TERRITORY OF AMERICAN SAMOA

INTEGRATED WATER QUALITY MONITORING AND ASSESSMENT REPORT 2014

Report Prepared by:

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Executive Summary

This report has been prepared to satisfy the listing requirements of Section 303(d) and the reporting requirements of Section 305(b) and 314 of the Clean Water Act. The report is the principal means by which AS-EPA, Congress, and the public evaluate whether territorial waters meet water quality standards, the progress made in maintaining and restoring water quality, and the extent of remaining problems. The report was prepared in accordance with *Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act* (USEPA 2005) and 2006 Integrated Report Guidance (IRG), supplemented by EPA's 2008, 2010, 2012, and 2014 memorandums.

The Territory of American Samoa lies roughly 14 degrees south of the equator between longitudes 169 and 173 west and about 2,500 miles southwest of Hawaii. The principal islands are Tutuila (with 97% of the population), Aunu'u, and the Manu'a. The islands of American Samoa are volcanic in origin and exhibit the rugged topographic relief common to the Pacific volcanic islands. The climate of the territory is tropical, with uniform high temperatures and high humidity throughout the year. The population of the territory was 55,519 in 2010. Factors such as population, inadequate land-use permitting, and increased production of solid waste and sewage, have detrimentally impacted water quality in streams and coastal waters of the Territory.

For this report AS-EPA assembled and evaluated all existing and readily available data and information relating to the categories of waters specified in 40 CFR§130.7(b)(5) for sampling and analyses completed between October 2011 and September 2013 (FY12 and FY13). The narrative section of the report, as well as assessments presented in Appendix B and Appendix C, reflect the data collected in FY12 and FY13. AS-EPA also completed a cumulative assessment of data from FY03 to FY13. The cumulative assessment is presented in Appendix A.

The primary unit of assessment used by AS-EPA for this report is the watershed. The total surface area of American Samoa is very small, only 76.1 sq. miles, which is divided into 41 watersheds with an average size of 1.8 sq. miles Water quality monitoring, along with coral / fish / benthic monitoring, covers 34 of the 41 watersheds, and also covers >95% of the population of American Samoa. Waterbodies in the watersheds were assessed according to levels of use support.

In FY12 and FY 13 58.4 out of a total of 257.5 stream miles were assessed. For the goal Protect and Enhance Ecosystems (Aquatic Life), 58.5 stream miles were assessed. For the goal to Protect and Enhance Public Health, 58.4 stream miles were assessed for Swimming and all were found to be Not Supporting. The Major Cause/Stressor identified for this reporting period was Pathogen Indicators. The major assessed sources of impairment were Collection System Failure and Intensive Animal Feeding Operations.

In FY12 and FY 13 118.6 out of a total of 149.5 ocean shoreline miles were assessed. For the goal Protect and Enhance Ecosystems (Aquatic Life) 45.1 shoreline miles were assessed. Of those miles, 15.5 were found to be Fully Supporting, 12.8 miles were found to be Partially Supporting, and 16.8 miles were found to be Not Supporting. For the goal to Protect and

Enhance Public Health, 104.2 shoreline miles were assessed for swimming. Of these, 45.5 miles were Fully Supporting, 5.9 miles were Partially Supporting, and 52.9 miles were Not Supporting. For the goal to Protect and Enhance Public Health, 7.9 shoreline miles were assessed for fish consumption, and 7.9 miles were found to be "Not Supporting". The Major Causes/Stresses identified for this reporting period were PCBs, Metals (Mercury), Pathogen Indicators, and Undetermined NPS Stressor (Table C6). The Major sources of impairment were Collection System Failure and Intensive Animal Feeding Operations.

No wetlands assessments were conducted during this reporting period.

A probabilistic based survey was conducted for the reef flats of Tutuila and Aunuu islands in 2010. Of 5.7 km^2 of reef flats assessed, 76% were Fully Supporting and 24% were Not Supporting for the goal Protect and Enhance Ecosystems (Aquatic Life). For the goal to Protect and Enhance Public Health (swimming), 100% were Fully Supporting. The reef flat survey will be repeated in 2015.

Aquifer monitoring data for all 11 hydrogeologic settings (individual public water systems) were assessed. No parameters were detected at concentrations exceeding the MCLs and all Nitrate concentrations were ≤5 mg/l. Four wells have been removed from service for high sodium levels or the presence of *E. coli*.

The 2014 303(d) list reflects all data collected between FY03 and FY13. Twenty two watersheds are listed for impaired streams for pollutants including enterococcus, nutrients, turbidity, and DO. No watersheds were added to the list in 2012 for impaired streams. Twenty four watersheds are listed for impaired ocean shorelines for the pollutants enterococcus and undetermined NPS stressors. One watershed was added to the 2014 list for impaired ocean shorelines for the pollutant enterococcus. No waterbodies were removed from the previous (2012) list.

A draft TMDL for the pollutant enterococcus in beaches and streams was completed in 2013. The new high priority pollutants for TMDL development (2016) are TN/TP in streams.

I Overview

The American Samoa Environmental Protection Agency (AS-EPA) has a responsibility to monitor, assess, and protect water quality for the Territory of American Samoa. U.S. federal and American Samoa local environmental legislation and regulations all apply in American Samoa.

This report has been prepared to satisfy the listing requirements of Section 303(d) and the reporting requirements of Section 305(b) and 314 of the Clean Water Act. The report is the principal means by which AS-EPA, Congress, and the public evaluate whether territorial waters meet water quality standards, the progress made in maintaining and restoring water quality, and the extent of remaining problems. The report was prepared in accordance with *Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act* (USEPA 2005) and 2006 Integrated Report Guidance (IRG), supplemented by EPA's 2008, 2010, 2012 and 2014 memorandums.

The narrative section of the 2014 report, as well as assessments presented in Appendix B and Appendix C, reflect data collected between October 2011 and September 2013 (FY12 and FY13) only. A cumulative assessment that reflects all data collected between FY03 and FY13 is presented in Appendix A.

i. Geographical Summary

The Territory of American Samoa lies roughly 14 degrees south of the equator between longitudes 169 and 173 west and about 2,500 miles southwest of Hawaii. The principal islands are Tutuila, Aunu'u, and the Manu'a islands (a cluster of three islands, Ta'u, Ofu and Olosega, located about 65 miles east of Tutuila). Swains Island, a small island with a population of less than 25 and Rose Atoll, an uninhabited atoll about 120 miles east of Tutuila, make up the remainder of the territory. The population of the territory is 55,519 (2010 census), of which approximately 97% live on the island of Tutuila.

The islands of American Samoa are volcanic in origin and exhibit the rugged topographic relief common to the Pacific volcanic islands. The climate of the territory is tropical, with uniform high temperatures and high humidity throughout the year. Mean daily temperature during the year varies from about 78 to 82 degrees Fahrenheit. The maximum altitude is about 3,180 ft. above mean sea level at the summit of Lata Mountain on Ta'u Island. Tutuila, with an area of 53 square miles, is the largest island in the territory. It is approximately 20 miles long and ranges in width from less than one mile, to a maximum of 5 miles at the Tafuna-Leone plain. A sharp-crested ridge 1,000 to 2,000 feet high with steeply eroded slopes dominates the entire length of the island.

The steep, variable topography of Tutuila effects localized rainfall amounts. The airport at Tafuna receives about 125 in. (3,180 mm) but Pago Pago receives nearly 200 in (4,090 mm). The crest of the range at Mt. Alava, altitude 1,600 ft. (914 m), receives considerably more than 250 in (6,350 mm). The driest months are June through September and the wettest are December through March, but heavy showers can occur in any month.

ii. Territorial Water Quality Review

Fresh Surface Waters

The small, steep watersheds and periodic intense rainfall cause highly variable flows in the nearly 260 miles of American Samoa's perennial streams. Despite these highly variable flows, the streams of American Samoa support a variety of aquatic species, several of which may be harvested for consumption. Designated uses include potable water supplies, support of indigenous wildlife, and aesthetic and recreational enjoyment. Stream water quality is most affected by development along a stream that changes the hydrology and shade along a stream, by development within a watershed that causes erosion and increased turbidity, and by nutrient and bacterial pollution from poorly constructed human and pig waste disposal systems. In some areas, improved service by sewage lines and subsequent decrease in the number of poorly constructed septic systems, as well as improved pig waste management, has improved stream water quality.

Ground Waters

The Tafuna-Leone plain is the site of the majority of American Samoa's residential and business development. The plain is also the site of the majority of the wells that pump ground water for distribution. Because volcanic stratum of Tutuila is highly permeable and does not have a great capacity to filter, there is a constant risk of groundwater contamination as pollution migrates from the surface with rainwater. The greatest threats to groundwater quality in American Samoa are pesticide residues, pollutants associated with automobiles, and pathogen and nutrient pollution from poorly constructed human and pig waste disposal systems.

Ground Water Under the Direct Influence of Surface Water (GUDI) studies have been initiated to determine if existing wells are under the direct influence of surface water. As of FY13, GUDI studies have been completed on 20 wells, and 9 wells have been determined GUDI. The water system operator is working diligently to drill replacement wells.

As in many small tropical islands with highly permeable soils, the fresh water aquifer floats on a layer of salt water beneath the ground. Rare dry periods of two- to three-months duration can result in critical drinking water shortages as salt water intrudes on the depleted fresh water lens.

Wetlands

American Samoa possesses a number of small but very important wetland habitats. The wetlands include coastal mangrove swamps, inland freshwater marshes and some cultivated *taro* fields. Designated uses include support of indigenous aquatic and terrestrial life, fishing, food cultivation and gathering, recreation, flood control and groundwater recharge. Wetlands in the territory are being lost or degraded by urban growth and development as a result of population increase.

Ocean Shoreline

American Samoa has nearly 150 miles of coastline. Fringing coral reefs that surround all of the islands in the territory characterize the embayments and open coastal waters of American Samoa. Designated uses include fishing and food gathering, recreation, support of marine life, mariculture, and scientific investigations. The reefs also provide a buffer for the islands against the impact of waves. The greatest threats to near-shore water quality and to the health of the reefs in American Samoa are from runoff from the land, especially pathogen and nutrient pollution from poorly constructed human and pig waste disposal systems as well as increased turbidity and nutrients from erosion. Solid waste, i.e. improperly disposed of trash, is another source of pollution in open coastal waters and embayments.

Pago Pago harbor is the most industrialized embayment in the Territory, with over a century of development subsequent to the creation of the Territory under the United States. As well as the sources of water quality impairments mentioned above for embayments in general, Pago Pago Harbor is affected by pollution from marina and port traffic, a small shipyard, and in the outer harbor effluent from the tuna canneries and sewage treatment plant. All point sources have National Pollutant Discharge Elimination System (NPDES) permits. Due to the segregation and transportation of cannery waste beyond the inner harbor, better treatment of sewage, and more effective monitoring and prosecution by the Coast Guard of commercial vessels that pollute the harbor, the water quality in the inner harbor has greatly improved in the last two decades.

There are several special management areas within the Territory's open coastal waters including Fagatele Bay National Marine Sanctuary, the Territorial Marine Park on Ofu and the American Samoa National Park, Ofu segment.

Open Ocean Waters

Designated uses of open ocean waters include fishing, scientific investigations, boating, support of marine life, and recreation. While there is a small offshore fishery, it is unknown whether offshore waters are affected by pollution. High strength wastes (high solids, high nitrogen, high phosphorus) from the tuna canneries are no longer dumped in a designated zone approximately five miles offshore. Starkist instead utilizes a new improved treatment process to turn the high strength waste into marketable by-products (e.g., fish meal). The process leaves a small amount of residual wastewater that is discharged into the local sewer system.

II Background

i. Total Waters

Table 1. Atlas Description of American Samoa

Topic	Value
Territorial Population	55,519*
Territory Surface Area (square miles)	76.1
Total Miles of Streams (miles)	258
Square Miles of Coral Reef	184
Miles of Ocean Coast	149
Acres of Fresh Water and Tidal Wetlands	396

*From 2010 Census

ii. Maps

The Territory of American Samoa is divided into 41 watershed units to simplify management of aquatic and terrestrial resources. Maps with watershed delineations are presented in Appendix D, Figures 1 and 2.

iii. Water Pollution Control Program

A. Watershed Approach

The total surface area of American Samoa is very small, only 76.1 sq. miles. This small surface area is divided into 41 watersheds, each with an average size of 1.8 sq. miles (Appendix B, Table 1, Figures 1 and 2). Water quality monitoring, along with coral / fish / benthic monitoring covers 33 out of the 41 watersheds, and also covers >95% of the population of American Samoa. Accordingly, tracking water quality on a watershed scale is fully adequate to meet our monitoring objectives and goals.

B. Point Source Program

There are only seven identified point sources in the Territory. These sources include: Starkist, Samoa Packing Trimarine, Utulei Waste Water Treatment Facility, Tafuna Waste Water Treatment Facility, British Petroleum, Satala Power Plant, and The American Samoa Shipyard Services Authority. Analysis of NPDES monitoring data confirms that overall, these facilities meet the requirements established by individual NPDES permits, and these point sources likely have negligible impact on water quality. In American Samoa, pollution tends to originate from non-point source rather than point sources.

C. Nonpoint Source Control Program

American Samoa has determined that all impaired designated uses in the Territory are due to nonpoint sources (NPS). Therefore, watersheds identified as impaired are considered areas where

NPS management measures have not yet improved water quality in the coastal zone. Impaired watersheds are targeted for enhanced management measures and water quality monitoring.

Full approval of the American Samoa Coastal Nonpoint Pollution Control Program (ASCNPCP) was received July 24, 2003. In FY12 and FY13 program effort was directed towards full implementation of the program plan.

iv. Cost / Benefit Assessment

Following are the approximate economic and social costs and benefits of actions necessary to achieve the objective of the Clean Water Act.

Costs:

- Capital investments in municipal facilities in the past 5 years: 14 million dollars
- Capital investments in municipal facilities in the past 10 years: 19 million dollars
- Capital investments in municipal facilities since 1972: 49 million dollars
- Capital investments in industrial facilities in the past 5 years: 0.01 million dollars
- Capital investments in industrial facilities in the past 10 years: 3.5 million dollars
- Capital investments in industrial facilities since 1972: 10 million dollars
- Investments in nonpoint source measures in the past 5 years: 3.5 million dollars
- Investments in nonpoint source measures in the past 10 years: 5.0 million dollars
- Investments in nonpoint source measures since 1972: 9.0 million dollars
- Annual operation and maintenance costs of municipal facilities: 1.5 million dollars
- Annual operation and maintenance costs of industrial facilities: 4.0 million dollars
- Total annual costs of municipal and industrial facilities: 5.5 million dollars
- Annual costs to government to administer water pollution control activities: 2.0 million dollars.

