are also monitored on a monthly basis (Figure 6).

Each month, Tinian and Rota monitor eleven and twelve beach areas respectively (Figure 7 and 8, respectively). These sites are frequently used by the community so they are now being monitored for microbiological and chemical parameters on a monthly basis.

The microbiological and chemical parameters that the Division of Environmental Surveillance Laboratory currently monitors includes: Salinity (‰), Dissolved Oxygen (% D.O.), Temperature (°C), pH, Turbidity (NTU), Orthophosphate (PO4), Nitrates (NO3), and Enterococci bacteria (cfu/100ml). These parameters are monitored on a weekly basis for Saipan West Beaches, and 6 week on/off intervals for all other locations.

Table 3. Saipan microbiological and chemical monitoring sites, corresponding to Figure 5.

Name	Site ID#	Test Freq.
Wing Beach	01	W
PauPau Beach	02	W
Nikko Hotel	03	W
San Roque School	04	W
Plumeria Hotel	05	W
Aqua Resort Hotel	06	W
Tanapag Meeting Hall	07	W
Central Repair Shop	08	W
Sea Plane Ramp	09	W
DPW Channel Bridge	10	W
N.Puerto Rico Dump	11.1	W
S. Puerto Rico Dump	11.2	W
Smiling Cove Marina	12	W
American Memorial Park Drainage	12.1	W
Outer Cove Marina	13	W
Micro Beach	14	W
Hyatt Hotel	15	W
Dai-Ichi Hotel	16	W
Garapan Drainage #1	17	W
Samoan Housing	18	W
Hafa-Adai Hotel	19	W
Garapan Drainage #2	20	W
Garapan Fishing Dock	21	W
Garapan Beach	22	W
Garapan Drainage #3	23	W
Chalan LauLau Beach	24	W
San Jose Beach	25	W
Civic Center Beach	26	W
Diamond Hotel	27	W
Grand Hotel	28	W
Community School	29	W
Sugar Dock	30	W
CK Dist #2 Drainage	31	W
CK Dist #4 Lally Beach	32	W
Chalan Piao Beach	33	W
Hopwood School	34	W
San Antonio Beach	35	W
PIC Beach	36	W
San Antonio Lift Station	37	W
Grotto Cave	01	Q
Bird Island Beach	02	Q
Jeffrey's Beach	03	Q
Old Man By the Sea	04	Q
Marine Beach	05	Q
Tank Beach	06	Q
Forbidden Island	09	Q
North Laulau Beach	10	Q
South Laulau Beach	11	Q
Obyan Beach	12	Q
Ladder Beach	13	Q
Unai Dangkulo Beach	14	Q
Managaha Beaches	01-11	M

Figure 5. Saipan Island Beach Water Quality Monitoring Locations.

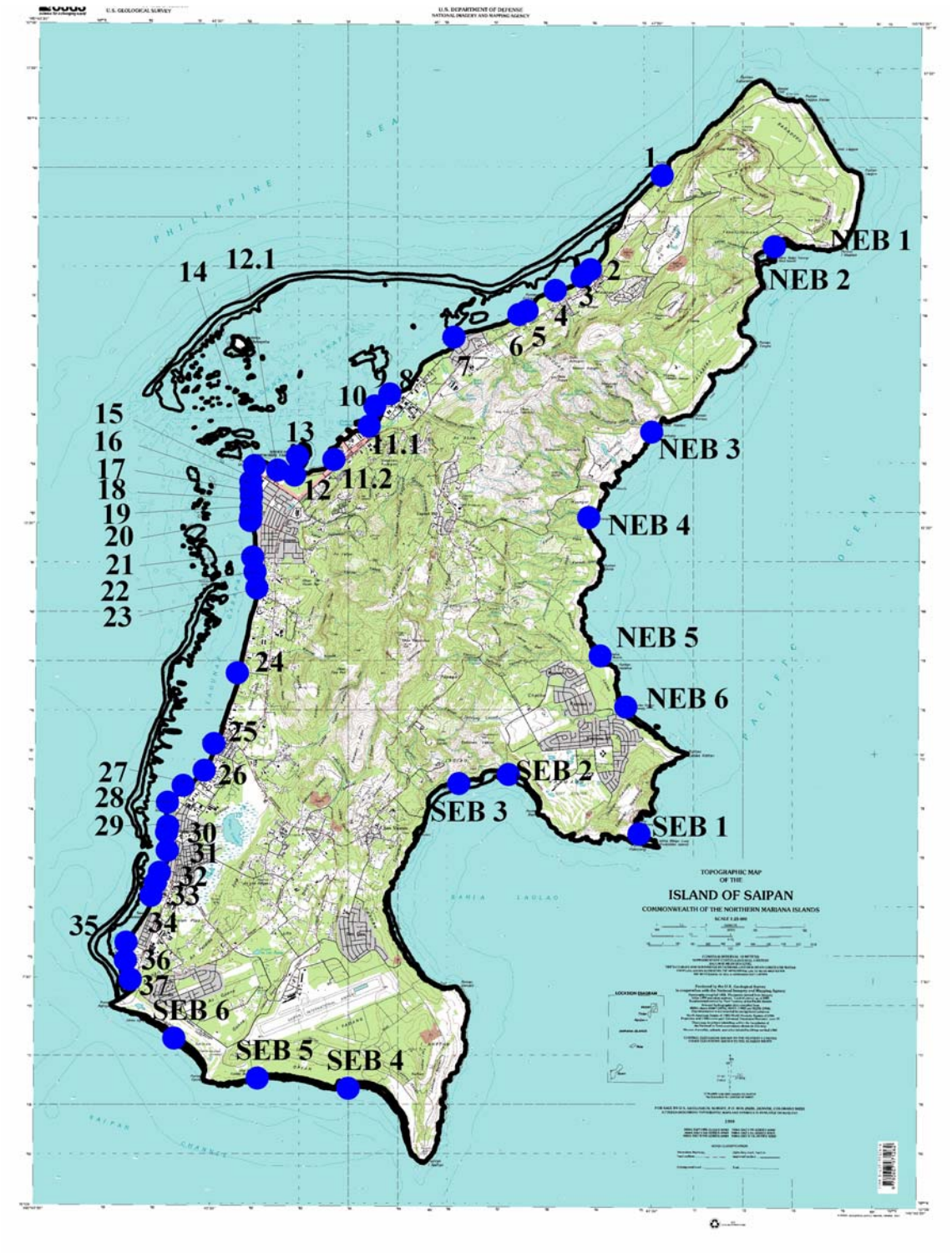


Figure 6. Managaha Island Beach Water Quality Monitoring Locations.

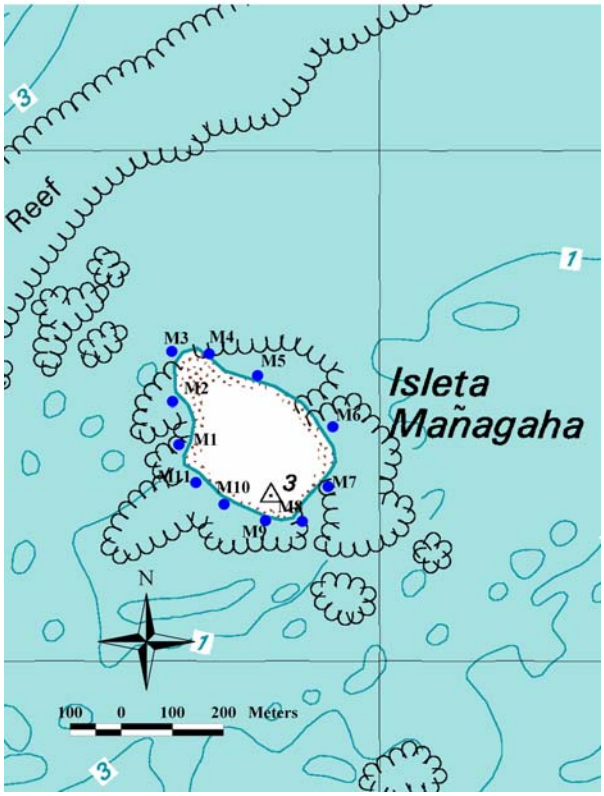


Figure 7. Tinian Island Beach Water Quality Monitoring Locations.

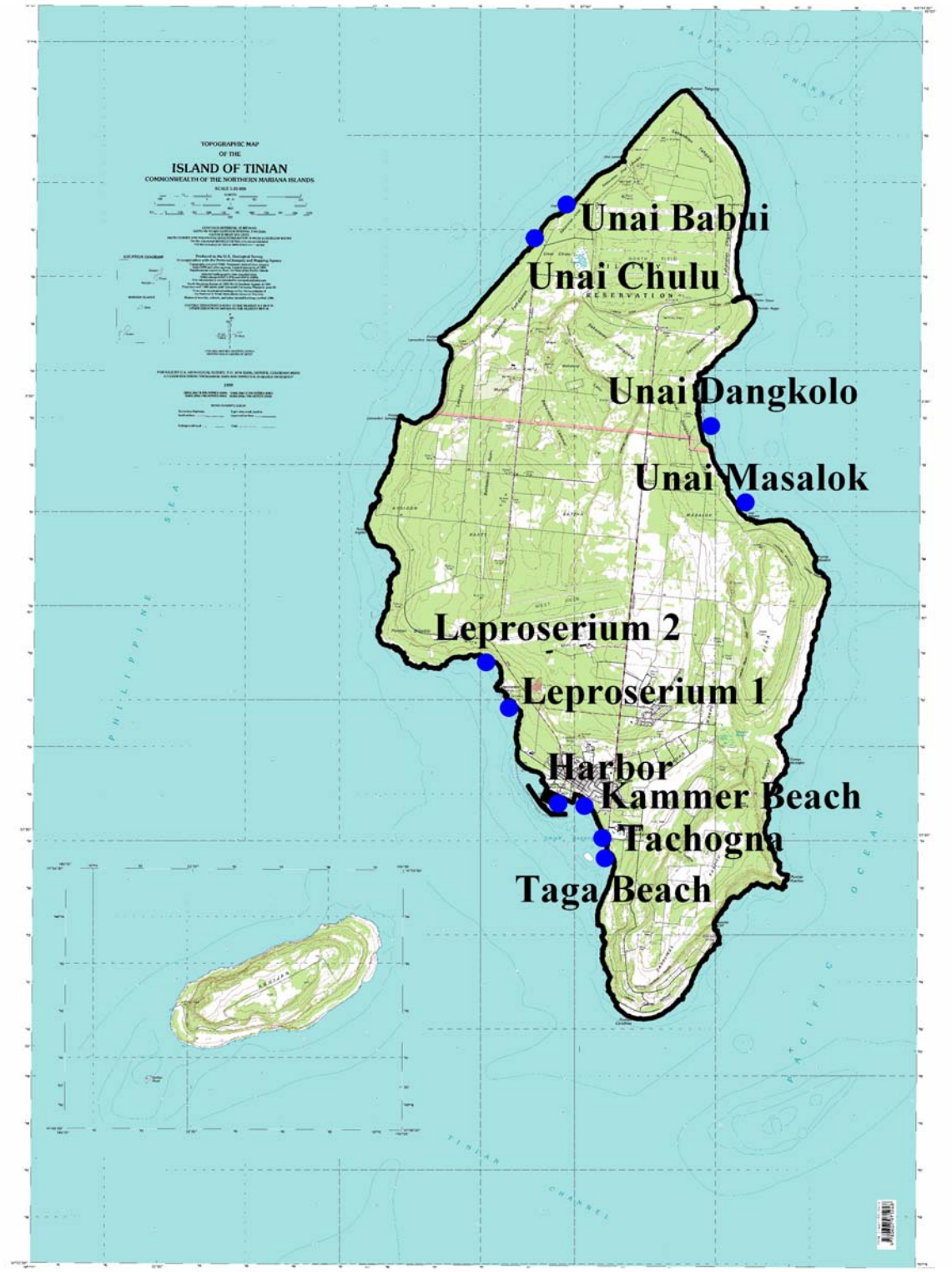
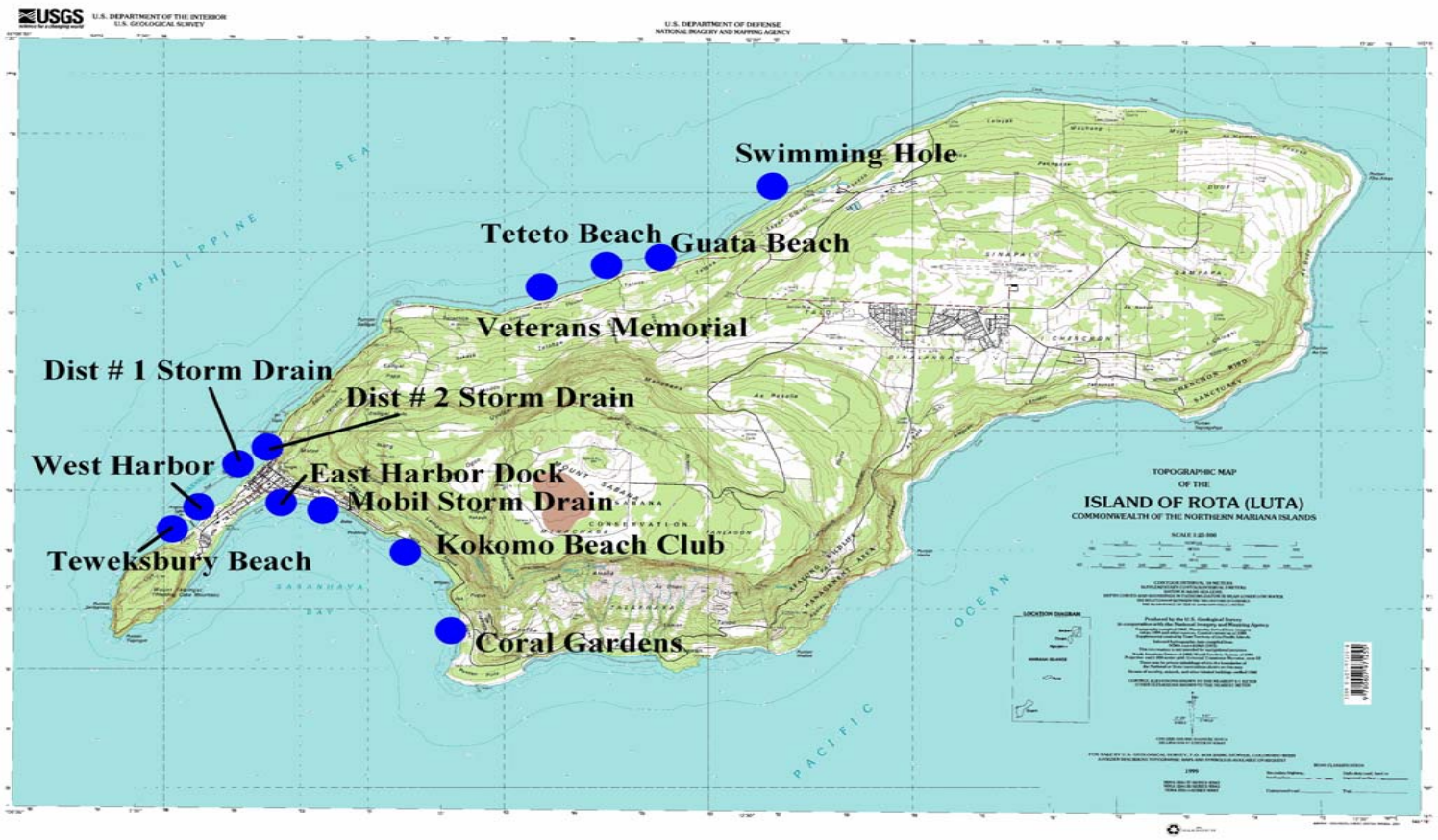


