2017-2020 Ketchikan Beach Monitoring Comprehensive Report

January 2021

Photo: Sampling at Mountain Point Surprise Beach, May 27, 2020. (SAWC photo)

SOUTHEAST ALASKA WATERSHED COALITION

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Work was completed in cooperation with EPA, Southeast Alaska Watershed Coalition, Ketchikan Indian Community, several DEC programs (Water Quality Standards, Assessment and Restoration (WQSAR), Compliance, Cruise Ship, and Wastewater Discharge Authorization), the City of Ketchikan, and the Ketchikan Gateway Borough.

Report cover photo was taken by Ketchikan Indian Community at Surprise Beach.

Executive Summary

The Alaska Beach program was initiated along the Ketchikan coastline to monitor fecal waste contamination during the 2017, 2018, 2019, and 2020 recreation seasons. Marine water samples were collected at 13 monitoring sites to evaluate potential health risks indicated by fecal coliform and enterococci bacteria, and to notify the public when levels exceeded state standards. Monitoring sites included Knudson Cove, Beacon Hill, South Point Higgins Beach, beach at Shull Road (Shull), beach off Sunset Drive (Sunset), South Refuge Cove State Recreation Site (South Refuge Cove), Thomas Basin Harbor, Seaport Beach, Rotary Park Pool, Rotary Park Beach, Mountain Point Surprise Beach, Mountain Point Cultural Food, and Herring Cove (see Figures 1 - 7). Eight sites were sampled in 2017, 13 sites in 2018, and 12 sites in 2019 and 2020.

To address additional community and tribal concerns in southern Ketchikan, the 2018 monitoring program added two alternating locations at Rotary Park Beach (Rotary Pool and Rotary Beach) and Mountain Point (Mt. Point Surprise Beach and Mt. Point Cultural Foods), and a new location at Herring Cove. For the 2019 and 2020 seasons, Beacon Point was excluded due to access issues, and all locations were monitored every week.

Table 1 provides specific site locations and descriptions, and Table 2 provides the nearby potential pollution sources for the specific monitoring locations. Relevant state water quality criteria for recreation and shellfish harvesting in marine waters are described in Table 3.

A monitoring report was released after the 2017 sampling season (https://dec.alaska.gov/water/water-quality/beach-program/), but in 2018, only a field report with monitoring data was released. A 2017-2019 comprehensive report was developed after the 2019 sampling season to compile all data and provide more in-depth discussion. This report is an updated version of the 2017-2019 report including 2020 data.

The 2017-2020 analytical tests for fecal coliform bacteria revealed that 11 of the 13 monitoring sites failed to meet the Alaska water quality standard (WQS) for the harvesting for consumption uses during 2 or more years including Knudson Cove, Beacon Hill, South Point Higgins, Shull, Sunset, South Refuge Cove, Thomas Basin Harbor, Seaport Beach, Rotary Park Pool, Mountain Point Cultural Food, and Herring Cove (Table 4 - 7). In 2020, all 12 sites failed to mean the 10% of samples criterion for harvesting and consumption of raw aquatic organisms such as mollusks (>31 CFU/100 mL) (Table 4 - 7).

The 2017-2020 analytical tests for enterococci showed that 12 of the 13 monitoring sites failed to meet the Alaska water quality standard (WQS) statistical threshold value criterion for recreation use, and 10 of the 13 sites failed to meet the Alaska WQS 30-day geometric mean criterion for recreation use during at least one year, and some exceeded the criteria all 4 years (Tables 9 - 13). In 2020 6 of the 12 sites failed to meet one or both of the enterococci criteria (South Point Higgins, Sunset Beach, Thomas Basin Harbor, Rotary Park Pool, Mountain Point Cultural Foods, and Herring Cove).

In addition to bacteria testing, Microbial Source Tracking (MST) for bacteria genetic identification was conducted during one sampling event per recreation season; however, there are not state criteria for

comparison. The human host marker were detected during at least one year at all 13 monitoring locations[1] tested (Table 14). The dog host marker was detected at all sites during at least one year with the exception of Mountain Point Surprise Beach. The gull host marker was detected in 12 of 13 locations during at least one year except for Mountain Point Cultural Foods Beach. Table 15- 18 provides individual sample results for the 2017 through 2020 recreation seasons.

Numerous potential bacteria sources are present along the Ketchikan coast, including: private and/or public sewer treatment system outfalls, public sewer treatment system emergency bypass discharges, sewer collection system deficiencies, individual septic tanks, wildlife, pet feces, boats in harbor and launch areas, and private watercraft, ferries, and cruise ships. The data collected to date are not sufficient to determine explicitly which bacteria sources in which beach locations are negatively affecting the marine water uses.

This document does not evaluate whether the coastal waters are impaired under Clean Water Act section 303(d), although the data summarized in this report may be used in a future impairment determination when preparing the 2020 Integrated Water Quality Monitoring and Assessment Report (Integrated Report). Prior to making a decision on impairment DEC will issue a public notice and comment period for the community, agencies, local and tribal governments, and other interested stakeholders.

Next Steps

DEC Beach program has been working with other DEC programs, the Ketchikan Borough, City of Ketchikan and other stakeholders to collect concurrent samples from various potential pollutant sources in the area. In addition, DEC's Alaska Clean Water Actions (ACWA) Grants Program is funding the development of a Watershed Management Plan which is designed to address the current pollution sources in Ketchikan and protect high quality waters. The plan evaluates wastewater/stormwater management options for reducing the pollutants (especially bacteria) entering Ketchikan freshwater watersheds and coastal marine waters from known diverse point and nonpoint bacteria discharges and sources. The plan will follow the EPA's 9-element watershed planning process.

This 2017-2020 Ketchikan Beach Monitoring Comprehensive Report, the 2017-2019 Ketchikan Beach Monitoring Comprehensive Report, the 2017-2018 Ketchikan Beach Field Report, and the 2017 Ketchikan Beach Monitoring Report are posted on the Beach website http://dec.alaska.gov/water/water-quality/beach-program/ and Water Quality Reports website at http://dec.alaska.gov/water/water-quality/reports. Data from these reports may be used to evaluate coastal waters near Ketchikan for impairment status in a future Integrated Report.

In future years, bacteria concentrations may be modeled using Virtual Beach to aid in issuing beach advisories. Virtual Beach is a tool designed by the U.S. Environmental Protection Agency (EPA) Center for Exposure Assessment Modeling (CEAM) Information Sources to help develop site-specific statistical models for the prediction of pathogen indicator levels at recreational beaches.

[1] Only 11 of 13 monitoring sites were tested for genetic markers in 2018. The Pool and Cultural Food sites were the alternating monitoring locations at Rotary Park and Mountain Point, respectively, and were analyzed for microbial source tracking.

1. ABOUT ALASKA'S BEACH PROGRAM

In response to increased occurrences of water-borne illnesses U.S. Congress passed the Beaches Environmental Assessment and Coastal Health (BEACH) Act in 2002. EPA administers grant funds to states, tribes and territories under the Act to establish monitoring and public notification programs. The BEACH program has established national marine water quality monitoring and reporting standards for fecal waste contamination and notifies the public when levels exceed state standards.

Congress passed the BEACH Act because pathogens in recreational waters can be naturally occurring, or they can be introduced through contamination events with the feces of humans and other warm-blooded animals. Commonly documented health issues from swimming in contaminated recreational waters include gastrointestinal illness, respiratory illnesses, skin rashes, and ear, eye, and wound infections. People who get an illness from swimming in contaminated water do not always associate their illness with swimming because the onset of the illness is delayed. For example, viral gastrointestinal illness is often mild, short-lived, and self-limiting, and symptoms usually take up to 24 hours to appear. Outbreaks of disease are usually documented when many people seek medical assistance because of a similar illness or the severity of the illness. However, people with mild illness often do not seek medical assistance. Therefore, disease outbreaks are often inconsistently recognized and the outbreak information in the literature is likely underestimated[2].

In Alaska, the Alaska DEC's Division of Water uses EPA grant funds for the Alaska Beach Program. Alaska's Beach Program provides funds to municipalities, watershed organizations, and tribal groups to conduct water quality monitoring on high-priority public beaches. Beach Programs have been set up in 15 Alaskan communities, including Ketchikan. The Ketchikan Beach program was developed in collaboration with the Ketchikan Indian Association (KIC), City of Ketchikan, Ketchikan Gateway Borough, and the Southeast Alaska Watershed Coalition (SAWC). Throughout the four years of this study (2017-2020) KIC has performed the weekly monitoring activities.

Two groups of bacteria, fecal coliform and enterococci, are measured as indicators of fecal waste contamination in marine waters. These bacteria are found in both human and animal feces. Alaska's criteria for bacteria are discussed in Section 3 Methods.

2. KETCHIKAN BEACH MONITORING LOCATIONS

The monitoring locations are situated along the coastal recreational areas within several watersheds. The surrounding and upgradient area uses include boat harbors, residential/commercial/industrial, state recreational sites, neighborhood/local beaches, and shellfish and marine food gathering.

The 13 beaches monitored during 2017-2020 are: Knudson Cove, Beacon Hill, South Point Higgins Beach, beach at Shull Road (Shull), beach off Sunset Drive (Sunset), South Refuge Cove State Recreation Site (South Refuge Cove), Thomas Basin Harbor, Seaport Beach, Rotary Park Pool, Rotary Park Beach,

[2] EPA National Beach Guidance and Required Performance Criteria for Grants, 2014 Edition (EPA-823-B-14-001).

Mountain Point Surprise Beach, Mountain Point Cultural Food, and Herring Cove (see Figures 1 - 7). Eight sites were sampled in 2017, 13 sites in 2018, and 12 sites in 2019 and 2020.

Rotary Park Beach, Rotary Park Pool, Mountain Point Surprise Beach, Mountain Point Cultural Food and Herring Cove sites were added to the monitoring program in 2018. Rotary Park 'Pool' is a shallow pool area which has a concrete enclosure at the outlet and the 'Beach' is a location where local groups recreate on the open coastal beach. The Mountain Point 'Surprise Beach' accommodates tourist groups gather for snorkeling and scuba diving, and the 'Cultural Food' location is used by tribal groups to gather marine foods for consumption. These locations were chosen based on conversations with representatives from the Ketchikan Gateway Borough and the Ketchikan Indian Community, the local tribal government. Herring Cove was also a location requested by the local tribal government group, the Our Way of Life Committee. Beacon Hill was monitored during the 2017 and 2018 seasons, but not during the 2019 and 2020 seasons due to access issues.

Table 1 provides a site description for each monitoring location. Table 2 describes the nearby pollution sources for each site. Site photographs from 2020 are attached as Appendix A. Photographs from previous years are available upon request.

Figure 1 shows the overall view of the Ketchikan beach monitoring locations. Figure 2 - 7 show detailed views of the monitoring locations. Figure 8 shows the cruise ship docking and anchor area, the ferry docking area, the airport, the Charcoal Point sewer treatment outfall and mixing zone, and the Mountain Point sewer treatment outfall and mixing zone.

Table 1. Monitoring locations and site descriptions

Site ID	Latitude	Longitude	Site description	Years Monitored
Knudson Cove	55° 28' 19.47" N 55.47208	-131° 47' 46.76" W -131.79632	Beach and small boat harbor in Knudson Cove in southern end of Clover Pass, approx. 10 miles north of downtown.	2017, 2018, 2019, 2020
Beacon Hill	55° 28' 20.21" N 55.47228	-131° 49' 22.98" W -131.82305	South of Clover Passage, approx. 9.4 miles north of downtown.	2017, 2018
South Point Higgins Beach	55° 26' 55.12" N 55.44864	-131° 49' 52.90" W -131.83136	South of South Point Higgins Beach, approx. 8.3 miles north of downtown.	2017, 2018, 2019, 2020
Beach at Shull Road	55° 26' 7.57" N 55.43544	-131° 47' 54.62" W -131.79851	South of Whipple Creek mouth, approx. 6.7 miles north of downtown.	2017, 2018, 2019, 2020
Beach at Sunset Drive	55° 24' 45.40" N 55.41261	-131° 45' 54.19" W -131.76505	On Sunset Peninsula approx. 4.7 miles north of downtown. South of Mud Bay.	2017, 2018, 2019, 2020
South Refuge Cove State Recreation Site	55° 24' 26.62" N 55.40739	-131° 45' 19.77" W -131.75549	South of state recreation site approx. 4 north miles of downtown.	2017, 2018, 2019, 2020
Thomas Basin Harbor	55° 20' 28.49" N 55.34125	-131° 38' 30.45" W -131.64179	Small boat harbor at mouth of Ketchikan Creek, approx. 2.5 miles south of downtown.	2017, 2018, 2019, 2020
Seaport Beach	55° 18' 52.63" N 55.31462	-131° 35' 35.68" W -131.5932	Local shellfish gathering beach approx. 5 miles south of downtown. Commercial area in Saxman.	2017, 2018, 2019, 2020
Rotary Park Beach (aka Bugges Beach)	55° 18' 35.34" N 55.30982	-131° 34' 49.27" W -131.58028	Highly used recreation beach approx. 6 miles south of downtown. Open coastal beach.	2018, 2019, 2020
Rotary Park Pool (aka Bugges Beach)	55° 18' 31.50" N 55.30981667	-131° 34' 39.34" W -131.58027778	Highly used recreation beach approx. 6 miles south of downtown. Concrete enclosure at outlet, marine water flows over enclosure.	2017, 2018, 2019, 2020
Mountain Point Surprise Beach	55° 17' 36.72" N 55.29353	-131° 32' 51.49"W -131.54750	Local recreation beach used for tourist group snorkeling, near Mountain Point boat launch, approx. 8 miles south of downtown.	2018, 2019, 2020
Mountain Point Cultural Food	55° 17' 34.05" N 55.29279	-131° 32' 21.08" W -131.53917	Local cultural food gathering beach, near Mountain Point boat launch, approx. 8 miles south of downtown.	2018, 2019, 2020
Herring Cove	55° 19" 34.57" N 55.32627	-131° 31' 22.13" W -131.52278	Local recreation beach used for tourist groups, northern end of Herring Cove, approx. 10.5 miles south of downtown.	2018, 2019, 2020