Benefits:

Benefits to the territory include the protection of the groundwater that supplies the majority of the drinking water for the Territory, the improved quality of Pago Pago Harbor, which has improved recreational and aesthetic enjoyment as well as habitat and coral reef recovery, protection of beaches and fringing coral reefs from pollution, and increased tourism. The coral reefs around American Samoa are used recreationally and supply much of the fresh fish and seafood for the territory. The reefs also provide a buffer for the islands against the impact of waves.

v. Special Territorial Concerns and Recommendations

Most special concerns in American Samoa are related to geographical aspects of the islands and cultural aspects of the Samoan people. The main concern is the pressure that the growth in population over the past 25 years in American Samoa is exerting on natural resources and the local environment. There is a very limited land base to accommodate new growth. Only one

third of Tutuila contains land that is suited for human development (i.e., only 19 square miles have a slope of less than 30%). Development factors such as poor land use permitting, overfishing, and increased production of solid waste and sewage will impact groundwater, streams, and coastal waters.

While local environmental education has made great strides in the last decade, there is still a widespread lack of understanding, acknowledgment, and acceptance of environmental issues that affect the Territory. The need to control litter and pig waste is now somewhat understood. However, the effect of pollution from soil erosion, automobiles and untreated sewage is not recognized as a public health and environmental threat. There is a lack of political and public will to enforce most environmental regulations. The regulations themselves are quite comprehensive, but are not seen as a priority for enforcement.

The Malaeimi valley in central Tutuila has been determined to be a major recharge area for the Tafuna-Leone aquifer, which supplies the majority of the drinking water for the Territory. A boil water notice has been in effect in this aquifer area for several years due to bacterial contamination of the aquifer. This valley has been proposed as a Special Management Area, and it is critical that the development in the area is carefully controlled to protect groundwater resources. Unfortunately, the Government has not yet adopted the proposal.

Lastly, the unique coral reef habitat that characterizes the fringing reefs of American Samoa merits special concern. Modern development, leading to road construction, increased solid waste and sewage, and sedimentation, has caused much indirect stress to the coral reefs, while overfishing has directly impacted the reef environment. The concern worldwide for the health and protection of coral reefs is mirrored here in American Samoa. This has led to directed management and research efforts on how to best protect reef habitats.

III Surface Water Assessment

i. Current Surface Water Monitoring Program

A. Monitoring Program Description

American Samoa has identified the following monitoring objectives to insure our monitoring program is efficient and effective in generating data that serve all management needs:

- Update water quality standards for all types of Territorial waters
- Determine water quality status and trends for all types of Territorial waters
- Make designated use support determinations and identify impaired waters for all types of Territorial waters
- Identify causes and sources of water quality problems for all types of Territorial waters
- Evaluate the effectiveness of Non Point Source Best Management Practices for restoring impaired designated uses for all types of Territorial waters
- Evaluate the effectiveness of NPDES permits

AS-EPA has developed a Territorial Monitoring and Assessment Program that includes all elements recommended by USEPA. The program incorporates an efficient combination of monitoring plans and strategies to meet all monitoring objectives. The plans/strategies include fixed station, intensive and screening level monitoring, judgmental, and probability designs. Monitoring plans and strategies include:

- AS-EPA Nearshore Marine Water Quality (BEACH) Monitoring Plan
- AS-EPA Stream Water Quality Monitoring Plan
- AS-EPA Probabilistic Monitoring
- AS-EPA Coral Reef Monitoring Plan
- Water Quality Monitoring Strategy for Pago Pago Harbor, American Samoa
- American Samoa Coastal Nonpoint Source Monitoring Strategy
- ASPA Drinking Water /Groundwater Systems Water Quality Monitoring Plan
- National Park of American Samoa Water Quality Monitoring Plan

B. Monitoring Schedule

Waters that will be monitored and assessed during the next 2-year integrated report cycle include:

- Streams: New stream systems will be assessed according to the plan outlined in the AS-EPA Stream Water Quality Monitoring Plan.
- Ocean Shoreline: Swimming resources will continue to be monitored according to the AS-EPA Nearshore Marine Water Quality Monitoring Plan. Coral reefs will be monitored according to the AS-EPA Coral Reef Monitoring Plan (to assess the effects of NPS pollution on AS Coral Reef Communities).
- Wetlands: No new wetland assessments will be conducted in the period leading up the next integrated report.

- Groundwater: Groundwater will continue to be monitored according to the ASPA Drinking Water /Groundwater Systems Water Quality Monitoring Plan.

ii. Status of Plan to Achieve Comprehensive Assessments

The expanded AS-EPA Territorial Water Quality Monitoring and Assessment Program was designed to be statistically rigorous and to satisfy USEPA guidelines for water quality monitoring programs. All categories of water bodies directly monitored by agency efforts were depicted and inventoried in the program. Sampling locations were geo-referenced with GPS as a collaborative effort with the American Samoa Coastal Management Program (ASCMP).

The Recreational Beach Monitoring Program and the Stream Monitoring Program were created to develop and implement comprehensive monitoring in these aquatic habitats. Fifty recreational beach locations in American Samoa are monitored, 44 weekly, and 6 monthly. This monitoring effort provides excellent coverage for local beach recreational areas. The stream monitoring program is based on a probabilistic model, where a small population of streams are selected at random from the overall population and monitored for 1 year. After that period, a new population of streams is selected at random for monitoring.

The first 4 years of stream monitoring data were analyzed in FY09, and provided a robust assessment of stream water quality in American Samoa. Stream monitoring in FY12 and FY13 was limited to microbiological monitoring due to lack of technical staff and equipment (YSI sonde) malfunctions. AS-EPA intends to re-implement stream chemical and physical monitoring by FY15.

Other programs, including the AS-EPA Probabilistic Monitoring and the AS-EPA Coral Reef Monitoring Program, monitor ocean water quality and coral reef health, and will allow the Territory to achieve comprehensive assessments with the limited resources available.

iii. Assessment Methodology

A. Assessment Methodology Description

1. The 2014 Integrated Report

AS-EPA assembled and evaluated all existing and readily available data and information from sampling and analyses completed in FY12 and FY13, as well as cumulative assessments from FY03 to FY13, relating to the categories of waters specified in 40 CFR§130.7(b)(5).

Sources for data and information evaluated for this report include:

- AS-EPA Stream Monitoring Program
- AS-EPA Beach Monitoring Program
- ASPA/AS-EPA Groundwater Monitoring Program
- AS-EPA Probabilistic Monitoring
- AS-EPA Coral Reef Monitoring Program

For this report, multiple uses based on current water quality standards have been assessed. The primary uses for water bodies in the territory are:

- Potable water supplies (groundwater)
- Support and propagation of indigenous aquatic and terrestrial life
- Compatible recreation and aesthetic enjoyment
- Fish and Shellfish consumption

Specific criteria for determining attainment of these individual uses have been incorporated in accordance with *Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates (USEPA 1997)* and *Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act* (USEPA 2005) and 2006 Integrated Report Guidance (IRG), supplemented by EPA's 2008, 2010, 2012 and 2014 memorandums and are described below in detail.

2. Assessment Information

The primary unit of assessment used by AS-EPA for this report is the watershed. As indicated previously, the total surface area of American Samoa is very small, only 76.1 sq. miles. This small surface area is divided into 41 watersheds, each with an average size of 1.8 sq. miles (Appendix D, Table 1, Figures 1 and 2). Water quality monitoring, along with coral / fish / benthic monitoring, covers 33 of the 41 watersheds and also covers >95% of the population of American Samoa. Accordingly, tracking water quality on a watershed scale is fully adequate to meet our monitoring and assessment objectives and goals.

Because the watershed is the primary assessment unit, AS-EPA recognizes that data from several locations within a watershed must be reconciled before assessing the overall use support of waters within that watershed. In this regard, when multiple sources of data within one watershed indicated different levels of use support, AS-EPA chose a conservative approach by selecting the least supporting level for the entire watershed.

Two types of assessment information were utilized: "Evaluated" and "Monitored". "Evaluated waters" are those for which the use support decision is based on information other than site-specific ambient data. This includes data on land use, location of sources, and best professional judgment of qualified biologists. "Monitored waters" are those for which the use support decision is principally based on current, site-specific, ambient monitoring data believed to accurately portray water quality conditions. The majority of the assessments in this report utilize monitored data.

Each source of Aquatic Life Use Support (ALUS) data, whether "evaluated" or "monitored" is assigned a Data Quality Level in accordance with *Guidelines for Preparation of the Comprehensive State Water Quality Assessments (305(b) Reports) and Electronic Updates (USEPA 1997)*. Data types are grouped into four categories: biological, habitat, toxicological, and physical/chemical. The rigor of a method within each data type is dictated by its technical components, spatial/temporal coverage, and data quality (precision and sensitivity). Level 4 data are of the highest quality for a data type and provide relatively high level of certainty. Level 1

data represent less rigorous approaches and thus provide a level of information with a greater degree of uncertainty.

3. Guidelines for Determining Levels of Use Support for Primary Uses.

3.1 Potable Water Supplies

The 2005 American Samoa Water Quality Standards added definitions for Class 1 and 2 streams. Class 1 has drinking water as a designated use. Class 2 does not have drinking water as a designated use. The assessment framework used for use support decisions for Class 1 waters is shown in Table 3 below.

Table 3. Assessment Framework for Determining Drinking Water Use Support

Classification	Monitoring Data		Use Support Restrictions
Full Support	Contaminants do not exceed water quality criteria	and/or	Drinking water use restrictions are not in effect.
Partial Support	Contaminants exceed water quality criteria intermittently	and/or	Drinking water use restrictions resulted in the need for more than conventional treatment with associated increases in cost.
Nonsupport	Contaminants exceed water quality criteria constantly	and/or	Drinking water use restrictions resulted in closures.
Unassessed	Source water quality has not been assessed for contaminants used or potentially present.		

3.2 Support and Propagation of Indigenous Aquatic and Terrestrial Life

Of the four data type categories (biological, habitat, toxicological and physical/chemical), only new data in one category, physical/chemical, was available during this reporting period for Aquatic Life Use Support (ALUS) determination. These data are of varying data quality levels as per the hierarchy of data levels for evaluation of aquatic life use attainment of the 1997 305(b) EPA guidance. The guideline for determining ALUS using more than one type of data is shown in Table 4 below.

Table 4. Determination of ALUS Using More Than One Data Type

ALUS Attainment	
Fully Supporting:	No impairment indicated by all data types.
ALUS Non-Attainment	
*Partially Supporting:	Impairment indicated by one or more data types and no impairment indicated by others.
*Not Supporting:	Impairment indicated by all data types.
*A determination of *Partially Supporting* or *Not Supporting* could be made based on the nature and rigor of the data and site-specific conditions in the results of the data types. If bioassessment (usually Level 3 or 4) indicates impairment, then a determination of *Not Supporting* should be made.	

i. Physical/Chemical Methods

USEPA guidance (1997) states the importance of incorporating the established criteria for conventionals and toxicants in ALUS determinations and to use the "worst case" approach where multiple parameters are available (USEPA, 1997). Tables 5 and 6 below, describe the decision guidelines used for determining ALUS using Physical/Chemical Methods for conventional data (and additional parameters) and toxicant data.

Conventional pollutants are defined by the Clean Water Act of 1977 as BOD, TSS, fecal coliform, oil and grease, and pH. Additional parameters analyzed by AS-EPA include Temperature, Dissolved Oxygen, Turbidity, Total Nitrogen, Total Phosphorus, and Enterococcus. These parameters were assessed by the criteria developed by the USEPA for the "Conventional Category". Priority pollutants include all pollutants listed as Priority Pollutants by the Clean Water Act and subsequent amendments to the act. No priority pollutant monitoring was conducted in FY10 or FY11.

Much of AS-EPA's Physical/Chemical data is considered Low/Moderate quality, based on technical components and spatial/temporal coverage, as defined by Table 3-4 in the 1997 EPA guidance document Hierarchy of Physical/chemical Data Levels for Evaluation of Aquatic Life Use Attainment. The ASWQS provides standards for these parameters presented in Table C1 (Appendix C).

Table 5. Decision Guidelines for Conventionals (and additional parameters) Used to Assess ALUS in Freshwater Rivers and in Marine Waters

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

* ASWQS state that compliance with numeric standards shall be determined utilizing at least four consecutive measurements over a period of not less than 3 months or greater than 12 months, unless otherwise specified by the Environmental Quality Commission.

Table 6. Decision Guidelines for Toxicants (priority pollutants, metals, chlorine and ammonia) Used to Assess ALUS in Freshwater Rivers and in Marine Waters

Degree of Aquatic Life Use Support	Criteria for Toxicants*
Fully Supporting	For any one pollutant, no more than 1 exceedance of acute criteria within a 3-year period based on grab or composite samples and no more than 1 exceedance of chronic criteria within a 3-year period based on grab or composite samples
Partially Supporting	For any one pollutant, acute or chronic criteria exceeded more than once within a 3-year period, but in ≤10 percent of samples.
Not Supporting	For any one pollutant, acute or chronic criteria exceeded in >10 percent of samples.

* ASWQS state that for toxic substances, compliance shall be determined by any single sample, unless otherwise specified by the Environmental Quality Commission.

ii. Habitat Assessment and Bioassessment

In FY12 and FY13, the AS-EPA stream monitoring program did not include a habitat assessment. No stream bioassessment data were collected during this period.

Guidelines from the USEPA guidance (1997) for ALUS determination using habitat assessment data are provided in Table 7 below.

In FY13 coral reef bioassessment data were collected.

Guidelines from the USEPA guidance (1997) for ALUS determination using bioassessment data are provided in Table 8 below. These guidelines were not developed for coral reef bioassessments. Therefore, a modified assessment methodology was developed by Dr. Peter Houk (UOG Marine lab) and is provided below.

Study Design

Monitoring was conducted to support the American Samoa Environmental Protection Agency NPS pollution control program. In culmination, 15 locations around Tutuila, the main and most populated island, have been surveyed over the past 10 years. Initial site visits to most locations (12 sites) were conducted in 2003 and 2005. Sites visited in 2003 were re-visited in 2007, and sites visited in 2005 were re-visited in 2008. Three additional sites were established in 2007. During each annual survey event, sites were selected across reef types, watershed sizes, and human population densities. In 2013 all monitoring sites were re-visited to provide an anchor point to help assess trends through time developed within this report. Notably, the timeframe for this monitoring effort coincided with significant impacts from cyclone Heta (2004, Tutuila), limited impacts from cyclone Olaf (2005, Manu'a), and unknown impacts from a devastating tsunami (2010).