Figure 8. Rota Island Beach Water Quality Monitoring Locations.



The development of the CNMI Water Quality Standards were largely based upon the review of existing water quality standards for other Tropical islands (Table 5). Due to the potential impact and delicate aspects of the coral reef ecosystems and the lack of existing data, stringent nutrient standards were adopted for the CNMI. DEQ recently initiated the collection of nutrient level data as the environmental laboratory has just developed the ability to monitor nutrient levels. There is a concern whether or not the current readings of nutrients are reflective of natural or anthropogenic sources. PO4 levels consistently violated the WQS on all islands greater than 50% of the time, with the exception of Managaha Island which is situated away from any terrestrial input.

Table 5. CNMI Water quality standards.

PARAMETER	CLASS AA	CLASS A	CLASS 1	CLASS 2
Fecal Coliform (CFU/100 ml)	GM[1]< 200 < 400	GM[1]< 200 Never > 400	GM[1]< 200 Never > 400	GM[1]< 200 Never > 400
Enterococci (CFU/ 100 ml)	GM < 35	GM <125	GM < 33	GM < 90
PH	8.05 - 8.15	8.05-8.15	6.50-8.50	6.50 - 8.50
NO_3 - N (mg/L)	< 0.20	< 0.50		
Total Nitrogen (mg/L)	< 0.4	< 0.75	< 0.75	< 1.50
Orthophosphate PO_4 (mg/L)	< 0.025	< 0.05	< 0.10	< 0.10
Total Phos PO_4 (mg/L)	< 0.025	< 0.05	< 0.10	< 0.10
Ammonia (mg/L) (un-iodized)	< 0.02	< 0.02	< 0.02	< 0.02
Dissolved O_2 (%)	> 75	> 75	> 75	> 75
Total Filterable Suspended Solids (mg/L)[2]	5	40	5	40
Salinity (‰)[2]	10	20‰ or above 250 mg/L	10	20‰ or above 250 mg/L
Total Dissolved Solids (mg/L)		500 mg/L		500 mg/L
Temperature (°C)[2]	1.0	1.0	1.0	1.0
Turbidity (NTU)[2]	0.5	1.0	0.5	1.0
Radioactive Materials	Discharge prohibited	Discharge prohibited	Discharge prohibited	Discharge prohibited
Oil & Petroleum	ND[3]	ND[3]	ND[3]	ND[3]

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

The goal of the DEQ Lab Surface Water Quality Monitoring Program is to assess CNMI's waterbodies for compliance with recreational uses and aquatic life uses. EPA guidance material was used assign each water body as 1) non-supportive, 2) partially supportive, and 3) fully supportive for use (Table 6).

2. Results and Discussion

Saipan Island has the largest number of waterbodies that were non-supportive for recreational use compared with Rota and Tinian and Managaha Island which had only

Table 6. Criteria for waterbody classification.

Degree of Aquatic Life Use Support	Criteria
Fully Supporting	For any one pollutant, WQS exceeded in ≤10 percent of measurements.
Partially Supporting	For any one pollutant, WQS exceeded in 11 to 25 percent of measurements.
Not Supporting	For any one pollutant, WQS exceeded in >25 percent of measurements.

one waterbody non-supportive (Table 7 - 9). Recreational use classifications were based upon *enterococci* bacteria violations. There was a large enough sample size for Saipan Island to carry out regression analysis between rainfall (independent) and *enterococci* bacteria counts (dependent) (Table 7). Rainfall explained a significant amount ($p<.05$, regression analysis) of the variance in bacteria levels at the majority of non-supportive waterbodies (Table 7). Observations have shown that storm events quickly inundate many of the sewage lift stations around Saipan, and the overflow enters the marine environment through drainages. This leads to predictable, elevated bacteria levels at many beach locations during storm events. Other known causes of bacteria violations include urban runoff from the heavily populated Garapan district. Only one site among the remaing islands resulted in a non-supportive ranking, which is adjacent to the relatively high populated village of Song Song, Rota (Table 9).

Orthophosphate (PO4) levels exceeded the WQS at all waterbodies on Saipan, Rota, and Tinian Island (Table 10 - 12). This suggests that the WQS criteria (.025 mg/l) is not appropriate for the CNMI, and the water quality standards should be updated in the next review cycle to account for this. The only exception to this finding was for Managaha, which is a small (~.5 km^2) island, situated away from terrestrial input. Dissovled oxygen measurements better served to evaluate aquatic life use support, and followed similar trends as bacteria data (Tables 10 – 12). Most non-supportive sites are associated with drainage regions on Saipan, especially areas where observations show frequent sewage lift station overflow, or heavy urban runoff. Dissolved oxygen readings are influenced by wave activity, and waterbodies protected from rough oceanographic conditions naturally have lower levels. As a result, all monitoring locations in the Saipan Lagoon consistently had DO readings below the water quality standards. This also suggests that during the next water quality standards review process dissolved oxygen criteria should also be evaluated. Benthic organisms are affected by nutrients, oxygen levels, and other water quality parameters, and the next section discusses how aquatic life uses are better evaluated from these data.

Table 7. Summary of beach monitoring locations and *Enterococci* bacteria violations for Saipan: a ranking of 1 = non-supportive, 2 = partially supportive, and 3 = fully supportive. Regression analysis results are presented as P values.

Beach Identifier	Beach Name	Longitude	Latitude	Number of Samples in 2003 (Enterococci)	Percent Violations (Enterococci)	Enterococci Rankings	Number of Samples for Regression (Rainfall (Y) vs. Enterococci (X))	P value for Regression Analysis (Rainfall (Y) vs. Enterococci (X))
WB 1	Wing Beach	15.2725	145.7927	52	12	2	84	0.619
WB 2	PauPau Beach	15.2552	145.7793	52	19	2	84	0.630
WB 3	Nikko Hotel	15.2539	145.7777	52	23	2	84	0.617
WB 4	San Roque School	15.2513	145.7727	52	50	1	84	0.179
WB 5	Plumeria Hotel	15.2476	145.7674	52	23	2	84	< .01 **
WB 6	Aqua Resort Hotel	15.2469	145.7659	52	19	2	84	< .01 **
WB 7	Tanapag Meeting Hall	15.2427	145.7536	48	54	1	84	< .001 ***
WB 8	Central Repair Shop	15.2322	145.7416	39	62	1	84	< .001 ***
WB 9	Sea Plane Ramp	15.2300	145.7388	46	17	2	84	< .05 *
WB 10	DPW Channel Bridge	15.2263	145.7377	46	93	1	84	0.068
WB 11.1	N. Puerto Rico Dump	15.2243	145.7319	6	33	1	57	0.805
WB 11.2	S. Puerto Rico Dump	15.2201	145.7311	36	47	1	9	0.069
WB 12	Smiling Cove Marina	15.2172	145.7236	46	37	1	62	< .001 ***
WB 12.1	American Memorial Park	15.2207	145.7242	45	44	1	45	< .001 ***
WB 13	Outer Cove Marina	15.2181	145.7205	46	17	2	74	0.622
WB 14	Micro Beach	15.2189	145.7161	52	15	2	74	< .001 ***
WB 15	Hyatt Hotel	15.2160	145.7154	52	21	2	84	0.115
WB 16	Dai-Ichi Hotel	15.2145	145.7155	52	35	1	84	0.074
WB 17	Drainage #1	15.2132	145.7156	46	72	1	57	< .01 **
WB 18	Samoan Housing area	15.2112	145.7155	52	38	1	76	< .001 ***
WB 19	Hafa-Adai Hotel	15.2096	145.7154	52	52	1	76	< .001 ***
WB 20	Drainage #2	15.2088	145.7154	41	51	1	44	0.212
WB 21	Garapan Fishing Dock	15.2022	145.7159	46	83	1	75	< .001 ***
WB 22	Garapan Beach	15.1965	145.7167	52	56	1	62	< .001 ***
WB 23	Drainage #3	15.1995	145.7163	46	54	1	59	< .001 ***
WB 24	Chalan Laulau Beach	15.1809	145.7131	52	12	2	66	< .01 **

Table 7. Cont.

Beach Identifier	Beach Name	Longitude	Latitude	Number of Samples in 2003 (Enterococci)	Percent Violations (Enterococci)	Enterococci Rankings	Number of Samples for Regression (Rainfall (Y) vs. Enterococci (X))	P value for Regression Analysis (Rainfall (Y) vs. Enterococci (X))
WB 25	San Jose Beach	15.1679	145.7088	52	13	2	78	0.885
WB 26	Civic Center Beach	15.1630	145.7069	52	19	2	76	0.845
WB 27	Diamond Hotel	15.1602	145.7030	52	17	2	84	0.616
WB 28	Grand Hotel	15.1571	145.7000	52	10	3	86	0.195
WB 29	Community School Beach	15.1527	145.7001	52	19	2	71	0.251
WB 30	Sugar Dock	15.1516	145.6999	46	70	1	76	0.937
WB 31	CK District #2 Drainage	15.1483	145.7001	46	37	1	68	< .001 ***
WB 32	CK District #4 Lally Beach	15.1442	145.6986	52	15	2	80	< .001 ***
WB 33	Chalan Piao Beach	15.1424	145.6979	52	15	2	80	< .001 ***
WB 34	Hopwood School Beach	15.1400	145.6970	48	29	1	46	0.121
WB 35	San Antonio Beach	15.1314	145.6924	52	6	3	73	< .001 ***
WB 36	Pacific Islands Club (PIC)	15.1281	145.6923	52	23	2	81	< .001 ***
WB 37	San Antonio Lift Station	15.1247	145.6932	46	52	1	50	< .001 ***
NEB 1	Grotto Cave	15.2587	145.8232	5	0	3	no data	no data
NEB 2	Bird Island Beach	15.2596	145.8140	5	0	3	no data	no data
NEB 3	Jeffrey's Beach	15.2254	145.7910	5	100	1	no data	no data
NEB 4	Old Man by the Sea	15.2097	145.7792	5	20	2	no data	no data
NEB 5	Marine Beach	15.1844	145.7815	5	0	3	no data	no data
NEB 6	Tank Beach	15.1750	145.7864	5	20	2	no data	no data
SEB 1	Forbidden Island	15.1518	145.7891	5	0	3	no data	no data
SEB 2	North Laulau Beach	15.1626	145.7644	5	20	2	no data	no data
SEB 3	South laulau Beach	15.1608	145.7550	5	40	1	no data	no data
SEB 4	Obyan	15.1049	145.7345	5	20	2	no data	no data
SEB 5	Ladder Beach	15.1067	145.7173	5	20	2	no data	no data
SEB 6	Unai Dangkulo Beach	15.1139	145.7015	5	0	3	no data	no data

Table 8. Summary of beach monitoring locations and *Enterococci* bacteria violations for Tinian and Rota: a ranking of 1 = non-supportive, 2 = partially supportive, and 3 = fully supportive.

