SURFRIDER KAUAI BLUE WATER TASK FORCE

2022 Water Testing

Year in Review Report

11 December 2022

Prepared for:

Surfrider Kaua'i
Kaua'i, HI
PO Box 2195
Kapa'a, HI
96746

CONTENTS

Section 1: Introduction **ix**

Project Objectives
Methodology and Calculations
Report Organization

Section 2: Executive Summary **xii**

Testing Data by Month
Testing Data by Site

Section 3: Testing Data by Month **1**

February 1
March 3
April 5
May 7
June 9
July 11
August 12
September 14
October 15
November 17
December 18
Yearly Summary 19

Section 4: Testing Data by Site **40**

Wainiha Stream 20
Waikoko Stream 23
Middles Surf 26
The Bowl Surf 29
Hanalei River 32
Kalihiwai Surf 34
Rock Quarry Surf 38
Moloa'a Stream 41
Anahola Bay Surf 44
Kealia Surf 47
Wailua River Mouth 50
Hanamaulu Stream 53
Hanamaulu Bay 55
Kalapaki Bay Surf 58
Nawiliwili Stream 61
Niumalu Beach Park 64
Pakala Beach 67

Section 7: Chronically Polluted Sites **70**

Appendix: References **71**

LIST OF EXHIBITS

Tables

Section 3

3.4 Sites not Tested in February
3.5 Water Testing Data, February, by Testing Site
3.7 Sites not Tested in March
3.8 Water Testing Data, March, by Testing Site
3.10 Sites not Tested in April
3.11 Water Testing Data, April, by Testing Site
3.13 Sites not Tested in May
3.14 Water Testing Data, May, by Testing Site
3.16 Sites not Tested in June
3.17 Water Testing Data, June, by Testing Site
3.19 Sites not Tested in July
3.20 Water Testing Data, July, by Testing Site
3.22 Sites not Tested in August
3.23 Water Testing Data, August, by Testing Site
3.25 Sites not Tested in September
3.26 Water Testing Data, September, by Testing Site
3.28 Sites not Tested in October
3.29 Water Testing Data, October, by Testing Site
3.31 Sites not Tested in November
3.32 Water Testing Data, November, by Testing Site
3.34 Sites not Tested in December
3.35 Water Testing Data, December, by Testing Site
3.37 Testing by Month, Summary

Section 4

4.1 Wainiha Stream Data
4.3 Waikoko Stream
4.5 Middles Surf
4.6 The Bowl Surf
4.7 Hanalei River
4.8 Kalihiwai Surf
4.10 Rock Quarry Surf
4.12 Moloa'a Stream
4.13 Anahola Bay Surf
4.15 Kealia Surf
4.20 Wailua River Mouth
4.21 Wailua Beach Park
4.22 Hanamaulu Stream
4.23 Hanamaulu Bay
4.24 Kalapaki Bay Surf
4.25 Nawiliwili Stream
4.28 Waiohai Surf
4.37 Pakala Beach

Figures

Section 4

4.1 Wainiha Stream Location
4.2 Wainiha Stream Data
4.5 Waikoko Stream Location
4.6 Waikoko Stream Data
4.9 Middles Surf Location
4.10 Middles Surf Data
4.11 The Bowl Surf Location
4.12 The Bowl Surf Data

4.13 Hanalei River Location
4.14 Hanalei River Data
4.15 Kalihiwai Surf Location
4.16 Kalihiwai Surf Data
4.19 Rock Quarry Surf Location
4.20 Rock Quarry Surf Data
4.23 Moloa'a Stream Location
4.24 Moloa'a Stream Data
4.25 Anahola Bay Surf Location
4.26 Anahola Bay Surf Data
4.29 Kealia Surf Location
4.30 Kealia Surf Data
4.39 Wailua River Mouth Location
4.40 Wailua River Mouth Data
4.41 Wailua Beach Park Location
4.42 Wailua Beach Park Data
4.43 Hanamaulu Stream & Bay Location
4.44 Hanamaulu Stream Data
4.45 Hanamaulu Bay Data
4.46 Kalipaki Bay Surf Location
4.47 Kalipaki Bay Surf Data
4.48 Nawiliwili Stream Location
4.49 Nawiliwili Stream Data
4.55 Waiohai Surf Location
4.56 Waiohai Surf Data
4.73 Pakala Beach Location
4.74 Pakala Beach Data

SECTION 1
Introduction

Water pollution caused by fecal contamination is a serious problem due to the potential for contracting diseases from pathogens (disease causing organisms). Frequently, concentrations of pathogens from fecal contamination are small, and the number of different possible pathogens is large. As a result, it is not practical to test for pathogens in every water sample collected. Instead, the presence of pathogens is determined with indirect evidence by testing for an "indicator" organism such as coliform bacteria. Coliforms come from the same sources as pathogenic organisms. Coliforms are relatively easy to identify, are usually present in larger numbers than more dangerous pathogens, and respond to the environment, wastewater treatment, and water treatment similarly to many pathogens. As a result, testing for coliform bacteria can be a reasonable indication of whether other pathogenic bacteria are present.

The enterococcus group is a subgroup of fecal streptococci bacteria. The enterococci portion of the streptococcus group is a valuable fecal indicating bacteria (FIB) for determining the extent of fecal contamination of recreational waters. Numerous worldwide studies in marine and fresh waters have demonstrated that the enterococci are one of the best bacterial indicators of water quality. Enterococcus is a group of bacteria found in the human gut, as well as other warm-blooded animals, and therefore is a good indicator of human waste. This is why numerous health departments across the globe use FIB as a means to test water quality.

As shown by the United States Environmental Protection Agency (EPA), enterococci have a greater correlation with swimming-associated gastrointestinal illness in both marine and fresh waters than any other bacterial indicator organisms and are less likely to "die off" in saltwater, making them ideal for testing marine waters.

In 1986, EPA set health-based national recreational water quality standards of 35 colony forming units (CFU, i.e. organisms) per 100 milliliters (ml) of beach water sampled (30-day average) or 104 CFU (organisms) per 100 ml (for a single sample). The EPA required states to notify the public if values exceeded these limits.

As of 2012, the use of enterococcus as a FIB is still the preferred method for testing for bacterial water contamination. While providing guidance, the EPA allows states like Hawai'i to set our own 30-day average and single-sample maximum thresholds.

The Surfrider Foundation, Kauai Chapter, Blue Water Task Force (BWTF), performs a monthly water test to look at levels of enterococcus in the island's recreational waters. The results of the BWTF's testing for 2019 is presented in this report.

OBJECTIVES

The principal objective of this project was to assess the levels of fecal indicating bacterial (FIB) pollution at different recreational water sites around the island of Kaua'i, Hawai'i.

In the course of the report, Surfrider Blue Water Task Force (BWTF):

- Analyzed and summarized monthly water testing data;
- Provided an overview most impacted water testing sites;

The study began 02 February 2022 and was completed 10 December 2022.

METHODOLOGY AND CALCULATIONS

Sampling and Laboratory Testing

All samples were collected and tested according to industry and governmental protocols.

Sites Tested

Testing sites were determined by either the BWTF or interest from the testing volunteers.

Most Probable Number

The BWTF uses the Idexx Enterolert™ enterococcus testing platform to look for fecal indicating bacteria (FIB) from testing sites. This is an EPA-approved method for enterococci detection for fresh and marine waters. The Enterolert™ platform allows BWTF to quantitatively measure the Most Probable Number (MPN), which is the number of enterococcus bacteria contained within 100 mls of sample. The threshold for the MPN for human safety is 135 organisms per 100 mls of sample.

Note: The IDEXX tests report results as Most Probable Number (MPN) per 100 ml, which is equivalent to CFU per 100 ml.

Geomean

The BWTF uses the US Environmental Protection Agency's (EPA) *Ambient Water Quality Criteria for Bacteria – 1986* guide for the use of enterococci testing as a fecal indicating bacteria. The EPA recommends that the enterococci are not to exceed 35 organisms per 100 mls of sample as the geomean threshold. The criteria for this report are calculated as the geometric mean of the measures MPN, based on 5 equally spaced samples, taken monthly.

Chronic Pollution

For the purposes of this report only, testing sites are considered to be chronically polluted if, and only if, both of these criteria are met: the site must have been tested more than 50% during the testing year, and, the site must have more than 50% of monthly geomeans be above the geomean threshold of 35.

Controls

Once a quarter, appropriate positive and negative controls are used to ensure the robustness of the testing process. These controls are consistent with industry standards.

Water samples collected for analysis for this report were provided by 38 volunteers for the Surfrider Foundation Blue Water Task Force.

Secondary sources for this report include the author's in-house database, literature searches, syndicated publications, industry newsletters, on-line computer databases, and other relevant sources.

REPORT ORGANIZATION

Section 3 provides an overview of testing data by month.

Section 4 is an overview of the testing data by testing site.

SECTION 2
Executive Summary

The primary objective of this study was to examine the samples above the Statistical Threshold Value (measured as Most Probable Number, MPN) and geomean of water samples on Kaua'i, Hawai'i collected at 18 sites. The data collection began in February 2022 and concluded in December 2022.

YEAR SUMMARY

Table 2.1 lists the yearly summary, with overall testing compliance for each month, the percent of samples from the testing sites (combined) above the statistical threshold value (STV) of 130 organisms per 100 mls of sample, and the percent of samples from the testing sites that were above the geomean threshold of 35.

Table 2.1
TESTING BY MONTH, SUMMARY

Date Tested	% Overall Testing Compliance	% of Samples Above STV	% of Samples Above Geomean
February 9, 2022	89	18	n/a
March 9, 2022	78	35	n/a
April 15, 2022	89	50	n/a
May 11, 2022	94	23	n/a
Jun 8, 2022	89	31	41
Jul 13, 2022	100	38	56
August 10, 2022	94	35	50
September 14, 2022	100	55	58
October 13, 2022	94	35	55
November 9, 2022	100	33	66
December 14, 2022	89	50	65

n/a Not applicable

SECTION 3
2022 Testing Data by Month

FEBRUARY 2022

BWTF testing site samples were collected on February 9, 2022. The monthly testing compliance for February is 89%.

Sites Not Tested

The sites not tested for February are shown in Table 3.4.

Table 3.4
SITES NOT TESTED IN FEBRUARY

Site	Site Number
Hanamaulu Bay, Surf	21
Pakala	31

Data

The water testing data for February is presented in Table 3.5, sorted by site.

- 18% of the sites tested in February were above the STV.

Table 3.5
WATER TESTING DATA FEBRUARY, BY TESTING SITE

Site	Site Number	MPN
Wainiha Stream	1	1.0
Waikoko Surf	3	20.0
Middles Surf	5	1.0
The Bowl Surf	6	10.0
Hanalei River	7	51.0
Kalihiwai Surf	8	1.0
Rock Quarry Surf	10	1.0
Moloa'a Stream	12	**199.0**
Anahola Bay Surf	13	1.0
Kealia Surf	15	1.0
Wailua River Park	17	75.0
Koloa Landing (Waikomo)	18	1.0
Hanamaulu Stream	22	**934.0**
Kalapaki Bay Surf	23	62.0
Nawilwili Stream	24	**187.0**
Waiohai Surf	28	1.0

Single-day MPN sample results should be less than 130 bacterial counts per 100 ml of sample
The Geomean for sample sites should be less than 35

MARCH 2022

BWTF testing site samples were collected on March 9, 2022. The monthly testing compliance for March is 78%.

Sites Not Tested

The sites not tested for March are shown in Table 3.7.

Table 3.7
TESTING SITES NOT TESTED IN MARCH

Site	Site Number
Koloa Landing (Waikomo)	18
Kalapaki Bay Surf	23
Waiohai Surf	28

Data

The water testing data for March is presented in Table 3.8, sorted by site.

- 35% of the sites tested in March were above the STV.

Table 3.8
WATER TESTING DATA MARCH, BY SITE

Site	Site Number	MPN
Wainiha Stream	1	121.0
Waikoko Surf	3	1.0
Middles Surf	5	10.0
The Bowl Surf (Hanalei Bay)	6	10.0
Kalihiwai Surf	7	1.0
Rock Quarry Surf	8	10.0
Moloa'a Stream	10	**487.0**
Anahola Bay Surf	11	1.0
Kealia Surf	12	1.0
Wailua River Park	15	**455.0**
Hanamaulu Bay (surf)	16	**246.0**
Hanamaulu Stream	17	**908.0**
Nawilwili Stream	21	**733.0**
Pakala	22	1.0
Wainiha Stream	24	**121.0**
Waikoko Surf	31	1.0

Single-day MPN sample results should be less than 130 bacterial counts per 100 ml of sample
The Geomean for sample sites should be less than 35

APRIL 2022

BWTF testing site samples were collected on April 16. The monthly testing compliance for April is 89%.