Three reef types have been identified during the course of ASEPA monitoring efforts: 1) primary framework with interstitial spaces common throughout the reef matrix, found mainly on the south side of Tutuila, and 2) primary framework with a well-cemented, underlying basement, lacking significant interstitial spaces, mainly found on the northern side of the island, and 3) intermixed sand and primary-framework reef patches. Primary coral framework (Holocene) were defined by a consolidated reef matrix created mainly by large coral skeletons cemented together with coralline algae, and interstitial spaces refer to the presence of cavities within the primary reef framework. Present monitoring designs are mainly focused on the first two reef types because they are the most predominant, and classified by geography (i.e., reef types 1 and 2 represents reefs along the south and north shore of Tutuila, respectively). For the present study, reef type 3 (intermixed sand and reef patches) was only represented by one site, Vatia, where modern growth was limited and dominated by *Porites cylindrica*. Within each of the two major reef types, representative sites were selected for investigation in accordance with watershed sizes, several proxies of watershed pollution, and along a gradient of wave exposure.

Ecological Data

Monitoring sites were established on the nearshore reef slopes (8–10 m) adjacent to selected watersheds, approximately 250 m away from stream discharge. During each survey event, a hand held global positioning system unit was used to identify the location of transects that were placed at a uniform depth of 9 – 11 m, with a known geographic heading. Benthic cover was evaluated using video and photo quadrat protocols along a series of transect lines. During the 2013 surveys, transect lines were separated into 6 x 25 m long replicates, and benthic substrate abundances were estimated from photographs of 0.5 x 0.5 m quadrats taken at 1 m intervals. Prior to 2013, benthic substrates were estimated from still frames captured from video transects along 3 x 50 m long replicates, also at 1 m intervals. In both instances cameras were

calibrated so that each photographs (or screen shots) represented a 0.5 x 0.5 m section of the reef. Methods were shifted in 2013 to improve statistical confidence while keeping the same overall sampling area. The shift in methods provides for enhanced confidence intervals (i.e., lower standard deviations) while having less influence on the mean abundances being estimated. Photographs were analyzed by projecting five random dots on the screen and noting the life form under each of the dots. The benthic categories chosen for analysis were corals (to genus level), turf algae (less than 2 cm), macroalgae (greater than 2 cm, to genus level if abundant), fleshy coralline algae known to overgrow coral (*Peyssonnelia, Pneophyllum*), calcifying crustose coralline algae, sand, and other invertebrates (genus level if abundant). From these categories, a benthic substrate ratio was classified as the percent cover of calcifying corals and crustose coralline algae divided by the percent cover of turf, macroalgae, and fleshy coralline algae substrate. High benthic substrate ratios indicate favorable reef condition, and dominance of calcifying substrates that accrete through time.

At each location coral communities were examined using a point quadrat technique. Ten replicate 1 x 1 m quadrats were haphazardly tossed at equal distances along the transect lines. Every colony whose center point lay inside the quadrat was recorded to species level, and the maximum diameter and diameter perpendicular to the maximum were measured. These measurements were used to estimate percent coverage, relative abundance, population density, and geometric diameter, with the mathematical assumption that colonies are circular. Margalef's d-statistic was calculated as a measure of the number of corals present, making some allowance for the abundance of individuals, or community evenness. This describes how evenly coral coverage was distributed at each site, but does not take overall percent cover into account. A low d-statistic suggests that coral coverage was not dominated by one, or a few, species.

Fish numerical abundance and biomass have been estimated since 2008 using a modified stationary point count (SPC) protocol. During 2008, five replicate SPC's were conducted. In each instance, an observed counted and estimated the size of all food fish that resided within a 7.5 m radius for a period of 5-minutes. During 2013, an observer took similar measurements within 12 replicate SPCs using a 7.5 m radius, but a shorter time of 3-minutes. Food fish were defined by acanthurids, scarids, serranids, carangids, labrids, lethrinids, lutjanids, balistids, kyphosids, mullids, and holocentrids that are a known to be harvested. Fish biomass estimates were calculated using the length assessments recorded during the SPCs. The biomass was calculated by using the formula W=A*L^B where W=weight, L= length, and A&B= growth parameters obtained from www.fishbase.org. When growth parameters were not known for a given species, values from a closely related species were used.

In order to account for varying SPC observation times, fish abundances were estimated for individual SPCs by dividing the biomass by the amount of time spent observing the fish. Given the potential bias associated with longer, 5-minute SPC's conducted in 2008, only the complete 2013 datasets were used in the statistical analyses described below (i.e., multivariate PCO plots, regression modeling, and correlation examination). However, estimated abundances for the most abundant fishes were explored between the two time frames by examining data from the same set of sites (2008 and 2013).

Macroinvertebrates have been counted along the transect lines used for benthic assessments since the inception of ASEPA monitoring efforts. However, we have continually found macroinvertebrate populations to be extremely scarce at all monitoring locations, and consistently have standard deviations that are over double the mean values. Therefore, macroinvertebrate data are not further discussed in the present report.

Environmental Data

Wave exposure data were gathered from NOAA Wave Watch III model predictions, summarized for American Samoa. For each monitoring site, mean wave heights were recorded with respect to their angle of exposure, using the wave-rose data, and the sum of wave intensity for all angles of exposure was calculated for each site.

Watersheds adjacent to each site were quantified using existing American Samoa Department of Commerce GIS layers pertaining to land use and boundaries. Disturbed land included all regions that no longer have tropical rainforest as the dominant tree cover, based upon United States Forest Service vegetation maps (http://www.fs.usda.gov/r5). Human population estimates were derived from the most recent census report.

Data Analysis

Reef Types and Geography –

Examinations were first conducted to describe the inherent differences between coral, fish, and benthic assemblages along the south shore of Tutuila compared with the north (i.e., framework reefs with interstitial spaces in the south versus predominately consolidated reef in the north). For all assemblages, data were aggregated at the site level, and species-by-site matrices were generated and used to create Bray-Curtis similarity matrices. Bray-Curtis similarity matrices were calculated by:

$$S_{(j,\,k)} = 1 - (\Sigma\,|Y_{ij} - Y_{ik}| \,/\, \Sigma\,(Y_{ij}+Y_{ik}))$$

where S represents the ecological similarity between two sites (j and k), Σ (numerator) represents the summation of the absolute differences in the abundance of each species (Y_i) at the two sites, and Σ (denominator) represents the sum of the abundances of species (Y_i) at the two sites. Bray-Curtis similarities define how consistent species abundance patterns were between each pair of sites. Similarity matrices were graphically interpreted using principle components ordination plots that depict the site-based distances into two- dimensional space. Significance between reef types is calculated from PERMANOVA tests that are similar to standard ANOVA tests that calculate significance based upon Bray-Curtis variation within and across reef types. These tests provide a pseudo-F statistic that is analogous to a standard ANOVA test result, and a P- value based upon permutation, or repeating the process until a probability distribution is generated.

Trends -

We first summarized general trends in coral cover and fish biomass at the island scale with respect to disturbance regimes and time. Shortly after monitoring efforts were initiated in 2003, a category 5 cyclone (Heta) impacted Tutuila, with wave heights reaching as high as 13 m reported offshore. In 2005, cyclone Olaf hit the nearby (150 km) Manu'a Islands, but wave intensities were less influential to Tutuila. Last, in 2010 a devastating tsunami impacted many low-lying areas around Tutuila, but significant impacts to the coral reef assemblages, particularly the reef slopes, have not been documented.

The general trends suggested that cyclone Heta was the largest, most ubiquitous acute disturbance to impact Tutuila since the inception of monitoring. We therefore sought to examine recovery trajectories for each site with respect to proxies of land pollution, herbivory, and wave exposure. For the south shore of Tutuila sufficient monitoring sites existed to perform regression analyses between ecological indicators of recovery and present status with respect to stressors and wave exposure. Three ecological indicators of recovery were generated. We calculated: 1) the change in mean coral colony size between 2013 and 2007/8 to provide an indication of coral growth capacity, 2) the change in the benthic substrate ratio over the same time period to provide an indication of calcification, and 3) the change in coral assemblage evenness to provide an indication of the distribution of coral species abundance patterns. Prior to regression analyses, correlations were examined between the three noted ecological indicators of change to assess their association during the recovery time period. In addition, two ecological indicators of present status were generated: 1) 2013 benthic substrate ratio, and 2) 2013 coral assemblage evenness.

Regression modeling was performed using the freely available R software (R Development Core Team 2008). Dependent variables were listed above. Independent variables included wave exposure, disturbed land per km^2, human population per km^2, a combined pollution proxy that represented the sum of disturbed land and human population, and mean herbivore size excluding new recruits that resided within size class bins below 10 cm. All variables were standardized to provide equal weighting for assessing their relative contributions, and a constant value was added to make all numbers positive (required for regression modeling). Only single term models were considered due to small sample sizes and to aid the relative assessment of individual stressors. Residual normality was inspected using the Shapiro-Wilk tests. Best-fit models were described in association with their Akaike's Information Criterion (AIC), whereby lower AIC scores indicated a better fit based upon R^2 values as well as the residual distributions.
Due to limited sites being established on the north shore of Tutuila compared to the south for logistical reasons, standard correlation testing was used to explore associations between the noted ecological indicators and environmental variables.

Two sites represented extreme outliers and were not considered in the existing regression modeling or correlation analysis. These were Leone (south) and Vatia (north). Leone has a disproportionally large and complex watershed, coupled with the most extensive human population density among sites in the present study. Further, watershed topography differs substantially at Leone, whereby watershed runoff runs through an extensive, flat drainage system prior to discharge to marine waters. Vatia represents the only site surveyed from a different reef type (type 3 noted in methods). As in previous reports, initial inspection of

regression models and correlation analyses found that both sites represented outliers for the present analyses (see *Watershed-based coral reef monitoring across Tutuila, American Samoa: Summary of decadal trends and 2013 assessment* by Dr. Peter Houk, David Benavente, and Steven Johnson).

Table 7. ALUS Determination Based on Habitat Assessment Data

Degree of Aquatic Life Use Support	Criteria
Fully Supporting	Reliable data indicate natural channel morphology, substrate composition, bank/riparian structure, and flow regime of region. Riparian vegetation of natural types and of relatively full standing crop biomass (i.e., minimal grazing or destructive pressure).
Partially Supporting	Modification of habitat slight to moderate usually due to road crossings, limited riparian zones because of encroaching land-use patterns, and some watershed erosion. Channel modification slight to moderate.
Not Supporting	Moderate to severe habitat alteration by channelization and dredging activities, removal of riparian vegetation, bank failure, heavy watershed erosion or alteration of flow regime.

Table 8. ALUS Determination Based on Bioassessment Data

Degree of Aquatic Life Use Support	Criteria
Fully Supporting	Reliable data indicate functioning, sustainable biological assemblages (e.g. fish, macroinvertebrates, or algae) none of which has been modified significantly beyond the natural range of the reference condition.
Partially Supporting	At least one assemblage (e.g. fish, macroinvertebrates, or algae) indicates moderate modification of the biological community compared to the reference condition.
Not Supporting	At least one assemblage indicates nonsupport. Data clearly indicate severe modification of the biological community compared to the reference condition.

Data levels for the four data type categories were ranked according to the hierarchy provided in the USEPA guidance (1997).

3.3 Recreation and Aesthetic Enjoyment

The current ASWQS lists Enterococci and *E.coli* as the microbiological indicators for fresh surface waters and Enterococci as the indicator for microbiological quality in marine waters.

Microbiological criteria used to determine use support for waters designated for whole body contact recreation are depicted in Table 9 below. The assessment methodology for determining whole body recreational contact in the 2008 report was based on the percentage of single sample exceedances. In the 2010 report, single sample maximum exceedances and the percentage of 5 week rolling geomean exceedances were included in the assessment methodology. For the 2012 report and this 2014 report, in addition to the single sample maximum exceedances, the annual geomean exceedances were used instead of percentage of 5 week rolling geomean exceedances.

Table 9. Whole Body Contact Recreation (all surface and marine water designations)

Level of Recreation Use Support	**Criteria**			
	Fresh Surface Water	Ocean Waters	Embayments: Pago Pago Harbor, Fagatele Bay, Pala Lagoon	All Other Embayments, Open Coastal Waters
Fully Supporting	*E. coli*: The single sample density of 576 per 100 mL is exceeded in ≤10 percent of measurements AND the annual geometric mean does not exceed 126. Enterococci: The single sample density of 151 per 100 mL is exceeded in ≤10 percent of measurements AND the annual geometric mean does not exceed 33.	Enterococci: The single sample density of 276 per 100 mL is exceeded in ≤10 percent of measurements AND the annual geometric mean does not exceed 35.	Enterococci: The single sample density of 104 per 100 mL is exceeded in ≤10 percent of measurements AND the annual geometric mean does not exceed 35.	Enterococci: The single sample density of 124 per 100 mL is exceeded in ≤10 percent of measurements AND the annual geometric mean does not exceed 35.
Partially Supporting	*E. coli*: The single sample density of 576 per 100 mL is exceeded in 11 to 25 percent of measurements OR the annual geometric mean of 126 is exceeded. Enterococci: The single sample density of 151 per 100 mL is exceeded in 11 to 25 percent of measurements OR the annual geometric mean of 33 is exceeded.	Enterococci: The single sample density of 276 per 100 mL is exceeded in 11 to 25 percent of measurements OR the annual geometric mean of 35 is exceeded.	Enterococci: The single sample density of 104 per 100 mL is exceeded in 11 to 25 percent of measurements OR the annual geometric mean of 35 is exceeded.	Enterococci: The single sample density of 124 per 100 mL is exceeded in 11 to 25 percent of measurements OR the annual geometric mean of 35 is exceeded.
Not Supporting	*E. coli*: The single sample density of 576 per 100 mL is exceeded in >25 percent of measurements OR the annual geometric mean of 126 is exceeded. Enterococci: The single sample density of 151 per 100 mL is exceeded in >25 percent of measurements OR the annual geometric mean of 33 is exceeded.	Enterococci: The single sample density of 276 per 100 mL is exceeded in >25 percent of measurements OR the annual geometric mean of 35 is exceeded.	Enterococci: The single sample density of 104 per 100 mL is exceeded in >25 percent of measurements OR the annual geometric mean of 35 is exceeded.	Enterococci: The single sample density of 124 per 100 mL is exceeded in >25 percent of measurements OR the annual geometric mean of 35 is exceeded.