Beach Identifier	Beach Name	Island Name	Longitude	Latitude	Number of Samples in 2003 (Enterococci)	Percent Violations (Enterococci)	Enterococci Rankings
T1	Unai Masalok Beach	Tinian	15.0211	145.6525	9	0	3
T2	Unai Dangkolo Beach	Tinian	15.0329	145.6467	9	0	3
T3	Unai Babui	Tinian	15.0775	145.6197	9	0	3
T4	Unai Chulu	Tinian	15.0705	145.6126	9	11	2
T5	Leprosarium Beach I	Tinian	14.9796	145.6099	9	0	3
T6	Leprosarium Beach II	Tinian	14.9875	145.6056	9	0	3
T7	Tachogna Beach	Tinian	14.9511	145.6285	9	0	3
T8	Taga Beach	Tinian	14.9542	145.6270	9	0	3
T9	Harbor	Tinian	14.9625	145.6171	9	0	3
T10	Kammer Beach	Tinian	14.9619	145.6228	9	0	3
R1	Coral Garden Beach	Rota	14.1161	145.1667	5	0	3
R2	Kokomo Beach Club	Rota	14.1294	145.1598	5	0	3
R3	Mobile Station Storm Drainage	Rota	14.1369	145.1428	5	0	3
R4	East Harbor Dock	Rota	14.1371	145.1416	5	0	3
R5	Tweksberry Beach	Rota	14.1311	145.1282	5	0	3
R6	West Harbor Marina	Rota	14.1335	145.1309	5	20	2
R7	District #2 Storm Drainage	Rota	14.1408	145.1379	5	80	1
R8	District #1 Strom Drainage	Rota	14.1422	145.1394	5	0	3
R9	Veterans Memorial Beach	Rota	14.1674	145.1787	5	0	3
R10	Teteto Beach	Rota	14.1702	145.1861	5	0	3
R11	Guata Beach	Rota	14.1723	145.1945	5	0	3
R12	Swimming Hole	Rota	14.1823	145.2091	5	0	3

Table 9. Summary of beach monitoring locations and *Enterococci* bacteria violations for Managaha: a ranking of 1 = non-supportive, 2 = partially supportive, and 3 = fully supportive.

Beach Identifier	Beach Name	Longitude	Latitude	Number of Samples in 2003 (Enterococci)	Percent Violations (Enterococci)	Enterococci Rankings
M1	Managaha Beaches	15.2409	145.7114	7	0	3
M2	Managaha Beaches	15.2420	145.7117	7	0	3
M3	Managaha Beaches	15.2425	145.7116	7	0	3
M4	Managaha Beaches	15.2428	145.7124	7	0	3
M5	Managaha Beaches	15.2426	145.7133	7	0	3
M6	Managaha Beaches	15.2410	145.7147	7	14	2
M7	Managaha Beaches	15.2403	145.7140	7	0	3
M8	Managaha Beaches	15.2398	145.7136	7	0	3
M9	Managaha Beaches	15.2400	145.7129	7	0	3
M10	Managaha Beaches	15.2401	145.7125	7	0	3
M11	Managaha Beaches	15.2405	145.7121	7	0	3

Table 10. Summary of Dissolved Oxygen and Orthophosphate (PO4) violations for Saipan: a ranking of 1 = non-supportive, 2 = partially supportive, and 3 = full supportive.

Beach Identifier	Beach Name	Number of Samples (Dissolved Oxygen)	% Violations (Dissolved Oxygen)	Ranking (Dissolved Oxygen)	Number of Samples (PO4)	% Violations (PO4)	Ranking (PO4)
WB 1	Wing Beach	25	4	3	33	91	1
WB 2	PauPau Beach	26	19	2	33	79	1
WB 3	Nikko Hotel	26	19	2	33	94	1
WB 4	San Roque School	26	27	1	33	91	1
WB 5	Plumeria Hotel	26	15	2	33	88	1
WB 6	Aqua Resort Hotel	27	7	3	33	88	1
WB 7	Tanapag Meeting Hall	25	24	2	29	90	1
WB 8	Central Repair Shop	21	48	1	20	95	1
WB 9	Sea Plane Ramp	25	16	2	27	96	1
WB 10	DPW Channel Bridge	25	40	1	27	100	1
WB 11.1	N. Puerto Rico Dump	4	25	0	4	75	1
WB 11.2	S. Puerto Rico Dump	17	47	1	20	100	1
WB 12	Smiling Cove Marina	24	38	1	27	96	1
WB 12.1	American Memorial Park	23	30	1	26	92	1
WB 13	Outer Cove Marina	24	4	3	27	89	1
WB 14	Micro Beach	26	15	2	33	85	1
WB 15	Hyatt Hotel	26	23	2	33	88	1
WB 16	Dai-Ichi Hotel	25	24	2	33	79	1
WB 17	Drainage #1	23	43	1	27	93	1
WB 18	Samoan Housing area	25	28	1	32	81	1
WB 19	Hafa-Adai Hotel	27	67	1	32	91	1
WB 20	Drainage #2	21	38	1	22	100	1
WB 21	Garapan Fishing Dock	25	68	1	25	92	1
WB 22	Garapan Beach	27	74	1	31	84	1
WB 23	Drainage #3	25	60	1	25	96	1
WB 24	Chalan Laulau Beach	26	81	1	30	80	1

Table 10. Cont.

Beach Identifier	Beach Name	Number of Samples (Dissolved Oxygen)	% Violations (Dissolved Oxygen)	Ranking (Dissolved Oxygen)	Number of Samples (PO4)	% Violations (PO4)	Ranking (PO4)
WB 25	San Jose Beach	27	74	1	30	70	1
WB 26	Civic Center Beach	27	74	1	29	66	1
WB 27	Diamond Hotel	27	63	1	29	72	1
WB 28	Grand Hotel	27	56	1	29	69	1
WB 29	Community School Beach	27	59	1	29	79	1
WB 30	Sugar Dock	25	68	1	24	92	1
WB 31	CK District #2 Drainage	25	60	1	23	96	1
WB 32	CK District #4 Lally Beach	27	67	1	30	90	1
WB 33	Chalan Piao Beach	27	70	1	30	90	1
WB 34	Hopwood School Beach	24	71	1	28	100	1
WB 35	San Antonio Beach	27	78	1	30	73	1
WB 36	Pacific Islands Club (PIC)	27	74	1	30	83	1
WB 37	San Antonio Lift Station	25	80	1	24	96	1
NEB 1	Grotto Cave	no data	no data	no data	no data	no data	no data
NEB 2	Bird Island Beach	7	0	3	9	89	1
NEB 3	Jeffrey's Beach	7	0	3	9	89	1
NEB 4	Old Man by the Sea	4	0	3	5	100	1
NEB 5	Marine Beach	4	0	3	5	100	1
NEB 6	Tank Beach	4	0	3	5	100	1
SEB 1	Forbidden Island	8	0	3	9	89	1
SEB 2	North Laulau Beach	8	0	3	9	78	1
SEB 3	South laulau Beach	6	0	3	7	100	1
SEB 4	Obyan	8	0	3	9	67	1
SEB 5	Ladder Beach	7	0	3	9	89	1
SEB 6	Unai Dangkulo Beach	7	0	3	9	100	1

Table 11. Summary of Dissolved Oxygen and Orthophosphate (PO4) violations for Managaha: a ranking of 1 = non-supportive, 2 = partially supportive, and 3 = fully supportive.

Beach Identifier	Beach Name	Number of Samples (Dissolved Oxygen)	% Violations (Dissolved Oxygen)	Ranking (Dissolved Oxygen)	Number of Samples (PO4)	% Violations (PO4)	Ranking (PO4)
M1	Managaha Beaches	11	20	2	15	20	2
M2	Managaha Beaches	11	7	3	15	7	3
M3	Managaha Beaches	11	7	3	15	7	3
M4	Managaha Beaches	11	0	3	15	0	3
M5	Managaha Beaches	11	7	3	15	7	3
M6	Managaha Beaches	11	7	3	15	7	3
M7	Managaha Beaches	11	0	3	15	0	3
M8	Managaha Beaches	11	0	3	15	0	3
M9	Managaha Beaches	11	0	3	15	0	3
M10	Managaha Beaches	11	7	3	15	7	3
M11	Managaha Beaches	11	7	3	15	7	3

Table 12. Summary of Dissolved Oxygen and Orthophosphate (PO4) violations for Tinian and Rota: a ranking of 1 = non-supportive, 2 = partially supportive, and 3 = fully supportive.

Beach Identifier	Beach Name	Island Name	Number of Samples (Dissolved Oxygen)	% Violations (Dissolved Oxygen)	Ranking (Dissolved Oxygen)	Number of Samples (PO4)	% Violations (PO4)	Ranking (PO4)
T1	Unai Masalok Beach	Tinian	no data	no data	no data	12	92	1
T2	Unai Dangkolo Beach	Tinian	no data	no data	no data	12	100	1
T3	Unai Babui	Tinian	no data	no data	no data	12	92	1
T4	Unai Chulu	Tinian	no data	no data	no data	12	100	1
T5	Leprosarium Beach I	Tinian	no data	no data	no data	12	100	1
T6	Leprosarium Beach II	Tinian	no data	no data	no data	12	100	1
T7	Tachogna Beach	Tinian	no data	no data	no data	12	100	1
T8	Taga Beach	Tinian	no data	no data	no data	12	100	1
T9	Harbor	Tinian	no data	no data	no data	12	92	1
T10	Kammer Beach	Tinian	no data	no data	no data	12	92	1
R1	Coral Garden Beach	Rota	no data	no data	no data	10	60	1
R2	Kokomo Beach Club	Rota	no data	no data	no data	10	90	1
R3	Mobile Station Storm Drainage	Rota	no data	no data	no data	10	100	1
R4	East Harbor Dock	Rota	no data	no data	no data	10	80	1
R5	Tweksberry Beach	Rota	no data	no data	no data	10	60	1
R6	West Harbor Marina	Rota	no data	no data	no data	10	90	1
R7	District #2 Storm Drainage	Rota	no data	no data	no data	10	70	1
R8	District #1 Strom Drainage	Rota	no data	no data	no data	10	80	1
R9	Veterans Memorial Beach	Rota	no data	no data	no data	10	90	1
R10	Teteto Beach	Rota	no data	no data	no data	10	80	1
R11	Guata Beach	Rota	no data	no data	no data	10	90	1
R12	Swimming Hole	Rota	no data	no data	no data	10	50	1

B. Lagoon and Coral Reef Biocriteria Monitoring Programs

1. Background and Methodology

Many monitoring programs that deal with water quality data collection only are not sufficient to detect changes over time. The only way for water quality data alone to provide useful statistically significant data would be through the use of continuous recording instruments or for samples to be collected on a daily basis from all locations (very expensive and difficult). A much more efficient method is to gather data on the distribution and abundances of organisms that live within the waters. For all island nations with tropical marine waters these marine communities will shift in response to nutrient loads, sediment loads, temperature, turbidity, and other water quality parameters (Rogers, 1990, Telesnicki and Goldberg, 1995). CNMI can then use the available water quality data (discussed in Laboratory Program), collected once per week, and combine this with other benthic community data for waterbody evalutation.

The CNMI Inter-Agency Marine Monitoring Team (MMT) was initially established in 1997 to help CNMI understand the current conditions of their coral reefs and coral reef resources. It has developed and expanded over the past 7 years to improve data collection techniques, data accuracy, staff training, and spatial coverage. It is the goal of the CNMI Marine Monitoring Team to carry out long-term monitoring to continually assess our reefs as CNMI grows. DEQ plays a major role in the MMT through its Marine Biologist, Non-Point Source Pollution Program, and Laboratory Program. Two biocriteria monitoring programs presently exist; the Saipan Lagoon and Nearshore Coral Reef programs. Both of these are very different from EPA funded bio-criteria monitoring programs in the U.S. mainland, due to the nature of tropical marine systems.