Sites Not Tested

The sites not tested for April are shown in Table 3.10.

Table 3.10
TESTING SITES NOT TESTED IN APRIL

Site	Site Number
Koloa Landing (Waikomo)	18
Waiohai Surf	28

Data

The water testing data for April is presented in Table 3.11, sorted by site.

- 50% of the sites tested in April were above the STV.

Table 3.11
WATER TESTING DATA APRIL, BY SITE

Site	Site Number	MPN
Wainiha Stream	1	**414.0**
Waikoko Surf	3	20.0
Middles Surf	5	**336.0**
The Bowl Surf (Hanalei Bay)	6	**313.0**
Hanalei River	7	30.0
Kalihiwai Surf	8	**269.0**
Rock Quarry Surf	10	**512.0**
Moloa'a Stream	12	10.0
Anahola Bay Surf	13	1.0
Kealia Surf	15	10.0
Wailua River Park	17	**428.0**
Koloa Landing (Waikomo)	18	**408.0**
Hanamaulu Bay (surf)	21	41.0
Hanamaulu Stream	22	**275.0**
Kalapaki Bay Surf	23	1.0
Nawilwili Stream	24	**414.0**
Waiohai Surf	28	1.0
Pakala	31	20.0

Single-day MPN sample results should be less than 130 bacterial counts per 100 ml of sample
The Geomean for sample sites should be less than 35

MAY 2022

BWTF testing site samples were collected on May 14, 2022. The monthly testing compliance for May is 94%.

Sites Not Tested

The sites not tested for May are shown in Table 3.13.

Table 3.13
TESTING SITES NOT TESTED IN MAY

Site	Site Number
Waiohai Surf	28

Data

The water testing data for May is presented in Table 3.14, sorted by site.

- 23% of the sites tested in May were above the STV.

Table 3.14
WATER TESTING DATA MAY, BY SITE

Site	Site Number	MPN
Wainiha Stream	1	41.0
Waikoko Surf	3	**1.0**
Middles Surf	5	**1.0**
The Bowl Surf (Hanalei Bay)	6	20.0
Hanalei River	7	134.0
Kalihiwai Surf	8	**1.0**
Rock Quarry Surf	10	85.0
Moloa'a Stream	12	197.0
Anahola Bay Surf	13	**1.0**
Kealia Surf	15	**1.0**
Wailua River Park	17	30.0
Koloa Landing (Waikomo)	18	388.0
Hanamaulu Bay (surf)	21	134.0
Hanamaulu Stream	22	350.0
Kalapaki Bay Surf	23	120.0
Nawilwili Stream	24	388.0
Pakala	31	**1.0**

Single-day MPN sample results should be less than 130 bacterial counts per 100 ml of sample
The Geomean for sample sites should be less than 35

JUNE 2022

BWTF testing site samples were collected on June 11, 2022. The monthly testing compliance for June is 89%.

Sites Not Tested

The sites not tested for June are shown in Table 3.16.

Table 3.16
TESTING SITES NOT TESTED IN JUNE

Site	Site Number
Hanalei River	7
Koloa Landing (Waikomo)	18
Kalapaki bay Surf	23
Waiohai Surf, Poipu	28

Data

The water testing data for June is presented in Table 3.17, sorted by site.

- 31% of the sites tested in June were above the STV.
- 41% of the sites tested in June were above the geomean of 35.

Table 3.17
WATER TESTING DATA JUNE, BY SITE

Site	Site Number	MPN	Geomean
Wainiha Stream	1	63.0	**102.3**
Waikoko Surf	3	1.0	1.8
Middles Surf	5	1.0	2.7
The Bowl Surf (Hanalei Bay)	6	1.0	18.9
Kalihiwai Surf	8	10.0	6.7
Rock Quarry Surf	10	10.0	**61.1**
Moloa'a Stream	12	**8,664.0**	**956.1**
Anahola Bay Surf	13	1.0	2.2
Kealia Surf	15	1.0	1.0
Wailua River Park	17	41.0	23.1
Hanamaulu Bay (surf)	21	**364.0**	n/d
Hanamaulu Stream	22	**637.0**	**449.7**
Nawilwili Stream	24	**266.0**	**305.0**
Pakala	31	1.0	n/d

Single-day MPN sample results should be less than 130 bacterial counts per 100 ml of sample
The Geomean for sample sites should be less than 35
n/d No data, insufficient data to calculate Geomean

JULY 2022

BWTF testing site samples were collected on July 9, 2022. The monthly testing compliance for July is 100%.

Data

The water testing data for July is presented in Table 3.20, sorted by site.

- 38.8% of the sites tested in July were above the STV.
- 56.2% of the sites tested in July were above the geomean of 35.

Table 3.20
WATER TESTING DATA JULY, BY SITE

Site	Site Number	MPN	Geomean
Wainiha Stream	1	**285.0**	**129.8**
Waikoko Surf	3	1.0	1.0
Middles Surf	5	20.0	5.3
The Bowl Surf (Hanalei Bay)	6	75.0	21.9
Hanalei River	7	**148.0**	**146.2**
Kalihiwai Surf	8	20.0	5.7
Rock Quarry Surf	10	**464.0**	**63.8**
Moloa'a Stream	12	**723.0**	**790.0**
Anahola Bay Surf	13	1.0	1.6
Kealia Surf	15	1.0	1.0
Wailua River Park	17	52.0	**49.3**
Koloa Landing (Waikomo)	18	**428.0**	n/d
Hanamaulu Bay (surf)	21	98.0	**219.0**
Hanamaulu Stream	22	**256.0**	**462.4**
Kalapaki Bay Surf	23	31.0	**39.4**
Nawilwili Stream	24	**882.0**	**449.5**
Waiohai Surf	28	1.0	n/d
Pakala	31	1.0	1.0
Kalapaki Bay Surf	23	2	**129.8**
Nawilwili Stream	24	1.0	1.0
Waiohai Surf	28	20.0	5.3
Pakala	31	75.0	21.9

Single-day MPN sample results should be less than 130 bacterial counts per 100 ml of sample
The Geomean for sample sites should be less than 35
n/d No data, insufficient data to calculate Geomean

AUGUST 2022

BWTF testing site samples were collected on August 10, 2022. The monthly testing compliance for August is 94%.

Sites Not Tested

The sites not tested for August are shown in Table 3.22.

Table 3.22
TESTING SITES NOT TESTED IN AUGUST

Site	Site Number
Waikoko Surf	3

Data

The water testing data for August is presented in Table 3.23, sorted by site.

- 35.2% of the sites tested in August were above the STV.
- 50% of the sites tested in August were above the geomean of 35.

Table 3.23
WATER TESTING DATA AUGUST, BY SITE

Site	Site Number	MPN	Geomean
Wainiha Stream	1	**556.0**	**176.1**
Middles Surf	5	52.0	7.3
The Bowl Surf (Hanalei Bay)	6	75.0	32.8
Hanalei River	7	**345.0**	**214.3**
Kalihiwai Surf	8	85.0	13.9
Rock Quarry Surf	10	10.0	63.8
Moloa'a Stream	12	97.0	**572.1**
Anahola Bay Surf	13	1.0	1.6
Kealia Surf	15	52.0	2.2
Wailua River Park	17	74.0	34.3
Koloa Landing (Waikomo)	18	86.0	n/d
Hanamaulu Bay (surf)	21	**243.0**	**218.4**
Hanamaulu Stream	22	**583.0**	**423.2**
Kalapaki Bay Surf	23	**171.0**	**48.2**
Nawilwili Stream	24	**286.0**	**372.4**
Waiohai Surf	28	84.0	n/d
Pakala	31	31.0	2.0

Single-day MPN sample results should be less than 130 bacterial counts per 100 ml of sample
The Geomean for sample sites should be less than 35
n/d No data, insufficient data to calculate Geomean

SEPTEMBER 2022

BWTF testing site samples were collected on September 10, 2022. The monthly testing compliance for September is 100%.

Data

The water testing data for September is presented in Table 3.26, sorted by site.

- 55.5% of the sites tested in September were above the STV.
- 58.8% of the sites tested in September were above the geomean of 35.

Table 3.26
WATER TESTING DATA SEPTEMBER, BY SITE

Site	Site Number	MPN	Geomean
Wainiha Stream	1	**1,376.0**	**223.9**
Waikoko Surf	3	1.0	1.0
Middles Surf	5	52.0	8.8
The Bowl Surf (Hanalei Bay)	6	**285.0**	31.7
Hanalei River	7	**199.0**	**195.7**
Kalihiwai Surf	8	41.0	14.7
Rock Quarry Surf	10	**323.0**	**66.2**
Moloa'a Stream	12	**171.0**	**459.4**
Anahola Bay Surf	13	1.0	1.0
Kealia Surf	15	1.0	2.2
Wailua River Park	17	**195.0**	**62.1**
Koloa Landing (Waikomo)	18	**199.0**	**291.8**
Hanamaulu Bay (surf)	21	**988.0**	**258.2**
Hanamaulu Stream	22	**1,658.0**	**560.2**
Kalapaki Bay Surf	23	63.0	**52.6**
Nawilwili Stream	24	**717.0**	**451.0**
Waiohai Surf	28	1.0	n/d
Pakala	31	1.0	2.0

Single-day MPN sample results should be less than 130 bacterial counts per 100 ml of sample
The Geomean for sample sites should be less than 35
n/d No data, insufficient data to calculate Geomean

OCTOBER 2022

BWTF testing site samples were collected on October 8, 2022. The monthly testing compliance for October is 94%

Sites Not Tested

The sites not tested for October are shown in Table 3.28.

Table 3.28
TESTING SITES NOT TESTED IN OCTOBER

Site	Site Number
Waikoko Surf	3

Data

The water testing data for October is presented in Table 3.29, sorted by site.

- 35% of the sites tested in October were above the STV.
- 55.5% of the sites tested in October were above the geomean of 35.

Table 3.29
WATER TESTING DATA OCTOBER, BY SITE

Site	Site Number	MPN	Geomean
Wainiha Stream	1	**313.0**	**336.3**
Middles Surf	5	72.0	20.8
The Bowl Surf (Hanalei Bay)	6	1.0	17.4
Hanalei River	7	**290.0**	**228.4**
Kalihiwai Surf	8	1.0	14.7
Rock Quarry Surf	10	97.0	**68.0**
Moloa'a Stream	12	**341.0**	**512.7**
Anahola Bay Surf	13	1.0	1.0
Kealia Surf	15	1.0	2.2
Wailua River Park	17	**218.0**	**92.3**
Koloa Landing (Waikomo)	18	52.0	**120.2**
Hanamaulu Bay (surf)	21	63.0	**222.0**
Hanamaulu Stream	22	**1,467.0**	**746.1**
Kalapaki Bay Surf	23	72.0	**47.4**
Nawilwili Stream	24	**663.0**	**502.1**
Waiohai Surf	28	1.0	2.4
Pakala	31	1.0	2.0

Single-day MPN sample results should be less than 130 bacterial counts per 100 ml of sample
The Geomean for sample sites should be less than 35

NOVEMBER 2022

BWTF testing site samples were collected on November 9, 2022. The monthly testing compliance for November is 100%.

Data

The water testing data for November is presented in Table 3.32, sorted by site.

- 50% of the sites tested in November were above the STV.
- 61.1% of the sites tested in November were above the geomean of 35.

Table 3.32
WATER TESTING DATA NOVEMBER

Site	Site Number	MPN	Geomean
Wainiha Stream	1	1.0	**146.8**
Waikoko Surf	3	31.0	1.8
Middles Surf	5	31.0	**41.3**
The Bowl Surf (Hanalei Bay)	6	**148.0**	**47.3**
Hanalei River	7	**414.0**	**261.4**
Kalihiwai Surf	8	1.0	9.3
Rock Quarry Surf	10	1.0	**42.9**
Moloa'a Stream	12	51.0	**183.6**
Anahola Bay Surf	13	1.0	1.0
Kealia Surf	15	1.0	2.2
Wailua River Park	17	**135.0**	**117.2**
Koloa Landing (Waikomo)	18	41.0	**109.3**
Hanamaulu Bay (surf)	21	**269.0**	**209.0**
Hanamaulu Stream	22	**4,225.0**	**1,089.3**
Kalapaki Bay Surf	23	20.0	**54.5**
Nawilwili Stream	24	**298.0**	**513.6**
Waiohai Surf	28	1.0	2.4
Pakala	31	1.0	2.0

Single-day MPN sample results should be less than 130 bacterial counts per 100 ml of sample
The Geomean for sample sites should be less than 35

DECEMBER 2022

BWTF testing site samples were collected on December 10, 2022. The monthly testing compliance for December is 89%.