3.4 Fish and Shellfish Consumption

Based on the results of the 2005 AS-EPA Tier II Fish Toxicity study, the fish consumption advisory continues to exist for fish and shellfish in the inner Pago Pago harbor. The USEPA guidance document (1997) provided classification hierarchy for use support status based on fish/shellfish consumption advisory data as depicted in Table 10 below.

Table 10. Fish/Shellfish Consumption Use Support Determination Based on Advisory Data

Degree of Aquatic Life Use Support	Criteria*
Fully Supporting	No fish/shellfish restrictions or bans are in effect.
Partially Supporting	"Restricted consumption" of fish in effect. Restricted consumption is defined as limits on the number of meals or size of meals consumed per unit of time for one or more fish/shellfish species. Or, a fish or shellfish ban in effect for a subpopulation that could be at potentially greater risk, for one or more fish/shellfish species.
Not Supporting	"No consumption" of fish or shellfish ban in effect for general population for one or more fish/shellfish species, or commercial fishing/shellfishing ban in effect.

* Fish/Shellfish consumption restrictions shall be determined based *on Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories. Risk Assessment and Fish Consumption Limits. Third Edition* (USEPA 2000). For target species, collect 3-10 individuals for each of 3-5 composites. Ranges are given due to highly variable abundance among coral reef fish species. Size-class composite analysis is not practicable for coral reef fish, since reef fish do not follow typical age-size relationships found for pelagic and temperate fishes (see *Tier 2 fish toxicity study. Chemical contaminants in fish and shellfish and recommended consumption limits for Territory of American Samoa*, 2005, by Peshut and Brooks).

4. Guidelines for Determining Consolidated Assessment and Listing Methodology (CALM) Categories

The Consolidated Assessment and Listing Methodology (CALM) categories for this report were determined from the *Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act* (USEPA 2005). Each water body type was assigned a CALM category, based on the following descriptions.

- 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].

iv. Streams Water Quality Assessment – FY12 and FY13 Data only

Using the guidelines presented above, American Samoa's stream waters were assessed according to levels of use support. This information is presented in Tables C2 through C4 in Appendix C and summarized in Appendix B.

AS-EPA gathered water quality data from streams in the Territory. All data were Monitored Data, no Evaluated Data was used for this report. The assessment of these data covers 58.4 miles out of 257.5 total stream miles (Table B2). The Assessed Goal was to Protect and Enhance Public Health. All other categories were either "Not Applicable" or "Applicable but no data was available" for this reporting period (Table C2). The Major Cause/Stress identified for this reporting period was Pathogen Indicators (Table C3). The major assessed sources of impairment were Collection System Failure and Intensive Animal Feeding Operations (Table C4). Trend analyses will be developed as stream monitoring continues and data accrues.

For the goal to Protect and Enhance Public Health, 58.4 stream miles were assessed for Swimming and all found to be Not Supporting (Table C2).

The following CALM categories were assigned based on the assessments for Swimming (Tables B1 and B2). Of the 31 watersheds with streams, twenty five watersheds were placed in Category 3 (199.1 miles). Six watersheds were placed in Category 5 (58.4 miles) A draft TMDL for enterococci in these watersheds was completed in 2013, but the TMDL has not yet been approved by USEPA.

v. Ocean Shoreline Assessment – FY12 and FY13 Data only

Using the guidelines presented above, American Samoa's ocean shoreline waters were assessed according to levels of use support. This information is presented in Tables C5 through C7 in Appendix C and summarized in Appendix B.

For this reporting period, the total size assessed in shoreline miles was 118.6 out of 149.5 total shoreline miles (Table B2). The Assessed Goals were 1) Protection and Enhancement of Ecosystems (Aquatic Life) and 2) Protection and Enhancement of Public Health (Fish Consumption and Whole Body Contact Recreation/Swimming). All other categories were either "Not Applicable" or "Applicable but no data was available" for this reporting period

(Table C5). The Major Causes/Stresses identified for this reporting period were PCBs, Metals (Mercury), Pathogen Indicators, and Undetermined NPS Stressor (Table C6). The Major sources of impairment were Collection System Failure and Intensive Animal Feeding Operations (Table C7). Trend analyses will be developed as the Territorial coral reef and marine monitoring program continues and data accrues.

For the goal Protect and Enhance Ecosystems (Aquatic Life) 45.1 miles were assessed. Of this total, 15.5 miles were Fully Supporting, 12.8 miles were Partially Supporting, and 16.8 miles were Not Supporting. For the goal to Protect and Enhance Public Health, 104.2 shoreline miles were assessed for swimming. Of this total, 45.5 miles were Fully Supporting, 5.9 miles were Partially Supporting, and 52.9 miles were Not Supporting. For the goal to Protect and Enhance Public Health, 7.9 shoreline miles were assessed for fish consumption, and 7.9 miles were found to be Not Supporting (Table C5).

The following CALM categories were assigned based on the assessments for Aquatic Life Use Support and Swimming (Tables B1 and B2). Nine of the 41 watersheds in American Samoa were given a CALM Category 2 (51.8 miles). Twenty two watersheds received a Category 5 rating (66.8 miles). A draft TMDL for enterococci in these watersheds was completed in 2013, but the TMDL has not yet been approved by USEPA.

vi. Wetlands Assessment – only FY12 and FY13 Data

No wetlands assessments were conducted during this reporting period. All watersheds that contained wetlands (14 out of 41) were placed in CALM category 3 (396.0 acres). Wetland assessment information is presented in Tables B8 through B10.

vii. Schedule for Establishing TMDLs / 303 (d) List

A TMDL priority list (303(d) list) for Category 5 waters is given in Appendix A.

A draft TMDL for the pollutant enterococcus in beaches and streams was completed in 2013. The new high priority pollutants for TMDL development (2016) are TN/TP in streams.

viii. Evaluating Pollutants/Surface Waters for Removal from the 303(d) List

AS-EPA shall remove a pollutant of a surface water from the 303(d) list based on one or more of the following criteria:

- USEPA approved a TMDL for the pollutant;
- The data used for previous listing is superseded by more recent credible and scientifically defensible data showing that the surface water meets the applicable numeric or narrative surface water quality standard. All historical data is considered, with a greater weight placed on more recent (last 3 – 5 years) data, except for Ocean

Shoreline (beaches for swimming), with a greater weight placed on the last 2 years because of the large number of samples collected;

- The surface water no longer meets the criteria for impairment based on a change in the applicable water quality standard or a designated use approved by USEPA;
- The surface water no longer meets the criteria for impairment for the specific narrative water quality standard based on a change in narrative water quality standard implementation procedures;
- A re-evaluation of the data indicate that the surface water does not meet the criteria for impairment because of a deficiency in the original analysis; or
- Pollutant loadings from naturally occurring conditions alone are sufficient to cause a violation of applicable water quality standards.

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

ix. Pollutant/Surface Water Combinations Removed from the 303(d) List

No waterbodies were removed from the 303(d) list in this reporting period.

The pollutant enterococcus was removed for the ocean shoreline in Watershed 26 (Matuu) because the data used for previous listing is superseded by more recent credible and scientifically defensible data showing that the waters now meet the enterococcus numeric water quality standards for single sample and geometric mean criteria. The watershed is now Fully supporting for recreational use. In addition, the 2013 draft TMDL found that at both beaches in the watershed bacteria concentrations typically fall below the enterococcus WQS single sample maximum. However the watershed remains on the 303 (d) list due to a Partially Supporting use support determination for ALUS.

x. Results of Probabilistic-based Surveys

In 2009, USEPA partnered with American Samoa EPA, CNMI DEQ, and Guam EPA to implement a Reef Flat survey effort in these Territories as part of the 2010 National Coastal Assessment (NCA). Fifty sampling locations on reef flats in each Territory were established within a probabilistic sampling framework. Indicator parameters were measured at all selected sampling sites. Indicators included water column hydrography (temperature, pH, dissolved oxygen, salinity, PAR), water chemistry (chlorophyll *a*, total nitrogen, dissolved inorganic nitrogen, total phosphorus, dissolved inorganic phosphorus, silicates), microbiology (enterococci), and a bioassessment (characterization of the major floral and faunal composition). Sampling for American Samoa was conducted in July 2010.

Principal survey objectives included:

1. Conduct a comprehensive survey of water quality indicators on the reef flats of Tutuila and Aunuu islands, utilizing the probabilistic design approach developed by EMAP. A reef flat is

defined as the shallow area between the shoreline intertidal zone and the reef crest of a fringing reef. The reef crest is defined as the sharp break in slope at seaward margin or edge of reef flat. The reef crest is typically slightly elevated compared to the reef flat and is the location of primary breakers.

2. Compare collected data with numerical criteria to develop a "snapshot" of current water quality conditions.

3. Establish a baseline for evaluation of how the conditions of the reef flat resources of American Samoa change over time. Repeated reef flat surveys on the order of every 5 years can then detect trends in environmental conditions.

Reef flat conditions were assessed by two water quality criteria, ASWQS (compliance or non compliance with numerical standards) and NCA draft criteria for Tropical Waters. Conditions were also assessed by benthic integrity rankings. ASWQS determinations are provided in Tables 11A and 11B below.

Note: Total reef flat area of Tutuila and Aunuu is 6.9 km^2. However, size of area assessed was 5.7 km^2 because 1.2 km^2 was not assessed due to unsafe conditions.

Table 11A. Attainment Results for Aquatic Life Use Support Calculated Using Probabilistic Monitoring Designs

Project Name	Am. Samoa Reef Flat Survey
Target Population	Reef flats of Tutuila and Aunuu
Type of Waterbody	Pago Pago Harbor, Embayments, and Open Coastal Waters
Size of Target Population	5.7
Units of Measurement	km^2
Designated_Use	Aquatic Life Use Support
Percent_attaining	76%
Percent_not attaining	24%
Percent nonresponsive	n/a
Indicator	Physical-chemical
Assessment date	July 2010
Precision	95%

Table 11B. Attainment Results for Swimming Use Support Calculated Using Probabilistic Monitoring Designs

Project Name	Am. Samoa Reef Flat Survey
Target Population	Reef flats of Tutuila and Aunuu
Type of Waterbody	Pago Pago Harbor, Embayments, and Open Coastal Waters
Size of Target Population	5.7
Units of Measurement	km^2
Designated_Use	Swimming
Percent_attaining	100%
Percent_not attaining	0%
Percent nonresponsive	n/a
Indicator	Bacteriological (Enterococcus)
Assessment date	July 2010
Precision	95%

xi. Cumulative Use Support Summary

The narrative section of the 2014 report, as well as assessments presented in Appendix B and Appendix C, reflect data collected in FY12 and FY13 only.

A cumulative assessment that reflects all data collected between FY03 and FY13 is presented in Appendix A. For this summary, the lowest level of use support was used for watersheds where use support determination differed from year to year, except where a pollutant or watershed has been removed from the Section 303(d) list. Since wetland data was low precision evaluated data, all wetlands were assigned to CALM Category 3.

IV Groundwater Assessment

Tables 12 to 14 report on the quality of the Tutuila, Ofu/Olosega and Ta'u aquifers that provide the majority of American Samoa's ground water resources. Table 12 provides an overview of the most important sources of ground water contamination. Best professional judgment provided the methodology and justification for prioritization of the sources indicated. In the same table, letters in the third column correspond with the following concerns for each contaminant source.

A. Human health and/or environmental risk (toxicity)
B. Size of population at risk
C. Location of sources relative to drinking water sources
D. Number and/or size of contaminant sources
E. Hydrogeologic sensitivity
F. Territorial findings, other findings
H. Geographic distribution/occurrence

As well, letters in the fourth column correspond with the contaminants/classes of contaminants considered to be associated with each of the sources that were checked.

A. Inorganic pesticides
B. Organic pesticides
C. Halogenated solvents
D. Petroleum compounds
E. Nitrate
G. Salinity/brine
H. Metals
I. Radionuclides
J. Bacteria
K. Protozoa
L. Viruses

Table 13 provides a summary of American Samoa's ground water protection efforts. AS-EPA and other cooperating government agencies have increased efforts to monitor and protect groundwater resources. Table 14 provides and ground water contaminant summary for the Tutuila aquifer. Tables 15-22 provide the occurrence of particular groups of contaminants for each hydrogeologic setting in American Samoa.

In FY12 continuous boil water notices due to E.coli were published for the Tafuna Plains area of the ASG Central public water system. Ground Water Under the Direct Influence of Surface Water (GUDI) studies have been initiated to determine if existing wells are under the direct influence of surface water. As of FY13, GUDI studies have been completed on 20 wells, and 9 wells have been determined GUDI. This surface water influence is the cause of the current boil water notices. The water system operator is working diligently to drill replacement wells so the boil water notices can be lifted.

Table 12: Major Sources of Ground Water Contamination

Contaminant Source	Ten Highest Priority Sources	Factors Considered in Selecting a Contaminant Source	Contaminants
Agricultural Activities			
Agricultural chemical facilities			
Animal feedlots	x	A,B,C,D,E,G	E,J,K,L
Drainage wells			
Fertilizer applications	x	A,B,C,D,E,G	E,J,K,L
Irrigation practices			
Pesticide applications	x	A,B,C,D,E,G	A,B
On-farm agricultural mixing and loading procedures			
Land application of manure (unregulated)			
Storage and Treatment Activities			
Land application (regulated or permitted)			
Material stockpiles			
Storage tanks (above ground)			
Storage tanks (underground)	x	A,B,C,D,E,G	D
Surface impoundments			
Waste piles			
Waste tailings			
Disposal Activities			
Deep injection wells			
Landfills	x	A,E	A,B,C,D,E,H,I,J,K,L
Septic systems	x	A,B,C,D,E,G	E,J,K,L
Shallow injection wells			
Other			
Hazardous waste generators			
Hazardous waste sites			
Large industrial facilities			
Material transfer operations			
Mining and mine drainage			
Pipelines and sewer lines	x	A,B,C,D,E,G	E,J,K,L
Salt storage and road salting			
Salt water intrusion	x	A,B,C,D,E,F,G	G
Spills			
Transportation of materials			
Urban runoff	x	A,B,C,D,E,G	C,D
Small-scale manufacturing and repair shops	x	A,C,E,G	C,D,H
Other sources (please specify)			

Table 13: Summary of American Samoa's Ground Water Protection Programs.