Table 2. Potential point and nonpoint sources[3] present in coastal marine waters near monitoring sites

Site ID	Individual septic tanks	Private sewer treatment system outfall(s)	Wildlife Pet feces	Private watercraft	Cruise ships, Ferries	Mountain Point sewer treatment system outfall(s)	Sewer collection system deficiencies	Charcoal Point sewer treatment system emergency bypass discharge	Boats at boat launches & in harbor areas
Knudson Cove	✓	✓	✓	✓					✓
Beacon Hill	✓	✓	✓	✓					
South Point Higgins	✓	✓	✓	✓	✓				
Shull	✓	✓	✓	✓	✓				
Sunset	✓	✓	✓	✓	✓				
South Refuge Cove	✓	✓	✓	✓	✓				
Thomas Basin			✓	✓			✓	✓	✓
Seaport			✓	✓	✓		✓	✓	
Rotary Beach			✓	✓	✓		✓	✓	
Rotary Pool			✓	✓	✓		✓		
Mt Point Surprise Beach			✓	✓	✓	✓	✓		✓
Mt Point Cultural Food[4]			✓	✓	✓	✓	✓		✓
Herring Cove	✓	✓	✓	✓			✓		

[3] Sources vary in volume and bacterial level.

[4] Private sewer treatment systems in this area were connected to the Mountain Point Wastewater Treatment Plant in 2018.

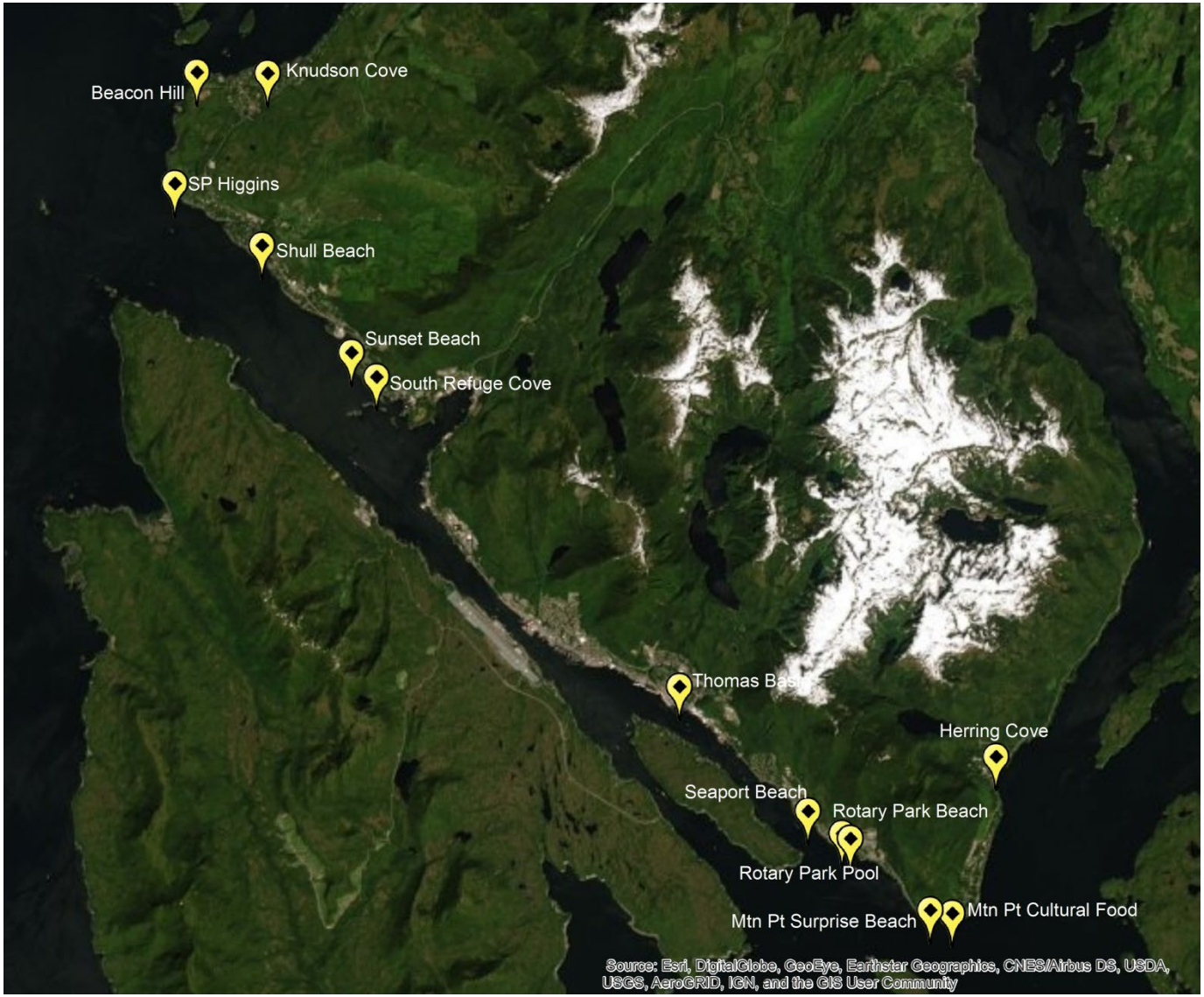


Figure 1. Ketchikan beach monitoring locations

Figure 2. 2019 & 2020 Ketchikan beach monitoring locations – Knudson Cove, South Point Higgins, and Shull Beach
Beacon Hill was monitored 2017-2018.

Figure 3. 2019 & 2020 Ketchikan beach monitoring locations –Sunset and South Refuge Cove

Figure 4. 2019 & 2020 Ketchikan beach monitoring locations – Thomas Basin

Figure 5. 2019& 2020 Ketchikan beach monitoring locations – Seaport, Rotary Beach and Rotary Pool

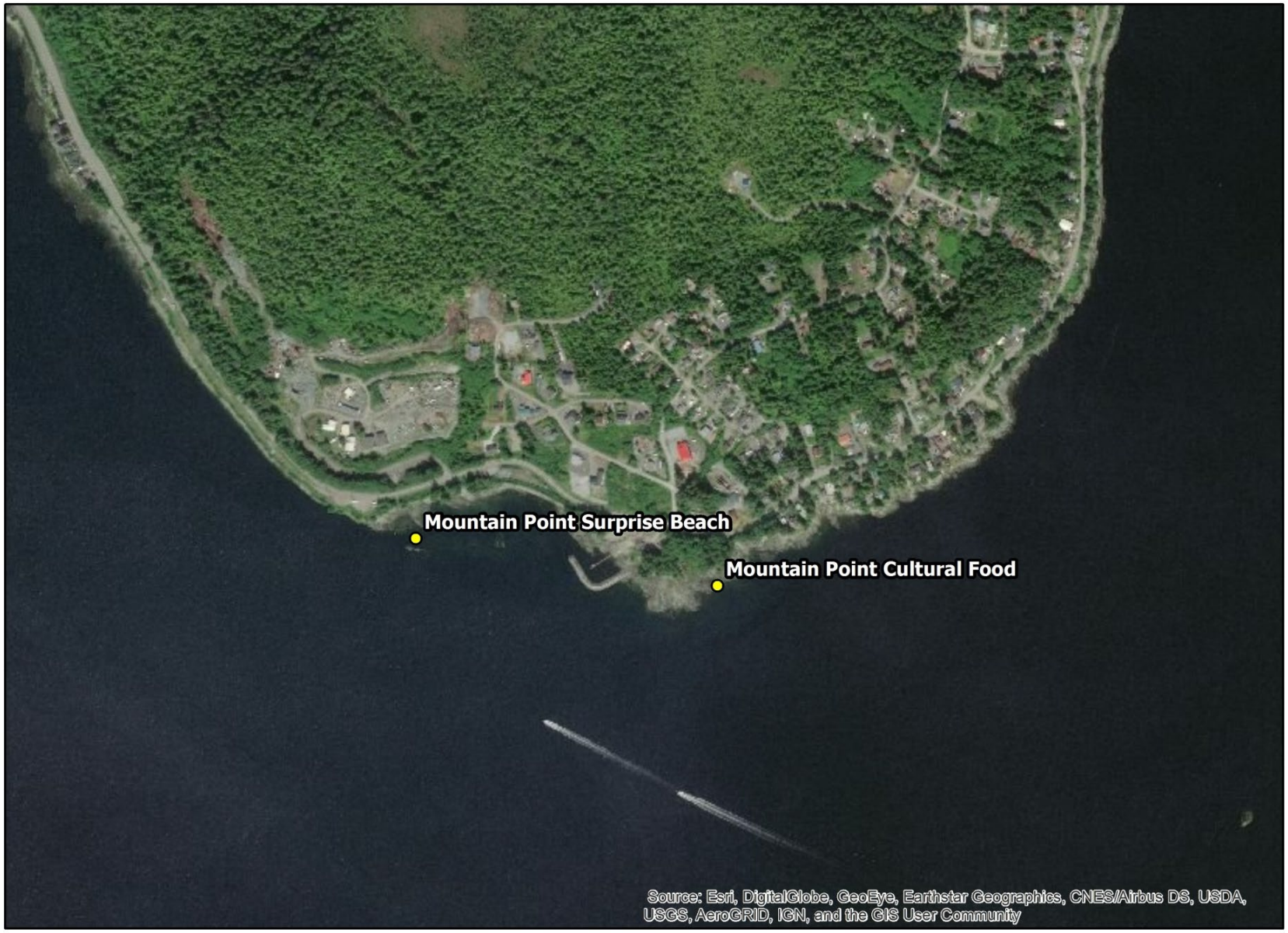


Figure 6. 2019 & 2020 Ketchikan beach monitoring locations – Mt Point Surprise Beach and Mt Point Cultural Food

Figure 7. 2019 & 2020 Ketchikan beach monitoring locations – Herring Cove.

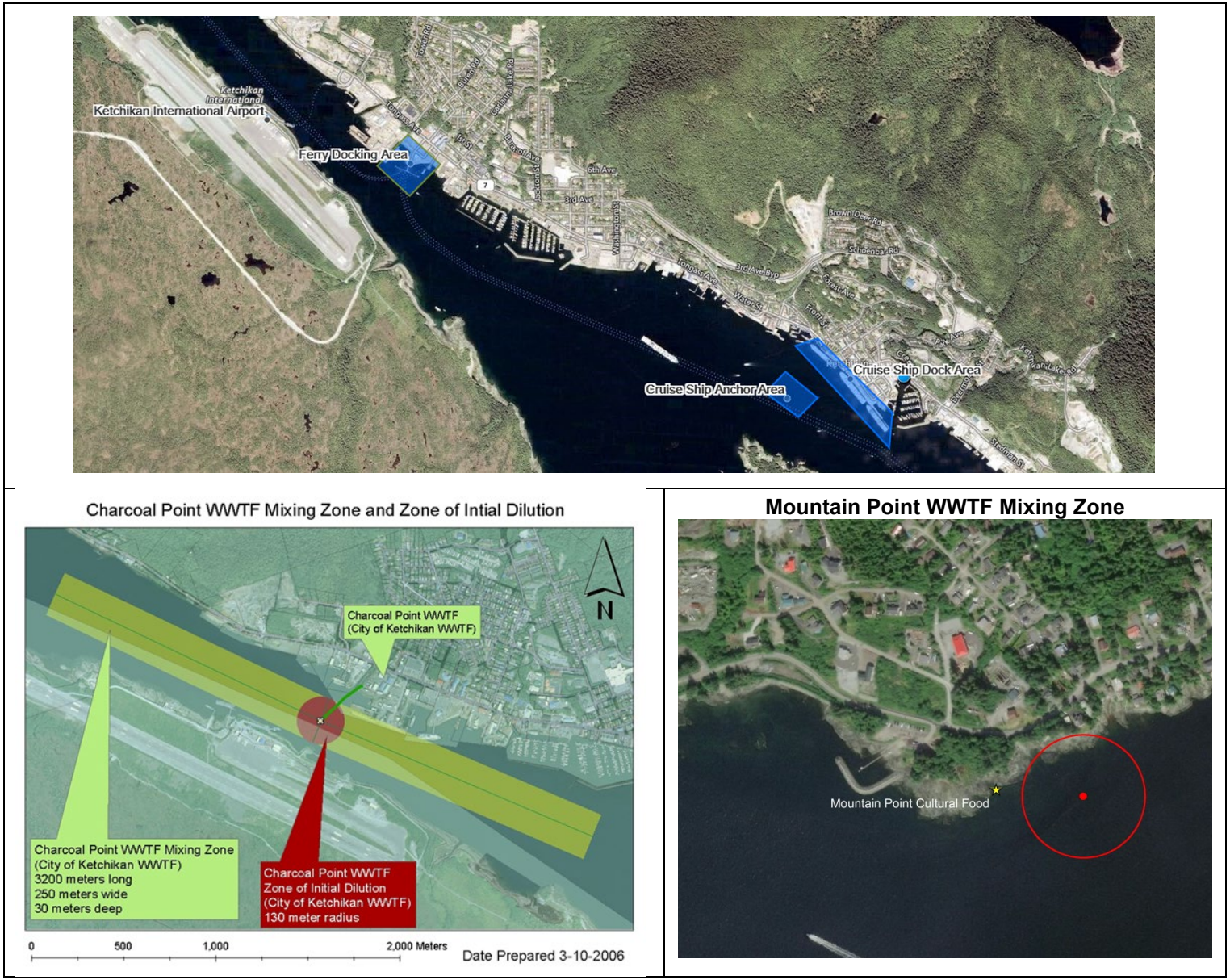


Figure 8. Ketchikan airport, ferry dock, cruise ship dock, and anchor area (top). Charcoal Point and Mountain Point mixing zones (bottom)