Sites Not Tested

The sites not tested for December are shown in Table 3.34.

Table 3.34
TESTING SITES NOT TESTED IN DECEMBER

Site	Site Number
The Bowl (Hanalei Bay)	6
Nawilwili Stream	24

Data

The water testing data for December is presented in Table 3.35, sorted by site.

- 50% of the sites tested in December were above the STV.
- 64.9% of the sites tested in December were above the geomean of 35.

Table 3.35
WATER TESTING DATA DECEMBER, BY SITE

Site	Site Number	MPN	Geomean
Wainiha Stream	1	**431.0**	**159.5**
Waikoko Surf	3	1.0	2.0
Middles Surf	5	75.0	**53.8**
Hanalei River	7	**627.0**	**348.9**
Kalihiwai Surf	8	**24,196.0**	**38.5**
Rock Quarry Surf	10	10.0	19.9
Moloa'a Stream	12	**7,270.0**	**291.3**
Anahola Bay Surf	13	1.0	1.0
Kealia Surf	15	1.0	2.2
Wailua River Park	17	**145.0**	**143.8**
Koloa Landing (Waikomo)	18	**563.0**	**115.5**
Hanamaulu Bay (surf)	21	**771.0**	**315.7**
Hanamaulu Stream	22	**2,382.0**	**1,701.7**
Kalapaki Bay Surf	23	1.0	27.4
Waiohai Surf	28	10.0	3.8
Pakala	31	10.0	3.1

Single-day MPN sample results should be less than 130 bacterial counts per 100 ml of sample
The Geomean for sample sites should be less than 35

YEAR SUMMARY

Table 3.37 lists the overall testing compliance for each month, the percent of samples from the testing sites (combined) above the statistical threshold value (STV) of 130 organisms per 100 mls of sample, and the percent of samples from the testing sites that were above the geomean threshold of 35.

Table 3.37
TESTING BY MONTH, SUMMARY

Date Tested	% Overall Testing Compliance	% of Samples Above STV	% of Samples Above Geomean
February 9, 2022	89	18	n/a
March 9, 2022	78	35	n/a
April 15, 2022	89	50	n/a
May 11, 2022	94	23	n/a
Jun 8, 2022	89	31	41
Jul 13, 2022	100	38	56
August 10, 2022	94	35	50
September 14, 2022	100	55	58
October 13, 2022	94	35	55
November 9, 2022	100	33	66
December 14, 2022	89	50	65

n/a Not applicable

SECTION 4
Testing Data by Site

SITE 1, WAINIHA STREAM

This site is with chronic pollution issues.

Location

The Wainiha Stream mouth drains into Wainiha Bay on the northern coast of Kauai (Fig. 4.1). Although this beach is extremely remote, it is still affected by bacterial pollution and is not recommended for swimming.

Figure 4.1
WAINIHA STREAM LOCATION

MPN, and Geomean

Yearly testing data for Site 1, Wainiha Stream, is presented in Table 4.1.

The data shows that:

- 63% of the dates sampled, 7 out of 11, were over the Statistical Threshold Value (STV) of 130 organisms per 100 mls of sample.

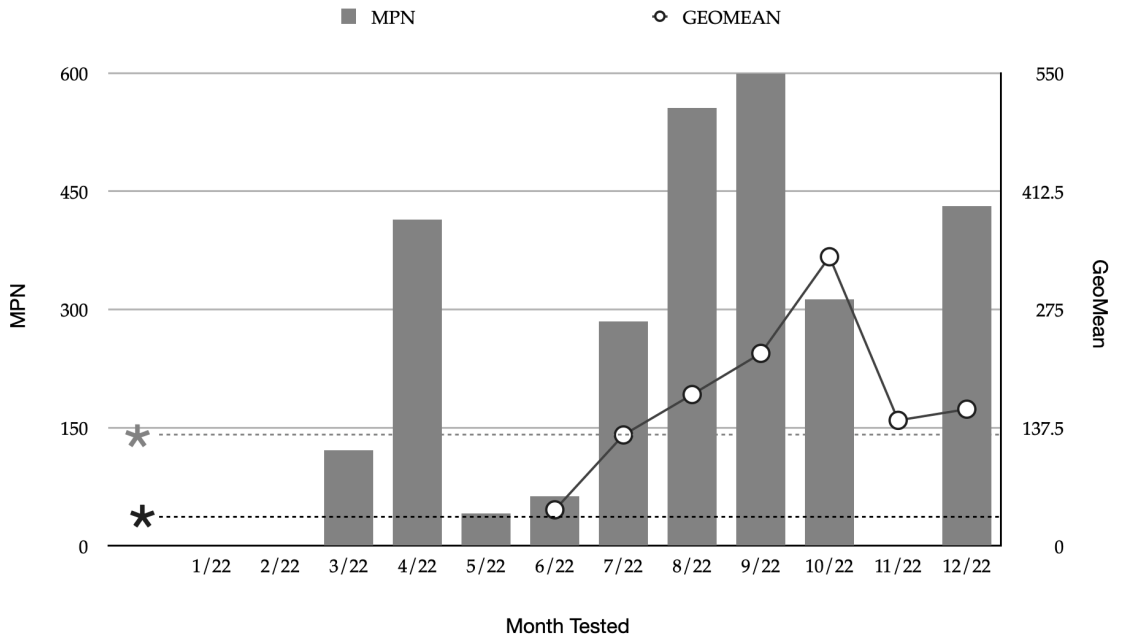
Table 4.1
WAINIHA STREAM DATA

Date Tested	MPN	Geomean
February 12, 2022	1	n/a
March 12, 2022	121	n/a
April 16, 2022	**414**	n/a
May 14, 2022	41	n/a
Jun 11, 2022	63	**41.9**
Jul 9, 2022	**285**	**129**
August 13, 2022	**556**	**176**
September 10, 2022	**1,376**	**223.9**
October 8, 2022	**313**	**336.3**
November 12, 2022	1	**146**
December 10, 2022	**431**	**159**

n/a Not applicable
n/t Not tested
Single-day sample results should be <130 (MPN)
Geomean of samples should be <35

A graphical representation of the yearly data for Wainiha Stream is presented in Figure 4.2. The thresholds for single day sample results (i.e., MPN) and Geomean are represented by the grey and black asterisks, respectively.

Figure 4.2
WAINIHA STREAM DATA



x-axis, testing dates; y-axis, MPN/Geomean
Single-day sample results should be <130 (* MPN)
Geomean of samples should be <35. (*)

SITE 3, WAIKOKO STREAM

This site does not have chronic pollution issues.

Location

Waikoko is a secluded, shady beach located at the far west end of Hanalei Bay and a famed surf site. Hawaiians named this location Waikoko, which translates to "blood water" probably because of the red mud washing off the hillside. (Fig. 4.5).

FIGURE 4.5
WAIKOKO STREAM

MPN, and Geomean

Yearly testing data for Site 3, Waikoko Stream, is presented in Table 4.3.

The data shows that:

- 0% of the dates sampled were over the Statistical Threshold Value (STV) of 130 organisms per 100 mls of sample.

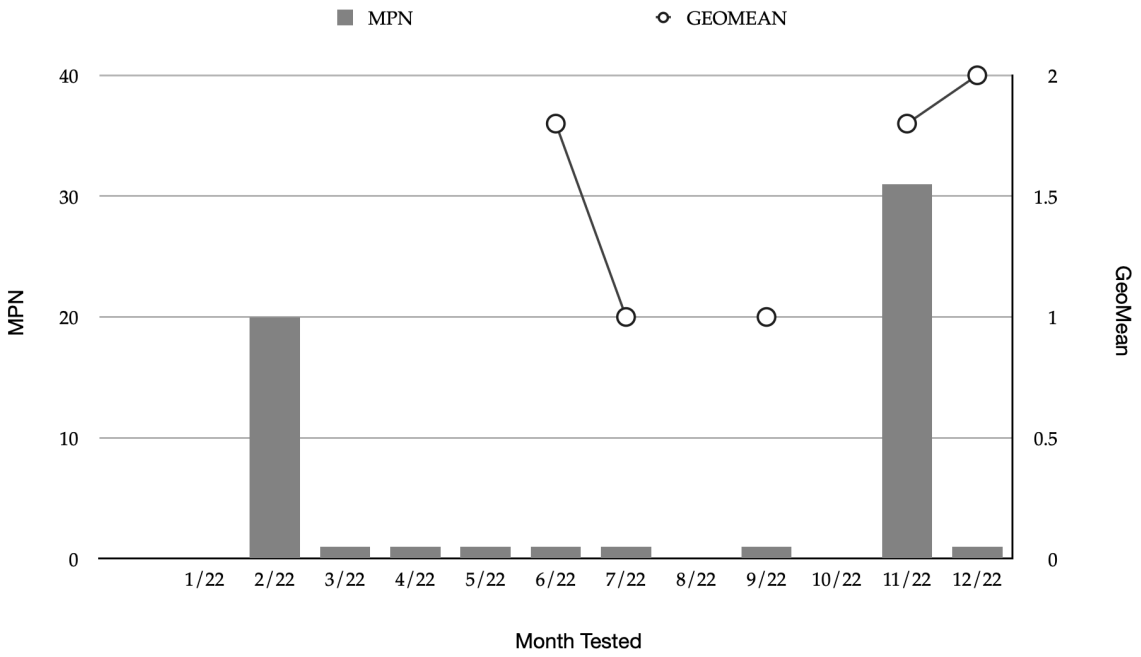
Table 4.3
WAIKOKO STREAM

Date Tested	MPN	Geomean
February 12, 2022	20	n/a
March 12, 2022	1	n/a
April 16, 2022	1	n/a
May 14, 2022	1	n/a
Jun 11, 2022	1	1.8
Jul 9, 2022	1	1
August 13, 2022	n/t	n/t
September 10, 2022	1	1
October 8, 2022	n/t	n/t
November 12, 2022	31	1.8
December 10, 2022	1	2

n/t Not tested
Single-day sample results should be <130 (MPN),
Geomean of samples should be <35.

A graphical representation of the yearly data for Waikoko Stream is presented in Figure 4.6. The thresholds for single day sample results (i.e., MPN) and Geomean are represented by the grey and black asterisks, respectively.

Table 4.6
WAIKOKO STREAM



x-axis, testing dates; y-axis, MPN/Geomean
Single-day sample results should be <130 (* MPN)
Geomean of samples should be <35. (*)

SITE 5, MIDDLES SURF

This site does not have chronic pollution issues.

Location

Middles is the name of the surf break in the middle of Hanalei Bay, with amazing surf during the winter. The entry to this surf spot is through Waioli Beach Park. (Fig. 4.9).

FIGURE 4.9
MIDDLES SURF

MPN, and Geomean

Yearly testing data for Site 5, Middles Surf, is presented in Table 4.5.

The data shows that:

- 0% of the dates sampled were over the Statistical Threshold Value (STV) of 130 organisms per 100 mls of sample.