No EPA criteria exist for the evaluation of coral reefs, however, the existing EPA guidance material can be logically manipulated to allow for evaluation of waterbodies based upon benthic communities. Lagoon benthic communities were evaluated by calculating a ratio of seagrass/sand/coral to turf/macroalgae coverage. Justification comes from studies which show turf and macroalgae abundances to increase in response to nutrient addition (Littler and Littler, 1985, Lapointe, 1997). The data collected here represent the highest level of technical components based upon EPA guidance material. All data were collected and analyzed by a professional biologist for interpretation. Methodology used to acquire these data can by obtained from (http://www.deq.gov.mp/MMT/lagoon.htm).

Coral reef benthic communities were evaluated by calculating a ratio of crustose coralline algae (CCA) to all other algae. Justification comes from studies which show CCA as the preferred substrate for coral settlement, and other turf and macroalgae to increase sediment trapping and inhibit coral survival (Rogers, 1990, Richmond, 1997, Fabricius and De'ath, 2001). A second measure of coral reef health was provided by coral community surveys, completed independently of benthos data collection. Three measurements of the coral community were averaged to quantify the overall integrity of each reef. These are community evenness, species richness, and average colony diameter (Meesters et al., 2001, Clarke and Warwick, 2001). An average is suggested because

these measures can be affected by the geological and physical setting of a site, and all three addressed simultaneously serve best to evaluate a reef regardless of its environmental setting. Methodology used to acquire coral reef data can by obtained at (http://www.deq.gov.mp/MMT/Reef.htm, Houk, 1999, and Houk, 2000).

Within each waterbody ecological surveys were completed to evaluate the aquatic life use support according to EPA guidance material as 1) non-supportive, 2) partially supportive, and 3) fully supportive. All waterbodies assessed in this study have adjacent development on land, and to some degree, anthropogenic pollutants. As a result, there is no true reference site established if one exists at all. Biocriteria monitoring programs were designed to sample sites along a disturbance gradient. A degree of measure was established based upon relative site comparisons (mean and standard deviations) for each variable in question (Table 13).

Table 13. A description of how relative measures were used to assign appropriate Aquatic Life Use Support designations.

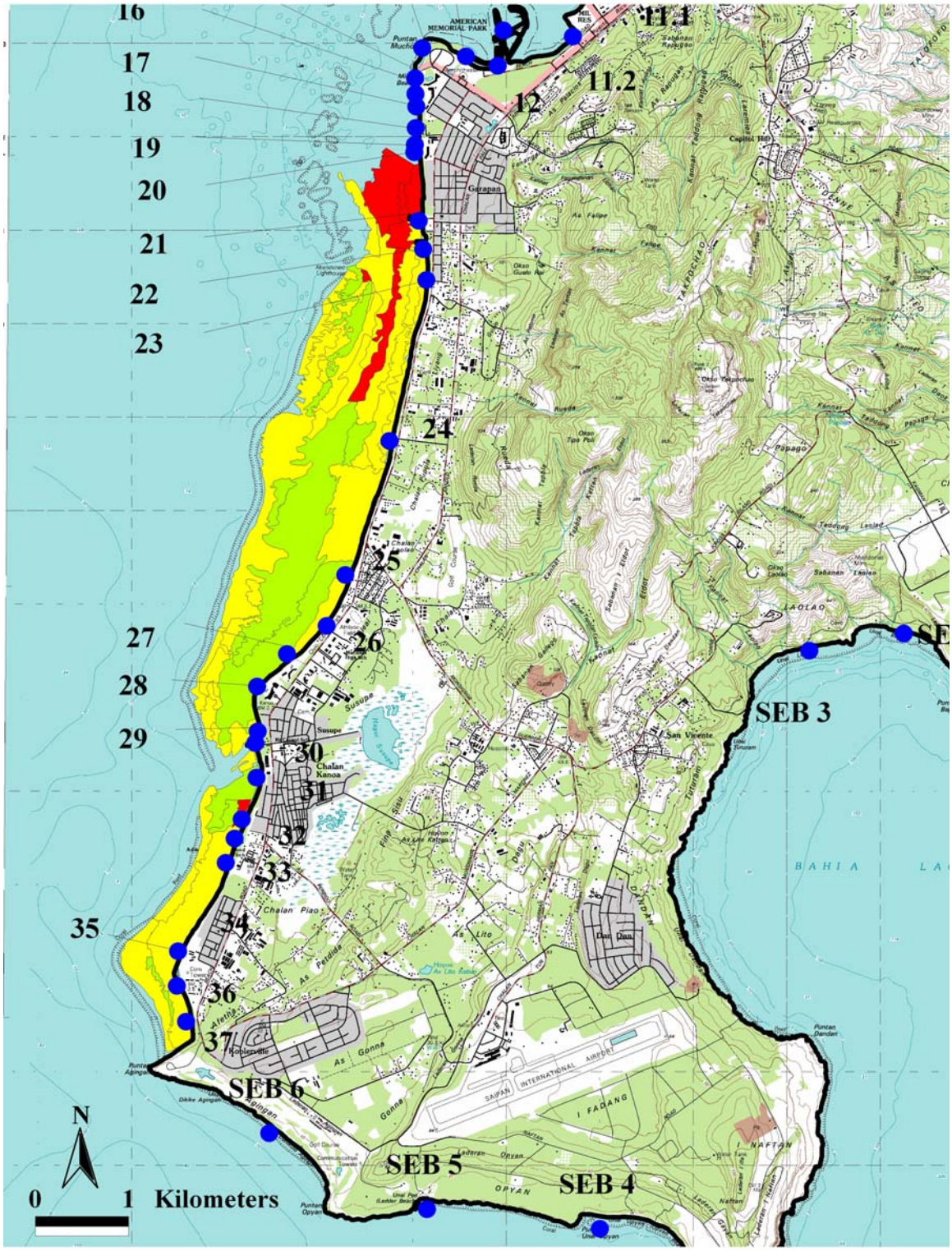
Biological Community Measure	Aquatic Life Use Support Designation
Less than one standard deviation below the mean	Not Supporting
Not different from mean	Partially Supporting
Greater than one standard deviation above the mean	Fully Supporting

2. Results and Discussion

There were three regions in the Saipan Lagoon which were non-supportive for aquatic life use (Figure 9). The largest is associated with Garapan, where urban runoff contaminated with high bacteria, nutrients, and low dissolved oxygen bathes the benthic community. As a result, there is a dominance of macroalgae (Calurpa spp.) compared with seagrass, sand, or corals. Another, large non-supportive waterbody in the lagoon is adjacent to Beach Road, at the southern end of Garapan. These waters receive large inputs of stormwater during rainfall events due to adjacent topography, and are also associated with relatively high bacteria and nutrient levels (Figure 9). The last small, localized non-supportive waterbody is located adjacent to Chalan Kanoa village, presumably due to frequent lift station failures. Water quality results agree with benthic data showing high bacteria and nutrient levels.

Twenty coral reef monitoring locations were used for waterbody evaluation (Figure 10). While the CNMI reef monitoring program has a better spatial coverage than shown, only sites with appropriate reef development can be used to evaluate water quality. At other locations, environmental factors such as exposure, reef slope, and prior geological development have a larger influence on the benthic community than water quality, and benthic data are not appropriate for evaluation of water quality.

Figure 9. Results from the Saipan Lagoon biocriteria monitoring for aquatic life use: red = non-supportive, yellow = partially supportive, and green = fully supportive.



Of the twenty locations surveyed, 1 was non-supportive, 5 were fully supportive, and the remaining were partially supportive for aquatic life use (Table 14). Rankings were provide by two measures; the benthic community and the coral community. The final ALUS ranking is based upon EPA guidance material where if any one measure of the community is non-supportive it is classified as such, and both must be fully supportive for such classification. The suggested explanation for most sites resulting in a partially supportive classification is the larger distances that impaired waters would have to travel to reach the reef monitoring locations compared with the lagoon monitoring locations. Fully supportive reefs are present only in relatively unpopulated watersheds, or barrier reef locations not heavily influenced by stormwater runoff.

In general, the results of rapid assessment based upon relative measures are less desirable than data analysis from long-term studies and monitoring programs, which will better elucidate small changes with greater statistical power. However, the present evaluation serves to fill an important role for regulatory agencies.

C. Integrated 305b and 303d Waterbody Classification

1. (CALM) Waterbody Classification

EPA Consolidated Assessment and Listing Methodology (CALM) was used to classify each waterbody based upon water quality and biocriteria assessments as follows:

- Category 1 Water body meets all designated uses. No use is impaired.
- Category 2 Water body meets some of the designated uses. There is insufficient data to evaluate any remaining designated uses.
- Category 3 There are insufficient data to evaluate any designated uses.
- Category 4a Water body is impaired for one or more designated uses, but a TMDL has already been prepared and completed.
- Category 4b Water body is impaired for one or more designated uses, but a TMDL is not necessary because other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future.
- Category 4c Water body is impaired for one or more designated uses, but a TMDL is not necessary because a pollutant does not cause the impairment.
- Category 5 Water body is impaired, and a TMDL is required [303(d) list].

Each water quality or biocriteria monitoring location was considered to be representative of water quality conditions within a 250 m radius. This distance is based upon CNMI water quality standards for sample violations. In several instances assessments from water quality and biocriteria are available for waterbodies. These data were used to assign categories as follows: All ‘partially supportive’ or ‘non-supportive’ rankings are defined as not meeting the designated use and the waterbody is considered ‘impaired’. Because biocriteria data are better indicators for aquatic life support (due to relatively small water quality sample sizes), only these data were considered where available. All

Figure 10. A map of coral reef biocriteria monitoring locations used in the present assessment.

Table 14. Results from the CNMI coral reef biocriteria monitoring program for aquatic life use: a ranking of 1 = non-supportive, 2 = partially supportive, and 3 = fully supportive. The final ALUS ranking is based upon EPA guidance material where if any one measure of the community is non-supportive it is classified as such, and both must be fully supportive for such classification.

	Coral Community Data							Benthic Community Data		
Site Name	Coral Community Evenness Measurement (Margalef's D-Statistic)	*Rank*	Coral Species Richness	*Rank*	Average Coral Geometric Diameter	*Rank*	**Coral Community Ranking**	Ratio of Benthic Substrate Health	**Benthic Community Ranking**	**ALUS**
AGU - 2	10.6	*3*	82.0	*3*	9.1	*3*	**3**	1.28	**3**	**Fully**
Akino	7.3	*2*	53.0	*2*	7.4	*2*	**2**	0.93	**2**	**Partially**
Barcinas Bay	4.6	*1*	45.0	*2*	8.7	*3*	**2**	0.30	**1**	**Partially**
Boy Scout	9.7	*2*	74.0	*2*	5.8	*2*	**2**	0.81	**2**	**Partially**
Coral Gardens	4.4	*1*	42.0	*1*	5.2	*2*	**1**	0.75	**2**	**Partially**
Coral Ocean Point	8.8	*2*	72.0	*2*	9.2	*3*	**2**	0.68	**2**	**Partially**
Iota N	4.6	*1*	21.0	*1*	6.5	*2*	**1**	0.84	**2**	**Partially**
Iota S	5.7	*1*	28.0	*1*	4.6	*1*	**1**	0.39	**1**	**Non**
Lau Lau Bay #1	8.9	*2*	50.0	*2*	7.3	*2*	**2**	0.29	**1**	**Partially**
Lau Lau Bay #2	6.6	*2*	59.0	*2*	5.0	*2*	**2**	0.77	**2**	**Partially**
Obyan	11.7	*3*	76.0	*3*	8.0	*2*	**3**	0.97	**2**	**Fully**
Outside Garapan	8.0	*2*	66.0	*2*	5.3	*2*	**2**	0.17	**1**	**Partially**
Outside Grand	8.4	*2*	79.0	*3*	8.8	*3*	**3**	1.18	**3**	**Fully**
Outside Managaha	8.5	*2*	77.0	*3*	6.1	*2*	**2**	1.32	**3**	**Fully**
ROT - 6	6.9	*2*	61.0	*2*	3.9	*2*	**2**	no data	**no data**	**Partially**
ROT - 5	7.3	*2*	69.0	*2*	5.4	*2*	**2**	no data	**no data**	**Partially**
SAI - 1	9.2	*2*	47.0	*2*	8.7	*3*	**2**	0.84	**2**	**Partially**
TIN - 1	11.4	*3*	65.0	*2*	6.0	*2*	**2**	no data	**no data**	**Partially**
West Harbor	8.5	*2*	49.0	*2*	4.5	*1*	**2**	0.32	**1**	**Partially**
Wing Beach	7.7	*2*	73.0	*2*	6.0	*2*	**2**	1.41	**3**	**Fully**
Average	7.9		59.4		6.6			0.78		
Standard Deviation	2.0		16.7		1.7			0.37		

accurate, available data was considered in this reporting. Because of the rarity of fresh, surface water in the CNMI (<2.5% of CNMI surface area), and the lack of public use, there is no regular monitoring to support this waterbody assessment process.