3. METHODS

Samples were collected for the 2017-2020 Ketchikan Beach monitoring project at 8-13 different sample locations along the coast of Ketchikan (Figures 1 - 7). Samples were collected once per week during the recreation season from approximately May 15 through September 15. Site photographs are attached as Appendix A. Sanitary surveys were also conducted, and are attached as Appendix B. The chain of custody and laboratory analytical reports for samples are attached as Appendix C.

Each sample was collected using the grab method with a clean 120 ml bottle provided by the laboratory. A field replicate for each analytical parameter (fecal coliform and enterococci) was collected from one monitoring location per week on a rotating schedule so that replicates were collected from each monitoring location. Temperature blanks accompanied all coolers to document that samples remained within acceptable temperature limits.

All bacteria samples were collected by KIC staff following Standard Operating Procedures as described in the Ketchikan Beach Water Quality Monitoring and Pathogen Detection Quality Assurance Project Plan (QAPP) and the Ketchikan Beach Monitoring Handbook at http://dec.alaska.gov/water/water-quality/beach-program/. Trained staff collected water samples wearing chest waders and shoulder length gloves. After wading to a depth of approximately three feet, water samples were collected about one foot below the surface of the water avoiding collecting any floating material. During sampling at each location, a Marine Beach Sanitary Survey was completed. The survey records information on water recreation and beach usage activities, wildlife, weather, water and air temperature, tidal conditions, and potential sources of pollution. Site-specific survey summary tables are attached as Appendix B.

R&M Engineering-Ketchikan, Inc. (R&M), a DEC-approved water quality laboratory[5] in Ketchikan, performed analyses of bacterial colonies present in the samples. R&M provided all sampling bottles, materials, and coolers. After sample collection, the sample bottles were stored in a cooler between 1 and 10 degrees Celsius and were returned to the laboratory within 6 hours of collection. Laboratory staff checked each temperature blank upon receipt. All sample temperatures were within acceptable limits.

Samples were also collected for Microbial Source Tracking (MST)[6] analysis. For one sampling event during the 2017, 2018, 2019, and 2020 field seasons a MST sample was collected at the same location, date, and time of the fecal coliform and enterococci samples. MST samples were collected in unpreserved laboratory-supplied 500 ml sterile polycarbonate Corning bottles.

Source Molecular, Inc., an EPA accepted MST and pathogen detection laboratory in Miami Florida, performed analyses using the quantitative polymerase chain reaction (qPCR) method to determine the host(s) genetic markers (i.e., human, domestic animals and/or wildlife) present in the samples.

[5] R&M laboratory is certified to perform microbiology analyses of drinking water.
[6] MST is a set of methods used to determine the host (different animals or human).

MST samples were packed in the cooler with gel ice and temperature blank, and were shipped via Fed Ex Priority Overnight to Source Molecular in Miami Florida immediately after the project sample collection. Source Molecular laboratory staff checked each temperature blank upon receipt. All sample temperatures were within acceptable limits. Samples were filtered and frozen upon receipt.

Data was reviewed for quality control and assurance by the DEC Quality Assurance Officer and the DEC Alaska Beach Project Manager. The project data was subsequently uploaded to the state Ambient Water Quality Monitoring System (AQWMS) database, and transmitted to the EPA BEACH program using the Water Quality eXchange (WQX) and maintained in the EPA BEach Advisory and Closing Online Notification (BEACON)[7] system and the Water Quality Portal data warehouse[8].

4. WATER QUALITY STANDARDS FOR BACTERIA IN MARINE WATERS

Applicable Alaska WQS for fecal coliform and enterococci in marine waters address the protection of designated uses for water supply (including aquaculture, seafood processing and industrial uses), water recreation (contact and secondary), and harvesting for consumption of raw mollusks or other raw aquatic life. The most stringent criteria for fecal coliform and the recreation criteria for enterococci are shown in **bold** text in Table 3.

The Alaska beach monitoring program focuses on the water recreation use using enterococci as an indicator for bacteria in the marine water. Data was compared to the contact recreation standard of "In a 30-day period, the geometric mean of samples may not exceed 35 enterococci CFU/100 ml, and not more than 10% of the samples may exceed a STV of 130 enterococci CFU/100 ml" (18 AAC 70 (14)(B)(i)). The two criteria (i.e. the "geometric mean" and the "10% of samples") in this standards must both be met. If either criterion is exceeded, then the water at that location fails the standard.

[7] The EPA created the BEach Advisory and Closing Online Notification (BEACON) system to provide pollution occurrences at coastal recreation waters to the public. The BEACON database contains state/tribe-reported beach monitoring and notification data and is available online at https://watersgeo.epa.gov/beacon2/about.html.

[8] The Water Quality Portal is maintained by the U.S. Geological Survey and the EPA.

Table 3. Alaska water quality criteria for bacteria in marine waters

Designated use	Description of criteria
(14) Bacteria, For Marine Water Uses	
(A) Water Supply	
(i) aquaculture	For products normally cooked, the geometric mean of samples taken in a 30-day period may not exceed 200 fecal coliform/100 ml, and not more than 10% of the samples may exceed 400 fecal coliform/100 ml. For products not normally cooked, the geometric mean of samples taken in a 30-day period may not exceed 20 fecal coliform/100 ml, and not more than 10% of the samples may exceed 40 fecal coliform/100 ml.
(ii) seafood processing	In a 30-day period, the geometric mean of samples may not exceed 20 fecal coliform/100 ml, and not more than 10% of the samples may exceed 40 fecal coliform/100 ml.
(iii) industrial	Where worker contact is present, the geometric mean of samples taken in a 30-day period may not exceed 200 fecal coliform/100 ml, and not more than 10% of the samples may exceed 400 fecal coliform/100 ml.
(B) Water Recreation	
(i) contact recreation	**In a 30-day period, the geometric mean of samples may not exceed 35 enterococci CFU/100 ml, and not more than 10% of the samples may exceed a statistical threshold value (STV) of 130 enterococci CFU/100 ml.**
(ii) secondary recreation	In a 30-day period, the geometric mean of samples may not exceed 200 fecal coliform/100ml, and not more than 10% of the samples may exceed 400 fecal coliform/100 ml.
(C) Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife	Not applicable.
(D) Harvesting for Consumption of Raw Mollusks or Other Raw Aquatic Life	**The geometric mean of samples may not exceed 14 fecal coliform/100 ml; and not more than 10% of the samples may exceed;** - 43 MPN per 100 ml for a five-tube decimal dilution test; - 49 MPN per 100 ml for a three-tube decimal dilution test; - 28 MPN per 100 ml for a twelve-tube single dilution test; **- 31 CFU per 100 ml for a membrane filtration test (see note 14).**[9]

[9] Note 14. When fecal coliform are monitored in waters designated as state approved shellfish harvesting and growing waters, these waters are also subject to 18 AAC 34.010(19).

5. RESULTS – 2017, 2018, AND 2019 BEACH DATA

Tables 4 - 17 include summaries and the analytical results for the 2017, 2018, 2019, and 2020 monitoring data. Chain of custody and laboratory analytical reports from 2020 are attached in Appendix C. Graphs showing individual monitoring location results from 2020 are attached in Appendix D. Chain of custody forms and laboratory analytical reports from 2017 can be found in that year's monitoring report (https://dec.alaska.gov/water/water-quality/beach-program/).

5.1 Fecal Coliform

The most stringent of the criteria for fecal coliform bacteria protects harvesting for consumption of raw mollusks or other raw aquatic life (harvesting use). This harvesting use criteria states that "the geometric mean of samples may not exceed 14 fecal coliform/100 ml" (geometric mean criterion), and "not more than 10% of the samples may exceed 31 colony forming units (CFU) per 100 ml for a membrane filtration test" (10% of samples criterion) in 18 AAC 70 (14)(D). The two criteria (i.e. the "geometric mean" and the "10% of samples") in this standard must both be met. If either criterion is exceeded, then the water at that location fails the standard. Table 4 includes a summary of results from 2017-2020.

Table 4. Summary of fecal coliform bacteria results for 2017 through 2020

Monitoring Locations	Total Samples	Maximum				% Exceedances				Geometric Mean			
		2017	2018	2019	2020	2017	2018	2019	2020	2017	2018	2019	2020
Knudson Cove	63	**200**[10]	**144**	**456**	**202**	**33**	**22**	**44**	**33**	**20**	13	**22**	**22**
Beacon Hill	27	**58**	**66**	--[11]	--	**11**	**17**	--	--	10	12	--	--
South Point Higgins Beach	63	**161**	**236**	**187**	**437**	**22**	**39**	**50**	**61**	7	**21**	**35**	**34**
Beach at Shull Road	63	**167**	**132**	**276**	**CG** (2001)	**22**	**28**	**39**	**50**	**15**	**20**	**19**	**34**
Beach at Sunset Drive	63	**142**	**93**	**196**	**300**	**33**	**33**	**28**	**28**	**15**	**20**	**21**	**22**
South Refuge Cove	63	**69**	**88**	**184**	**44**	**11**	**33**	**22**	**17**	12	**17**	**15**	9
Thomas Basin Harbor	63	**CG**[12] (>250)	**CG** (>250)	**431**	**324**	**33**	**44**	**61**	**56**	**14**	**28**	**38**	**58**
Seaport Beach	63	**CG** (>250)	**63**	**163**	**152**	**33**	**17**	**22**	**17**	**16**	7	11	11
Rotary Park Beach	43	--	26	**272**	**60**	--	0	**39**	**17**	--	9	**25**	**15**
Rotary Park Pool	56	**200**	**169**	**390**	**CG** (2001)	**33**	**45**	**33**	**56**	**24**	**20**	**20**	**44**
Mountain Point Surprise Beach	43	--	23	**133**	**106**	--	0	**33**	**22**	--	7	**20**	**17**
Mountain Point Cultural Food	47	--	**118**	**526**	**406**	--	**45**	**67**	**39**	--	**17**	**64**	**29**
Herring Cove	54	--	**318**	**386**	**464**	--	**72**	**61**	**78**	--	**47**	**44**	**69**

[10] Bold red font indicates exceedance of criteria 18AAC70 (14) (D) Harvesting – – maximum result, over 10% of samples exceedance, and seasonal geometric mean for each recreation year monitored.

[11] -- not tested, not part of sampling plan that year.

[12] CG – confluent growth. The 2017/2018 data used 250 FC/100 ml as a proxy value for confluent growth. Based on updated studies, 2001 FC/100ml was used for 2019/2020 data.

2017 Results

Nine sites (Knutson Cove, Beacon Hill, South Point Higgins, Shull, Sunset, South Refuge Cove, Thomas Basin, Seaport and Rotary Pool) were sampled weekly from July 18 through September 13, 2017. All nine sites failed to meet fecal coliform standard for the harvesting use.

The number of fecal coliform bacteria colonies in each sample ranged from <1 CFU/100 ml (non-detect) to >2000[13] CFU/100 ml (confluent growth) at the Ketchikan beach monitoring sites. All nine of the monitoring sites failed to meet the 10% of samples criterion for fecal coliform bacteria. Confluent growth was encountered at two beaches (Seaport and Thomas Basin) on August 22, 2017 exceeding the 10% of samples criterion for the aquaculture use for cooked products.

Five of nine sites (Knudson Cove, Shull, Sunset, Thomas Basin, Seaport and Rotary Pool) also exceeded the geometric mean criterion for harvesting use. Rotary Pool also exceeded the geometric mean criterion (>20 CFU/100 ml) for aquaculture and seafood processing uses. Table 5 shows the analytical data results of fecal coliform testing for 2017 monitoring.