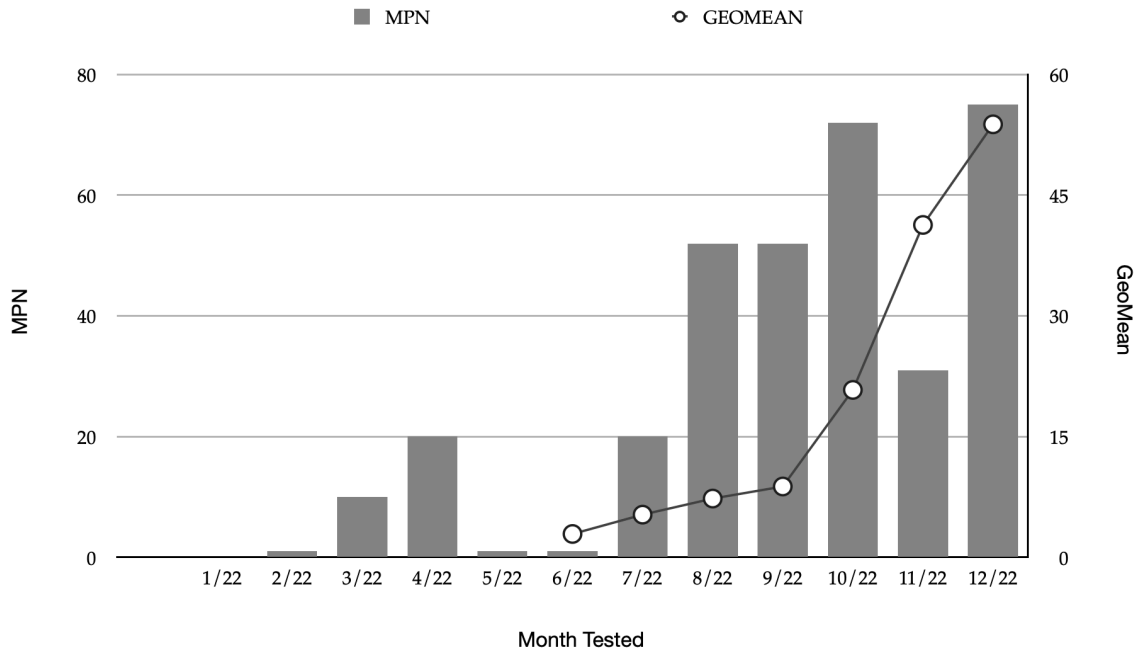
Table 4.5
MIDDLES SURF

Date Tested	MPN	Geomean
February 12, 2022	1	n/a
March 12, 2022	10	n/a
April 16, 2022	20	n/a
May 14, 2022	1	n/a
Jun 11, 2022	1	2.9
Jul 9, 2022	20	5.3
August 13, 2022	52	7.3
September 10, 2022	52	8.8
October 8, 2022	72	20.8
November 12, 2022	31	**41.3**
December 10, 2022	75	**53.8**

n/a Not applicable
Single-day sample results should be <130 (MPN),
Geomean of samples should be <35.

A graphical representation of the yearly data for Middles Surf is presented in Figure 4.10. The thresholds for single day sample results (i.e., MPN) and Geomean are represented by the grey and black asterisks, respectively.

Figure 4.10
2022 MIDDLES SURF



x-axis, testing dates; y-axis, MPN/Geomean
Single-day sample results should be <130 (* MPN)
Geomean of samples should be <35. (*)

SITE 6, THE BOWL (HANALEI BAY)

This site does not have chronic pollution issues.

Location

The Bowl is an iconic surf spot off of Hanalei Bay, formed by a reef. Black Pot Beach Park is the entry spot for the Bowl. The surf can be large at times, with strong currents. The water in Hanalei Bay is usually clean, except for heavy rains causing a Brown Water Advisory from the Hawaii Department of Health (Fig. 4.11).

FIGURE 4.11
THE BOWL

MPN, and Geomean

Yearly testing data for Site 6, The Bowl Surf, is presented in Table 4.6.

The data shows that:

- 17% of the dates sampled were over the Statistical Threshold Value (STV) of 130 organisms per 100 mls of sample.

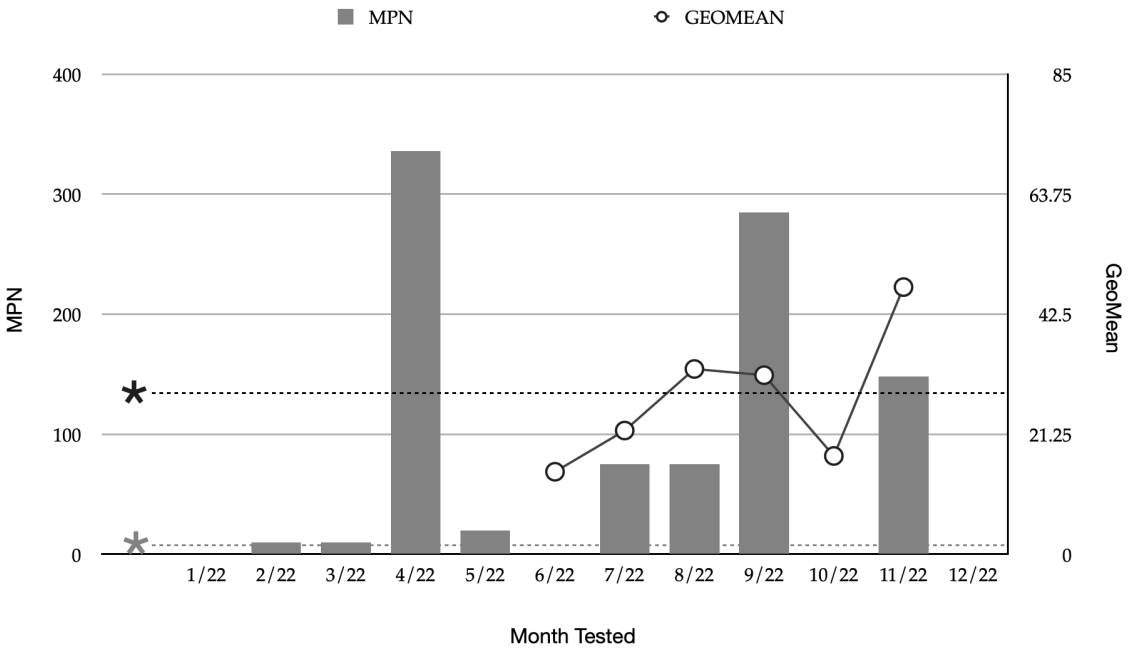
Table 4.6
THE BOWL SURF

Date Tested	MPN	Geomean
February 12, 2022	10	n/a
March 12, 2022	10	n/a
April 16, 2022	**336**	n/a
May 14, 2022	20	n/a
Jun 11, 2022	1	14.6
Jul 9, 2022	75	21.9
August 13, 2022	75	32.8
September 10, 2022	**285**	31.7
October 8, 2022	1	17.4
November 12, 2022	148	**47.3**
December 10, 2022	n/t	n/t

n/a Not applicable
Single-day sample results should be <130 (MPN),
Geomean of samples should be <35.

A graphical representation of the yearly data for The Bowl Surf is presented in Figure 4.12. The thresholds for single day sample results (i.e., MPN) and Geomean are represented by the grey and black asterisks, respectively.

Figure 4.12
2022 THE BOWL



x-axis, testing dates; y-axis, MPN/Geomean
Single-day sample results should be <130 (* MPN)
Geomean of samples should be <35. (*)

SITE 7, HANALEI RIVER AT WEKE ROAD

This site has chronic pollution issues.

Location

The Hanalei River drains to the sea at the northeast side of Hanalei Bay. The river borders Black Pot Beach Park. This is the entrance point for the Bowl, an iconic surf spot formed by a reef. The surf can be large at times, with strong currents. The Hanalei River is mostly polluted, and it is recommended to stay out, especially when it is murky (Fig. 4.13).

FIGURE 4.13
HANALEI RIVER AT WEKE ROAD

MPN, and Geomean

Yearly testing data for Site 7, Hanalei River, is presented in Table 4.7.

The data shows that:

- 81% of the dates sampled were over the Statistical Threshold Value (STV) of 130 organisms per 100 mls of sample.

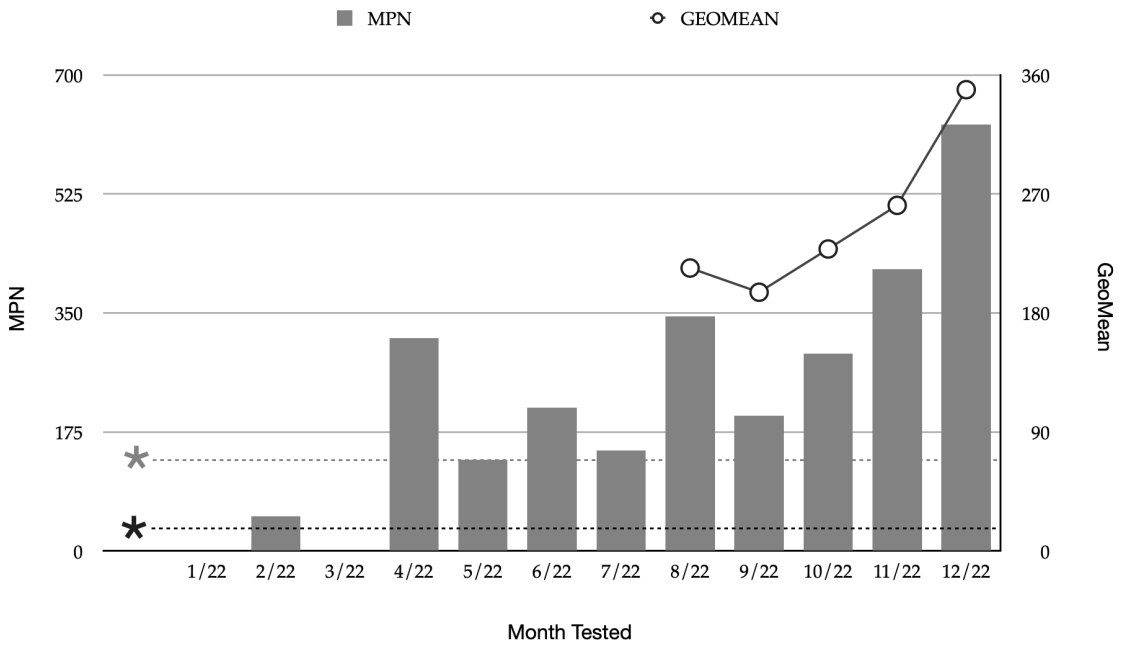
Table 4.7
HANALEI RIVER

Date Tested	MPN	Geomean
February 12, 2022	51	n/a
March 12, 2022	n/t	n/a
April 16, 2022	**313**	n/a
May 14, 2022	**134**	n/a
Jun 11, 2022	**211**	n/a
Jul 9, 2022	**148**	**214**
August 13, 2022	**345**	**195.7**
September 10, 2022	**199**	**228.4**
October 8, 2022	**290**	**261.4**
November 12, 2022	**414**	**348.9**
December 10, 2022	**627**	**214**

n/a Not applicable
n/t Not tested
Single-day sample results should be <130 (MPN),
Geomean of samples should be <35.

A graphical representation of the yearly data for Hanalei River is presented in Figure 4.14. The thresholds for single day sample results (i.e., MPN) and Geomean are represented by the grey and black asterisks, respectively.

Figure 4.14
2022 HANALEI RIVER



x-axis, testing dates; y-axis, MPN/Geomean
Single-day sample results should be <130 (* MPN)
Geomean of samples should be <35. (*)

SITE 8, KALIHIWAI SURF

This site does not have chronic pollution issues.

Location

Kalihiwai on the north shore of Kauai is a localized surf spot within Kalihiwai Bay, and during the winter months can have some very large surf (Fig. 4.15).

FIGURE 4.15
KALIHIWAI SURF

MPN, and Geomean

Yearly testing data for Site 8, Kalihiwai Surf, is presented in Table 4.8.

The data shows that:

- 0% of the dates sampled were over the Statistical Threshold Value (STV) of 130 organisms per 100 mls of sample.

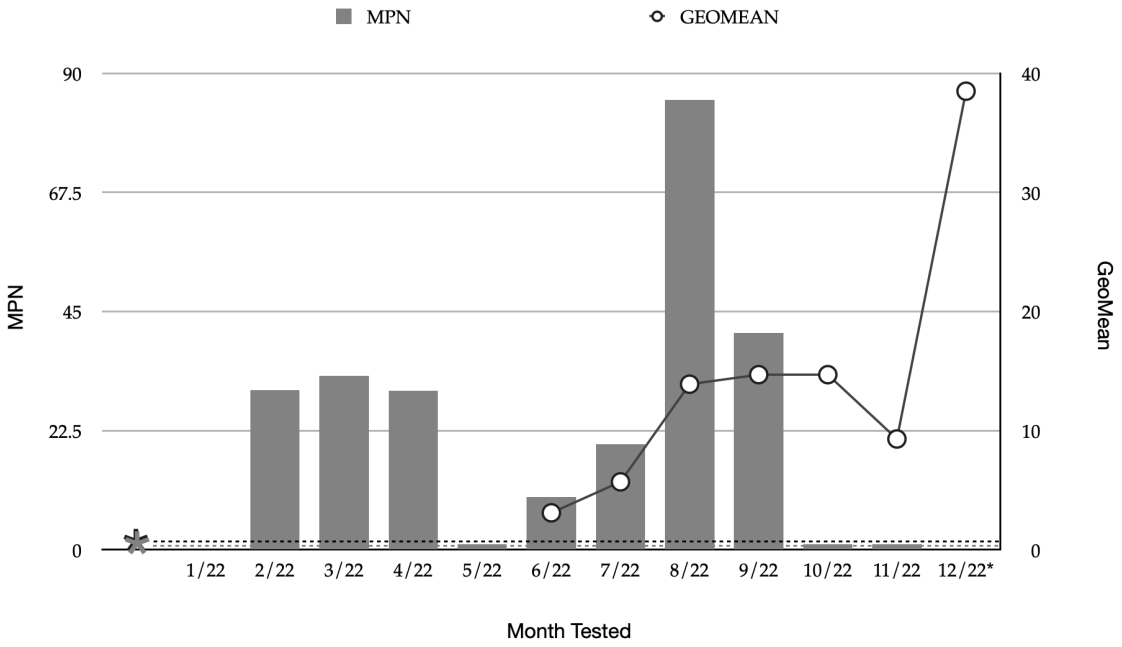
Table 4.8
2022 KALIHIWAI SURF

Date Tested	MPN	Geomean
February 12, 2022	32.9	n/a
March 12, 2022	30	n/a
April 16, 2022	1	n/a
May 14, 2022	10	n/a
Jun 11, 2022	20	3.1
Jul 9, 2022	85	5.7
August 13, 2022	41	13.9
September 10, 2022	1	14.7
October 8, 2022	1	14.7
November 12, 2022	0	9.3
December 10, 2022	30.1	**38.5**

n/a Not applicable
Single-day sample results should be <130 (MPN),
Geomean of samples should be <35.