Through the analysis of these data we realized orthophosphate and dissolved oxygen standards are more stringent that ambient conditions in many cases. All sites located adjacent to the largest islands of Saipan, Tinian, and Rota violated the .025 mg/l (Class A) or .05 mg/l (Class AA) standards, and thus resulted in placement on the 303(d) listing, unless biocriteria surveys resulted in fully supportive conditions. Only monitoring locations adjacent to Managaha island did not have ambient orthophosphate conditions above the standard. Similarly, at 85% of Saipan monitoring locations adjacent to the lagoon, more than 30% of dissolved oxygen measurements were below the 75% standard. This resulted in almost every site in the Saipan Lagoon being placed upon the 303(d) listing. It is probable that these standards are the reason for the majority of CNMI's waters being placed upon the 303(d) list, however without adequate time for DEQ to gather sufficient data to support and EPA approved water quality standards change these results must stand.

The majority of impaired waters are found on the west coast of Saipan associated with sewage lift station overflows and urban runoff from adjacent development (Table 15). All but .5 km of impaired waters were classified in category 5 and placed on the 2004 303(d) list for CNMI. The only exception is the Dai-Ichi Drainage (Saipan monitoring location #17) which is the site of a CNMI government funded stormwater treatment project. This project will create an artificial wetland to treat surface runoff that currently discharges to the lagoon. The discharge from the wetland will be injected in to a deep well, and will not affect the adjacent surface water quality in the future. Upon completion we expect our monitoring results to show the positive effects of this BMP upon water quality and the marine ecosystem.

Water quality assessment efforts have increased over the past 2 years. The coastline of Saipan (75.52 km) consists of ~38% (28.57 km) sandy beach, of which ~88% is monitored by either or both water quality assessment programs (Table 16). The coastline of Managaha is all sandy beach and monitoring efforts cover the entire island. Tinian Island has only ~12% sandy shores, of which ~71% are monitored. Rota has a ~30% beach coastline, of which ~35% is monitored. The present results show that 40.24 km of impaired coastline exists around CNMI, 28.05 km on Saipan, .19 km on Managaha, 4.5 km on Tinian, and 8.5 km on Rota (Table 16). An explanation of these results has been discussed above, and is mainly due to stringent orthophosphate and dissolved oxygen water quality standards that do no represent ambient conditions. Regardless, these numerical data will serve as a baseline for future assessment of CNMI waterbodies.

D. Water Quality Permitting and Other Pollution Prevention Programs

The Division of Environmental Quality (DEQ) and other CNMI government agencies implement several environmental programs to control point and non-point sources of pollution. Some of the programs are related to federal standards, whereas others are locally developed. Many of DEQ's programs focus primarily on permitting, therefore serving as a pollution prevention mechanism for new development, and as an enforcement mechanism for previously permitted development and discharges.

DEQ also implements other, non-permitting programs that focus more on public education and demonstrations, such as the Non-Point Source (NPS) Pollution Control Program, which focuses primarily on public education and the administration of Section 319 demonstration project grants. DEQ's NPS program also coordinates with EPA, NOAA, and the CNMI Coastal Resources Management Office to implement the requirements of the Section 6217 Coastal Non-Point Source Pollution Program into all applicable CNMI regulations and environmental programs.

Table 15. (CALM) waterbody classification for all islands based upon all designated uses (*enterococci* = recreation use, all other rankings = aquatic life use). See text for explanation.

Beach Identifier	Beach Name	Island Name	Enterococci Rankings (Recreational Use)	DO Ranking (ALUS)	PO4 Rankings (ALUS)	Bio-Criteria Ranking (ALUS)	(CALM) Waterbody Category
WB 1	Wing Beach	Saipan	Partially Supportive	Fully Supportive	Not Supportive	Fully Supportive	1
WB 2	PauPau Beach	Saipan	Partially Supportive	Partially Supportive	Not Supportive	no data within 250 m of sample point	5
WB 3	Nikko Hotel	Saipan	Partially Supportive	Partially Supportive	Not Supportive	no data within 250 m of sample point	5
WB 4	San Roque School	Saipan	Not Supportive	Not Supportive	Not Supportive	no data within 250 m of sample point	5
WB 5	Plumeria Hotel	Saipan	Partially Supportive	Partially Supportive	Not Supportive	no data within 250 m of sample point	5
WB 6	Aqua Resort Hotel	Saipan	Partially Supportive	Fully Supportive	Not Supportive	no data within 250 m of sample point	5
WB 7	Tanapag Meeting Hall	Saipan	Not Supportive	Partially Supportive	Not Supportive	no data within 250 m of sample point	5
WB 8	Central Repair Shop	Saipan	Not Supportive	Not Supportive	Not Supportive	no data within 250 m of sample point	5
WB 9	Sea Plane Ramp	Saipan	Partially Supportive	Partially Supportive	Not Supportive	no data within 250 m of sample point	5
WB 10	DPW Channel Bridge	Saipan	Not Supportive	Not Supportive	Not Supportive	no data within 250 m of sample point	5
WB 11.1	N. Puerto Rico Dump	Saipan	Not Supportive	No Data	Not Supportive	no data within 250 m of sample point	5
WB 11.2	S. Puerto Rico Dump	Saipan	Not Supportive	Not Supportive	Not Supportive	no data within 250 m of sample point	5
WB 12	Smiling Cove Marina	Saipan	Not Supportive	Not Supportive	Not Supportive	no data within 250 m of sample point	5
WB 12.1	American Memorial Park Drainage	Saipan	Not Supportive	Not Supportive	Not Supportive	no data within 250 m of sample point	5
WB 13	Outer Cove Marina	Saipan	Partially Supportive	Fully Supportive	Not Supportive	no data within 250 m of sample point	5
WB 14	Micro Beach	Saipan	Partially Supportive	Partially Supportive	Not Supportive	no data within 250 m of sample point	5
WB 15	Hyatt Hotel	Saipan	Partially Supportive	Partially Supportive	Not Supportive	no data within 250 m of sample point	5
WB 16	Dai-Ichi Hotel	Saipan	Not Supportive	Partially Supportive	Not Supportive	no data within 250 m of sample point	5
WB 17	Drainage #1	Saipan	Not Supportive	Not Supportive	Not Supportive	no data within 250 m of sample point	4b
WB 18	Samoan Housing area	Saipan	Not Supportive	Not Supportive	Not Supportive	Non Supportive	5
WB 19	Hafa-Adai Hotel	Saipan	Not Supportive	Not Supportive	Not Supportive	Non Supportive	5
WB 20	Drainage #2	Saipan	Not Supportive	Not Supportive	Not Supportive	Non Supportive	5
WB 21	Garapan Fishing Dock	Saipan	Not Supportive	Not Supportive	Not Supportive	Non Supportive	5
WB 22	Garapan Beach	Saipan	Not Supportive	Not Supportive	Not Supportive	Non Supportive	5
WB 23	Drainage #3	Saipan	Not Supportive	Not Supportive	Not Supportive	Non Supportive	5
WB 24	Chalan Laulau Beach	Saipan	Partially Supportive	Not Supportive	Not Supportive	Non Supportive	5
WB 25	San Jose Beach	Saipan	Partially Supportive	Not Supportive	Not Supportive	Fully Supportive	1
WB 26	Civic Center Beach	Saipan	Partially Supportive	Not Supportive	Not Supportive	Partially Supportive	5
WB 27	Diamond Hotel	Saipan	Partially Supportive	Not Supportive	Not Supportive	Fully Supportive	1
WB 28	Grand Hotel	Saipan	Fully Supportive	Not Supportive	Not Supportive	Fully Supportive	1
WB 29	Community School Beach	Saipan	Partially Supportive	Not Supportive	Not Supportive	Partially Supportive	5

Table 15. Cont.

Beach Identifier	Beach Name	Island Name	Enterococci Rankings (Recreational Use)	DO Ranking (ALUS)	PO4 Rankings (ALUS)	Bio-Criteria Ranking (ALUS)	(CALM) Waterbody Category
WB 30	Sugar Dock	Saipan	Not Supportive	Not Supportive	Not Supportive	Partially Supportive	5
WB 31	CK District #2 Drainage	Saipan	Not Supportive	Not Supportive	Not Supportive	Fully Supportive	1
WB 32	CK District #4 Lally Beach	Saipan	Partially Supportive	Not Supportive	Not Supportive	Non Supportive	5
WB 33	Chalan Piao Beach	Saipan	Partially Supportive	Not Supportive	Not Supportive	Partially Supportive	5
WB 34	Hopwood School Beach	Saipan	Not Supportive	Not Supportive	Not Supportive	Partially Supportive	5
WB 35	San Antonio Beach	Saipan	Fully Supportive	Not Supportive	Not Supportive	Partially Supportive	5
WB 36	Pacific Islands Club (PIC)	Saipan	Partially Supportive	Not Supportive	Not Supportive	Partially Supportive	5
WB 37	San Antonio Lift Station	Saipan	Not Supportive	Not Supportive	Not Supportive	Partially Supportive	5
NEB 1	Grotto Cave	Saipan	Fully Supportive	No Data	No Data	no data within 250 m of sample point	5
NEB 2	Bird Island Beach	Saipan	Fully Supportive	Fully Supportive	Not Supportive	Partially Supportive	5
NEB 3	Jeffrey's Beach	Saipan	Not Supportive	Fully Supportive	Not Supportive	no data within 250 m of sample point	5
NEB 4	Old Man by the Sea	Saipan	Partially Supportive	Fully Supportive	Not Supportive	no data within 250 m of sample point	5
NEB 5	Marine Beach	Saipan	Fully Supportive	Fully Supportive	Not Supportive	no data within 250 m of sample point	5
NEB 6	Tank Beach	Saipan	Partially Supportive	Fully Supportive	Not Supportive	no data within 250 m of sample point	5
SEB 1	Forbidden Island	Saipan	Fully Supportive	Fully Supportive	Not Supportive	no data within 250 m of sample point	5
SEB 2	North Laulau Beach	Saipan	Partially Supportive	Fully Supportive	Not Supportive	Partially Supportive	5
SEB 3	South laulau Beach	Saipan	Not Supportive	Fully Supportive	Not Supportive	Partially Supportive	5
SEB 4	Obyan	Saipan	Partially Supportive	Fully Supportive	Not Supportive	Fully Supportive	1
SEB 5	Ladder Beach	Saipan	Partially Supportive	Fully Supportive	Not Supportive	no data within 250 m of sample point	5
SEB 6	Unai Dangkulo Beach	Saipan	Fully Supportive	Fully Supportive	Not Supportive	Partially Supportive	5
M1	Managaha Beaches	Managaha	Fully Supportive	Partially Supportive	Partially Supportive	no data within 250 m of sample point	5
M2	Managaha Beaches	Managaha	Fully Supportive	Fully Supportive	Fully Supportive	no data within 250 m of sample point	1
M3	Managaha Beaches	Managaha	Fully Supportive	Fully Supportive	Fully Supportive	no data within 250 m of sample point	1
M4	Managaha Beaches	Managaha	Fully Supportive	Fully Supportive	Fully Supportive	no data within 250 m of sample point	1
M5	Managaha Beaches	Managaha	Fully Supportive	Fully Supportive	Fully Supportive	no data within 250 m of sample point	1
M6	Managaha Beaches	Managaha	Partially Supportive	Fully Supportive	Fully Supportive	no data within 250 m of sample point	5
M7	Managaha Beaches	Managaha	Fully Supportive	Fully Supportive	Fully Supportive	no data within 250 m of sample point	1
M8	Managaha Beaches	Managaha	Fully Supportive	Fully Supportive	Fully Supportive	no data within 250 m of sample point	1
M9	Managaha Beaches	Managaha	Fully Supportive	Fully Supportive	Fully Supportive	no data within 250 m of sample point	1

Table 15. Cont.