[13] The 2017/2018 data used 250 FC/100 ml as a proxy value for confluent growth. Based on updated studies, 2001 FC/100ml was used for 2019/2020 data.

Table 5. 2017 Fecal coliform testing results (CFU/100 ml)

Sample Date	Knudson Cove	Beacon Hill	South Pt Higgins	Shull	Sunset	South Refuge Cove	Thomas Basin	Seaport	Rotary Pool
Jul 18/19	16	5	<1	8	<1 (<1)	11	5	3 (<1)	6
Jul 24/25	5	2	8	**167 (68)**	16	11 (7)	9	7	**68**
Jul 26/27	9	6	16 (2)	12	13	8	14	3	137 (99)
Jul 31/Aug 1	**167**	6	<1	6	**41 (8)**	7	7	4 (7)	9
Aug 8/9	**98**	11	7 (3)	4	**142**	8 (15)	**42**	21	27
Aug 14/15	6 (9)	22	**161**	27	15	6	**36**	**37**	21 (11)
Aug 22/23	**>200 TNTC**	**58**	**37**	**33**	**51 (29)**	**69 (32)**	**>2000 CG**	**>2000 CG**	**>200 TNTC**
Aug 29	2	18	5	16	3 (2)	7	<1	41	9
Sep 13	12	8	2	9	17	4	13	21 (22)	6
Seasonal Fecal Geometric Mean	**20**	10	6	**15**	14	10	**16**	**20**	**24**

CFU = colony forming units
CG = confluent growth
TNTC = too numerous to count

2018 Results

13 monitoring sites (Knutson Cove, Beacon Hill, South Point Higgins, Shull, Sunset, South Refuge, Thomas Basin, Seaport, Rotary Park, Rotary Pool, Mountain Point Surprise Beach, Mountain Point Cultural Food, and Herring Cove) were sampled weekly from May 17 to September 12, 2018. Eleven of the 13 monitoring sites failed to meet the fecal coliform standard for the harvesting use. Only Rotary Park and Mountain Point Surprise Beach met fecal coliform standards.

The number of fecal coliform bacteria colonies in each sample ranged from <1 CFU/100 ml (non-detect) to > 2000 CFU/100 ml (confluent growth) at the Ketchikan beach monitoring sites. All eleven failed the 10% of samples criterion. Confluent growth was encountered in the marine water sample at Thomas Basin collected on August 9, 2018. Thomas Basin failed the 10% of samples criterion for the aquaculture use for cooked products.

Eight of the 13 monitoring sites (South Point Higgins, Shull, Sunset, South Refuge, Thomas Basin, Mountain Point Cultural Food, and Herring Cove) also failed to meet the Alaska WQS geometric mean criterion. In addition, three of the 13 sites (South Point Higgins, Thomas Basin and Herring Cove) exceeded the geometric mean criterion of 20 CFU/100 ml for the aquaculture and seafood processing uses. Table 6 shows the analytical data results of fecal coliform bacteria for 2018 monitoring.

Table 6. 2018 Fecal coliform testing results (CFU/100 ml)

Sample Date	Knudson Cove	Beacon Hill	S Pt Higgins	Shull	Sunset	S Refuge Cove	Thomas Basin	Seaport	Rotary Beach	Rotary Pool	Mt Point Surprise Beach	Mt Point Cultural Food	Herring Cove
May 17	28 (26)	3	5	3	3	5	1	<1	--	<1	--	8	2
May 22	**144**	26	**84**	**132**	**48**	**64**	**81**	**51**	--	**39 (17)**	--	**46**	**94**
May 31	26	**66**	**56 (48)**	27	**51**	**49**	12	**33**	--	23	--	21	9
Jun 6	15	15	31	29 (22)	11	18	**139**	13	--	**36**	--	**103**	**123**
Jun 14	11	**46**	65	**118**	31	**33**	19	16	--	**169**	--	9	**32 (28)**
Jun 20	6	5	8	6	4	6	9	3	13	--	15 (11)	--	67
Jun 27	17	13	22	15	12	10	19	8 (8)	26	--	23	--	13
Jul 2	9	10	11	26	21 (17)	15	**41**	3	8	--	9	--	18
Jul 12	18	9	**136**	14	28	26 (22)	**37**	5	8	--	3	--	**33**
Jul 18	2	3	2	5	5	7	19	3	4	--	2	--	**32 (31)**
Jul 26	**32**	**50**	**236**	4	**67**	22 (19)	23	6	13	--	9	--	45
Aug 1	6	10	33	12 (9)	8	1	24 (21)	5	5	--	5	--	18
Aug 9	8	30	**168**	**119**	**93**	**53**	**>2000 CG**	26	--	**131**	--	**43**	**210**
Aug 16	3 (2)	7	5	16	13	3	14	5	--	9	--	4	**81**
Aug 23	**94**	6	19	13	**81**	16	**59**	<1	--	24	--	<1 (<1)	**246**
Aug 30	3	2	3	25	8	**88**	**49**	4	--	4 (6)	--	4	56
Sep 5	**42 (37)**	10	3	**49**	23	**55**	**72**	5	--	3	NA	**118**	**318**
Sep 12	3	26	28	**33**	**50**	25	26	**63**	--	25	NA	**98 (90)**	**213**
Seasonal Geometric Mean	13	12	**21**	**20**	**20**	**17**	**32**	7	9	**16**	7	**18**	**47**

2019 Results

12 monitoring sites (Knutson Cove, South Point Higgins, Shull, Sunset, South Refuge, Thomas Basin, Seaport, Rotary Park, Rotary Pool, Mountain Point Surprise Beach, Mountain Point Cultural Food, and Herring Cove) were sampled weekly from May 15 to September 18, 2019. All of the 12 monitoring sites failed to meet the fecal coliform standard for the harvesting use.

The number of fecal coliform bacteria colonies in each sample ranged from <1 CFU/100 ml (non-detect) to >2000 CFU/100 ml (confluent growth) at the Ketchikan beach monitoring sites. All twelve monitoring sites failed to meet the 10% of samples criterion. Confluent growth was encountered in the marine water samples at Rotary Beach on June 11 and Shull Beach and Rotary Pool on August 21, 2019. Seven of 12 sites failed to mean the 10% of samples criterion for the aquaculture use for cooked products (>400 CFU/100 mL).

10 of 12 sites also failed the geometric mean criterion. The only beach that met the geometric mean criterion for harvesting was Seaport. In addition, 10 of the 12 sites (all but Seaport and Surprise Beach) also exceeded geometric mean criterion for the aquaculture and seafood processing uses. Table 7 shows the analytical data results of fecal coliform bacteria for 2019 monitoring.

Table 7. 2019 Fecal coliform results (CFU/100 ml)

Sample Date	Knudson Cove	S Pt Higgins	Shull	Sunset	S Refuge Cove	Thomas Basin	Seaport	Rotary Beach	Rotary Pool	Mtn Point Surprise Beach	Mtn Point Cultural Food	Herring Cove
May 15	5 (4)	52	3	17	6	55	2	10	6	21	18	30
May 22	3	7 (8)	13	15	6	11	<1	8	<1	8	9	12
May 29	20	12	3 (2)	7	48	6	3	11	9	4	61	14
Jun 5	2	25	15	43 (39)	7	12	3	7	6	34	11	18
Jun 11	58	181	276	18	163 (155)	214	79	>2000 CG	206	37	86	113
Jun 19	14	76	34	12	2	16 (18)	6	10	<2	24	526	36
Jun 25	23	16	15	12	13	12	6 (8)	9	19	8	28	15
Jul 2	239	68	37	165	58	74	145	46	142 (112)	13	214	171
Jul 10	3	6	12	7	5	9	3	16 (8)	11	4	9	8
Jul 17	194	66	116	87	28	431	63	272	390	133 (118)	247	386
Jul 23	4	10	16	14	4	42	22 (18)	24	26	10	152	36
Jul 29	46	160	41	14	16	38	12	37	66	82	131	104 (92)
Aug 7	3 (1)	7	19	5	7	11	6	8	84	30	45	33
Aug 13	125	43 (55)	15	16	17	37	21	51	20	58	104	215
Aug 21	456	176	>2000 CG	190	184	258	10	94	>2000 CG (>2000 CG)	52	86	184
Sep 4	66	27	53	196	12	62	3	118	22	16	209 (210)	239
Sep 10	44	187	95	9	8 (22)	76	163	6	3	13	20	>400
Sep 18	12	12	19	9	6	48	17	25	5	13	131	216 (202)
Seasonal Fecal Geometric Mean	22	35	30	21	15	38	11	28	21	20	64	64

2020 Results

12 monitoring sites (Knutson Cove, South Point Higgins, Shull, Sunset, South Refuge, Thomas Basin, Seaport, Rotary Park, Rotary Pool, Mountain Point Surprise Beach, Mountain Point Cultural Food, and Herring Cove) were sampled weekly from May 21 to September 17, 2020. All of the 12 monitoring sites failed to meet the fecal coliform standard for the harvesting use.

The number of fecal coliform bacteria colonies in each sample ranged from <1 CFU/100 ml (non-detect) to >2000 CFU/100 ml (confluent growth) at the Ketchikan beach monitoring sites. All twelve monitoring sites failed to meet the 10% of samples criterion. Confluent growth was encountered in the marine water samples at Rotary Pool on July 3rd and 6th and Shull Beach on June 26, 2020.

11 of 12 sites also failed the geometric mean criterion. Seaport and South Refuge Cover were the only beaches that met the criteria where the geometric mean may not exceed 14 CFU/100ml. Table 8 shows the analytical data results of fecal coliform bacteria for 2020 monitoring.

Table 8. 2020 Fecal coliform results (CFU/100 ml)

Sample Dates	Knudson	SP Higgins	Shull	Sunset	Refuge	Thomas Basin	Seaport	Rotary Beach	Rotary Pool	Mtn P Surprise	Mtn P Cultural	Herring
May 21	12	53	8	18	5	30	48	26	9	4	4	65
May 27	7	8	24	31	<1	16	5	6	5	11	10	33
Jun 3	8	109	51	23	24	30	11	17	144	22	4	32
Jun 9	5	16	20	21	4	23	5	4	97	5	6	32
Jun 17	39	32	46	8	3	33	6	12	20	19	7	26
Jun 22	70	343	2001 (CG)	12	9	96	5	17	88	16	21	39
Jul 3	5	122	4	41	30	28	6	18	2001 (CG)	16	22	46
Jul 6	3	34	12	18	33	21	7	23	4	35	28	82
Jul 13	23	<1	3	7	6	168	10	8	2	2	12	15
Jul 22	31	437	18	68	9	19	15	18	75	24	82	101
Jul 27	77	14	14	20	6	55	16	20	507	4	12	13
Aug 4	12	62	194	210	16	324	152	58	436	106	124	464
Aug 11	8	6	8	12	<2	26	10	4	14	42	406	136
Aug 18	202	154	224	300	42	190	36	60	132	52	162	250
Aug 25	31	8	64	14	9	166	8	6	59	26	85	239
Sep 1	90	56	122	40	44	260	12	46	110	28	26	194
Sep 9	188	74	78	<2	18	42	4	10	12	18	112	22
Sep 17	18	18	32	24	28	166	6	14	10	28	114	434
Seasonal Geometric Mean	22	34	34	22	9	58	11	15	44	17	29	69

5.2 Enterococci

The water quality criteria for enterococci bacteria protects contact recreation use. This enterococci standard states that "In a 30-day period, the geometric mean of samples may not exceed 35 enterococci CFU/100 ml" (geometric mean criterion), "and not more than 10% of the samples may exceed a statistical threshold value (STV) of 130 enterococci CFU/100 ml" (10% of samples criterion) in 18 AAC 70 (14)(B)(i). The two criteria (i.e. the "geometric mean" and the "10% of samples") in this standards must both be met within a rolling 30-day period. If either criterion is exceeded, then the water at that location fails the standard. A summary of enterococci results for 2017-2020 is shown in Table 9.

Table 9. Summary of enterococci bacteria results for 2017 through 2020

Monitoring Locations	Total Samples	Maximum				% Exceedances				Max Geometric Mean			
		2017	2018	2019	2020	2017	2018	2019	2020	2017	2018	2019	2020
Knudson Cove	63	**1986**	**2603**	**369**	97	**22**	**17**	**11**	0	**50**	**54**	**39**	19
Beacon Hill	27	**579**	**183**	--	--	**11**	6	--	--	**45**	21	--	--
South Point Higgins Beach	63	**161**	**410**	130	**2235**	**11**	**33**	0	**17**	**41**	**70**	23	**90**
Beach at Shull Road	63	125	**754**	**727**	**160**	0	**17**	**17**	6	**44**	**49**	**37**	20
Beach at Sunset Drive	63	**248**	**410**	130	**231**	**11**	**33**	0	6	32	**70**	23	**56**
South Refuge Cove	63	**1300**	97	**3448**	41	**11**	0	6	0	33	27	27	13
Thomas Basin Harbor	63	**2420**	**2755**	**1024**	**620**	**33**	**28**	**33**	**11**	**62**	**451**	**133**	**83**
Seaport Beach	63	**250**	52	**173**	**152**	**33**	0	6	6	27	12	9	19
Rotary Park Beach	43	--	10	**269**	**192**	--	0	**11**	6	--	8	**44**	18
Rotary Park Pool	56	**1120**	**1454**	**2851**	**3448**	**44**	**27**	**17**	**28**	**300**	**71**	**71**	**161**
Mountain Point Surprise Beach	43	--	51	**384**	41	--	7	6	0	--	8	22	13
Mountain Point Cultural Food	47	--	**414**	**934**	**144**	--	**18**	**28**	6	--	**43**	**177**	**67**
Herring Cove	53	--	**457**	**2595**	**706**	--	**22**	**33**	**28**	--	**70**	**23**	**123**

2017 Results

Nine sites (Knutson Cove, Beacon Hill, South Point Higgins, Shull, Sunset, South Refuge Cove, Thomas Basin, Seaport and Rotary Pool) were sampled weekly from July 18 through September 13, 2017. All nine sites failed to meet enterococci standard for the contact recreation use (Table 10).