A graphical representation of the yearly data for Kalihiwai Surf is presented in Figure 4.16. The thresholds for single day sample results (i.e., MPN) and Geomean are represented by the grey and black asterisks, respectively.

Figure 4.16
2022 KALIHIWAI SURF



x-axis, testing dates; y-axis, MPN/Geomean
Single-day sample results should be <130 (✱ MPN)
Geomean of samples should be <35. (✱)

SITE 10, ROCK QUARRY SURF

This site does not have chronic pollution issues.

Location

Rock Quarry Beach was named after an old rock quarry at the northern end but is properly known as Kahili. Kahili is secluded, quiet, and a favorite for locals. The surf can be large here, with strong currents. The Kilauea Stream at the northern end of the beach is usually polluted, so it is not recommended to swim near the mouth (Fig. 4.19).

FIGURE 4.19
ROCK QUARRY SURF

MPN, and Geomean

Yearly testing data for Site 10, Rock Quarry Surf, is presented in Table 4.10.

The data shows that:

- 27% of the dates sampled were over the Statistical Threshold Value (STV) of 130 organisms per 100 mls of sample.

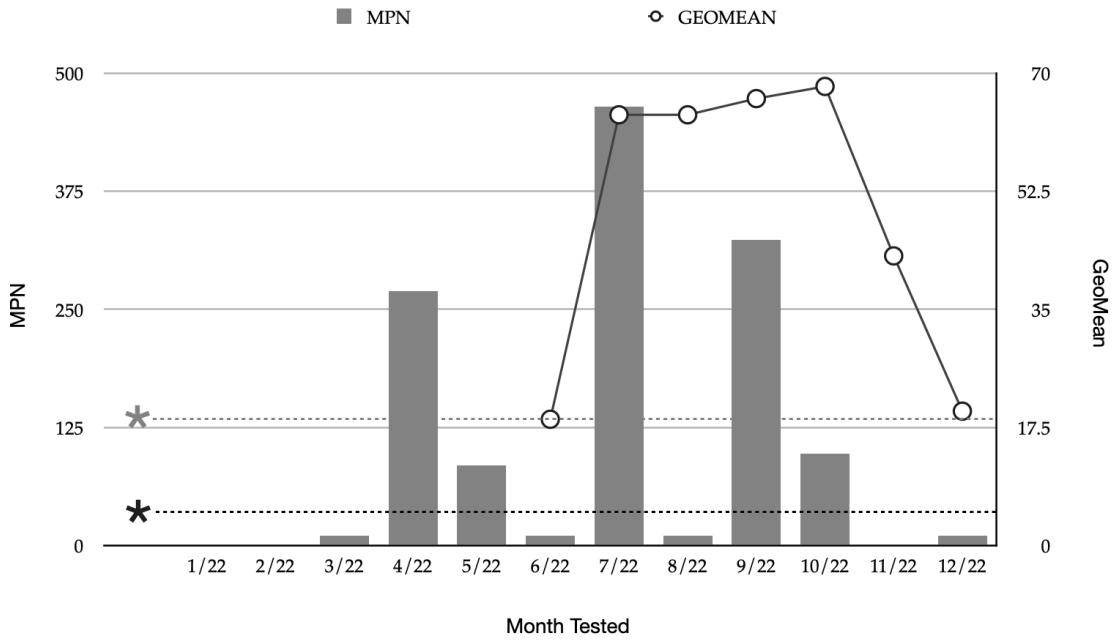
Table 4.10
ROCK QUARRY SURF

Date Tested	MPN	Geomean
February 12, 2022	1	n/a
March 12, 2022	10	n/a
April 16, 2022	**269**	n/a
May 14, 2022	85	n/a
Jun 11, 2022	10	18.7
Jul 9, 2022	**464**	**63.8**
August 13, 2022	10	**63.8**
September 10, 2022	**323**	**66.2**
October 8, 2022	97	**68.0**
November 12, 2022	1	**42.9**
December 10, 2022	10	19.9

n/a Not applicable
Single-day sample results should be <130 (MPN),
Geomean of samples should be <35.

A graphical representation of the yearly data for Rock Quarry Surf is presented in Figure 4.20. The thresholds for single day sample results (i.e., MPN) and Geomean are represented by the grey and black asterisks, respectively.

Figure 4.20
ROCK QUARRY SURF



x-axis, testing dates; y-axis, MPN/Geomean
Single-day sample results should be <130 (* MPN)
Geomean of samples should be <35. (*)

SITE 12, MOLOA'A STREAM

This site has chronic pollution issues.

Location

Moloa'a Bay has a small, beautiful beach. The water at the beach is clean, but the stream is heavily polluted (Fig. 4.23).

FIGURE 4.23
MOLOA'A STREAM

MPN, and Geomean

Yearly testing data for Site 12, Moloa'a Stream, is presented in Table 4.12.

The data shows that:

- 81% of the dates sampled were over the Statistical Threshold Value (STV) of 130 organisms per 100 mls of sample.

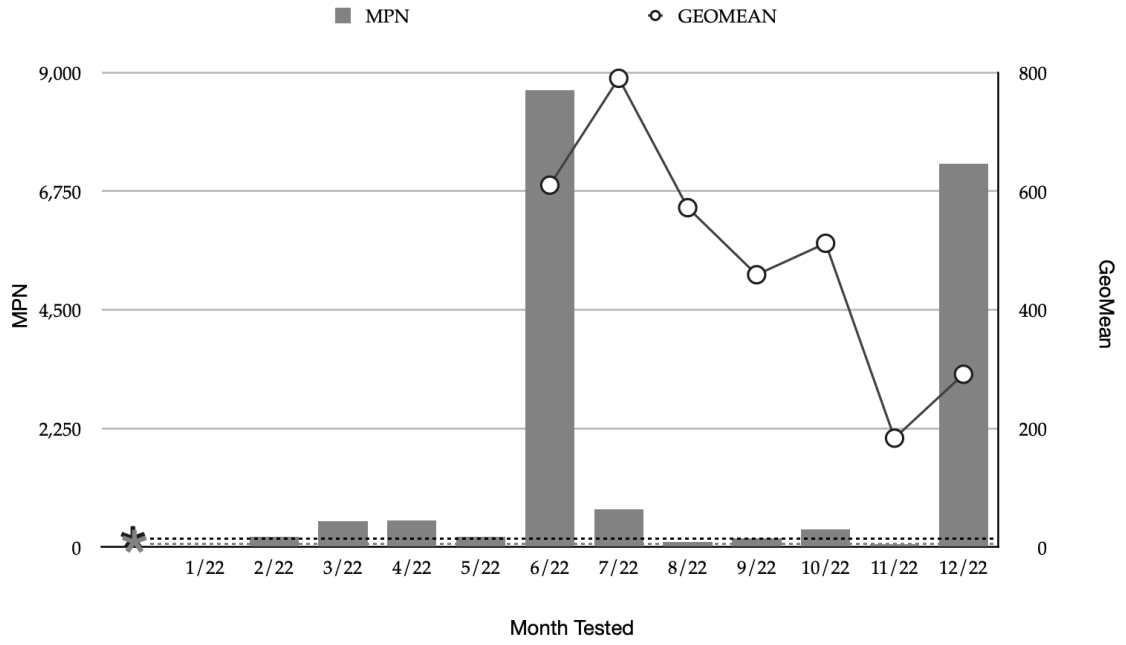
Table 4.12
MOLOA'A STREAM

Date Tested	MPN	Geomean
February 12, 2022	**199**	n/a
March 12, 2022	**487**	n/a
April 16, 2022	**512**	n/a
May 14, 2022	**197**	n/a
Jun 11, 2022	**8,664**	**610**
Jul 9, 2022	**723**	**790**
August 13, 2022	97	**572**
September 10, 2022	**171**	**459**
October 8, 2022	**341**	**512**
November 12, 2022	51	**183.6**
December 10, 2022	**7,270**	**291.3**

n/a Not applicable
Single-day sample results should be <130 (MPN),
Geomean of samples should be <35.

A graphical representation of the yearly data for Moloa'a Stream is presented in Figure 4.24. The thresholds for single day sample results (i.e., MPN) and Geomean are represented by the grey and black asterisks, respectively.

Figure 4.24
2022 MOLOA'A STREAM



x-axis, testing dates; y-axis, MPN/Geomean
Single-day sample results should be <130 (* MPN)
Geomean of samples should be <35. (*)

SITE 13, ANAHOLA BAY SURF

This site does not have chronic pollution issues.

Location

Anahola Bay is a long, white sand beach with a reef running adjacent to the beach, making this a great beach for snorkeling. The Anahola Stream at the northern end of the beach is very polluted, so it is not recommended to swim near the mouth (Fig. 4.25).

FIGURE 4.25
ANAHOLA BAY SURF

MPN, and Geomean

Yearly testing data for Site 13, Anahola Bay Surf, is presented in Table 4.13.

The data shows that:

- 0% of the dates sampled were over the Statistical Threshold Value (STV) of 130 organisms per 100 mls of sample.

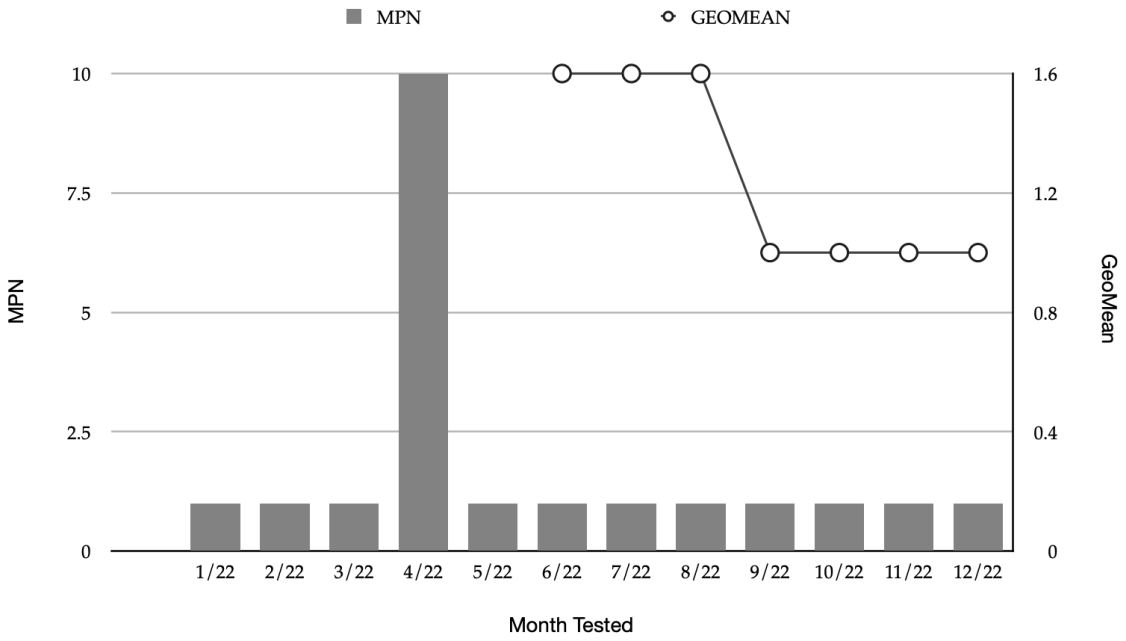
Table 4.13
2022 ANAHOLA BAY SURF

Date Tested	MPN	Geomean
February 12, 2022	1	n/a
March 12, 2022	1	n/a
April 16, 2022	1	n/a
May 14, 2022	10	n/a
Jun 11, 2022	1	n/a
Jul 9, 2022	1	1.6
August 13, 2022	1	1.6
September 10, 2022	1	1.6
October 8, 2022	1	1.0
November 12, 2022	1	1.0
December 10, 2022	1	1.0

n/a Not applicable
Single-day sample results should be <130 (MPN),
Geomean of samples should be <35.