Beach Identifier	Beach Name	Island Name	Enterococci Rankings (Recreational Use)	DO Ranking (ALUS)	PO4 Rankings (ALUS)	Bio-Criteria Ranking (ALUS)	(CALM) Waterbody Category
M10	Managaha Beaches	Managaha	Fully Supportive	Fully Supportive	Fully Supportive	no data within 250 m of sample point	1
M11	Managaha Beaches	Managaha	Fully Supportive	Fully Supportive	Fully Supportive	no data within 250 m of sample point	1
T1	Unai Masalok Beach	Tinian	Fully Supportive	No Data	Not Supportive	no data within 250 m of sample point	5
T2	Unai Dangkolo Beach	Tinian	Fully Supportive	No Data	Not Supportive	Fully Supportive	1
T3	Unai Babui	Tinian	Fully Supportive	No Data	Not Supportive	no data within 250 m of sample point	5
T4	Unai Chulu	Tinian	Partially Supportive	No Data	Not Supportive	no data within 250 m of sample point	5
T5	Leprosarium Beach I	Tinian	Fully Supportive	No Data	Not Supportive	Partially Supportive	5
T6	Leprosarium Beach II	Tinian	Fully Supportive	No Data	Not Supportive	Partially Supportive	5
T7	Tachogna Beach	Tinian	Fully Supportive	No Data	Not Supportive	no data within 250 m of sample point	5
T8	Taga Beach	Tinian	Fully Supportive	No Data	Not Supportive	no data within 250 m of sample point	5
T9	Harbor	Tinian	Fully Supportive	No Data	Not Supportive	no data within 250 m of sample point	5
T10	Kammer Beach	Tinian	Fully Supportive	No Data	Not Supportive	no data within 250 m of sample point	5
R1	Coral Garden Beach	Rota	Fully Supportive	No Data	Not Supportive	Partially Supportive	5
R2	Kokomo Beach Club	Rota	Fully Supportive	No Data	Not Supportive	no data within 250 m of sample point	5
R3	Mobile Station Storm Drainage	Rota	Fully Supportive	No Data	Not Supportive	no data within 250 m of sample point	5
R4	East Harbor Dock	Rota	Fully Supportive	No Data	Not Supportive	no data within 250 m of sample point	5
R5	Tweksberry Beach	Rota	Fully Supportive	No Data	Not Supportive	no data within 250 m of sample point	5
R6	West Harbor Marina	Rota	Partially Supportive	No Data	Not Supportive	Partially Supportive	5
R7	District #2 Storm Drainage	Rota	Not Supportive	No Data	Not Supportive	no data within 250 m of sample point	5
R8	District #1 Strom Drainage	Rota	Fully Supportive	No Data	Not Supportive	no data within 250 m of sample point	5
R9	Veterans Memorial Beach	Rota	Fully Supportive	No Data	Not Supportive	Partially Supportive	5
R10	Teteto Beach	Rota	Fully Supportive	No Data	Not Supportive	no data within 250 m of sample point	5
R11	Guata Beach	Rota	Fully Supportive	No Data	Not Supportive	no data within 250 m of sample point	5
R12	Swimming Hole	Rota	Fully Supportive	No Data	Not Supportive	Partially Supportive	5

Table 16. Final statistics for CNMI waters based upon (CALM) classification.

Island	Total Coastline (km)	Total Beach Coastline (km)	Total Beach Coastline Monitored for Recreational Use (Enterococci) (km)	Total Beach Coastline Monitored in (Bio-Criteria Program, ALUS) (km)	(CALM) Category 1 (not impaired, sufficient data) (km)	(CALM) Category 4b (impaired, corrective actions in place)	(CALM) Category 5 (impaired)
Saipan	68.96	28.57	25	15.75	3.5	0.5	28.05
Managaha	1.04	1.04	1.04	none in 2003	0.85	0	0.19
Tinian	51.36	7.08	5	1	0.5	0	4.5
Aguijan	11.57	0	0	0.5	0.5	0	0
Rota	50.52	17.05	6	3	0	0	8.5

1. *Non-Point Source Pollution Control Program*
    a. Overview

The CNMI Division of Environmental Quality's (DEQ) Non-point Source Pollution (NPS) Program is an interactive program in its fifth year of existence. The program relies and gives support and assistance to other programs within DEQ, other CNMI and federal agencies, and the general public. The CNMI NPS program helps to understand water quality impairment and make management decisions. The NPS program responsibilities include:

- ensuring all public and private activities comply with Section 319 of the Clean Water Act;
- administering the 319 grant program for best management demonstration - projects;
- participating on the CNMI's Marine Monitoring Team that implements the Long-Term Marine Monitoring Plan for bio-criteria assessment of water quality;
- participating on the Interagency Watershed, Coral Reef, and GIS groups ;
- developing a Geographic Information System to analyze and spatially display environmental data and to integrate GIS and GPS;
- reviewing CRM permit applications;
- reviewing DEQ Section 401 Water Quality Certification applications;
- coordinating with DEQ's Earthmoving and Erosion Control program;
- developing Total Maximum Daily Load (TMDL) plans for impaired waterbodies;
- preparing water quality assessment reports; and
- implementing the Clean Water Action Plan by developing a Unified Watershed Assessment and Action Strategies for prioritized watersheds.

In the CNMI, the main sources of non-point source pollution are sporadic failure of sewage lift stations, urban runoff, agricultural runoff, improper land clearing in rural areas, and septic systems on non-appropriate soils. Associated nutrients, bacteria, sediments, and to a lesser degree, toxic chemicals, are pollutants of greatest concern for clean nearshore waters and healthy marine ecosystems. The resource agencies of the CNMI have and continue to build efforts for prevention, control, and reduction of non-point source pollution.

The CNMI uses a watershed approach to protect and manage impaired waterbodies. Each year, an interagency watershed group selects a watershed associated with impaired waters which agencies focus funding and efforts on. This process has been formalized through the completion of the Unified Watershed Assessment, which categorizes and prioritizes watersheds for restoration. The development of the Watershed Restoration Action Strategies (WRAS) also benefits these efforts. Any 319 funds that become available as a result of the Clean Water Action Plan will be targeted for the highest priority watersheds in Category I as listed in the Unified Watershed Assessment, and projects will be prioritized in accordance with the WRAS. The DEQ Non-point Source

Pollution program is well integrated with other local and federal agency goals. This is done primarily through the participation in the Interagency Watershed Working Group, Coral Reef Coordinating and Science Advisory Committees and the Geographic Information System (GIS) group. Water quality and biocriteria monitoring data are used to designate watersheds of concern, and monitoring change over time. These data collection programs yield information which the NPS program, and interagency groups, can act upon.

b. 6217 Coastal Non-Point Program

The Coastal Non-point Pollution Control Program was developed in accordance with Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990. This program affirms the dedication of DEQ's NPS program to work with the Coastal Resources Management Office (CRMO), to control NPS pollution in our waters. The plan serves as a guide to agency efforts in NPS pollution control. The plan also serves as a program upgrade for the CNMI's existing non-point source program's coastal waters element, administered by DEQ, under Section 319 of the Water Quality Act of 1987. In August, 2003, the CNMI's Coastal Non-point Pollution Control Program was fully approved by NOAA and EPA, satisfying all of the conditions of approval.

The 6217 program identifies best management practices (BMPs) that will be used to control non-point sources of pollution. These BMPs are implemented through the following programs: Coastal Resources Management permitting program, coral reef local action strategies, the Section 401 Water Quality Certification program, the Earthmoving and Erosion Control program, and the 319 grant program. The yearly program plan for the Non-point Source Pollution section includes a schedule with goals, objectives, and milestones for implementation of projects. DEQ uses funding through 319 grants, base grant from EPA, and local funds to implement the program. CRM uses federal 6217 funds, Coral Reef Initiative and monitoring grants, and local funds to address Non-point Source Pollution problems. Despite this combined effort, appropriate levels of funding for BMP projects will never be available from natural resource management agencies in CNMI, and assistance must come from other sources such as capital improvement projects, federal highway assistance, and flood control funding.

As part of the 6217 approval process the CNMI had to establish an On-Site Disposal System (OSDS) compliance inspection program. In February, 2003, DEQ Wastewater and NPS branch, partnering with the Bureau of Environmental Health, have implemented a permanent OSDS Compliance Inspection Program and began by carrying out inspections in priority watersheds. This project identifies failing on-site disposal systems and estimate the costs involved to address this issue statewide. The systems being inspected are marked with a GPS and entered into a database tracking system for future inspections and watershed nutrient loading estimations.

Another important condition of the 6217 approval was for all DEQ applicants to be required to obtain a nutrient management plan in accordance with the United States Department of Agriculture- Natural Resource Conservation Service. The plan should

include the proper use of appropriate Best Management Practices as described in the seven (7) core components for the nutrient management measure in the "EPA Guidance Specifying Management Measures for Sources of Non-point Pollution in Coastal Waters (pp.2-52)," and in the "NRCS Nutrient Management 590-1".

A third important 6217 program implementation was the development of A Construction Site Chemical and Material Control Handbook. This offers guidance to proper application and management of toxic substances and nutrients as well as other construction material. The handbook serves as a guide to reducing non-point source pollution from construction sites.

c. Present 319 Projects

Know Your Watershed –

This project's goals are to minimize and/or control the environmental impact caused by stormwater runoff and individual contribution. The first goal of the project is to educate and bring public awareness within the community about the impacted watershed. For the past three years, DEQ has held its Environmental Symposium and Exhibit Fair as a forum for natural resource agencies to educate and share information about their program activities with the general public. The symposium has been successfully attended by schools, legislators, and various members of the general public.
The second goal aims at creating an alliance with members of the affected community. The main focus of creating this partnership is for the Garapan community to take part in protecting and maintaining the health of their watershed. With this project people are being made aware of the degrading water quality in their watershed as well as their environment. They are also given the opportunity to get involved in clean-ups of the drainage in their area, and are taught how to reduce, reuse and recycle. As a result, several nonprofit groups, as well as the local government's Environmental Interagency Cleanup Operations Team (EICOT) have been contributing their efforts in cleaning the drainages in Garapan. The project is still ongoing with a wide variety of awareness campaigns and public education materials still being distributed to the Garapan community.

Beach Road Area Management Project –

This is one of the newest projects for fiscal year 2002. The goal of this project is to determine, design, and install best management practices that will visibly demonstrate various measures to manage NPS pollution. The BMP's used will pertinent for widespread use. Proposed demonstration projects include such measures as vegetative filter strips, grassed/ rock-lined waterways, new landscaping (grasses, shrubs, trees and vines to minimize erosion and increase sediment filtration), diversions (of upland runoff from reaching the lagoon), sediment basins and velocity controls (in and adjacent to drainageways), delineated parking sites (to let grass grow and reduce compaction), porous surfacing for individual parking spots, drainage cleanouts (from Middle Road to lagoon outlet), bank stabilization (along drainageways), road shoulder planting (to reduce

dust and mud), street sweeping, road grading (e.g. crowns & waterbars on the road from Beach Road to Gualo Rai), agriculture/animal waste management, and others to be determined and refined through the planning process.

Tinian Animal Wastes Project –

This project is designed to demonstrate to swine producers how to protect the island's water supply. The aquifer located in the Marpo watershed is Tinian's sole source for drinking water. The use of local materials are being used for composting chipped wood with animal wastes to minimize nutrient loadings through absorption of the wastes. The compost is distributed to all swine producers within the Marpo watershed, and has been recognized to minimize animal wastes runoff into the Marpo wetland. This project is still ongoing, and is now in collaboration with the Alternative Wastes Management project funded under a U.S. EPA Water Quality grant to demonstrate a sustainable swine waste management practices through dry litter waste systems and portable pen system in the Pacific Region (CNMI, Guam and FSM) as the most affordable and practical way to manage waste, conserve water and resolve water pollution problems.

Stormwater and Erosion Control BMP Manual -

The CNMI Division of Environmental Quality has identified a need for new stormwater and erosions control guidance manuals to assist the local engineering and development community. This project will result in the development of two manuals for Stormwater Best Management Practices Design, and Erosion Control Best Management Practices Design Manual. CNMI DEQ is partnering with Guam EPA in the development of these manuals to increase funding for the project. This is beneficial for both island nations because they are part of the same geological chain. Through the RFP process private consultants have bided on the project, and the award was given to Horsley and Witten, Inc. Both agencies, together with Horsley and Witten are presently working in the development of a design manual for the CNMI and Guam. The manuals will provide everything necessary to develop site erosion and stormwater control plans, based on the use of Best Management Practices. DEQ used a combination of Section 319 grant funding and EPA HQ funds to pay for the development of the manual. In March, 2004, CNMI DEQ, Guam EPA, and Horsley and Witten held the first series of workshops on both islands. It was well attended by engineering firms, contractors, developers, and government agencies involved in road improvement and design work. The workshop focused on the content of the manuals. The project will also include future training for engineers, contractors, and developers. A draft of the manual is made accessible online for public review and comment at www.deq.gov.mp, it is expected to be completed by Fall, 2004.

d. Watershed Inspections

The NPS program has recently begun watershed inspections in Priority 1 – Category I watersheds, (i.e., West Takpochau, Kagman, Laulau, Achugao). The goal of the

watershed inspections is to gather data during storm events regarding non-point source pollutant loads based on water quality criteria. This is done by marking GPS points at the bottom of a major drainage region, and working upward, taking water samples at each major fork in the drainage. All GPS points will be integrated onto a GIS map for visually analysis and storage. Sampling criteria include dissolved oxygen, temperature, pH, conductivity, turbidity, nitrates, and phosphates during storm events for a given drainage. This will identify where the major sources of non-point source pollution are coming from and allow for proper best management practices (BMP) placement.