The number of enterococci in each sample ranged from <1.0 MPN/100 ml (non-detect) to 2,420 MPN/100 ml at the Ketchikan beach monitoring sites (Table 10). Eight of the nine monitoring sites (all except for Shull) failed to meet the 10% of samples criterion. All nine of the monitoring sites failed to meet the geometric mean criterion.

Table 10. 2017 Enterococci testing results (MPN/100 ml)

Sample Date	Knudson Cove	Beacon Hill	S Pt Higgins	Shull	Sunset	S Refuge Cove	Thomas Basin	Seaport	Rotary Pool
Jul 18/19	5.1	1.0	1.0	6.2	4.1 (5.2)	2.0	2.0	3 (3.1)	3.0
Jul 24/25	3.0	<1	4.1	124.6 (81.3)	8.5	6.1 (5.2)	4.1	2.0	45.7
Jul 26/27	12.2	19.3	7.4 (23.8)	27.5	10.9	12.1	>2419.6	7.3	980.4 (579.4)
Jul 31/Aug 1	15.6	26.6	13.1	20.6	34.1 (46.4)	26.6	3.0	3.1 (26.6)	47.4
Aug 8/9	1986.3	579.4	1119.9 (980.4)	75.9	248.1	1299.7 (157.8)	86.2	204.6	980.4
Aug 14/15	26.9 (26.3)	16.6	82.3	50.4	22.5	21.3	156.5	21.1	313.0 (69.7)
Aug 22/23	488.4	101.7	46.2	28.1	47.4 (33.7)	81.6 (57.8)	137.4	250.0	1119.9
Aug 29	1.0	7.2	24.3	3.0	<1 (8.5)	13.0	14.5	135.4	69.3
Sep 13	14.5	9.7	9.5	8.4	9.5	13.5	70.3	12	26.2
Maximum 30-Day Geometric Mean	87	55	67	44	42	60	106	83	437

2018 Results

13 monitoring sites (Knutson Cove, Beacon Hill, South Point Higgins, Shull, Sunset, South Refuge, Thomas Basin, Seaport, Rotary Park, Rotary Pool, Mountain Point Surprise Beach, Mountain Point Cultural Food, and Herring Cove) were sampled weekly from May 17 to September 12, 2018. Nine of the 13 monitoring sites failed to meet the enterococci standard for the contact recreation use. South Refuge Cove, Seaport, Rotary Beach and Mountain Point Surprise Beach met enterococci standards for contact recreation use in 2018.

The number of enterococci in each sample ranged from non-detect (<1.0 MPN/100 ml) to 2,755 MPN/100 ml at the Ketchikan beach monitoring sites. Nine of the 13 monitoring sites (Knudson, Beacon Hill, Sunset, South Point Higgins, Shull, Thomas Basin, Rotary Pool, Mt Point Cultural Food, and Herring Cove) failed to meet the 10% of samples criterion. Six of the 13 monitoring sites failed to meet the geometric mean criterion. The beaches that exceeded the enterococci geometric mean were Knudson Cove, South Point Higgins, Shull, Thomas Basin, Mt Point Cultural Foods, and Herring Cove. Table 11 shows the analytical data results for enterococci testing in 2018.

Table 11. 2018 Enterococci testing results (MPN/100 ml)

Sample Date	Knudson Cove	Beacon Hill	S Pt iggins	Shull	Sunset	S Refuge Cove	Thomas Basin	Seaport	Rotary Beach	Rotary Pool	Mtn Point Surprise Beach	Mtn Point Cultural Food	Herring Cove
May 17	**2595 (2603)**	**183**	31	30	20	74	10	<10	NA	20	NA	10	31
May 22	**341**	30	61	20	63	95	51	10	NA	30 (20)	NA	106	30
May 31	20	<10	60 (70)	<10	<10	<10	41	<10	NA	10	NA	20	<10
Jun 6	<10	<10	<10	41 (30)	<10	41	**173**	30	NA	30	NA	121	109
Jun 14	<10	<10	**410**	**144**	31	10	20	10	NA	**145**	NA	<10	10 (<10)
Jun 20	<10	<10	<10	<10	10	<10	<10	20	10	NA	<10 (<10)	NA	<10
Jun 27	<10	71	<10	20	<10	20	10	<10 (<10)	10	NA	<10	NA	<10
Jul 2	74	<10	<10	<10	<10 (<10)	<10	<10	<10	<10	NA	<10	NA	10
Jul 12	20	41	**350**	<10	<10	<10 (10)	30	10	<10	NA	<10	NA	41
Jul 18	20	<10	<10	20	<10	<10	52	>10	10	NA	<10	NA	20 (30)
Jul 26	20	52	**134**	<10	61	20 (31)	52	<10	<10	NA	<10	NA	<10
Aug 1	20	<10	30	<10 (<10)	10	20	63 (52)	<10	10	NA	51	NA	20
Aug 9	10	10	**241**	**727**	**187**	97	**2755**	52	NA	**336**	NA	51	**201**
Aug 16	<10 (10)	10	<10	**181**	<10	<10	74	<10	NA	10	NA	10	31
Aug 23	86	10	31	10	41	10	**496**	<10	NA	31	NA	<10 (<10)	**156**
Aug 30	<10	10	10	<10	10	<10	**350**	10	NA	10 (<10)	NA	40	20
Sep 5	**173 (131)**	<10	<10	10	10	<10	**528**	10	NA	<10	NA	**414**	**457**
Sep 12	<10	10	**279**	20	<10	41	130	<10	NA	**309**	NA	**183 (181)**	**414**
Maximum 30-Day Geometric Mean	**54**	21	**70**	**37**	30	27	**451**	13	8	30	8	**43**	**113**

2019 Results

12 monitoring sites (Knutson Cove, South Point Higgins, Shull, Sunset, South Refuge, Thomas Basin, Seaport, Rotary Park, Rotary Pool, Mountain Point Surprise Beach, Mountain Point Cultural Food, and Herring Cove) were sampled weekly from May 15 to September 18, 2019 with the exception of the week of August 26. 11 of the 12 monitoring sites failed to meet the enterococci standard for the contact recreation use. South Point Higgins met the enterococci standard for contact recreation use.

The number of enterococci in each sample ranged from <1.0 MPN/100 ml (non-detect) to 3,448 MPN/100 ml at the Ketchikan beach monitoring sites. 11 of the 12 monitoring sites (Knudson Cove, Shull, Sunset, Thomas Basin, Rotary Park Pool, Rotary Park Beach, Mountain Point Cultural Food, and Herring Cove) failed to meet the 10% of samples criterion. Five of the 13 monitoring sites also failed to meet the geometric mean criterion. Seven of the 12 beaches exceeded the enterococci geometric mean were (Knudson Cove, Shull, Thomas Basin, Rotary Park Beach, Mt Rotary Pool, Point Cultural Beach, and Herring Cove. Table 12 shows the analytical data results for enterococci testing in 2019.

Table 12. 2019 Enterococci testing results (MPN/100 ml)

Sample Date	Knudson Cove	S Pt Higgins	Shull	Sunset	S Refuge Cove	Thomas Basin	Seaport	Rotary Beach	Rotary Pool	Mtn Point Surprise Beach	Mtn Point Cultural Food	Herring Cove
May 15	<10 (<10)	<10	<10	10	<10	256	<10	<10	<10	<10	<10	<10
May 22	<10	<10 (<10)	20	<10	<10	<10	<10	<10	<10	<10	10	<10
May 29	<10	<10	<10 (<10)	<10	<10	<10	<10	<10	10	<10	41	<10
Jun 5	31	<10	<10	<10 (<10)	<10	10	<10	<10	10	10	20	<10
Jun 11	52	130	199	<10	2851 (3448)	487	20	84	1576	20	323	41
Jun 19	10	10	<10	<10	<10	20 (20)	<10	10	20	10	620	10
Jun 25	41	10	<10	10	<10	10	<10 (<10)	<10	52	<10	50	<10
Jul 2	121	97	52	301	31	41	20	197	52 (108)	51	857	213
Jul 10	<10	<10	<10	<10	<10	<10	<10	<10 (<10)	<10	<10	<10	<10
Jul 17	369	20	108	31	10	984	20	269	2851	384 (218)	934	565
Jul 23	<10	<10	<10	<10	<10	10	<10 (<10)	10	<10	<10	259	10
Jul 29	<10	10	20	10	97	<10	<10	30	41	<10	41	20 (20)
Aug 7	<10 (<10)	<10	10	<10	20	<10	<10	<10	<10	<10	20	<10
Aug 13	84	10 (10)	10	<10	<10	10	20	<10	<10	10	51	613
Aug 21	309	74	386 (379)	156	118	450	<10	50	372	41	84	63
Sep 4	20	10	<10	<10	10	1024	<10	20	52	<10	20 (20)	262
Sep 10	<10	10	754	<10	<10 (<10)	63	20	10	<10	<10	<10	2595
Sep 18	121	63	20	148	52	144	173	20	<10	10	97	185 (173)
Max 30-Day Geometric Mean	44	26	73	28	27	254	17	44	71	22	177	403

2020 Results

12 monitoring sites (Knudson Cove, South Point Higgins, Shull, Sunset, South Refuge, Thomas Basin, Seaport, Rotary Park, Rotary Pool, Mountain Point Surprise Beach, Mountain Point Cultural Food, and Herring Cove) were sampled weekly from May 21 to September 17, 2020. Seven (7) of the 12 monitoring sites (South Point Higgins, Shull, Sunset, Thomas Basin, Rotary Pool, Mountain Point Cultural Foods, and Herring Cove) failed to meet the enterococci standard for the contact recreation use.

The number of enterococci in each sample ranged from <1.0 MPN/100 ml (non-detect) to 3,448 MPN/100 ml at the Ketchikan beach monitoring sites. Four (4) of the 12 monitoring sites (South Point Higgins, Thomas Basin, Rotary Pool, and Herring Cove) failed to meet the 10% of samples criterion. Six (6) of the 12 monitoring sites also failed to meet the geometric mean criterion (South Point Higgins, Sunset, Thomas Basin, Rotary Pool, Mountain Point Cultural Foods, and Herring Cove). Table 13 shows the analytical data results for enterococci testing in 2020.

Table 13. 2020 Enterococci testing results (MPN/100 ml)

Sample Date	Knudson	SP Higgins	Shull	Sunset	Refuge	Thomas Basin	Seaport	Rotary Beach	Rotary Pool	Mtn P Surprise	Mtn P Cultural	Herring
May 21	30	51	10	94	<10	31	10	10	20	40	<10	10
May 27	10	10	<10	83	<10	10	<10	<10	<10	<10	<10	<10
Jun 3	<10	**160**	10	30	20	10	<10	20	**617**	10	<10	30
Jun 9	<10	74	<10	**231**	<10	52	10	<10	**171**	10	10	63
Jun 17	<10	**332**	20	10	10	<10	<10	<10	10	<10	<10	<10
Jun 22	10	20	96	20	20	106	20	**192**	**3448**	20	10	30
Jul 3	<10	75	<10	<10	<10	<10	<10	20	30	41	41	<10
Jul 6	<10	<10	10	20	41	20	<10	<10	41	10	<10	<10
Jul 13	20	<10	<10	10	10	41	10	<10	<10	10	10	<10
Jul 22	31	**2235**	<10	20	10	<10	10	<10	31	<10	121	20
Jul 27	10	<10	20	10	<10	52	<10	10	51	<10	10	10
Aug 4	<10	92	40	41	<10	**620**	**155**	52	**323**	41	109	**706**
Aug 11	<10	<10	<10	<10	<10	10	<10	<10	<10	<10	85	30
Aug 18	97	63	**160**	10	31	**241**	10	<10	31	41	119	**246**
Aug 25	10	<10	<10	10	<10	41	10	<10	10	<10	20	41
Sep 1	10	<10	10	<10	<10	10	31	30	30	<10	31	**134**
Sep 9	52	10	30	10	20	<10	20	<10	**213**	10	31	10
Sep 17	<10	10	<10	<10	20	20	<10	10	20	10	**144**	**350**
Maximum 30-Day Geometric Mean	19	**90**	20	**56**	13	**83**	19	18	**161**	13	**67**	**123**

5.3 Microbial Source Tracking (MST)

MST results cannot conclusively determine presence or absence of a particular source, but repeated testing over the years suggests that human sources likely contribute to bacteria pollution at all sites. Additionally, dog and gull results point to wildlife sources at most beaches as well. MST results for individual markers are not statistically correlated with either fecal coliform or enterococci concentration, and unquantified environmental processes that break down, transport, and dilute the DNA. MST tests use these results to make inferences about the relative contributions of different sources to the bacteria contamination. A summary of MST results across the 2017-2020 monitoring years is included in Table 14.