A graphical representation of the yearly data for Anahola Bay Surf is presented in Figure 4.26. The thresholds for single day sample results (i.e., MPN) and Geomean are represented by the grey and black asterisks, respectively.

Figure 4.26
ANAHOLA BAY SURF



x-axis, testing dates; y-axis, MPN/Geomean
Single-day sample results should be <130 (* MPN)
Geomean of samples should be <35. (*)

SITE 15, KEALIA SURF

This site does not have chronic pollution issues.

Location

Kealia is a long white sand beach with clear water, on the eastern shore of Kauai. Be mindful of the size of the surf here, because it can be large at times creating dangerous currents (Fig. 4.29).

FIGURE 4.29
KEALIA SURF

MPN, and Geomean

Yearly testing data for Site 15, Kealia Surf, is presented in Table 4.15.

The data shows that:

- 0% of the dates sampled were over the Statistical Threshold Value (STV) of 130 organisms per 100 mls of sample.

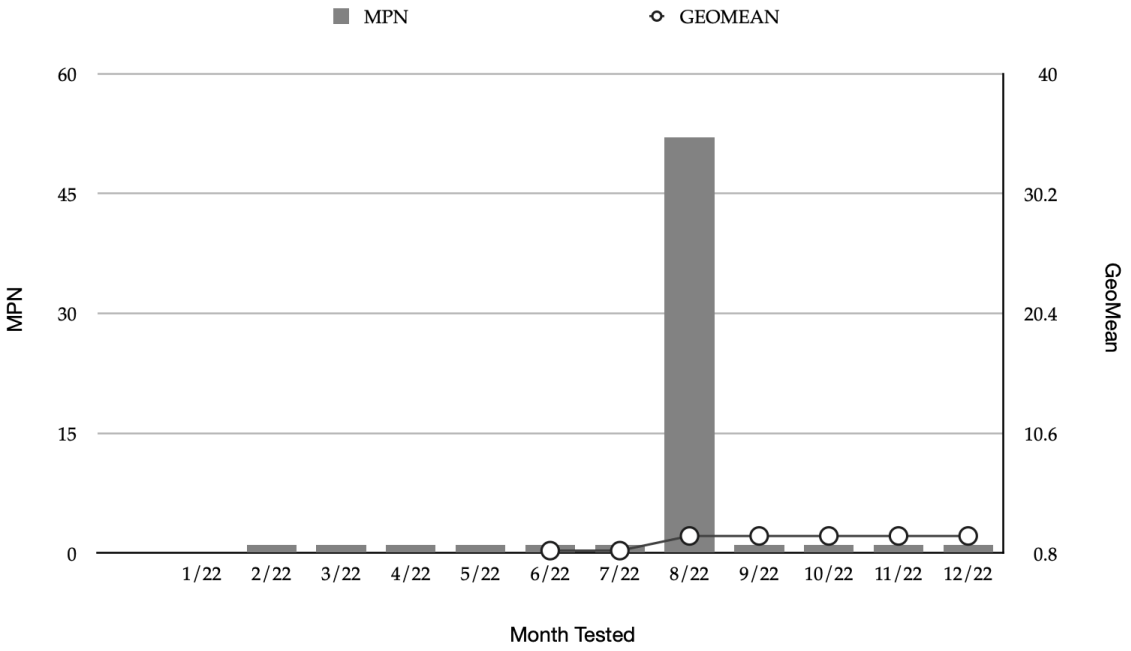
Table 4.15
KEALIA SURF

Date Tested	MPN	Geomean
February 12, 2022	1	n/a
March 12, 2022	1	n/a
April 16, 2022	1	n/a
May 14, 2022	1	n/a
Jun 11, 2022	1	n/a
Jul 9, 2022	1	1
August 13, 2022	52	1
September 10, 2022	1	2.2
October 8, 2022	1	2.2
November 12, 2022	1	2.2
December 10, 2022	1	2.2

n/a Not applicable
Single-day sample results should be <130 (MPN),
Geomean of samples should be <35.

A graphical representation of the yearly data for Kealia Surf is presented in Figure 4.30. The thresholds for single day sample results (i.e., MPN) and Geomean are represented by the grey and black asterisks, respectively.

Figure 4.30
2022 KEALIA SURF



x-axis, testing dates; y-axis, MPN/Geomean
Single-day sample results should be <130 (* MPN)
Geomean of samples should be <35. (*)

SITE 17, WAILUA RIVER MOUTH

This site may have chronic pollution issues.

Location

The Wailua River is extremely culturally significant, being one of the largest land divisions on Kauai. The Wailua River was a political center, offering access to marine resources and agricultural land. The river meets the sea at Wailua Beach Park, a popular spot for surfers and kiteboarders. The water can be polluted here (Fig. 4.39).

FIGURE 4.39
WAILUA RIVER MOUTH

MPN, and Geomean

Yearly testing data for Site 20, Wailua River Mouth, is presented in Table 4.20.

The data shows that:

- There is a 100% testing compliance rate, with 12 out of 12 months sampled;
- 45% of the dates sampled were over the Statistical Threshold Value (STV) of 130 organisms per 100 mls of sample.

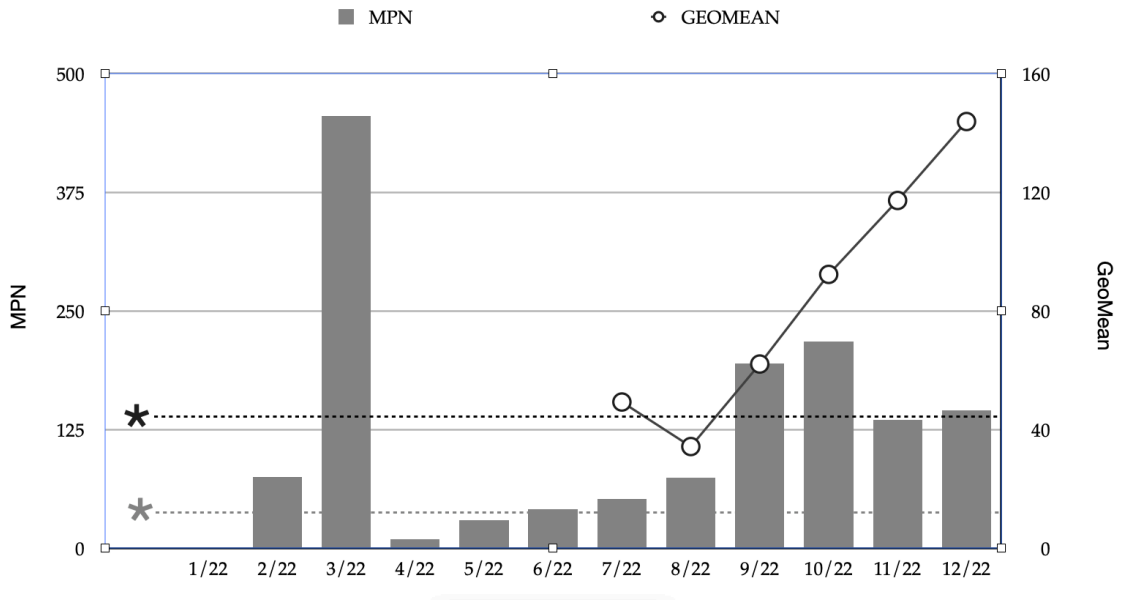
Table 4.20
WAILUA RIVER MOUTH

Date Tested	MPN	Geomean
February 12, 2022	75	n/a
March 12, 2022	**455**	n/a
April 16, 2022	10	n/a
May 14, 2022	30	n/a
Jun 11, 2022	41	n/a
Jul 9, 2022	52	**49.3**
August 13, 2022	74	34.3
September 10, 2022	**195**	**62.1**
October 8, 2022	**218**	**92.3**
November 12, 2022	**135**	**117.2**
December 10, 2022	**145**	**143.8**

n/t Not applicable
Single-day sample results should be <130 (MPN)
Geomean of samples should be <35

A graphical representation of the yearly data for Waimea River Mouth is presented in Figure 4.40. The thresholds for single day sample results (i.e., MPN) and Geomean are represented by the grey and black asterisks, respectively.

Figure 4.40
WAILUA RIVER MOUTH



x-axis, testing dates; y-axis, MPN/Geomean
Single-day sample results should be <130 (* MPN)
Geomean of samples should be <35. (*)

SITES 21&22, HANAMAULU STREAM AND BAY

This site has chronic pollution issues.

Location

This freshwater stream feeds Hanama'ulu Bay, causing onshore waters to be murky in the bay. Bacteria levels tend to be very high in this stream (Fig. 4.43).

FIGURE 4.43
HANAMAULU STREAM

MPN, and Geomean

Yearly testing data for Site 22, Hanamaulu Stream and Hanamaulu Bay, is presented in Table 4.22 and 4.33, respectively.

The data shows that:

- 100% of the sample dates for Hanamaulu Stream and 64% of the sample dates for Hanamaulu Bay were over the Statistical Threshold Value (STV) of 130 organisms per 100 mls of sample.

Table 4.22
HANAMAULU STREAM

Date Tested	MPN	Geomean
February 12, 2022	934	n/a
March 12, 2022	908	n/a
April 16, 2022	408	n/a
May 14, 2022	350	n/a
Jun 11, 2022	637	599
Jul 9, 2022	256	462
August 13, 2022	583	432
September 10, 2022	1,658	560
October 8, 2022	1,467	746
November 12, 2022	4,225	1089
December 10, 2022	2,382	1701

n/a Not applable
n/t Not tested
Single-day sample results should be <130 (MPN)
Geomean of samples should be <35

Table 4.23
HANAMAULU BAY

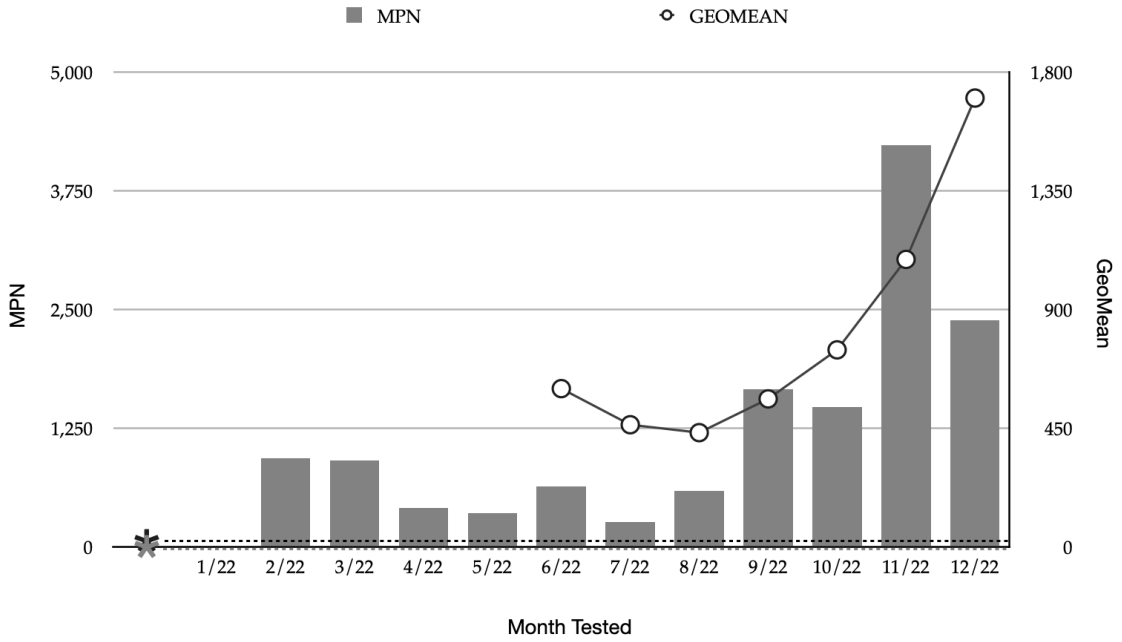
Date Tested	MPN	Geomean
February 12, 2022	n/t	n/a
March 12, 2022	246	n/a
April 16, 2022	428	n/a
May 14, 2022	134	n/a
Jun 11, 2022	364	n/a
Jul 9, 2022	98	219
August 13, 2022	243	218
September 10, 2022	988	258
October 8, 2022	63	222
November 12, 2022	269	209
December 10, 2022	271	315

n/a Not applable
n/t Not tested
Single-day sample results should be <130 (MPN)
Geomean of samples should be <35

A graphical representation of the yearly data for Hanamaulu Stream is presented in Figure 4.44. The thresholds for single day sample results (i.e., MPN) and Geomean are represented by the grey and black asterisks, respectively.