Programs or Activities	Program Exists or is Under Development	Implementation Status	Responsible State Agency
Active SARA Title III Program	x	under development	AS-EPA/TEMCO
Ambient ground water monitoring system	x	fully established	ASPA/AS-EPA
Aquifer vulnerability assessment	x	fully established	AS-EPA/ASPA
Aquifer mapping	x	under development	AS-EPA/ASPA
Aquifer characterization	x	under development	AS-EPA/ASPA
Comprehensive data management system	x	fully established	AS-EPA/ASPA
EPA-endorsed Core Comprehensive State Ground Water Protection Program (CSGWPP)	x	under development	AS-EPA/ASPA
Ground water discharge permits			
Ground water Best Management Practices	x	under development	AS-EPA/ASPA
Ground water legislation	x	fully established	AS-EPA/ASPA
Ground water classification	x	under development	AS-EPA/ASPA
Ground water quality standards	x	fully established	AS-EPA
Interagency coordination for ground water protection initiatives	x	fully established	AS-EPA/ASPA
Non point source controls	x	fully established	AS-EPA/ASPA/DOC
Pesticide State Management Plan	x	fully established	AS-EPA
Pollution Prevention Program	x	fully established	AS-EPA
Resource Conservation and Recovery Act (RCRA) Primacy			
Source Water Assessment Program			
State Superfund			
State RCRA Program incorporating more stringent requirements than RCRA Primacy			
State septic system regulations	x	fully established	ASPA/Public Health
Underground storage tank installation requirements	x	fully established	AS-EPA
Underground storage tank remediation fund			
Underground storage tank permit program	x	fully established	AS-EPA
Underground injection control program			
Vulnerability assessment for drinking water/wellhead protection	x	fully established	AS-EPA/ASPA
Well abandonment regulations	x	fully established	AS-EPA/ASPA
Wellhead Protection Program (EPA approved)	x	under development	AS-EPA/ASPA
Well installation regulations	x	fully established	AS-EPA/ASPA
Brownfields 128(a) Program	x	fully established	AS-EPA

Table 14: Ground Water Contamination Summary

Source Type	Number of Sites	Number of sites that are listed and/or have confirmed releases	Number of sites with confirmed ground water contamination	Contaminants	Number of site investigations	Number of sites that have been stabilized or have had the source removed	Number of sites with corrective action plans	Number of sites with active remediation	Number of sites with cleanup completed
NPL	0								
CERCLIS (non-NPL)	0								
DOD/DOE	2	2	0	Petroleum	2	1	2	1	1
LUST	1	1	0	Petroleum	1	0	0	0	0
RCRA Corrective Action	0								
Underground Injection	0								
State Sites	3	3	0	PCB, Petroleum	3	2	3	1	2
Non-Point Sources	0								
Other (specify)	0								

NPL - National Priority List
CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System
DOE - Department of Energy
DOD - Department of Defense
LUST - Leaking Underground Storage Tanks

Table 15. Aquifer Monitoring Data
Hydrogeologic Setting: Tutuila (ASG Central)
Data Reporting Period: FY12 and FY13

Monitoring Data Type	Total No. of Wells Used in the Assessment	Parameter Groups	Number of Wells								
			No detections of parameters above MDLs or background levels		Nitrate concentrations range from background levels to less than or equal to 5 mg/l **AND** No detections of parameters other than nitrate above MDLs or background levels and/or located in areas that are sensitive or vulnerable		Nitrate ranges from greater than 5 to less than or equal to 10 mg/l **OR** Other parameters are detected at concentrations exceeding the MDLs but less than or equal to the MCLs	One or more parameters are detected at concentrations exceeding the MCLs	Number of Wells Removed from service	Number of wells Requiring Special Treatment1	Background parameters exceed MCLs
			ND	Number of wells in sensitive or vulnerable areas (optional)	Nitrate ≤ 5mg/l AND VOC, SOC, and other parameters not detected	Number of wells in sensitive or vulnerable areas (optional)					
Untreated Water Quality Data from Public Water Supply Wells		**VOC**									
		SOC									
		NO3									
		Other									
Finished Water Quality Data from Public Water Supply Wells	39	**VOC**	39	39	-	-	-	0	0	0	0
		SOC	39	39	-	-	-	0	0	0	0
		NO3	0	39	39	39	0	0	0	0	0
		Other2	-	-	-	-	-	-	-	-	-

1 All groundwater wells required chlorination treatment.
2 Includes inorganic chemical contaminants only

Table 16. Aquifer Monitoring Data
Hydrogeologic Setting: Aoa
Data Reporting Period: FY12 and FY13

Monitoring Data Type	Total No. of Wells Used in the Assessment	Parameter Groups	Number of Wells								
			No detections of parameters above MDLs or background levels		Nitrate concentrations range from background levels to less than or equal to 5 mg/l **AND** No detections of parameters other than nitrate above MDLs or background levels and/or located in areas that are sensitive or vulnerable		Nitrate ranges from greater than 5 to less than or equal to 10 mg/l **OR** Other parameters are detected at concentrations exceeding the MDLs but less than or equal to the MCLs	One or more parameters are detected at concentrations exceeding the MCLs	Number of Wells Removed from service	Number of wells Requiring Special Treatment1	Background parameters exceed MCLs
			ND	Number of wells in sensitive or vulnerable areas (optional)	Nitrate ≤ 5mg/l AND VOC, SOC, and other parameters not detected	Number of wells in sensitive or vulnerable areas (optional)					
Untreated Water Quality Data from Public Water Supply Wells		**VOC**									
		SOC									
		NO3									
		Other									
Finished Water Quality Data from Public Water Supply Wells	2	**VOC**	2	2	-	-	0	0	0	0	0
		SOC	2	2	-	-	0	0	0	0	0
		NO3	0	2	2	2	0	0	0	0	0
		Other2	-	-	-	-	-	-	-	-	-

1 All groundwater wells required chlorination treatment.
2 Includes inorganic chemical contaminants only.

Table 17. Aquifer Monitoring Data
Hydrogeologic Setting: Fagasa
Data Reporting Period: FY12 and FY13

Monitoring Data Type	Total No. of Wells Used in the Assessment	Parameter Groups	Number of Wells								
			No detections of parameters above MDLs or background levels		Nitrate concentrations range from background levels to less than or equal to 5 mg/l **AND** No detections of parameters other than nitrate above MDLs or background levels and/or located in areas that are sensitive or vulnerable		Nitrate ranges from greater than 5 to less than or equal to 10 mg/l **OR** Other parameters are detected at concentrations exceeding the MDLs but less than or equal to the MCLs	One or more parameters are detected at concentrations exceeding the MCLs	Number of Wells Removed from service	Number of wells Requiring Special Treatment1	Background parameters exceed MCLs
			ND	Number of wells in sensitive or vulnerable areas (optional)	Nitrate ≤ 5mg/l AND VOC, SOC, and other parameters not detected	Number of wells in sensitive or vulnerable areas (optional)					
Untreated Water Quality Data from Public Water Supply Wells		**VOC**									
		SOC									
		NO3									
		Other									
Finished Water Quality Data from Public Water Supply Wells	2	**VOC**	2	2	-	-	0	0	0	0	0
		SOC	2	2	-	-	0	0	0	0	0
		NO3	0	2	2	2	0	0	0	0	0
		Other2	-	-	-	-	-	-	-	-	-

1 All groundwater wells required chlorination treatment.
2 Includes inorganic chemical contaminants only.

Table 18. Aquifer Monitoring Data
Hydrogeologic Setting: Masefau
Data Reporting Period: FY12 and FY13

Monitoring Data Type	Total No. of Wells Used in the Assessment	Parameter Groups	Number of Wells								
			No detections of parameters above MDLs or background levels		Nitrate concentrations range from background levels to less than or equal to 5 mg/l **AND** No detections of parameters other than nitrate above MDLs or background levels and/or located in areas that are sensitive or vulnerable		Nitrate ranges from greater than 5 to less than or equal to 10 mg/l **OR** Other parameters are detected at concentrations exceeding the MDLs but less than or equal to the MCLs	One or more parameters are detected at concentrations exceeding the MCLs	Number of Wells Removed from service	Number of wells Requiring Special Treatment1	Background parameters exceed MCLs
			ND	Number of wells in sensitive or vulnerable areas (optional)	Nitrate ≤ 5mg/l AND VOC, SOC, and other parameters not detected	Number of wells in sensitive or vulnerable areas (optional)					
Untreated Water Quality Data from Public Water Supply Wells		**VOC**									
		SOC									
		NO3									
		Other									
Finished Water Quality Data from Public Water Supply Wells	2	**VOC**	2	2	-	-	0	0	0	0	0
		SOC	2	2	-	-	0	0	0	0	0
		NO3	0	2	2	2	0	0	0	0	0
		Other2	-	-	-	-	-	-	-	-	-

1 All groundwater wells required chlorination treatment.
2 Includes inorganic chemical contaminants only.

Table 19. Aquifer Monitoring Data
Hydrogeologic Setting: Vatia
Data Reporting Period: FY12 and FY13

Monitoring Data Type	Total No. of Wells Used in the Assessment	Parameter Groups	Number of Wells								
			No detections of parameters above MDLs or background levels		Nitrate concentrations range from background levels to less than or equal to 5 mg/l **AND** No detections of parameters other than nitrate above MDLs or background levels and/or located in areas that are sensitive or vulnerable		Nitrate ranges from greater than 5 to less than or equal to 10 mg/l **OR** Other parameters are detected at concentrations exceeding the MDLs but less than or equal to the MCLs	One or more parameters are detected at concentrations exceeding the MCLs	Number of Wells Removed from service	Number of wells Requiring Special Treatment1	Background parameters exceed MCLs
			ND	Number of wells in sensitive or vulnerable areas (optional)	Nitrate ≤ 5mg/l AND VOC, SOC, and other parameters not detected	Number of wells in sensitive or vulnerable areas (optional)					
Untreated Water Quality Data from Public Water Supply Wells		**VOC**									
		SOC									
		NO3									
		Other									
Finished Water Quality Data from Public Water Supply Wells	2	**VOC**	2	2	-	-	0	0	0	0	0
		SOC	2	2	-	-	0	0	0	0	0
		NO3	0	2	2	2	0	0	0	0	0
		Other2	-	-	-	-	-	-	-	-	-

1 All groundwater wells required chlorination treatment.
2 Includes inorganic chemical contaminants only.

Table 20. Aquifer Monitoring Data
Hydrogeologic Setting: Afono
Data Reporting Period: FY12 and FY13

Monitoring Data Type	Total No. of Wells Used in the Assessment	Parameter Groups	Number of Wells								
			No detections of parameters above MDLs or background levels		Nitrate concentrations range from background levels to less than or equal to 5 mg/l **AND** No detections of parameters other than nitrate above MDLs or background levels and/or located in areas that are sensitive or vulnerable		Nitrate ranges from greater than 5 to less than or equal to 10 mg/l **OR** Other parameters are detected at concentrations exceeding the MDLs but less than or equal to the MCLs	One or more parameters are detected at concentrations exceeding the MCLs	Number of Wells Removed from service	Number of wells Requiring Special Treatment1	Background parameters exceed MCLs
			ND	Number of wells in sensitive or vulnerable areas (optional)	Nitrate ≤ 5mg/l AND VOC, SOC, and other parameters not detected	Number of wells in sensitive or vulnerable areas (optional)					
Untreated Water Quality Data from Public Water Supply Wells		**VOC**									
		SOC									
		NO3									
		Other									
Finished Water Quality Data from Public Water Supply Wells	2	**VOC**	2	2	-	-	0	0	0	0	0
		SOC	2	2	-	-	0	0	0	0	0
		NO3	0	2	2	2	0	0	0	0	0
		Other2	-	-	-	-	-	-	-	-	-

1 All groundwater wells required chlorination treatment.
2 Includes inorganic chemical contaminants only.

Table 21. Aquifer Monitoring Data
Hydrogeologic Setting: Aunu'u
Data Reporting Period: FY12 and FY13

Monitoring Data Type	Total No. of Wells Used in the Assessment	Parameter Groups	Number of Wells								
			No detections of parameters above MDLs or background levels		Nitrate concentrations range from background levels to less than or equal to 5 mg/l **AND** No detections of parameters other than nitrate above MDLs or background levels and/or located in areas that are sensitive or vulnerable		Nitrate ranges from greater than 5 to less than or equal to 10 mg/l **OR** Other parameters are detected at concentrations exceeding the MDLs but less than or equal to the MCLs	One or more parameters are detected at concentrations exceeding the MCLs	Number of Wells Removed from service	Number of wells Requiring Special Treatment1	Background parameters exceed MCLs
			ND	Number of wells in sensitive or vulnerable areas (optional)	Nitrate ≤ 5mg/l AND VOC, SOC, and other parameters not detected	Number of wells in sensitive or vulnerable areas (optional)					
Untreated Water Quality Data from Public Water Supply Wells		**VOC**									
		SOC									
		NO3									
		Other									
Finished Water Quality Data from Public Water Supply Wells	2	**VOC**	2	2	-	-	0	0	0	0	0
		SOC	2	2	-	-	0	0	0	0	0
		NO3	0	2	2	2	0	0	0	0	0
		Other2	-	-	-	-	-	-	1	-	-

1 All groundwater wells required chlorination treatment.
2 Includes inorganic chemical contaminants only.

Table 22. Aquifer Monitoring Data
Hydrogeologic Setting: Ofu
Data Reporting Period: FY12 and FY13

Monitoring Data Type	Total No. of Wells Used in the Assessment	Parameter Groups	Number of Wells								
			No detections of parameters above MDLs or background levels		Nitrate concentrations range from background levels to less than or equal to 5 mg/l **AND** No detections of parameters other than nitrate above MDLs or background levels and/or located in areas that are sensitive or vulnerable		Nitrate ranges from greater than 5 to less than or equal to 10 mg/l **OR** Other parameters are detected at concentrations exceeding the MDLs but less than or equal to the MCLs	One or more parameters are detected at concentrations exceeding the MCLs	Number of Wells Removed from service	Number of wells Requiring Special Treatment1	Background parameters exceed MCLs
			ND	Number of wells in sensitive or vulnerable areas (optional)	Nitrate ≤ 5mg/l AND VOC, SOC, and other parameters not detected	Number of wells in sensitive or vulnerable areas (optional)					
Untreated Water Quality Data from Public Water Supply Wells		**VOC**									
		SOC									
		NO3									
		Other									
Finished Water Quality Data from Public Water Supply Wells	2	**VOC**	2	2	-	-	0	0	0	0	0
		SOC	2	2	-	-	0	0	0	0	0
		NO3	0	2	2	2	0	0	0	0	0
		Other2	-	-	-	-	-	-	-	-	-