Table 14. Summary of Microbial Source Tracking (MST) results for 2017 through 2020.

Monitoring Locations	MST Human				MST Dog				MST Gull			
	2017	2018	2019	2020	2017	2018	2019	2020	2017	2018	2019	2020
Knudson Cove	1380	DNQ	918	1310	--	ND	DNQ	DNQ	--	DNQ	ND	DNQ
Beacon Hill	160	DNQ	--	--	--	DNQ	--	--	--	DNQ	--	--
South Point Higgins	DNQ	2990	DNQ	871	--	991	ND	553	--	DNQ	DNQ	ND
Shull	168	158	DNQ	1020	--	299	ND	DNQ	--	307	3770	1620
Sunset	DNQ	216	DNQ	763	--	1860	ND	553	--	DNQ	ND	ND
South Refuge Cove	153	771	DNQ	630	--	ND	808	DNQ	--	DNQ	ND	DNQ
Thomas Basin	138	287	DNQ	5770	--	359	DNQ	908	DNQ	906	3650	7940
Seaport	1180	DNQ	ND	DNQ	--	DNQ	ND	DNQ	--	7000	1260	ND
Rotary Beach	--	--	1350	DNQ	--	--	DNQ	ND	--	--	ND	DNQ
Rotary Pool	DNQ	DNQ	ND	DNQ	DNQ	37200	DNQ	DNQ	146	2420	ND	DNQ
Mt Point Surprise Beach	--	--	1940	1240	--	--	ND	ND	--	DNQ	ND	DNQ
Mt Point Cultural Food	--	8770	ND	3220	--	DNQ	ND	DNQ	--	--	ND	ND
Herring Cove	--	588	DNQ	ND	--	12	547	ND	--	11900	20200	919

DNQ – detected, not quantified.
ND – non-detect
'--' – not available, not tested

2017 Results

In addition to bacteria testing, source pollution investigation using microbial source tracking for bacteria genetic identification was conducted on August 8/9, 2017 samples. All nine of the monitoring locations were analyzed for human Bacteroidetes ID hosts. The human host marker was detected at all nine monitoring locations.

Based on the beach recreation activities and congregation of sea birds, two locations (Thomas Basin and Rotary Beach) were also analyzed for dog, gull, and goose Bacteroidetes ID hosts. The dog and gull host markers were detected at Rotary Pool; the goose host marker was not detected. The gull host marker was also detected at Thomas Basin. Table 15 shows the host bacteria that were targeted for the 2017 monitoring project and the final results of the analyses.

Table 15. Microbial Source Tracking Results for 2017

Bacteroidetes Type	Knudson Cove	Beacon Hill	S Pt Higgins	Shull	Sunset	S Refuge Cove	Thomas Basin	Seaport	Rotary Pool
Human	1380.0	160.0	DNQ	168.0	DNQ	153.0	138.0	1180.0	DNQ
Gull	NA	NA	NA	NA	NA	NA	DNQ	NA	146
Goose	NA	NA	NA	NA	NA	NA	NA	NA	ND
Dog	NA	NA	NA	NA	NA	NA	NA	NA	DNQ

NA – not available, not tested.
DNQ – detected, not quantified.
ND – non-detect

2018 Results

On August 9, 2018, 11 of 13 monitoring sites were tested for genetic markers. (Only one of the alternating beaches at Rotary Park and at Mountain Point were analyzed for microbial source tracking; Rotary Pool and Mt Point Cultural Food sites.) The human host marker and the gull host marker were detected at all 11 monitoring locations. Nine of the 11 monitoring locations also had dog host markers detected. Knudson Cove and South Refuge Cove beaches did not have dog host markers present. Table 16 shows the host bacteria that were targeted for the 2018 monitoring project, and the final results of the analyses.

2019 Results

On July 30 and September 10, 2019 all 12 monitoring sites were tested for genetic markers. The human host marker was detected at nine locations (excluding Mt Point Cultural Foods, Rotary Pool, and Seaport). The gull host marker was detected at four locations (Seaport, Thomas Basin, Shull, Herring, and South Point Higgins), and the dog host marker was detected at six locations (Herring, South Refuge, Knudson, Rotary Park Beach, Rotary Pool, and Thomas Basin). Table 17 shows the host bacteria that were targeted for the 2019 monitoring project, and the final results of the analyses.

Table 16. Microbial Source Tracking Results for 2018

Bacteroidetes Type	Knudson Cove	Beacon Hill	S Pt Higgins	Shull	Sunset	S Refuge Cove	Thomas Basin	Seaport	Rotary Beach	Rotary Pool	Mtn Point Surprise Beach	Mtn Point Cultural Food	Herring Cove
Human	DNQ	DNQ	2990	158	216	771	287	DNQ	NA	DNQ	NA	8770	588
Dog	ND	DNQ	991	299	1860	ND	359	DNQ	NA	37200	NA	DNQ	12
Gull	DNQ	DNQ	DNQ	307	DNQ	DNQ	906	7000	NA	2420	NA	DNQ	11900

NA – not available, not tested.

DNQ – detected, not quantified.

ND – non-detect

Table 17. Microbial Source Tracking Results for 2019

Bacteroidetes Type	Knudson Cove	Beacon Hill	S Pt Higgins	Shull	Sunset	S Refuge Cove	Thomas Basin	Seaport	Rotary Beach	Rotary Pool	Mtn Point Surprise Beach	Mtn Point Cultural Food	Herring Cove
Human	918	NA	DNQ	DNQ	DNQ	DNQ	DNQ	ND	1350	ND	1940	ND	DNQ
Dog	DNQ	NA	ND	ND	ND	808	DNQ	ND	DNQ	DNQ	ND	ND	547
Gull	ND	NA	DNQ	3770	ND	ND	3650	1260	ND	ND	ND	ND	20200

NA – not available, not tested.

DNQ – detected, not quantified.

ND – non-detect

2020 Results

On September 1, 2020 all 12 monitoring sites were tested for genetic markers. The human host marker was detected at all sites except Herring Cove. The gull host marker was detected at all sites except South Point Higgins, Sunset, Seaport, and Mountain Point Cultural Foods. The dog host marker was detected at all sites except Rotary Beach, Mountain Point Surprise, and Herring Cove. Table 18 shows the host bacteria that were targeted for the 2020 monitoring project, and the final results of the analyses.

Table 18: Microbial Source Tracking Results for 2020

Bacteroidetes Type	Knudson Cove	Beacon Hill	S Pt Higgins	Shull	Sunset	S Refuge Cove	Thomas Basin	Seaport	Rotary Beach	Rotary Pool	Mtn Point Surprise Beach	Mtn Point Cultural Food	Herring Cove
Human	1310	NA	871	1020	763	6300	5770	DNQ	DNQ	DNQ	1240	3220	ND
Dog	DNQ	NA	553	DNQ	553	DNQ	908	DNQ	ND	DNQ	ND	DNQ	ND
Gull	DNQ	NA	ND	1620	ND	DNQ	7940	ND	DNQ	DNQ	DNQ	ND	919

NA – not available, not tested.
DNQ – detected, not quantified.
ND – non-detect

6. SANITARY SURVEYS & TIDAL MOVEMENT

Marine sanitary surveys were conducted at every location during every event for all four years of sampling. A site-specific EPA Marine Beach Sanitary Survey was used to record water recreational and beach usage activities, wildlife, weather, water and air temperature, tidal conditions, and potential sources of pollution. Sanitary surveys summary tables with comparison to analytical results from 2018, 2019, and 2020 are attached as Appendix B. The survey observations of potential sources at each monitoring location are shown in Table 2. Site photographs from 2018 and 2019 are attached as Appendix A. Graphs showing individual monitoring location results from 2019-2020 are attached in Appendix D.

The following summations provide discussion of how the sanitary survey observations and analytical results may relate to one another.

- The 2020 season was the wettest on record for Ketchikan with 47.29 inches of precipitation during the meteorological summer season (June-August). Generally, an increase in precipitation with a decrease in air and water temperature can lower bacteria levels. Comparing 2020 with data from 2017-2019, there was a mixed trend for enterococci with approximately half of the sites showing a general decrease, while half showed an increase. For fecal coliform, about two-thirds of the sites remained stable or had a slight increase, while one-third showed a decrease. Figure 9.

- Due to the Covid-19 pandemic, the 2020 season saw a reduction in Ketchikan sanitary facility use by approximately 1.1 million due to no cruise ship visitors.

- The Knudson Cove monitoring site was relocated at the beginning of the 2020 season and moved away from a septic marine outfall to a more heavily used recreation area of the cove.

- In 2020, an increase in fecal coliform was found to be correlated with an increase in turbidity and an increase in precipitation (p-value =0.0135 and p-value=0.000016, respectively). Figure 11.

- Increase in enterococci concentrations in 2020 were found to be correlated with increased turbidity (p-value=0.0046), but there was no significant correlation between enterococci concentration and precipitation (p-value=0.23). Figure 12.

- Increased precipitation, as well as extended periods of low precipitation, was associated with elevated bacteria levels in the marine water samples in 2018 and 2019. Notably, large storm events prior to the June 11, July 17, and Aug 21, 2019 sampling events were associated with high fecal coliform and enterococci concentrations, while elevated concentrations were also observed across most sites during the driest period of the summer (July 2, 2019) (Figure 10). There was no apparent linear correlation between bacteria concentration and precipitation during this period.

- Both clear and turbid water conditions had elevated bacteria levels in the marine water samples, and turbidity conditions appeared less relevant to bacteria concentrations than precipitation in 2019 (Figure 13 - Figure 14).

- During 2018, the combination of heavy rain (1.71 inches in less than 24 hours on August 9, 2018), and turbid conditions at most locations, generally resulted in elevated bacteria levels in the marine water samples. On August 9, 2018, confluent bacteria growth was detected at Thomas Basin.

- The number of waterfowl on the beaches does not have an apparent correlation with elevated bacteria levels in the marine water samples. Some time periods have a significant number of waterfowl with low bacteria levels, and other time periods have a small amount of waterfowl with elevated bacteria levels. There are also times when both waterfowl and bacteria levels are elevated.

- Both wildlife and anthropogenic influences were detected at seven beaches during the 2019 season, and all beaches tested in the 2018 and 2017 seasons.

- Multiple environmental variables likely contribute to bacteria concentrations, and a multivariate statistical approach, such as those available in the Virtual Beach tool, may provide more insights into which combination of factors is most relevant to each site.

- In 2017 the combination of no rain, calm water with no turbidity, warm air temperatures (60-68 degrees Fahrenheit), and increased numbers of wildlife in early August coincided with elevated bacteria levels in the marine water samples. Heavy rains in mid-August (4.84 inches in 48 hours), turbid conditions, and increased number of wildlife coincided with test results of confluent bacteria growth and generally elevated bacteria levels in the marine water samples.

- In 2017 Rotary Beach had numerous gulls (17-30) and ravens during 3 of the 9 monitoring events, and 1-4 dogs on several monitoring events. All of these observations coincided with moderate to elevated levels of bacteria in the marine waters. Also, most of the monitoring events at the Shull and Seaport monitoring locations had an abundance of gulls (15-57), shorebirds, some ravens and 1-2 dogs. These observations coincided with low to moderate levels of bacteria in the marine waters.