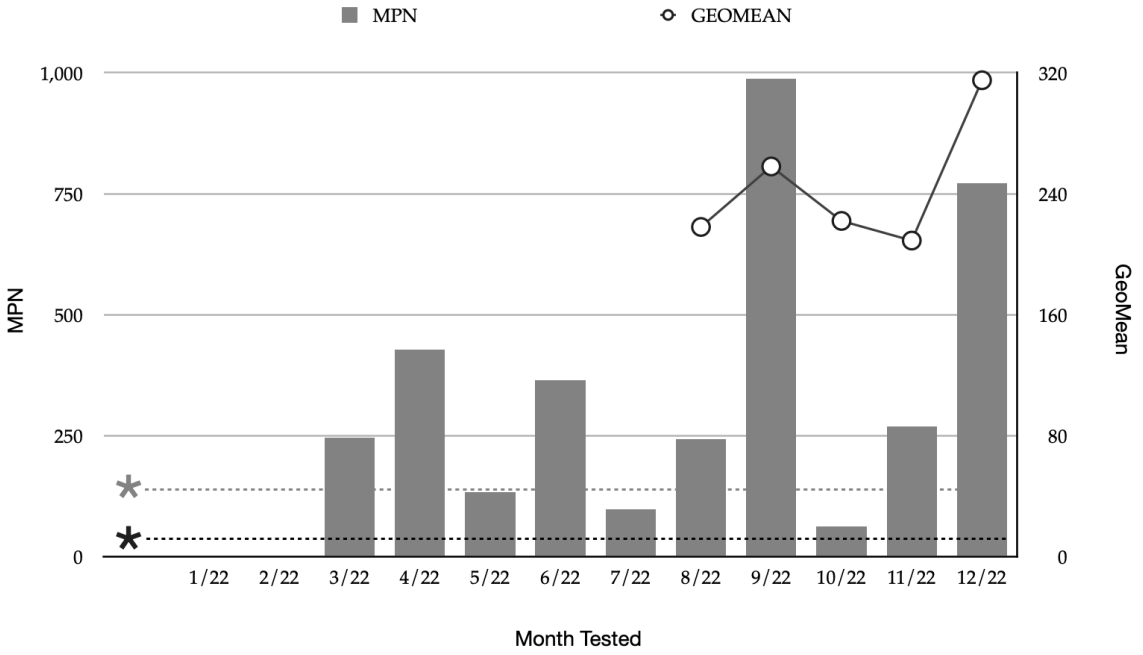
A graphical representation of the yearly data for Hanamaulu Bay is presented in Figure 4.45. The thresholds for single day sample results (i.e., MPN) and Geomean are represented by the grey and black asterisks, respectively.

Figure 4.44
HANAMAULU STREAM



x-axis, testing dates; y-axis, MPN/Geomean
Single-day sample results should be <130 (* MPN)
Geomean of samples should be <35. (*)

Figure 4.45
HANAMAULU BAY



x-axis, testing dates; y-axis, MPN/Geomean
Single-day sample results should be <130 (* MPN)
Geomean of samples should be <35. (*)

SITE 23, KALAPAKI BAY SURF

This site does not have chronic pollution issues.

Location

Kalapaki Bay has a large beautiful sandy beach and is within Nawiliwili Beach Park. The water here is generally clean (Fig. 4.45).

FIGURE 4.46
KALAPAKI BAY SURF

MPN, and Geomean

Yearly testing data for Site 23, Kalapaki Bay Surf, is presented in Table 4.23.

The data shows that:

- 9% of the dates sampled, 2 out of 12, were over the Statistical Threshold Value (STV) of 130 organisms per 100 mls of sample.

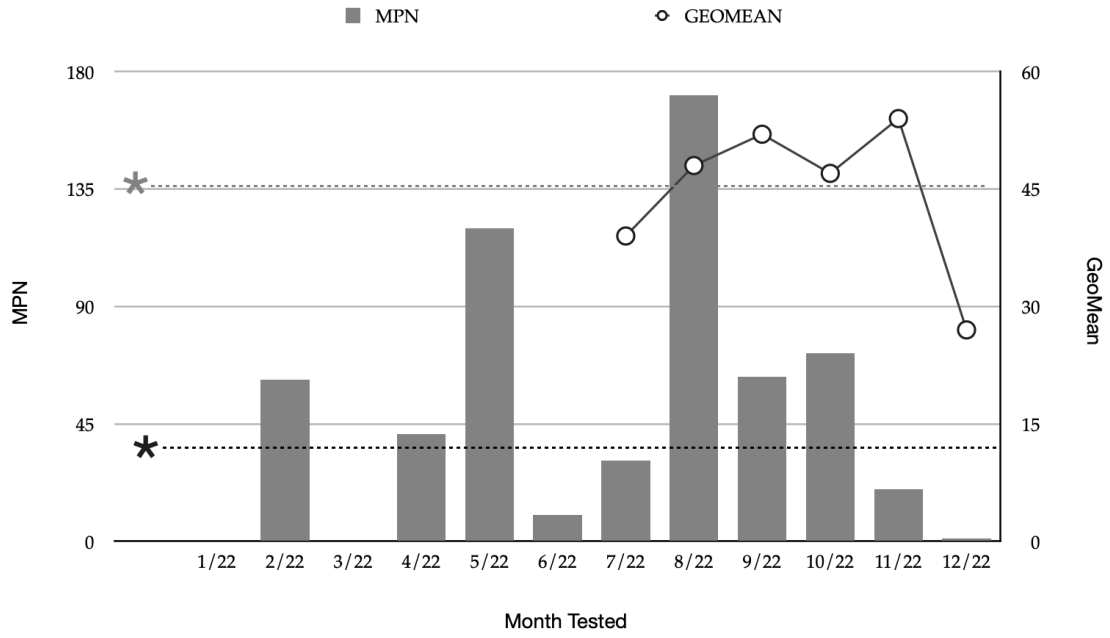
Table 4.24
KALIPAKI BAY SURF

Date Tested	MPN	Geomean
February 12, 2022	62	n/a
March 12, 2022	n/t	n/a
April 16, 2022	41	n/a
May 14, 2022	120	n/a
Jun 11, 2022	10	n/a
Jul 9, 2022	31	**39**
August 13, 2022	**171**	**48**
September 10, 2022	63	**52**
October 8, 2022	72	**47**
November 12, 2022	20	**54**
December 10, 2022	1	27

n/t Not tested
n/a Not applicable
Single-day sample results should be <130 (MPN)
Geomean of samples should be <35

A graphical representation of the yearly data for Kalapaki Bay Surf is presented in Figure 4.46. The thresholds for single day sample results (i.e., MPN) and Geomean are represented by the grey and black asterisks, respectively.

Figure 4.47
KALIPAKI BAY SURF



x-axis, testing dates; y-axis, MPN/Geomean
Single-day sample results should be <130 (* MPN)
Geomean of samples should be <35. (*)

SITE 24, NAWILIWILI STREAM

This site has chronic pollution issues.

Location

Nawiliwili Stream is located within Nawiliwili Beach Park. This small freshwater stream feeds into Kalapaki Bay, which is named after Hawaiian Wiliwili trees that were once abundant there. This stream tends to be polluted from nearby housing and industrial runoff. It is not recommended to swim or play in this stream (Fig. 4.47).

FIGURE 4.48
NAWILIWILI STREAM

MPN, and Geomean

Yearly testing data for Site 24, Nawiliwili Stream, is presented in Table 4.24.

The data shows that:

- 100% of the dates sampled were over the Statistical Threshold Value (STV) of 130 organisms per 100 mls of sample.

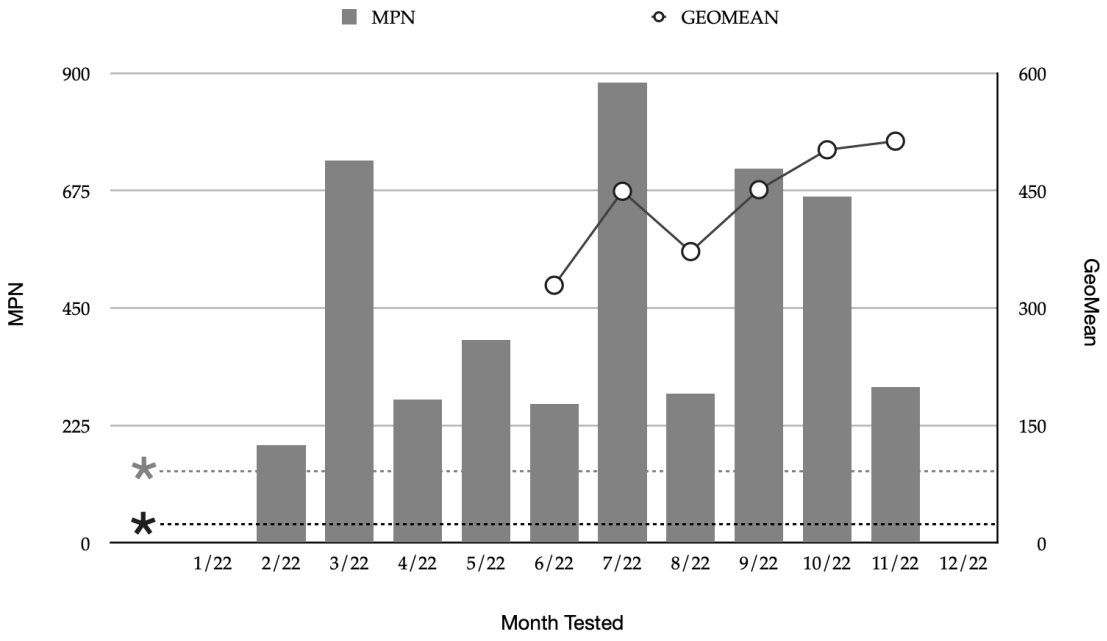
Table 4.25
NAWILIWILI STREAM

Date Tested	MPN	Geomean
February 12, 2022	187	n/a
March 12, 2022	733	n/a
April 16, 2022	275	n/a
May 14, 2022	388	n/a
Jun 11, 2022	266	329
Jul 9, 2022	882	449
August 13, 2022	286	372
September 10, 2022	717	451
October 8, 2022	663	502
November 12, 2022	298	513
December 10, 2022	n/t	n/t

n/t Not tested
n/a Not applicable
Single-day sample results should be <130 (MPN)
Geomean of samples should be <35

A graphical representation of the yearly data for Nawiliwili Stream is presented in Figure 4.48. The thresholds for single day sample results (i.e., MPN) and Geomean are represented by the grey and black asterisks, respectively.

Figure 4.49
NAWILIWILI STREAM



x-axis, testing dates; y-axis, MPN/Geomean
Single-day sample results should be <130 (* MPN)
Geomean of samples should be <35. (*)

SITE 28, WAIOHAI SURF

Limited testing data suggests this site does may not have chronic pollution issues.

Location

Waiohai Surf, next to Poipu Beach Park is a beautiful beach front resort with a beginner-friendly surf break. At times there is a strong current and during the summer there tends to be large surf (Fig. 4.55).

FIGURE 4.55
WAIOHAI SURF

MPN, and Geomean

Yearly testing data for Site 28, Waiohai Surf, is presented in Table 4.28.

The data shows that:

- 0% of the dates sampled were over the Statistical Threshold Value (STV) of 130 organisms per 100 mls of sample.