1 All groundwater wells required chlorination treatment.
2 Includes inorganic chemical contaminants only.

Table 23. Aquifer Monitoring Data
Hydrogeologic Setting: Olosega
Data Reporting Period: FY12 and FY13

Monitoring Data Type	Total No. of Wells Used in the Assessment	Parameter Groups	Number of Wells								
			No detections of parameters above MDLs or background levels		Nitrate concentrations range from background levels to less than or equal to 5 mg/l **AND** No detections of parameters other than nitrate above MDLs or background levels and/or located in areas that are sensitive or vulnerable		Nitrate ranges from greater than 5 to less than or equal to 10 mg/l **OR** Other parameters are detected at concentrations exceeding the MDLs but less than or equal to the MCLs	One or more parameters are detected at concentrations exceeding the MCLs	Number of Wells Removed from service	Number of wells Requiring Special Treatment1	Background parameters exceed MCLs
			ND	Number of wells in sensitive or vulnerable areas (optional)	Nitrate ≤ 5mg/l AND VOC, SOC, and other parameters not detected	Number of wells in sensitive or vulnerable areas (optional)					
Untreated Water Quality Data from Public Water Supply Wells		**VOC**									
		SOC									
		NO3									
		Other									
Finished Water Quality Data from Public Water Supply Wells	2	**VOC**	2	2	-	-	0	0	0	0	0
		SOC	2	2	-	-	0	0	0	0	0
		NO3	-	-	-	-	-	-	0	0	0
		Other2	-	-	-	-	-	-	-	-	-

1 All groundwater wells required chlorination treatment.
2 Includes inorganic chemical contaminants only.

Table 24. Aquifer Monitoring Data
Hydrogeologic Setting: Ta'u-Faleasao
Data Reporting Period: FY12 and FY13

Monitoring Data Type	Total No. of Wells Used in the Assessment	Parameter Groups	Number of Wells								
			No detections of parameters above MDLs or background levels		Nitrate concentrations range from background levels to less than or equal to 5 mg/l **AND** No detections of parameters other than nitrate above MDLs or background levels and/or located in areas that are sensitive or vulnerable		Nitrate ranges from greater than 5 to less than or equal to 10 mg/l **OR** Other parameters are detected at concentrations exceeding the MDLs but less than or equal to the MCLs	One or more parameters are detected at concentrations exceeding the MCLs	Number of Wells Removed from service	Number of wells Requiring Special Treatment1	Background parameters exceed MCLs
			ND	Number of wells in sensitive or vulnerable areas (optional)	Nitrate ≤ 5mg/l AND VOC, SOC, and other parameters not detected	Number of wells in sensitive or vulnerable areas (optional)					
Untreated Water Quality Data from Public Water Supply Wells		**VOC**									
		SOC									
		NO3									
		Other									
Finished Water Quality Data from Public Water Supply Wells	3	**VOC**	3	3	-	-	0	0	0	0	0
		SOC	3	3	-	-	0	0	0	0	0
		NO3	0	3	3	3	0	0	0	0	0
		Other2	-	-	-	-	-	-	-	-	-

1 All groundwater wells required chlorination treatment.
2 Includes inorganic chemical contaminants only

Table 25. Aquifer Monitoring Data
Hydrogeologic Setting: Fitiuta
Data Reporting Period: FY12 and FY13

Monitoring Data Type	Total No. of Wells Used in the Assessment	Parameter Groups	Number of Wells								
			No detections of parameters above MDLs or background levels		Nitrate concentrations range from background levels to less than or equal to 5 mg/l **AND** No detections of parameters other than nitrate above MDLs or background levels and/or located in areas that are sensitive or vulnerable		Nitrate ranges from greater than 5 to less than or equal to 10 mg/l **OR** Other parameters are detected at concentrations exceeding the MDLs but less than or equal to the MCLs	One or more parameters are detected at concentrations exceeding the MCLs	Number of Wells Removed from service	Number of wells Requiring Special Treatment1	Background parameters exceed MCLs
			ND	Number of wells in sensitive or vulnerable areas (optional)	Nitrate ≤ 5mg/l AND VOC, SOC, and other parameters not detected	Number of wells in sensitive or vulnerable areas (optional)					
Untreated Water Quality Data from Public Water Supply Wells		**VOC**									
		SOC									
		NO3									
		Other									
Finished Water Quality Data from Public Water Supply Wells	1	**VOC**	1	1	-	-	0	0	0	0	0
		SOC	1	1	-	-	0	0	0	0	0
		NO3	0	1	1	1	0	0	0	0	0
		Other2	-	-	-	-	-	-	-	-	-

1 All groundwater wells required chlorination treatment.
2 Includes inorganic chemical contaminants only

V Public Participation Process

As part of the integrated report process, AS-EPA announced the completion of the Integrated Water Quality Monitoring and Assessment Report and solicited public comments over a 30-day period. The public announcements were advertised in a local newspaper and on the ASEPA website, and the document was made available to any interested member of the public to review and provide comments. No comments were received.

VI Appendix A Table A1. 305b Use Support / CALM Assessment Category Summary (Cumulative: Includes all FY03 to FY13 data)

WATERSHED	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Development Category	mi	mi	pr	pr	pr	pr	mi	in	pr	mi	mi	mi	mi	mi	in	in	in	ex	mi	in	in	mi	ex	ex	ex	in	ex	ex	pr	ex	mi	in	in	ex	pr	mi	pr	mi	pr	pr	pr
Waterbody Type **Designated Use**																																									
Streams																																									
Aquatic Life	F	N	F	F	F		N	F	F	N		N	N		F	F	F	N	F	N	N	N	N	N	N	N	N			N	F	F									
Swimming	N	N	N	N	N		N	N	N	N		N	N					N	N		N	N	N	N	N	N	N			N											
Drinking Water																																									
CALM Assessment Category	5	5	5	5	5	3	5	5	5	5	3	5	5		2	2	2	5	5	5	5	5	5	5	5	5	5			5	2	2	3								3
Ocean Shoreline																																									
Aquatic Life			F				N	N	F	F		N	F	N	N						N	F	N	F	N	N		P	P	P				F							
Swimming			N					N		N	N	N	N	P	N	N	F	F	F	N	N	N	N	F	N	F	N	F		N	N	P	P	F		F		F		F	
Fish Consumption	F																				F		F	N	F	F				F											
CALM Assessment Category	2	3	5	3	3	3	5	5	2	5	5	5	5	5	5	5	2	2	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	2	3	1	3	2	3	2	3
Wetlands																																									
Aquatic Life																																									
Agriculture																																									
Cult./Ceremonial																																									
Recreation																																									
CALM Assessment Category										3		3			3		3	3			3			3			3			3				3	3	3		3		3	

Note: In watersheds where samples were taken at more than one site, the lowest level of use support was used for the summary.

Legend

Shaded areas indicate watersheds that do not have the waterbody type for evaluating designated use, or, the designated use does not apply for the waterbody in that watershed.

Designated Use Support Level
F - Fully Supporting (good)
P - Partially Supporting (fair)
N - Not Supporting (poor)

Development Category
pr - pristine
mi - minimal
in - intermediate
ex - extensive

CALM Assessment Category
1 - All Designated Uses (DUs) met
2 - Some DUs met; insufficient data to evaluate remaining DUs
3 - Insufficient data to evaluate any DUs
4 - Water is impaired; TMDL not needed
5 - Water is impaired; TMDL needed

Note: All Waterbodies (Streams) have only ASWQS Class 2 designated uses

Note: In watersheds where use support determination differed from year to year the lowest level of use support was used for this summary, except where a pollutant or watershed has been removed from the 303(d) list.

Table A2. Size of Surface Waters Assigned to Reporting Categories Summary (Cumulative: Includes all FY03 to FY013 data)

Waterbody Type	Category							Total in Territory	Total Assessed
	1	2	3	4a	4b	4c	5		
Stream, Miles	0.0	20.5	26.9	0.0	0.0	0.0	210.1	257.5 miles	230.6
Ocean Shoreline, Miles	5.2	41.1	25.0	0.0	0.0	0.0	78.2	149.5 miles	124.5
Wetlands, Acres	0.0	0.0	396.0	0.0	0.0	0.0	0.0	396.0	0.0

CALM Assessment Category

1-- All Designated Uses (DUs) met.
2-- Some DUs met; insufficient data to evaluate remaining Dus.
3-- Insufficient data to evaluate any DUs.
4-- Water is impaired; TMDL not needed.
4a- Impaired or threatened for one or more designated uses but does not require the development of a TMDL because TMDL had been completed.
4b- Impaired or threatened for one or more designated uses but does not require the development of a TMDL because other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the
4c- Impaired or threatened for one or more designated uses but does not require the development of a TMDL because impairement is not caused by a pollutant.
5-- Water is impaired; TMDL needed.

Table A3. 2014 303 (d) and TMDL Priority List

Category 5 Waters - 303(d) List (High Priority for TN/TP, Medium Priority for Other Pollutants)

Waterbody Type	Watershed Number	Pollutant	Year Listed	Projected TMDL Submittal Date (TN/TP)	Projected TMDL Submittal Date (Other Pollutants)
Streams	2	TN, TP, Turbidity, DO / Enterococcus	2004 / 2008	2016	2018
Streams	20	TN, TP, Turbidity, DO	2004	2016	2018
Streams	21	TN, TP, Turbidity, DO / Enterococcus	2004 / 2008	2016	2018
Streams	24	TN, TP, Turbidity, DO / Enterococcus	2004 / 2010	2016	2018
Streams	25	TN, TP, Turbidity / Enterococcus	2004 / 2010	2016	2018
Streams	26	TN, TP, Turbidity, DO / Enterococcus	2004 / 2010	2016	2018
Streams	27	TN, TP, Turbidity, DO / Enterococcus	2004 / 2008	2016	2018
Streams	7	TN, TP / Enterococcus	2006 / 2010	2016	2018
Streams	1	Enterococcus	2008	2016	2018
Streams	3	Enterococcus	2008	2016	2018
Streams	4	Enterococcus	2008	2016	2018
Streams	8	Enterococcus	2008	2016	2018
Streams	10	Enterococcus / TN, Turbidity, DO	2008 / 2010	2016	2018
Streams	19	Enterococcus	2008	2016	2018
Streams	23	Enterococcus / TN, TP, Turbidity	2008 / 2010	2016	2018
Streams	30	Enterococcus / TN, TP, Turbidity, DO	2008 / 2010	2016	2018
Streams	5	Enterococcus	2010	2016	2018
Streams	9	Enterococcus	2010	2016	2018
Streams	12	TN, TP, Turbidity, DO, Enterococcus	2010	2016	2018
Streams	13	TN, TP, Turbidity, Enterococcus	2010	2016	2018
Streams	18	TN, TP, Turbidity, DO, Enterococcus	2010	2016	2018
Streams	22	TN, TP, Turbidity, Enterococcus	2010	2016	2018

Note: Draft Enterococcus TMDL completed in 2014

Category 5 Waters - 303(d) List (High Priority for TN/TP, Medium Priority for Other Pollutants)

Waterbody Type	Watershed Number	Pollutant	Year Listed	Projected TMDL Submittal Date (TN/TP)	Projected TMDL Submittal Date (Other Pollutants)
Ocean Shoreline	23	Enterococcus / Undetermined NPS Stressor	2004 / 2008	N/A	2018
Ocean Shoreline	24	Enterococcus	2004	N/A	2018
Ocean Shoreline	25	Enterococcus / Undetermined NPS Stressor	2004 / 2008	N/A	2018
Ocean Shoreline	26	Undetermined NPS Stressor	2008	N/A	2018
Ocean Shoreline	27	Enterococcus	2004	N/A	2018
Ocean Shoreline	3	Enterococcus	2006	N/A	2018
Ocean Shoreline	8	Enterococcus / Undetermined NPS Stressor	2006 / 2008	N/A	2018
Ocean Shoreline	10	Enterococcus	2006	N/A	2018
Ocean Shoreline	12	Enterococcus / Undetermined NPS Stressor	2006 / 2008	N/A	2018
Ocean Shoreline	15	Enterococcus/ Undetermined NPS Stressor	2006 / 2008	N/A	2018
Ocean Shoreline	21	Enterococcus / Undetermined NPS Stressor	2006 / 2008	N/A	2018
Ocean Shoreline	30	Enterococcus/ Undetermined NPS Stressor	2006 / 2008	N/A	2018
Ocean Shoreline	32	Enterococcus	2006	N/A	2018
Ocean Shoreline	33	Enterococcus	2006	N/A	2018
Ocean Shoreline	7	Undetermined NPS Stressor	2008	N/A	2018
Ocean Shoreline	11	Enterococcus	2008	N/A	2018
Ocean Shoreline	13	Enterococccus	2012	N/A	2018
Ocean Shoreline	16	Enterococcus	2008	N/A	2018
Ocean Shoreline	20	Enterococcus	2008	N/A	2018
Ocean Shoreline	22	Enterococcus	2008	N/A	2018
Ocean Shoreline	28	Undetermined NPS Stressor	2008	N/A	2018
Ocean Shoreline	31	Enterococcus	2008	N/A	2018
Ocean Shoreline	14	Enterococcus	2012	N/A	2018
Ocean Shoreline	29	Undetermined NPS Stressor	2014	N/A	2018

Note: Draft Enterococcus TMDL completed in 2014

VII Appendix B Table B1. 305b Use Support / CALM Assessment Category Summary (FY12 and FY13 data only)

WATERSHED	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
Development Category	mi	mi	pr	pr	pr	pr	mi	in	pr	mi	mi	mi	mi	mi	in	in	in	ex	mi	in	in	mi	ex	ex	ex	in	ex	ex	pr	ex	mi	in	in	ex	pr	mi	pr	mi	pr	pr	pr
Waterbody Type Designated Use																																									
Streams																																									
Aquatic Life																																									
Swimming	N			N																	N			N	N	N															
Drinking Water **																																									
CALM Assessment Category	5	3	3	5	3	3	3	3	3	3	3	3	3		3	3	3	3	3	3	5	3	3	5	5	5	3			3	3	3	3								3
Ocean Shoreline																																									
Aquatic Life								N	F			N	F	N	N						N	F	N		N	P			P	P					F						
Swimming			N					N		N	N	N	N	P	N	N	F	F	F	N	N	N	N	N	N	F	N	F		N	N	P	P	F		F		F		F	
Fish Consumption																								N																		
CALM Assessment Category	3	3	5	3	3	3	3	5	2	5	5	5	5	5	5	5	2	2	2	5	5	5	5	5	5	5	5	2	5	5	5	5	5	2	3	2	3	2	3	2	3
Wetlands																																									
Aquatic Life																																									
Agriculture																																									
Cult./Ceremonial																																									
Recreation																																									
CALM Assessment Category										3		3			3		3	3			3			3			3			3				3	3	3		3		3	

Note: In watersheds where samples were taken at more than one site, the lowest level of use support was used for the summary.