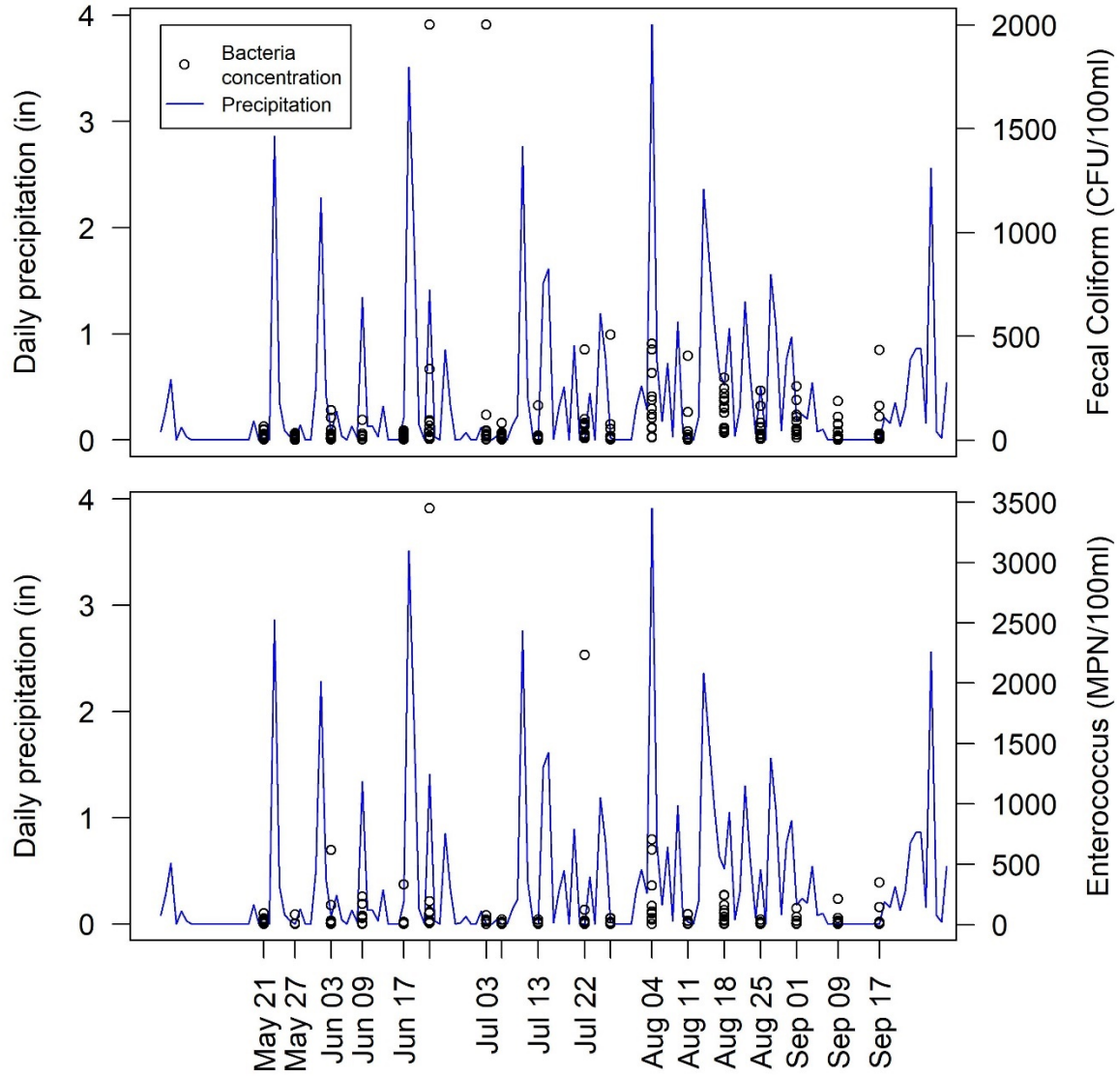


Figure 9: Bacteria concentrations in relation to precipitation across the 2020 sampling season.

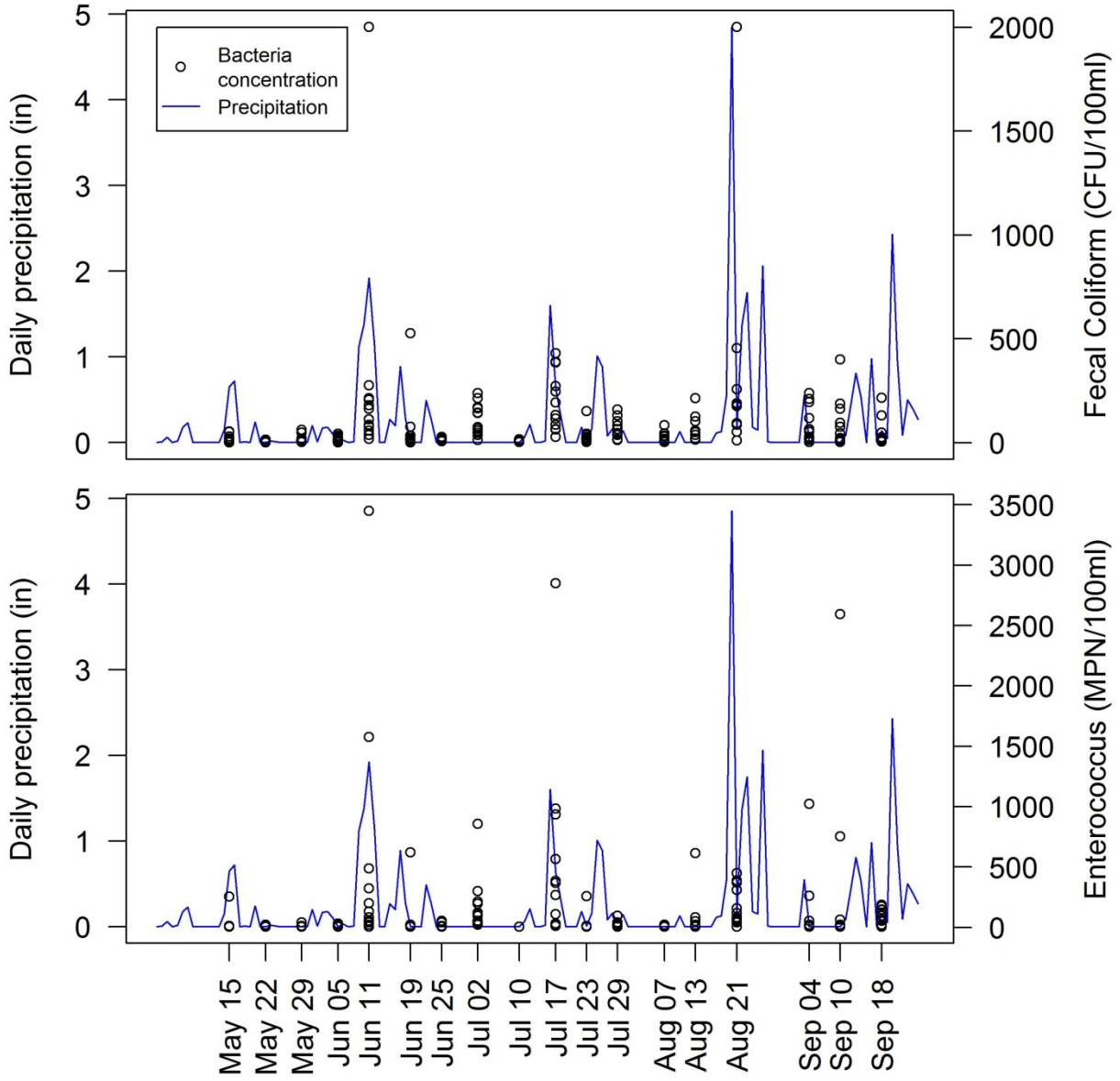


Figure 10. Bacteria concentrations in relation to precipitation across the 2019 sampling season.

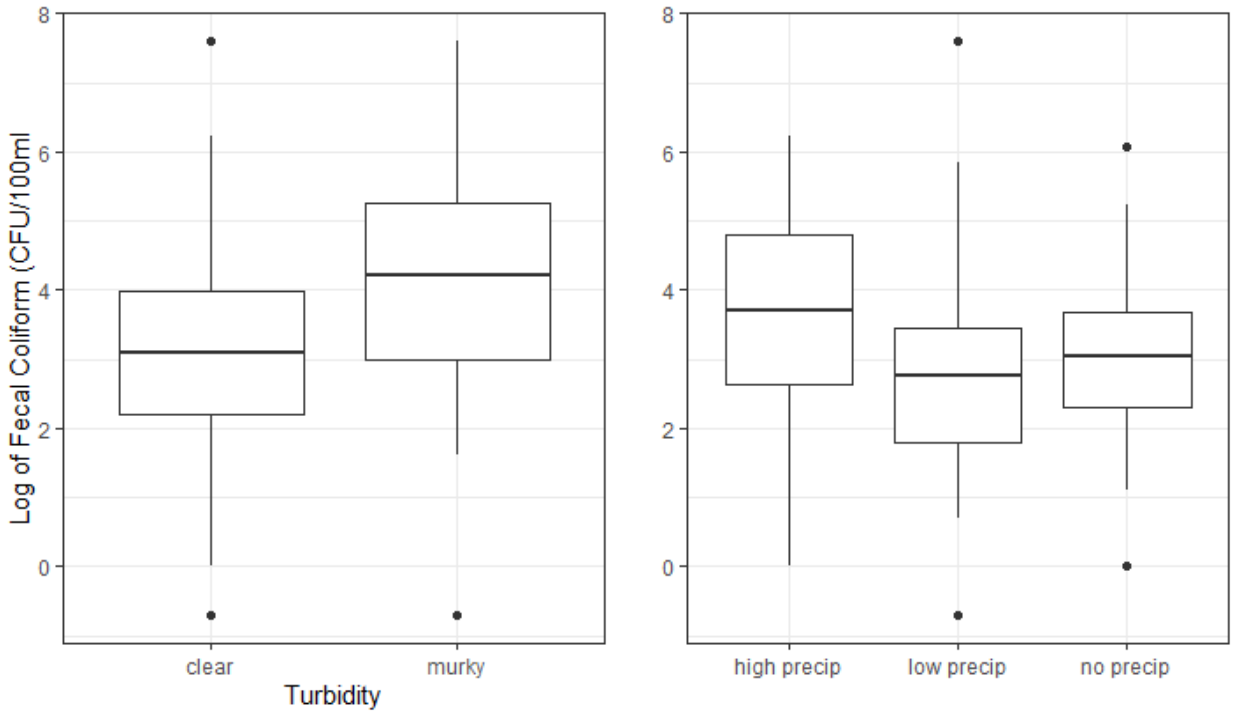


Figure 11: Fecal coliform concentrations at sampling sites across turbidity and precipitation conditions during the 2020 season[14].

[14] For precipitation, "high" includes sampling dates with >1" in the preceding 72 hours, and "low" includes sampling dates with >0" and <1" in the preceding 72 hours.

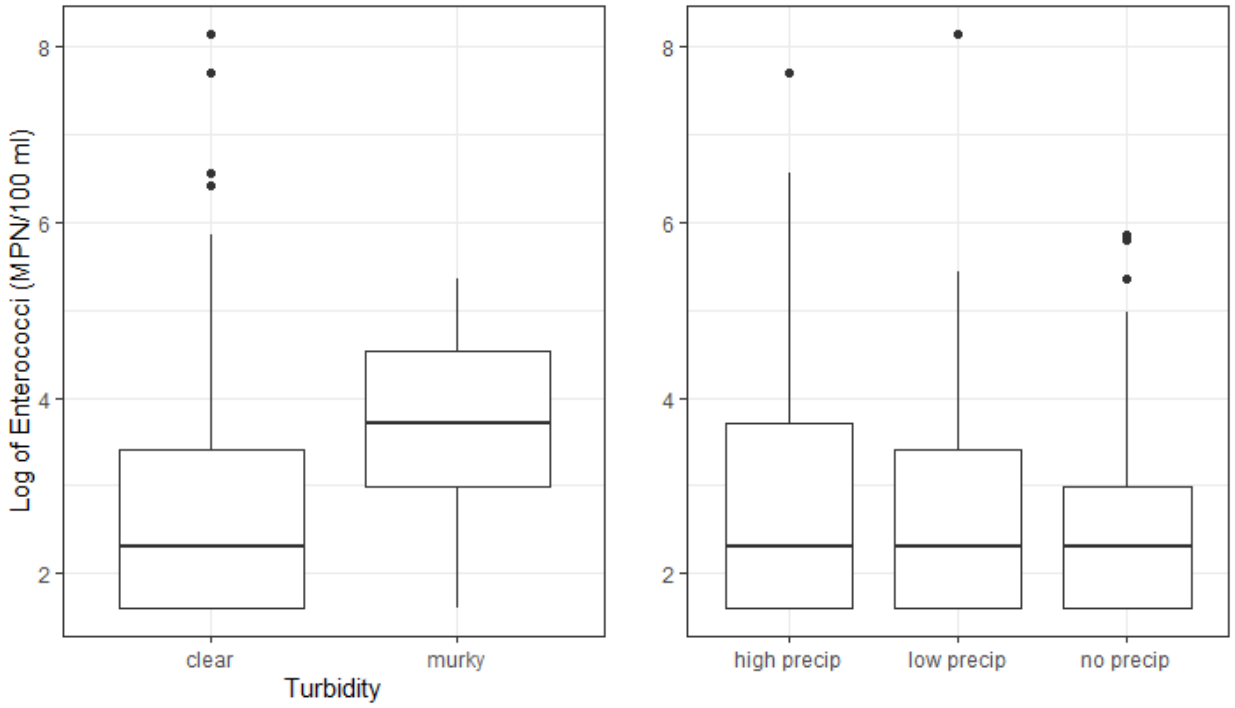


Figure 12: Enterococci concentrations at sampling sites across turbidity and precipitation conditions during the 2020 season