2. Earthmoving and Erosion Control Permitting Program

a. Overview

The Division of Environmental Quality (DEQ) administers a permitting program under the authority of the CNMI Earthmoving and Erosion Control Regulations. The regulations require all earthmoving activities above a certain size to obtain an Earthmoving and Erosion Control Permit. The definition of what constitutes an earthmoving activity is very broad and encompasses almost all construction, agriculture, and underwater construction activities. The earthmoving permit program also serves as the primary permitting mechanism for other environmental and regulatory programs, with each permit application requiring the review and approval of the CNMI Coastal Resources Management Office (CRMO), CNMI Division of Fish and Wildlife (DFW), and the CNMI Historic Preservation Office (HPO). The earthmoving permit then serves as the primary enforcement mechanism for both DFW and HPO, through site-specific conditions included in each permit. CRMO uses the earthmoving permit application as their primary screening mechanism for determining whether a project requires a Coastal Resources Management Permit.

To obtain a permit, an applicant must provide both temporary and a permanent erosion control plans. In practice, DEQ requires that the permanent erosion control plan also address post-development stormwater runoff from the entire developed site or activity. The plans must meet the requirements of the regulations, which specify that erosion control measures be designed for the 25 year, 24 hour storm, and be based on either 75% sediment removal rate, or 24-hour detention of runoff. DEQ considers the appropriate use of stormwater and erosion control Best Management Practices (BMPs) to be consistent with these requirements, and routinely provides technical guidance to the public on BMP selection and design. Through a Clean Water Act Section 319 grant, DEQ will be developing a stormwater and erosion control BMP design manual over the next year, which will be applicable to the CNMI, Guam, and other Pacific islands that wish to use the manual.

Issuance of all commercial and non-residential, non-commercial earthmoving permits is contingent upon the review and approval of DEQ's technical staff, and pre-construction site inspection by DEQ environmental specialists. Certain residential projects with erosion or stormwater concerns also receive this level of review, on a case-by-case basis depending on need. Once construction commences, DEQ inspects all permitted projects to ensure the approved erosion control measures have been implemented, with the

exception of residences in areas served by subdivision stormwater systems and other minor projects not requiring the installation of BMPs. DEQ also requires inspection prior to concealment of all post-construction (permanent) stormwater and sediment control structures, such as catch basins and underground infiltration fields.

b. Program Status/Major Projects

Regulations

DEQ and Guam Environmental Protection Agency (GEPA) are presently in the process of developing new manuals for stormwater and erosion control site design and construction. The manuals are being developed by a contractor, and are scheduled for completion as early as December, 2004. The contract includes training workshops for engineers and contractors, and work is underway to develop a certification program. Amendments to the regulations will also be developed as part of the project, to adopt the new design standards and manuals.

Permits

During Fiscal Year 2002, DEQ issued 81 commercial and 202 non-commercial earthmoving and erosion control permit applications. During Fiscal Year 2003, DEQ issued 122 commercial and 80 non-commercial earthmoving and erosion control permit applications. Non-commercial permits are defined to include all government, agricultural, and residential earthmoving activities. The decrease in the number of non-commercial permits issued during 2003 is primarily related to a decrease in residential construction associated with the Kagman homesteads, which accounted for a very large number of non-commercial permits issued over the previous five or more years.

Construction activity in the CNMI remains depressed, having been affected, overall, by slumping economies in most Asian countries that previously were the source of investment and development activity in the CNMI. FY2002 and 2003 were particularly slow years, compounded by the effects of the September 11 terrorist attacks, the SARS crisis, and the Iraq war. All commercial earthmoving projects during FY 2002 and 2003 were of a relatively small nature. Large development projects that were in the works prior to the 1997 Asian economic crisis, such as the Bird Island and Obyan Beach golf courses and resorts, have been abandoned.

The only earthmoving projects with a significant potential impact to water quality during FY 2001 and early FY 2002 were large government projects, including new schools and homestead projects, many of which have not yet started construction, pending adequate funding for necessary infrastructure (sewer, water, power). Three new public schools were constructed during this period, two of which included on-site wastewater treatment systems, which are discussed below. None of the projects contributed in a significant way to surface water quality degradation, and all were constructed in compliance with the Earthmoving and Erosion Control Regulations with few problems.

3. Water Quality Standards & Certification Program

a. Overview

The CNMI Water Quality Standards set criteria for all Commonwealth waters and ground water in order to protect their use and value for propagation of fish and wildlife, recreational purposes, public water supply use, taking into consideration their use and value for commerce. DEQ frequently uses the numerical and narrative water quality standards as the basis for enforcement actions in cases where other CNMI regulations are not quite so clear, for instance, sewer overflows from privately owned sewers. In addition to providing numerical and narrative water quality standards, the Standards also contain the CNMI Anti-Degradation Policy, Mixing Zone requirements, Land Disposal of Wastewater permitting program, and the Section 401 Water Quality Certification program. DEQ also consults the Water Quality Standards when evaluating Coastal Resources Management (CRM) Major Siting Permits, and has cited the potential for violation of the Standards as justification for both special conditioning of CRM permits, and occasionally denial recommendations.

DEQ issues Section 401 Water Quality Certifications for any federally-permitted or licensed activity that may result in a discharge into waters of the United States. This includes all projects requiring an NPDES permit, an Army Corps of Engineers Section 404 permit, and certain projects permitted under Section 10 of the Rivers and Harbors Act that may involve discharges, such as pier and dock construction. The CNMI Water Quality Standards form the basis of certification determinations.

b. Program Status/Major Projects

<u>Water Quality Standards Update</u> -

DEQ published proposed amendments to the CNMI Water Quality Standards on April 23, 2004. The proposed amendments included revisions to the microbiological criteria, anti-degradation policy, and permitting requirements for dredge and fill projects, among other changes. The proposed amendments may be adopted as early as May, 2004, and no later than June, 2004.

<u>Section 401 Water Quality Certifications</u>

CNMI Section 401 Water Quality Certifications cover a wide variety of discharges, from sewage outfalls to minor activities occurring in wetlands under the authority of the Corps' Nation-Wide Permit program. In addition to individual Section 401 Water Quality Certifications, the program also provides for DEQ review and approval of Storm Water Pollution Prevention Plans (SWPPP) for projects and activities that require a NPDES Stormwater General Permit, such as the bulk fuel facilities at each island's seaports and airports.

The following is a brief list of major projects and on-going activities that either received Section 401 Water Quality Certification or were monitored for compliance with certifications issued in prior years:

Reverse Osmosis Discharges -

In 2000, EPA issued a General Permit for the discharge of reverse osmosis brine from commercial de-salinization plants. Typically, these plants are operated by hotels to provide potable water for their guests and operations, but there are also several garment manufacturing facilities and commercial bottled water suppliers that are covered by this permit. The facilities that are covered typically discharge directly to the shoreline through existing storm drainages. Most (if not all) of the storm drains where discharges occur suffer from serious water quality problems, including microbiological violations and algae blooms, the sources of which have not been definitively determined. As of the end of FY 2003, all dischargers have obtained coverage under the NPDES Permit and individual Section 401 Water Quality Certifications, and all have been found to be violating the discharge limits for nitrogen, phosphorous, sulfide, and ammonia. USEPA issued Administrative Orders to all dischargers in 2002, resulting in the decision by all to begin discharging to injection wells. As of the time of this writing, injection wells had been installed at four of the facilities, and plans were underway for the remaining facilities to be in compliance before the end of 2004. Once accomplished, all discharges to Commonwealth waters will cease.

Sadog Tasi Sewage Treatment Plant -

This treatment plant is operated by the Commonwealth Utilities Corporation (CUC) and is designed to provide secondary treatment for an average daily flow of 4.8 million gallons per day (MGD). The annual average flow was 3.0 MGD in 1998. The treated effluent is discharged through an ocean outfall at a depth of 49 feet, approximately 1,200 feet offshore into the Class A receiving waters of Tanapag Harbor. A new NPDES Permit was issued by EPA in April, 2001. As part of this permit, CUC was required to establish a mixing zone. The mixing zone analysis was performed by EPA, and resulted in the determination that the discharge is presently violating the CNMI Water Quality Standards for Enterococci, copper, silver, and zinc. In their April 9, 2001, cover letter for the NPDES Permit, EPA stated that issuance of an Administrative Order would follow within weeks, and would require that CUC come into compliance with the discharge requirements within a set time schedule. DEQ's Section 401 Water Quality Certification was issued with the condition that CUC strictly follow the requirements of EPA's proposed Administrative Order, which was said to be forthcoming at the time. As of the date of this writing EPA has not issued an Administrative Order, however, EPA has been working with CUC on a number of fronts, and has seen an improvement in operation and maintenance of the treatment plant.

The NPDES Permit contained discharge monitoring and reporting requirements, including the requirement to monitor and report marine water quality at the site of the

outfall. Little or no monitoring has been performed at the outfall site, however, CUC has budgeted purchase of a small boat to obtain samples starting in FY2005.

Agingan Point Sewage Treatment Plant -

This plant is also operated by the Commonwealth Utilities Corporation, and was designed to provide secondary treatment for an average daily flow of 3.0 million gallons per day (MGD). The annual average flow was 2.04 MGD in 1998. The treated effluent is discharged at the surf line through an intertidal outfall into the Class A receiving waters of Tinian Channel. EPA issued an NPDES permit on September 20, 1999, and an Administrative Order on November 1, 1999, for violations of effluent limitations for indicator organisms, nutrients, metals, and turbidity. A compliance schedule was developed by CUC and EPA which calls for the construction of a new ocean outfall, and additional treatment to reduce concentrations. CUC completed the design of the new outfall in 2003, and received all necessary permits for construction, but has not yet initiated construction due to funding problems.

The NPDES Permit contained discharge monitoring and reporting requirements, including the requirement to monitor and report marine water quality along the surf zone near the outfall. CUC began shoreline water quality monitoring in 2003. Results so far indicate surprisingly few violations, perhaps due to the strong currents and rapid mixing in the surf zone. Data was not available for presentation in this report.

Santa Margarita Salvage Operation -

This is an underwater salvage project that has been on-going since 1994. DEQ issued a revised Section 401 Water Quality Certification in early 1999, and work has proceeded under this authorization each dive season since then. The 2001 dive season passed with no trouble. Daily turbidity monitoring reports were submitted by the permittee (IOTA Partners) and no violations were noted.

Saipan Integrated Solid Waste Management System -

DEQ issued a Section 401 Water Quality Certification for this project in August, 2000, which includes the construction of a new solid waste transfer station and landfill. The reason for issuance of this certification was the filling of a small jurisdictional wetland at the Lower Base Transfer Station site. This wetland was replaced with an on-site mitigation wetland of larger size than was filled. The most important aspect of this project, however, is the construction of the new landfill in Marpi, which will allow the final closure of the Puerto Rico Dump. The continued operation of the Puerto Rico Dump is perhaps the most visible environmental problem in the CNMI, and has been the subject of an EPA Administrative Order based on violations of the Clean Water Act since 1994. A new, fully RCRA-D compliant landfill and transfer station system was completed in February, 2003, at which time the disposal of solid waste at the Puerto Rico Dump was permanently ceased. However, actual closure work has yet to commence, and it is suspected that the dump is still discharging contaminants to the lagoon. At the time

of writing, an EPA "Brownfields" study of potential re-use scenarios for the dump site was underway, and a new compliance schedule had not yet been issued.

Tanapag Heights Subdivision Project -

The CNMI Office of Public Lands (now the Marianas Public Lands Authority, or MPLA) applied in 2001 for the construction of subdivision roads and infrastructure for 273 homestead lots on a steeply sloped and severely erodible area above Tanapag Village. As proposed, the project would have disturbed a wide area covering the upper watersheds of one of the few streams on Saipan with perennial flows, as well as the watersheds for two fresh water springs that serve as a major water supply for the neighboring villages. DEQ, USFWS, and USEPA opposed issuance of the Section 404 permit for this project as initially proposed. The project has now been scaled back to 60 lots, all located on the lower slopes, and impacts to the upper watershed of the major streams and spring have been completely avoided. This latest revision of the project has satisfied the concerns of the federal agencies, and at the time of this writing, DEQ was in the process of issuing a water quality certification.