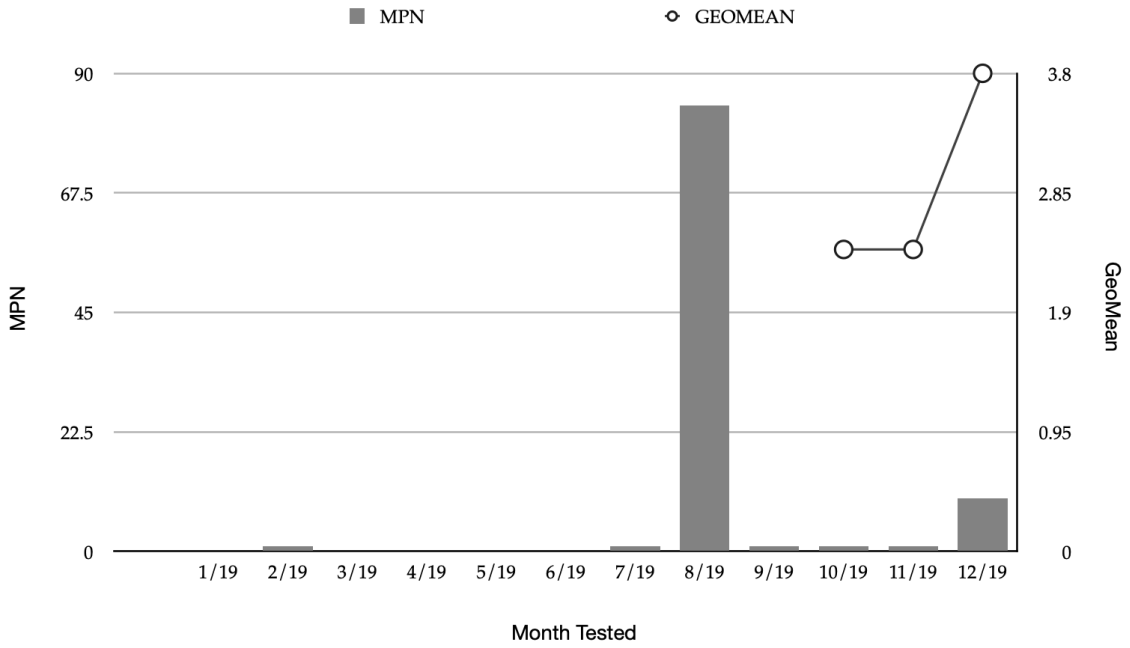
Table 4.28
WAIOHAI SURF

Date Tested	MPN	Geomean
February 12, 2022	n/t	n/a
March 12, 2022	1	n/a
April 16, 2022	n/t	n/a
May 14, 2022	n/t	n/a
Jun 11, 2022	n/t	n/a
Jul 9, 2022	1	n/a
August 13, 2022	84	n/a
September 10, 2022	1	n/a
October 8, 2022	1	2.4
November 12, 2022	1	2.4
December 10, 2022	10	3.8

n/t Not tested
n/d Not enough data to calculate the Geomean
Single-day sample results should be <130 (MPN)
Geomean of samples should be <35

A graphical representation of the yearly data for Waiohai Surf is presented in Figure 4.56. The thresholds for single day sample results (i.e., MPN) and Geomean are represented by the grey and black asterisks, respectively.

Figure 4.56
WAIOHAI SURF



x-axis, testing dates; y-axis, MPN/Geomean
Single-day sample results should be <130 (* MPN)
Geomean of samples should be <35. (*)

SITE 31 PAKALA BEACH

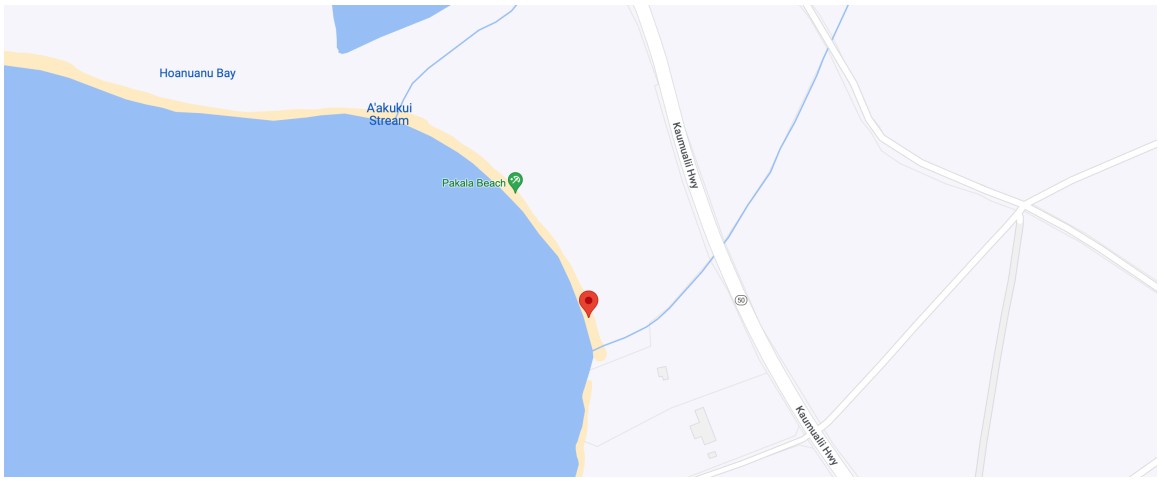
This site does not have chronic pollution issues.

Location

Pakala Beach, also known as Infinites, , also called Alakoko or Niamalu Pond, lies at a large bend in the Hule‘ia River, from which it is separated by a wall 900 yards long. It is the best example of an inland fishpond in the entire state, and is said to have been built by Menehune, suggesting that it was built during the earliest period of Hawaiian settlement

To get to Pakala Beach, you’ll need to park along the shoulder of the **Kaumualii Highway near mile marker 21**, and then take a short hike down the trail. Also known as HI-50, this highway has a high-speed limit, so be careful as you get out of your vehicle. You have to be especially vigilant while crossing, especially if you’re parked around the bend. Barring periods of heavy rain, the trail conditions are usually easily walkable, but be sure to wear shoes with good tread to keep your steady footing.
(Fig. 4.37).

FIGURE 4.73
PAKALA BEACH



MPN, and Geomean

Yearly testing data for Site 31, Pakala, is presented in Table 4.37.

The data shows that:

- 0% of the dates sampled were over the Statistical Threshold Value (STV) of 130 organisms per 100 mls of sample.

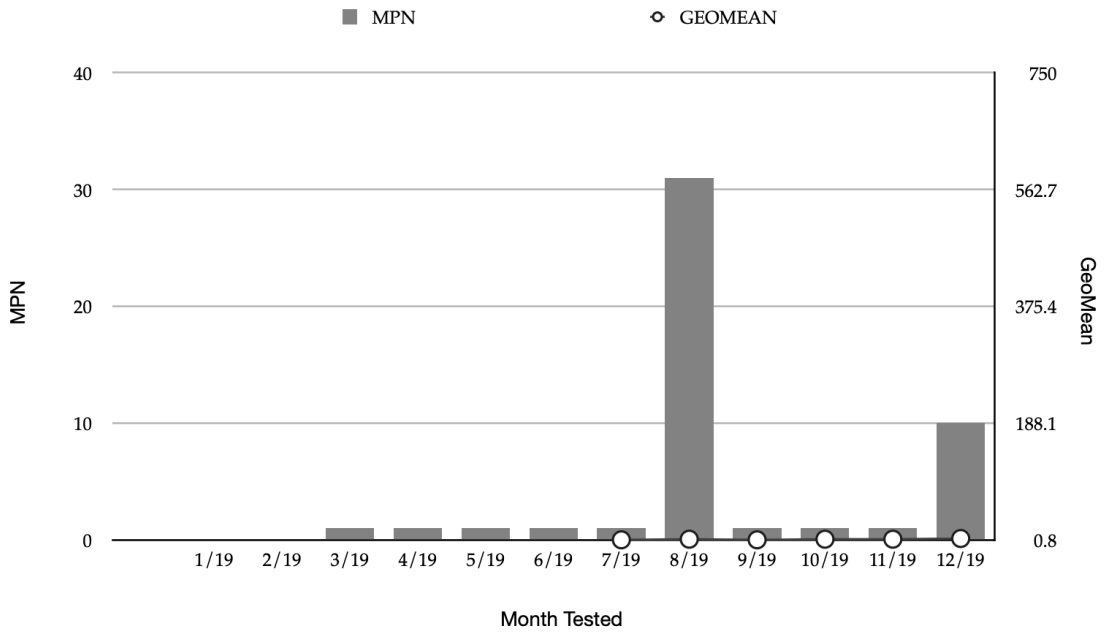
Table 4.37
PAKALA BEACH

Date Tested	MPN	Geomean
February 12, 2022	n/t	n/a
March 12, 2022	1	n/a
April 16, 2022	1	n/a
May 14, 2022	1	n/a
Jun 11, 2022	1	n/a
Jul 9, 2022	1	n/a
August 13, 2022	31	2.0
September 10, 2022	1	1.0
October 8, 2022	1	2.0
November 12, 2022	1	2.0
December 10, 2022	10	3.1

n/t Not tested
n/a Not applicable
Single-day sample results should be <130 (MPN)
Geomean of samples should be <35

A graphical representation of the yearly data for Pakala Beach is presented in Figure 4.74. The thresholds for single day sample results (i.e., MPN) and Geomean are represented by the grey and black asterisks, respectively.

Figure 4.74
PAKALA BEACH



x-axis, testing dates; y-axis, MPN/Geomean
Single-day sample results should be <130 (✱ MPN)
Geomean of samples should be <35. (✱)

January through November 2022, not tested

SECTION 7
Chronically Polluted Sites

Marine/freshwater pollution is the chronic or accidental release into the environment of natural or artificial substances that are harmful to ecosystems, human health and/or water-related uses. Natural phenomena, such as volcanic eruptions do not meet these criteria. Chronic water pollution is caused by permanent or periodical releases of polluting substances, levels of which may vary widely over time.

This report does not seek to define testing sites as chronic under any State or Federal scientific or legal definitions of "chronically polluted." Rather, this report simply provides criteria by which testing sites that have persistent and sustained high levels of bacterial contamination over the course of the testing year can be referred to as having a chronic pollution issue.

There are many variables that contribute to a site's pollution, and this report does not claim to draw any conclusions as to why, or how, a site becomes polluted. It is also noted that each of these sites are tested only once per month. A more comprehensive analysis of each of these sites is required to determine if they are indeed—legally and scientifically— "chronically polluted".

For the purposes of this analysis only, and in the interest of providing information to facilitate discussion around the results in this report, testing sites are referred to here as being chronically polluted if, and only if, both of the following criteria are met:

- The testing site must have a testing compliance of >50% during the testing year.
- The testing site must have >50% of its samples in total be above the MPN threshold of 130.

APPENDIX
References

Ashbold, NJ. (2001, January). *Indicators of microbial water quality.* Retrieved from https://www.researchgate.net/publication/252756462_Indicators_of_microbial_water_quality

Beachapedia. (2017, January 23). *Epidemiology Studies.* Retrieved from http://beachapedia.org/Epidemiology_Studies

Dayna, NS. (2008). *Confronting Chronic Pollution: A Socio-Legal Analysis of Risk and Precaution.* Retrieved from https://digitalcommons.osgoode.yorku.ca/cgi/viewcontent.cgi?article=1199&context=clpe

Ducrotoy, JP. (2022, February 17). *Coastal pollution and impacts.* Retrieved from http://www.coastalwiki.org/wiki/Coastal_pollution_and_impacts

Dias, M., and Wilson, R. (2012, December 2). *EPA updates recreational water quality criteria*. Retrieved from https://www.surfrider.org/coastal-blog/entry/epa-releases-new-water-quality-criteria

Surfrider Foundation. (2020, January 11). *Blue Water Task Force, Kaua'i.* Retrieved from https://www.surfrider.org/blue-water-task-force/chapter/23

United States Environmental Protection Agency, National Service Center for Environmental Publications (NSCEP). (2008). *Comparison of Enterococcus Measurements in Marine Beach and Bay Samples by Quantitative Real Time Polymerase Chain Reaction Membrane Filtration and Enterolert.* Retrieved from https://tinyurl.com/urfoya3

United States Environmental Protection Agency. (2018, December 20). *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (2000) Documents.* Retrieved from https://www.epa.gov/wqc/methodology-deriving-ambient-water-quality-criteria-protection-human-health-2000-documents

United States Environmental Protection Agency. (2000). *Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health (2000).* Retrieved from https://www.epa.gov/sites/production/files/2018-10/documents/methodology-wqc-protection-hh-2000.pdf

United States Environmental Protection Agency. (2022, December 16). *Recreational Water Quality Criteria and Methods*. Retrieved from https://www.epa.gov/wqc/recreational-water-quality-criteria-and-methods

United States Environmental Protection Agency. (2020). *Water Quality Standards Handbook, Chapter 3: Water Quality Criteria.* Retrieved from https://www.epa.gov/sites/production/files/2014-10/documents/handbook-chapter3.pdf