Legend

Shaded areas indicate watersheds that do not have the waterbody type for evaluating designated use, or, the designated use does not apply for the waterbody in that watershed.

Designated Use Support Level
F - Fully Supporting (good)
P - Partially Supporting (fair)
N - Not Supporting (poor)

Development Category
pr - pristine
mi - minimal
in - intermediate
ex - extensive

CALM Assessment Category
1 - All Designated Uses (DUs) met
2 - Some DUs met; insufficient data to evaluate remaining DUs
3 - Insufficient data to evaluate any DUs
4 - Water is impaired; TMDL not needed
5 - Water is impaired; TMDL needed

Note: Watershed 24 (Pago Pago) placed in Category 4a for Fish Consumption (TMDL completed in 2007) but remains in Category 5 for Swimming

Note: All Waterbodies (Streams) have only ASWQS Class 2 designated uses

Table B2. Size of Surface Waters Assigned to Reporting Categories for 2014 (FY12 and FY13 data only)

Waterbody Type	Category							Total in Territory	Total Assessed
	1	2	3	4a	4b	4c	5		
Stream, Miles	0.0	0.0	199.1	0.0	0.0	0.0	58.4	257.5 miles	58.4
Ocean Shoreline, Miles	0.0	51.8	30.9	0.0	0.0	0.0	66.8	149.5 miles	118.6
Wetlands, Acres	0.0	0.0	396.0	0.0	0.0	0.0	0.0	396.0	0.0

CALM Assessment Category

1-- All Designated Uses (DUs) met.

2-- Some DUs met; insufficient data to evaluate remaining Dus.

3-- Insufficient data to evaluate any DUs.

4-- Water is impaired; TMDL not needed.

4a- Impaired or threatened for one or more designated uses but does not require the development of a TMDL because TMDL had been completed.

4b- Impaired or threatened for one or more designated uses but does not require the development of a TMDL because other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future.

4c- Impaired or threatened for one or more designated uses but does not require the development of a TMDL because impairement is not caused by a pollutant.

5-- Water is impaired; TMDL needed.

VIII Appendix C

Table C1: Summary of American Samoa Water Quality Standards

Parameters	Fresh Surface Waters	Embayments	Pago Harbor Embayment	Embayments (Fagatele Bay and Pala Lagoon)	Open Coastal Waters	Ocean Waters
Temperature	-not to deviate more than 1.5 °F from ambient and not to fluctuate more than 1 °F on an hourly basis or to exceed 85 °F (except when due to natural causes)					
Light Penetration Depth	not < 65.0 ft (to exceed given value 50% of the time)	not < 120.0 ft (to exceed given value 50% of the time)	not < 65.0 ft (to exceed given value 50% of the time)	not < 130.0 ft (to exceed given value 50% of the time)	not < 130.0 ft (to exceed given value 50% of the time)	not < 150.0 ft (to exceed given value 50% of the time)
PH	6.5-8.6 range (+/- 0.2 pH units of that which would naturally occur)	6.5-8.6 range (+/- 0.2 pH units of that which would naturally occur)	6.5-8.6 range (+/- 0.2 pH units of that which would naturally occur)	6.5-8.6 range (+/- 0.2 pH units of that which would naturally occur)	6.5-8.6 range (+/- 0.2 pH units of that which would naturally occur)	6.5-8.6 range (+/- 0.2 pH units of that which would naturally occur)
Dissolved Oxygen	not < 75% saturation or not <6.0 mg/L	not < 70% saturation or not <5.0 mg/L	not < 70% saturation or not <5.0 mg/L	not < 80% saturation or not <5.5 mg/L	not < 80% saturation or not <5.5 mg/L	not < 80% saturation or not <5.5 mg/L
Turbidity	not > 5.0 NTU	not > 0.35 NTU	not > 0.75 NTU	Fagatele Bay not >0.25 NTU; Pala Lagoon not >0.75 NTU	not > 0.25 NTU	Not > 0.20 NTU
Chlorophyll-a	N/A	not >0.5 ug/L	not >1.0 ug/L	not >0.35 ug/L	not >0.25 ug/L	not >0.18 ug/L
Total Nitrogen	not > 300.0 ug/L	not > 150.0 ug/L	not > 200.0 ug/L	not > 135.0 ug/L	not > 130.0 ug/L	not > 115.0 ug/L
Total Phosphorus	not > 150.0 ug/L	not > 20.0 ug/L	not > 30.0 ug/L	not > 15.0 ug/L	not > 15.0 ug/L	not >11.0 ug/L
E. coli / Enterococcus	*E. coli*: Single sample density not > 576/100 ml *Enterococci*: Single sample density not > 151/ 100 ml Geometric mean not > 33/100 ml	*Enterococci*: Single sample density not > 124 /100 ml Geometric mean not >/100 ml	*Enterococci*: Single sample density not > 104 /100 ml Geometric mean not > 35 /100 ml	*Enterococci*: Single sample density not > 104 /100 ml Geometric mean not > 35/100 mL.	*Enterococci*: Single sample density not > 124 /100 ml Geometric mean not > 35 /100 ml	*Enterococci*: Single sample density not > 276 /100 ml Geometric mean not > 35 /100 ml

Table C2: Individual Use Support Summary for Streams (miles) (FY12 and FY13 data only)
Total Miles of Streams = 258

Goals	Use	Size Assessed (miles)	Size Fully Supporting	Size Partially Supporting	Size Not Supporting	Size Insufficient Data
Protect & Enhance Ecosystems	**Aquatic Life**	-	-	-	-	257.5
Protect & Enhance Public Health	**Fish Consumption**	-	-	-	-	-
	Shellfishing	-	-	-	-	-
	Swimming	58.4	0	0	58.4	199.1
	Drinking Water	*	*	*	*	*
Social & Economic	**Agricultural**	*	*	*	*	*
	Cultural/Ceremonial	*	*	*	*	*

Notes:

zero (0) = Category applicable, but size of water in category is zero

dash (-) = Category applicable no data available

Asterisk (*****) = category not applicable

Table C3: Total Sizes of Waters Impaired by Various Cause/Stressor Categories (FY12 and FY13 data only)

Type of Waterbody: Streams

Cause/Stressor Category	Size of Waters Impaired (miles)
Cause/Stressor Unknown	-
Unknown Toxicity	-
Pesticides	-
Priority Organics	-
Non-point Organics	-
PCBs	-
Dioxins	-
Metals	-
Ammonia	-
Cyanide	-
Sulfates	-
Chloride	-
Other Inorganics	-
Nutrients	-
pH	-
Siltation	-
Organic Enrichment/low DO	-
Salinity/TDS/Chlorides	-
Thermal Modifications	*
Flow Alterations	-
Other Habitat Alterations	-
Pathogen Indicators	58.4
Radiation	*
Oil and Grease	-
Taste and Odor	-
Suspended Solids	-
Noxious Aquatic Plants (Macrophytes)	*
Excessive Algal Growth	-
Total Toxics	-
Turbidity	-
Exotic Species	-
Other (specify)	*

Notes: zero (0) = Category applicable, but size of water in category is zero

dash (-) = Category applicable no data available

asterisk (*****) = category not applicable

Table C4. Total Sizes of Waters Impaired by Various Source Categories (FY12 and FY13 data only)
Type of Waterbody: Streams

Source Category	Size of Waters Impaired (miles)
Industrial Point Sources	-
Municipal Point Sources	-
Combined Sewer Overflows	-
Collection System Failure	58.4
Domestic Wastewater Lagoon	*
Agriculture	-
Crop-related sources	*
Grazing-related sources	*
Intensive Animal Feeding Operations	58.4
Silviculture	*
Construction	-
Urban Runoff/Storm Sewers	-
Resource Extraction	*
Land Disposal	-
Hydromodification	-
Habitat modification (non-hydromod)	-
Marinas and recreational Boating	*
Erosion from Derelict Land	-
Atmospheric Deposition	-
Waste Storage/Storage Tank Leaks	-
Leaking Underground Storage Tanks	-
Highway maintenance and Runoff	-
Spills (Accidental)	-
Contaminated Sediments	-
Debris and Bottom Deposits	-
Internal Nutrient Cycling (Primary lakes)	*
Sediment Resuspension	*
Natural Sources	-
Recreational And Tourism Activities	*
Salt Storage Sites	*
Groundwater Loadings	*
Groundwater Withdrawal	*
Other Specify	-
Unknown Source	-
Sources Outside State Jurisdiction	*

Notes: asterisk (*) = category not applicable
dash (-) = Category applicable no data available
zero (0) = Category applicable, but size of water in category is zero

Table C5: Individual Use Support Summary for Ocean Shoreline (miles) (FY12 and FY13 data only)
Total Miles of Ocean shoreline = 149.5

Goals	Use	Size Assessed (miles)	Size Fully Supporting	Size Partially Supporting	Size Not Supporting	Size Insufficient Data
Protect & Enhance Ecosystems	**Aquatic Life**	45.1	15.5	12.8	16.8	104.4
Protect & Enhance Public Health	**Fish Consumption**	7.9	0	0	7.9	141.6
	Shellfishing	-	-	-	-	-
	Swimming	104.2	45.5	5.9	52.9	45.2
	Drinking Water	*	*	*	*	*
Social & Economic	**Agricultural**	*	*	*	*	*
	Cultural/Ceremonial	*	*	*	*	*

Notes:
zero (**0**) = Category applicable, but size of water in category is zero
dash (**-**) = Category applicable no data available
Asterisk (*****) = category not applicable

Table C6: Total Sizes of Waters Impaired by Various Cause/Stressor Categories
Type of Waterbody: Ocean Shoreline (FY12 and FY13 data only)

Cause/Stressor Category	Size of Waters Impaired (miles)
Cause/Stressor Unknown	-
Unknown Toxicity	-
Pesticides	-
Priority Organics	-
Non-point Organics	-
PCBs	7.9
Dioxins	-
Metals (Mercury)	7.9
Ammonia	-
Cyanide	-
Sulfates	-
Chloride	-
Other Inorganics	-
Nutrients	-
PH	-
Siltation	-
Organic Enrichment/low DO	-
Salinity/TDS/Chlorides	-
Thermal Modifications	*
Flow Alterations	-
Other Habitat Alterations	-
Pathogen Indicators	58.8
Radiation	*
Oil and Grease	-
Taste and Odor	-
Suspended Solids	-
Noxious Aquatic Plants (Macrophytes)	*
Excessive Algal Growth	-
Total Toxics	-
Turbidity	-
Exotic Species	-
Other (Undetermined NPS stressor)	29.6

Notes: zero (**0**) = Category applicable, but size of water in category is zero
dash (**-**) = Category applicable no data available
asterisk (*****) = category not applicable

PCBs and Metals Categories: TMDL was completed in 2007 for Watershed 24, Pago Pago Harbor (7.9 miles)

Undetermined NPS Stressor Category: This category is used for all watersheds determined to be impaired for ALUS by Coral Reef Bioassessments

Table C7. Total Sizes of Waters Impaired by Various Source Categories (FY10 and FY11
Type of Waterbody: Ocean Shoreline

Source Category	Size of Waters Impaired (miles)
Industrial Point Sources	-
Municipal Point Sources	-
Combined Sewer Overflows	-
Collection System Failure	58.8
Domestic Wastewater Lagoon	-
Agriculture	-
Crop-related sources	*
Grazing-related sources	*
Intensive Animal Feeding Operations	58.8
Silviculture	*
Construction	-
Urban Runoff/Storm Sewers	-
Resource Extraction	*
Land Disposal	-
Hydromodification	-
Habitat modification (non-hydromod)	-
Marinas and recreational Boating	*
Erosion from Derelict Land	-
Atmospheric Deposition	-
Waste Storage/Storage Tank Leaks	-
Leaking Underground Storage Tanks	-
Highway maintenance and Runoff	-
Spills (Accidental)	-
Contaminated Sediments	-
Debris and Bottom Deposits	-
Internal Nutrient Cycling (Primary lakes)	*
Sediment Resuspension	*
Natural Sources	-
Recreational And Tourism Activities	*
Salt Storage Sites	*
Groundwater Loadings	*
Groundwater Withdrawal	*
Other Specify (Multiple Nonpoint Sources)	-
Unknown Source	-
Sources Outside State Jurisdiction	*

Notes: asterisk (*) = category not applicable
dash (-) = Category applicable no data available
zero (0) = Category applicable, but size of water in category is zero

Table C5: Individual Use Support Summary for Wetlands (acres) (FY12 and FY13 data only)
Total Acres of Wetlands = 396

Goals	Use	Size Assessed (acres)	Size Fully Supporting	Size Partially Supporting	Size Not Supporting	Size Insufficient Data
Protect & Enhance Ecosystems	**Aquatic Life**	-	-	-	-	396
Protect & Enhance Public Health	**Fish Consumption**	*	*	*	*	*
	Shellfishing	*	*	*	*	*
	Swimming	*	*	*	*	*
	Drinking Water	*	*	*	*	*
Social & Economic	**Agricultural**	-	-	-	-	396
	Cultural/Ceremonial	-	-	-	-	396
	Recreational	-	-	-	-	396

Notes:
zero (**0**) = Category applicable, but size of water in category is zero
dash (-) = Category applicable no data available
Asterisk (*****) = category not applicable

Table C9: Total Sizes of Waters Impaired by Various Cause/Stressor
Type of Waterbody: Wetlands (FY12 and FY13 data only)

Cause/Stressor Category	Size of Waters Impaired (acres)
Cause/Stressor Unknown	-
Unknown Toxicity	-
Pesticides	-
Priority Organics	-
Non-point Organics	-
PCBs	-
Dioxins	-
Metals	-
Ammonia	-
Cyanide	-
Sulfates	-
Chloride	-
Other Inorganics	-
Nutrients	-
PH	-
Siltation	-
Organic Enrichment/low DO	-
Salinity/TDS/Chlorides	-
Thermal Modifications	*
Flow Alterations	-
Other Habitat Alterations	-
Pathogen Indicators	-
Radiation	*
Oil and Grease	-
Taste and Odor	-
Suspended Solids	-
Noxious Aquatic Plants (Macrophytes)	*
Excessive Algal Growth	-
Total Toxics	-
Turbidity	-
Exotic Species	-
Other (habitat loss)	-