Rota East Harbor -

A Section 401 water quality certification was issued in July, 2002, for the reconstruction of the small boat launching and pier facility at Rota's East Harbor. In December 2002, Super Typhoon Pongsona struck Rota and completely destroyed the existing facility, necessitating a re-design of the harbor improvements. An amended 401 certification was issued in 2004 for the revised plans, which include maintenance dredging and construction of a new pier, seawall, and boat launching ramp. Construction had not yet begun as of the date of this report.

4. Individual Wastewater Disposal System Permitting Program

a. Overview

The Division of Environmental Quality (DEQ) administers a permitting program under the authority of the Individual Wastewater Disposal Systems (IWDS) Rules and Regulations. The regulations establish minimum standards for on-site disposal systems, including septic systems and other wastewater treatment systems (OWTS), such as package treatment plants. All new development that is not connected to a sewer system must obtain a permit for the construction of an IWDS or OWTS. The OWTS regulations also require treatment of animal waste,.

The program also covers the maintenance of new and existing IWDS, requirements when the systems fail, requirements for temporary toilets at construction sites and outdoor events, and a registration program for wastewater haulers.

The regulations set somewhat rigid design requirements for septic systems. Each application for a new or replacement septic system is thoroughly reviewed by DEQ program and technical staff for adherence to these requirements. Septic system designs

are based on individual percolation tests for each site. DEQ assists applicants with septic system design, and has developed materials that graphically illustrate the requirements of the regulations, including design spreadsheets and construction drawings for applicants for single-family septic system permits..

Once a permit is issued, DEQ staff perform a series of inspections for every system to ensure it is properly constructed. Inspections occur prior to permitting once system component locations are staked out, and at every step requiring concealment of work. When construction has been completed to DEQ's specifications, the owner is issued a certification of use, and the Department of Public Works building occupancy permit can be released.

DEQ has also been involved in a program to inspect existing septic systems since 2002, with the assistance of the Bureau of Environmental Health. Staff from DEQ and BEH work on a village-by-village basis, and inspect every residence for the presence of signs of septic system failure, and educate septic system owners on the need for regular pumping of septic tanks.

Larger facilities that cannot connect to a sewer system must construct an Other Wastewater Treatment System (OWTS). The regulations reference design standards for the construction of sewage treatment plants. Over the past several years, DEQ has issued permits for several facilities employing OWTS for on-site sewage treatment, ranging from a small package treatment plant for a U.S. government communication facility on Tinian, to a large lagoon and wetland system for a resort in Rota. OWTS permits require discharge monitoring, and enforcement is entirely within the jurisdiction of DEQ.

b. Program Status/Major Projects

<u>Regulations</u>

DEQ amended the IWDS regulations in November, 2002, changing the name of the regulations to the "Wastewater Treatment and Disposal Regulations" (WTD). Amendments included the addition of requirements for the treatment of waste from confined animal feeding operations (CAFOs), and provisions to allow permitting of alternative treatment systems, such as constructed wetlands, under the OWTS program, and several other minor technical changes.

<u>Permits</u>

In FY 2002 DEQ issued 100 IWDS Permits, and 8 Wastewater Pumper Truck Registrations.. In FY 2003 DEQ issued 72 IWDS Permits, and 8 Wastewater Pumper Truck Registrations.. Most IWDS applications were for individual residences or small commercial buildings. The decrease in the number of permits issued during 2003 is primarily related to a decrease in residential construction associated with the Kagman homesteads, which accounted for a very large number of IWDS permits issued over the previous five or more years.

Four OWTS permits were issued during FY 2002-2004, including the leachate treatment system at the Marpi landfill, the Kagman High School, Kagman Junior High School, and the Kagman Juvenile Detention Facility.

The following is a summary of important OWTS that have been previously permitted by DEQ, and are presently being monitored:

Stanford Hotel (San Vicente, Saipan) –

The Stanford Hotel operates an OWTS consisting of an aerobic treatment unit and subsurface discharge. An Administrative Order was issued against the owner of this facility in 2002 for failure to renew their permit, and failure to properly operate and maintain the system. As of the date of this report, the owner has made limited progress towards restoring the treatment system, and violations of effluent quality limitations are still frequent. DEQ is maintaining enforcement presence.

Er Est Golf Course Resort (Rota) –

The Rota Resort operates an OWTS consisting of a lagoon system with a free water surface constructed wetland, ultraviolet disinfection, and re-use of treated effluent for golf course irrigation. The treatment system has been operating considerably below its design capacity since it was constructed, and is regularly augmented with well water to maintain flow. Aside from occasional late reporting of discharge monitoring results, the Rota Resort has generally maintained compliance with permit conditions. Effluent quality is well within permitted limitations, perhaps due to the low loading.

Managaha Island Wastewater Treatment Facilities (Saipan) –

Tasi Tours & Transportation, Inc. operates a small OWTS to serve the tourist facilities on the island of Managaha. After a series of violations of the marine water quality standards at the island's beaches in 2002, DEQ inspected the facility and found that the treatment plant had fallen into disrepair and had been illegally converted to a conventional septic system. DEQ issued a Notice of Violation to Tasi Tours in September, 2002, and ordered the repair of the facility and application for a new permit, which had not been renewed for several years. Tasi Tours obtained the services of a licensed treatment plant operator and engineer, and restored the system to its original condition by early 2003, and added a chlorination stage. However, effluent quality has been consistently poor. Addition of a small rock filter stage in mid 2003 has failed to significantly improve treatment. As of the time of this writing, Tasi Tours was contemplating conversion to a holding tank, which would be pumped daily by boat. Tasi Tours has not provided any details regarding their holding tank plans, and it is unlikely that a holding tank and pumping system can be permitted without a significant investment in equipment that can meet all DEQ and US Coast Guard requirements. DEQ will continue with enforcement and monitoring procedures, and aims to resolve the situation during 2004.

Seishin Farms (Kalabera, Saipan) –

DEQ issued an OWTS permit for this relatively large pig farm in 1996. At the time, the treatment system consisted of a mechanical solids removal system and an oxidation pond. Solids were to be removed and dried on a nearby, concrete drying bed. Treated effluent from the oxidation pond was to be disposed by spray irrigation onto a nearby vegetated area. In September 2001, DEQ inspected the site based on a complaint, and found that the treatment system had fallen into disrepair and was no longer in operation. Sludge had spread across a large portion of the property, and wastewater was routinely overflowing off the site onto neighboring properties, into a stream bed leading toward the ocean. A Notice of Violation was served to the owner, who secured an agreement for assistance from the USDA Natural Resources Conservation Service. To date, little progress has been made by the owner, partly due to failure to provide matching funds required by the USDA. DEQ is continuing with monitoring and enforcement procedures.

Tinian Dynasty Hotel & Casino (San Jose, Tinian) –

The Tinian Dynasty operates a large package treatment plant that discharges to a series of subsurface leaching fields, approximately 1,000 feet from the shoreline at Tachogna Beach. While the Tinian Dynasty has been submitting monitoring reports, They frequently fail to monitor for nitrate, and are in violation of the effluent limitation of 1.0 mg/l when they do. As part of the Tinian Dynasty's original CRM permit, marine monitoring at Tachogna Beach had been required to monitor for potential adverse effects related to the effluent discharge. The Tinian Dynasty has yet to implement the required monitoring program, despite repeated meetings and written notices.

LSG Flight Kitchen (Saipan Airport) –

This facility utilizes a combination of aerobic treatment and a subsurface flow constructed wetland prior to discharge to a subsurface leaching field. Though the facility has occasionally failed to submit monitoring reports, and suffered one overflow incident, recent monitoring reports have shown that the facility is performing satisfactorily. This facility will eventually be decommissioned when the Airport sewer system is completed, which is scheduled for some time in 2004.

Kagman Sewage Treatment Plant (Kagman, Saipan) –

The Commonwealth Utilities Corporation (CUC) obtained a Coastal Resources Management (CRM) Major Siting Permit for the construction of a collection system and a secondary-level treatment plant in the Kagman area, with disposal to a series of injection wells located near the coastline on the north side of the Kagman peninsula. The CRM permit is an overall project approval, however, it was based on preliminary designs only, and CUC must still obtain specific operating permits from DEQ for the treatment plant and the injection wells. At the time of this writing, no applications had been submitted, and a value engineering study is underway, funded by the Department of the Interior. DEQ expects there to be many additional requirements, including detailed

hydrogeologic investigations, as part of the remaining permit requirements, regardless of ultimate design choice.

Kagman Constructed Wetland Systems (Saipan) –

Constructed wetland systems were installed for the Kagman High School, Kagman Junior High School, and the Kagman Juvenile Detention Center during FY 2002-2003. All three wetlands are now in operation, and permitted to the Department of Public Works, which has failed to monitor the systems as required by their operating permits. Letters to DPW and the Public School System regarding their responsibilities have gone un-answered. DEQ has not yet initiated enforcement actions.

Marpi Solid Waste Facility (Saipan) –

A leachate treatment system for the new Marpi Solid Waste Facility was permitted under the OWTS program and constructed in 2003. The facility consists of a large holding pond, an aeration tank, and three large subsurface-flow constructed wetlands cells. The system is designed to treat and dispose an average daily flow of up to 60,000 gallons per day, based on maximum wet-season leachate generation and final landfill configuration. As of the time of this writing, the treatment system is in operation, but the operation permit has not been issued to the Department of Public Works because the construction of the leaching field had not yet been completed. The system was allowed to discharge for a short period during the 2003 wet season, after testing of the leachate revealed that it did not pose a hazard of groundwater contamination, as expected during initial phase of landfill operations. There has been no discharge from the system since 2003, and leachate is presently being held in the storage pond and re-circulated through the wetland system to maintain plant growth. Monitoring under a draft OWTS permit has been performed for several months and so far has revealed excellent effluent quality. Leachate strength is expected to increase over the first several years of operation, during which monitoring will be performed on a monthly basis. As of the time of this writing, work on the leaching field was scheduled to be completed by July, 2004, after which the OWTS operations permit would be issued to DPW.

IV. Ground Water Assessment

A. Numeric Ground Water Standards

At the present time, the CNMI does not have numerical classification standards for ground water. There is a requirement in the CNMI Groundwater Management and Protection Act for the designation of Class I, II, and III aquifers. U.S. EPA Region IX and DEQ are presently planning to use contracted resources to develop aquifer classification maps for Saipan based on existing geologic and groundwater data. This has been difficult to do without any significant data sources on quality of aquifers. However, as the GIS system develops, this will allow for a better opportunity to designate aquifers.

Although not enforceable, Saipan is still a long way from meeting the EPA secondary drinking water standards. However, they are being proposed and monitored to be used in aquifer classification. Marine water quality standards will be used to protect ground water in the near-shore environment.

B. Summary Results of Ground Water Monitoring

The CNMI Groundwater Protection and Management Act was enacted into law in 1988. The first set of Well Drilling regulations were adopted in 1992 and later amended in 1994. The well drilling regulations set standard requirements and criteria for licensed well drillers, well construction, setback distances, and requirements for operating of new and renewed wells. As part of operations, annual monitoring of chlorides, conductivity, total dissolve solids, pH, total coliform and monthly withdrawal rate of water are required for all wells.

With the new GIS program and hand held GPS units, DEQ will continue to develop a database of all private wells with information on operation date, location, and monitoring data. The database is its early infantile stages with much need for improvement on quality control of missing or inaccurate data. It is envisioned that the data will be integrated into the CNMI GIS system. DEQ will be able to use the fully developed GIS system to identify existing sources of contamination and potential problems for proposed new and existing wells.

A general review of the sample data for the private wells shows that chlorides and conductivity gradually increase over time in many of the wells. In some wells, a reduction in the operating pressure has resulted in a decrease in conductivity and chlorides. (Note: Conductivity was believed to be a better indicator of increasing saltwater intrusion due to potential laboratory error associated with testing equipment for chlorides). It is the current unofficial policy to limit all new wells to under a pumping rate of 20 gallons per minute unless there are unusual circumstances with high quality aquifer and special needs.

As DEQ laboratory capabilities increase, DEQ will continue requiring the testing of nitrates in private and municipal water wells used for drinking and other human consumptions. To be assured that the quality of ground water being used by the local community is not contaminated from old military or current activities, testing for metals, volatile organic compounds, and synthetic organic compounds, pesticide and herbicide, radionuclides and other inorganic compounds were required as part of a source water assessment. In May 2000, DEQ and EPA region IX conducted an island wide sampling of all private wells for VOC's, metals, pesticides and herbicides on several wells. In 1999, DEQ started enforcing the Phase II/V chemical monitoring and is currently underway. Several private well were found to have exceeded the EPA Maximum Contaminant Level (MCL) for drinking water.

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