Notes: zero (**0**) = Category applicable, but size of water in category is zero
dash (**-**) = Category applicable no data available
asterisk (*****) = category not applicable

Table C10. Total Sizes of Waters Impaired by Various Source Categories (FY12 and FY13
Type of Waterbody: Wetlands

Source Category	Size of Waters Impaired (acres)
Industrial Point Sources	-
Municipal Point Sources	-
Combined Sewer Overflows	-
Collection System Failure	-
Domestic Wastewater Lagoon	-
Agriculture	-
Crop-related sources	*
Grazing-related sources	*
Intensive Animal Feeding Operations	-
Silviculture	*
Construction	-
Urban Runoff/Storm Sewers	-
Resource Extraction	*
Land Disposal	-
Hydromodification	-
Habitat modification (non-hydromod), i.e., filling	-
Marinas and recreational Boating	*
Erosion from Derelict Land	-
Atmospheric Deposition	-
Waste Storage/Storage Tank Leaks	-
Leaking Underground Storage Tanks	-
Highway maintenance and Runoff	-
Spills (Accidental)	-
Contaminated Sediments	-
Debris and Bottom Deposits	-
Internal Nutrient Cycling (Primary lakes)	*
Sediment Resuspension	*
Natural Sources	-
Recreational And Tourism Activities	*
Salt Storage Sites	*
Groundwater Loadings	*
Groundwater Withdrawal	*
Other Specify	-
Unknown Source	-
Sources Outside State Jurisdiction	*

Notes: asterisk (*) = category not applicable

Dash (-) = Category applicable no data available

Zero (0) = Category applicable, but size of water in category is zero

VIX Appendix D

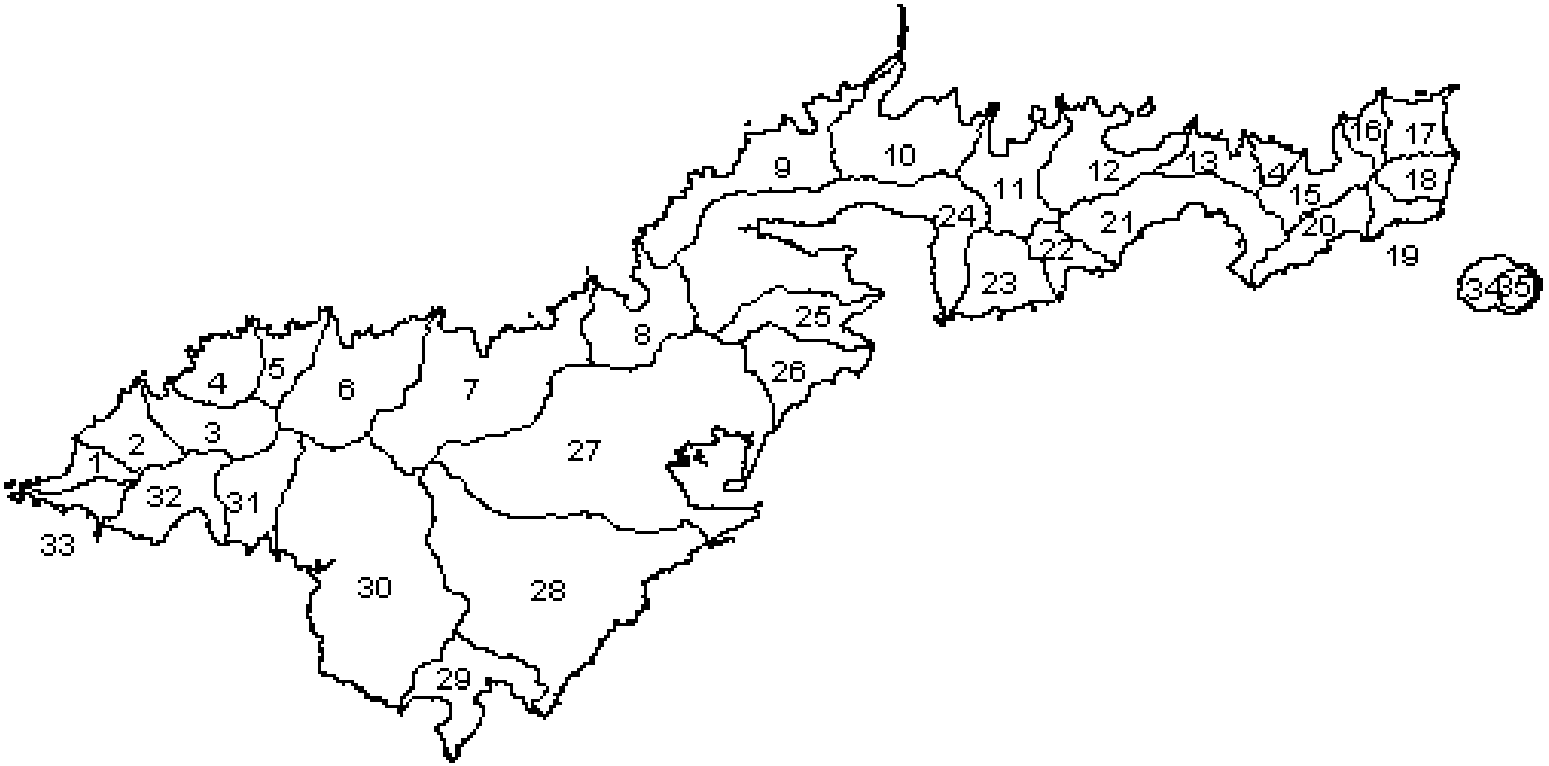
Table D1. Area and aquatic resources information for watersheds of American Samoa.

Watershed	Number	Watershed Area (mi^2)	Perennial Stream Miles	Ocean Shoreline Miles	Wetland Acres	Latitude	Longitude
Poloa	1	0.42	1.6	1.4	0	14º 19' 02.57" S	170º 50' 05.21" W
Fagalii	2	0.80	6.6	1.8	0	14º 18' 24.30" S	170º 49' 34.48" W
Maloata	3	1.08	7.7	0.9	0	14º 18' 14.45" S	170º 48' 59.11" W
Fagamalo	4	1.30	7.3	3.2	0	14º 17' 36.76" S	170º 48' 26.06" W
Aoloau Sisifo	5	0.62	5.1	3.3	0	14º 17' 25.16" S	170º 47' 27.50" W
Aoloau Sasae	6	2.05	15.9	2.6	0	14º 17' 35.02" S	170º 46' 26.61" W
Aasu	7	3.27	16.0	4.5	0	14º 17' 46.61" S	170º 45' 10.66" W
Fagasa	8	1.35	6.0	2.3	0	14º 17' 13.56" S	170º 43' 18.75" W
Fagatuitui	9	2.00	14.4	8.6	0	14º 15' 15.27" S	170º 42' 06.27" W
Vatia	10	1.89	14.4	4.0	34.1	14º 14' 50.92" S	170º 39' 54.64" W
Afono	11	1.29	7.2	3.4	0	14º 15' 22.23" S	170º 38' 53.76" W
Masefau	12	1.42	7.7	4.5	43.1	14º 15' 23.39" S	170º 37' 52.29" W
Masausi	13	0.60	4.5	1.7	0	14º 15' 21.65" S	170º 36' 28.22" W
Sailele	14	0.26	0	1.5	0	14º 15' 23.39" S	170º 35' 48.79" W
Aoa	15	0.85	3.3	1.5	23.5	14º 15' 41.95" S	170º 35' 14.58" W
Onenoa	16	0.30	2.9	0.9	0	14º 14' 58.46" S	170º 34' 48.48" W
Tula	17	0.60	3.6	2.5	8.0	14º 14' 44.54" S	170º 33' 41.80" W
Alao	18	0.52	4.2	0.7	15.5	14º 15' 47.17" S	170º 33' 48.76" W
Auasi	19	0.40	1.8	1.7	0	14º 16' 17.32" S	170º 34' 22.97" W
Amouli	20	0.80	4.3	2.4	0	14º 16' 38.19" S	170º 35' 16.32" W
Fagaitua	21	1.88	14.4	3.7	2.0	14º 16' 05.14" S	170º 36' 47.93" W
Alega	22	0.51	2.8	1.3	0	14º 16' 48.05" S	170º 38' 14.33" W
Laulii-Aumi	23	0.70	6.0	2.0	0	14º 17' 18.20" S	170º 39' 01.88" W
Pago Pago	24	4.00	21.1	7.9	0.6	14º 16' 20.29" S	170º 41' 58.11" W
Fagaalu	25	0.96	6.5	1.3	0	14º 17' 28.92" S	170º 40' 58.92" W
Matuu	26	1.00	7.5	2.2	0	14º 18' 07.33" S	170º 41' 20.33" W
Nuuuli Pala	27	6.70	24.0	8.8	122.9	14º 18' 58.97" S	170º 42' 38.40" W
Tafuna Plain	28	5.50	0	6.9	0	14º 20' 51.99" S	170º 43' 26.26" W
Fagatele-Larson	29	1.23	0	5.7	0	14º 22' 25.49" S	170º 45' 34.39" W
Leone	30	5.67	26.2	4.9	96.8	14º 20' 56.08" S	170º 47' 11.99" W
Afao-Asili	31	1.07	3.2	1.2	0	14º 20' 02.84" S	170º 47' 57.98" W
Nua-Seetaga	32	1.20	7.5	2.6	0	14º 19' 53.87" S	170º 48' 58.35" W
Amanave	33	0.40	3.2	1.8	0	14º 19' 30.26" S	170º 50' 03.81" W
Aunuu Sisifo	34	0.38	0	3.4	111.9[a]	14º 16' 58.98" S	170º 33' 38.94" W
Aunuu Sasae	35	0.22	0	0.1		14º 17' 04.82" S	170º 32' 47.75" W
Ofu Saute	36	1.78	0	5.2	5.9	14º 11' 08.81" S	169º 40' 09.18" W
Ofu Matu	37	1.06	0	4.2	0	14º 09' 56.41" S	169º 39' 28.09" W
Olosega Sisifo	38	1.00	0	4.1	7.4	14º 10' 08.65" S	169º 37' 54.65" W
Olosega Sasae	39	1.20	0	3.4	0	14º 10' 21.85" S	169º 36' 33.94" W
Tau Matu	40	14.20	ND	18.7	36.0	14º 12' 55.30" S	169º 28' 18.79" W
Tau Saute	41	3.30	0.6	6.4	0	14º 14' 57.18" S	169º 27' 35.81" W
Totals		75.78	257.5	149.4	396.0		

[a]represents total wetlands in both watersheds 34 and 35 (Aunuu Sisifo and Aunuu Sasae)

[nd]no data

Figure D1. Map of Tutuila and Aunu'u, American Samoa, and the 35 watersheds that comprise the islands.



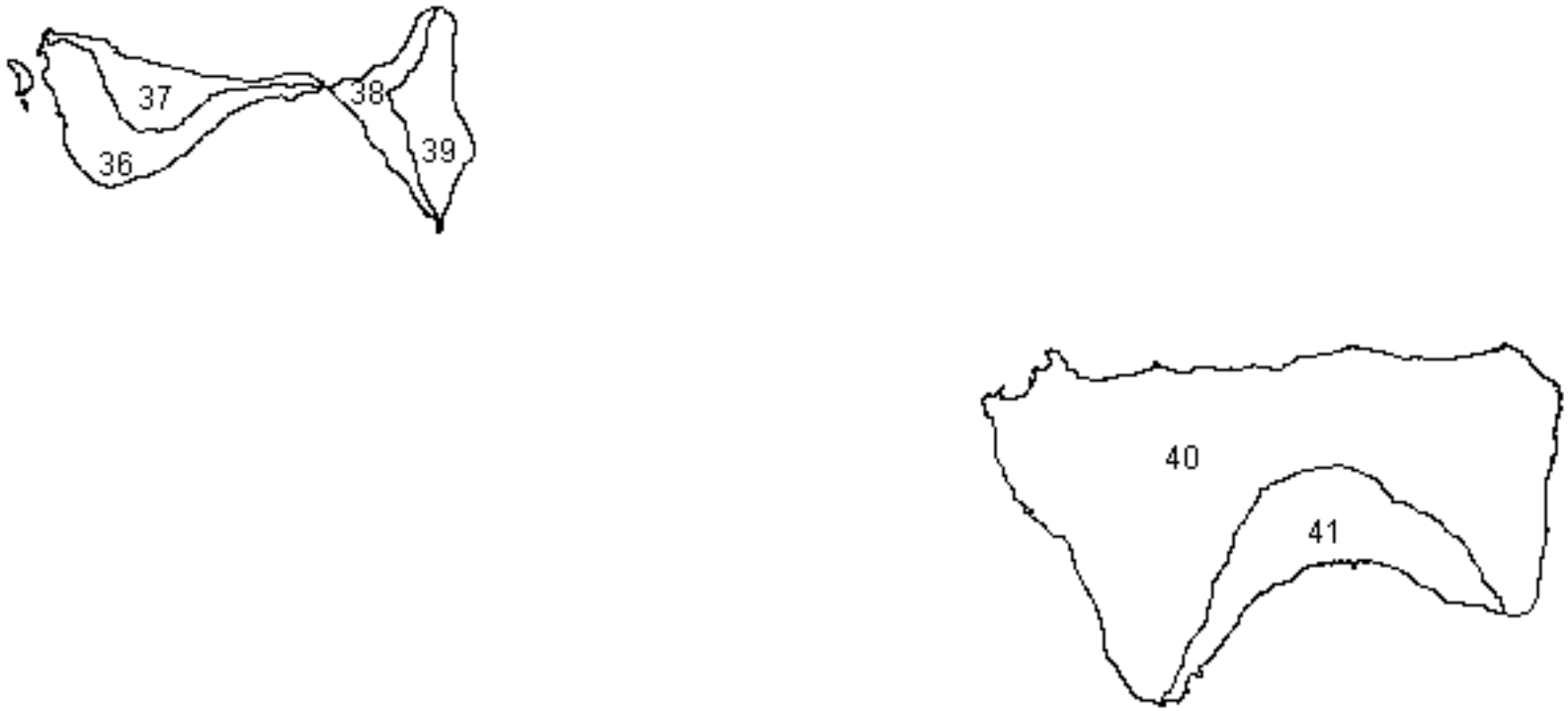


Figure D2. Map of the Manu'a Islands (Ofu, Olosega, and Ta'u), American Samoa, and the 6 watersheds that comprise the islands.