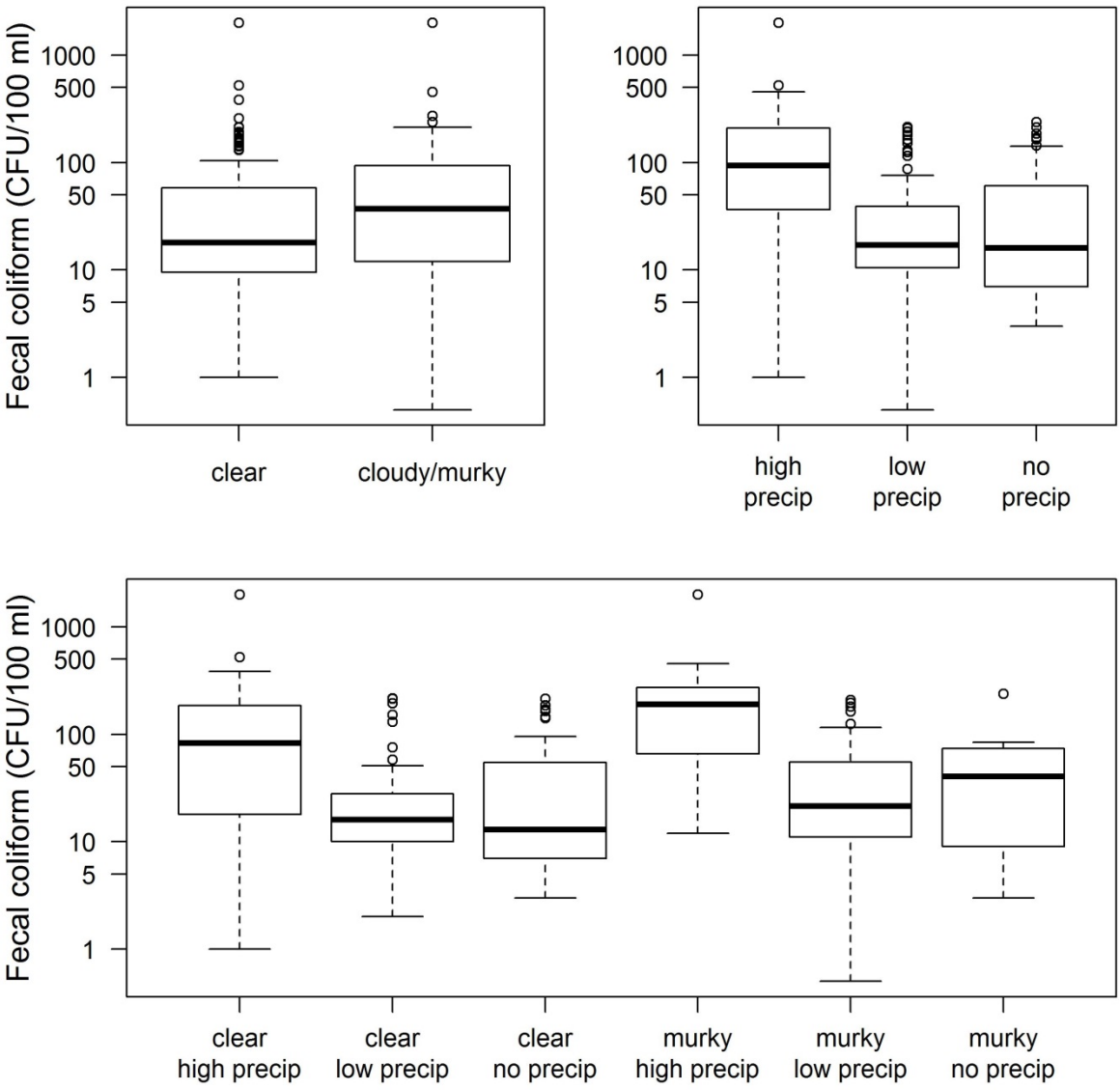


Figure 13. Fecal coliform concentrations at sampling sites across turbidity and precipitation conditions during the 2019 season.

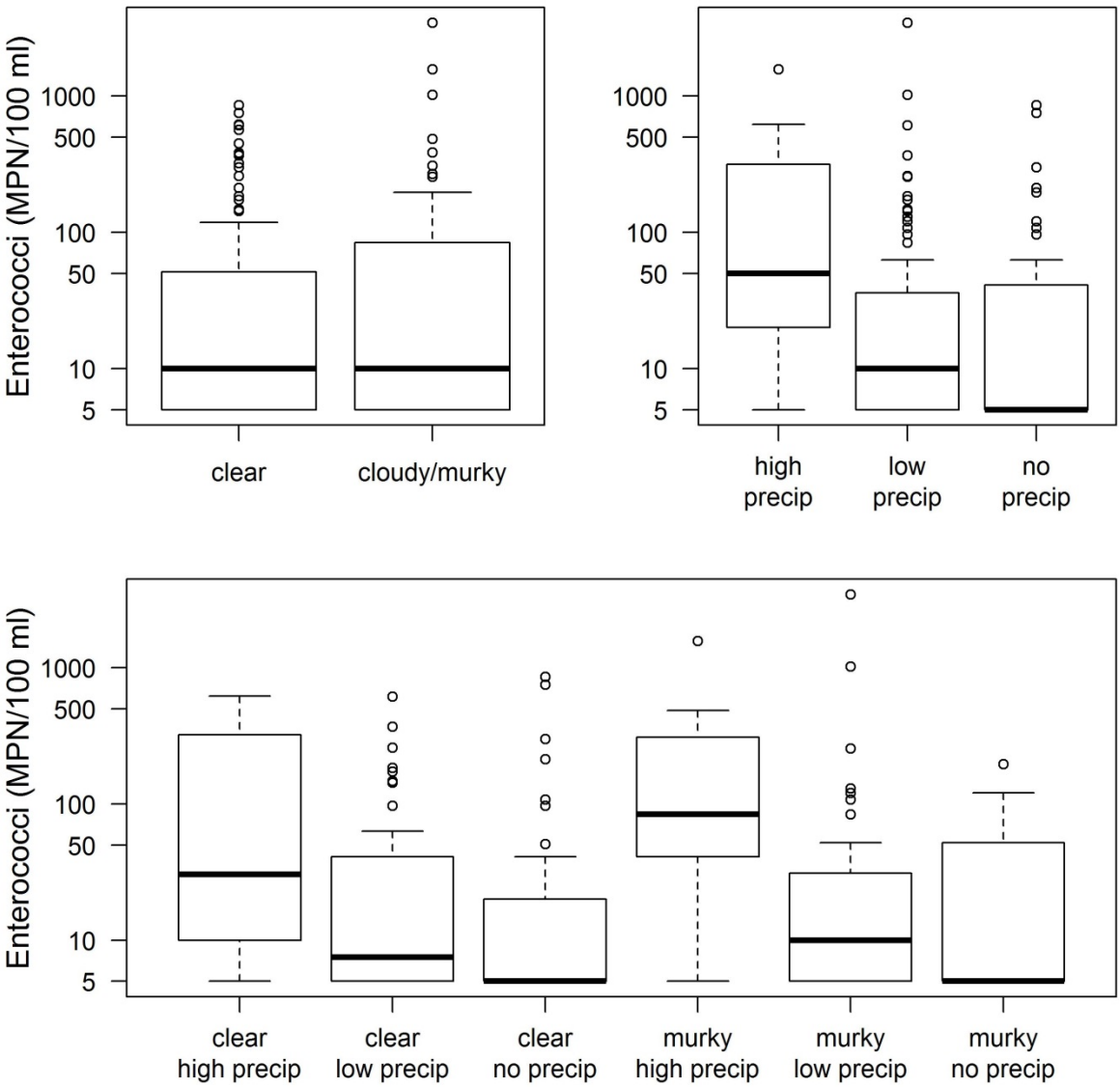


Figure 14. Enterococci concentrations at sampling sites across turbidity and precipitation conditions during the 2019 season.[33]

Tidal movement in Tongass Narrows generally follows the schematics in Figures 12 - 13[15]. NOAA staff[16] remarked that there is a flood tide convergence zone at the narrowest section. That zone does move NW/SE during flood tide (or divergence with minor upwelling at ebb) which is supported by basic fluid dynamics of the tide. It is not expected that a one-way tidal set would occur in the Narrows (with the exception of a tsunami). During the 2020 sampling season, peak predicted near-surface tidal current speeds were around 1.39 KT at the beginning of June. Predictions can be found at https://tidesandcurrents.noaa.gov/noaacurrents/Predictions?id=SEA0711_12.

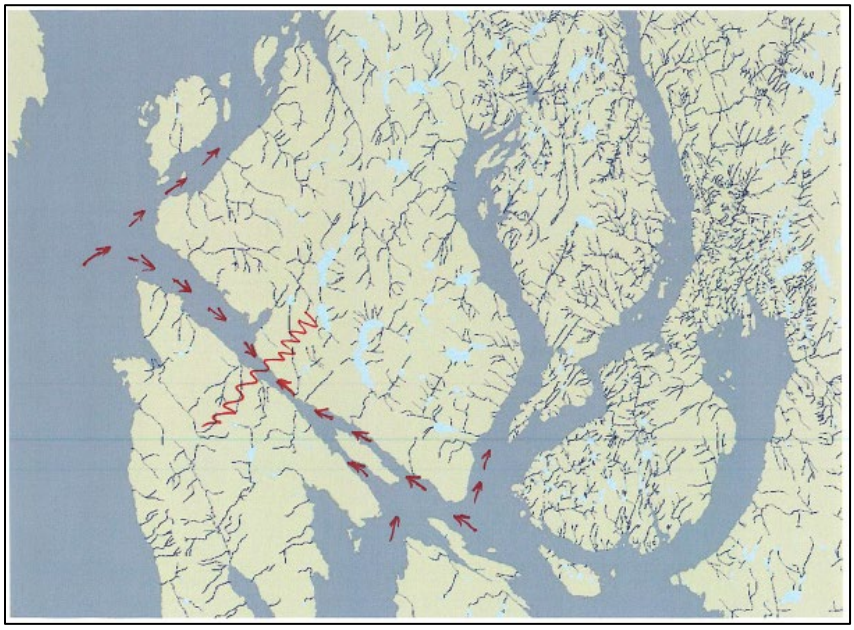


Figure 15. General direction of currents during Tongass Narrows flood tide.

[15] The schematic for the tidal movement in the Tongass Narrows was provided by Steven Corporon, former Director of the Harbormaster's Office in Ketchikan, Alaska.

[16] Joel Curtis of NOAA provided measurements and predictions for the Tongass Narrows.

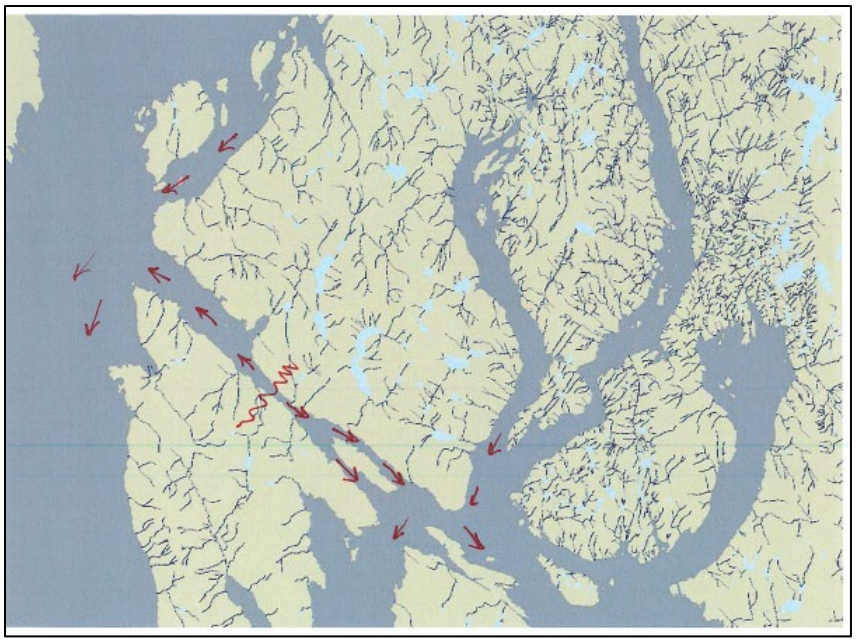


Figure 16. General direction of currents during Tongass Narrows ebb tide

7. PUBLIC OUTREACH

Four press releases were distributed between May 24 and September 18, 2018 providing detailed monitoring information and precautionary measurements to avoid exposure to bacteria impacted marine water. To further notify the public, the City of Ketchikan posted advisory signs at the beaches warning of elevated bacteria levels for 2018, and each week DEC posted information about which beaches had elevated bacteria levels on the Ketchikan Events Facebook page. Copies of these press releases can be found on the DEC's Alaska Beach Grant Program website at http://dec.alaska.gov/water/water-quality/beach-program/. The EPA Beach webpage provides detailed beach information, and can be found at https://www.epa.gov/beaches.

During 2019, two press releases were distributed on June 13 and July 5, providing detailed monitoring information and precautionary measurements to avoid exposure to bacteria impacted marine water. Copies of these press releases can be found on the DEC's Alaska Beach Grant Program website at http://dec.alaska.gov/water/water-quality/beach-program/. To further notify the public, the City of Ketchikan posted advisory signs at the beaches warning of elevated bacteria levels for 2019, and each week DEC posted information about which beaches had elevated bacteria levels on the Ketchikan Events Facebook page (Figure 15). The EPA Beach webpage provides detailed beach information and can be found at https://www.epa.gov/beaches.

On April 5, 2019, DEC and SAWC staff presented on the Ketchikan environmental projects at the Friday Night Insights event at the Forest Service Southeast Discovery Center in Ketchikan Alaska. DEC's Water Quality Standards, Assessment and Restoration staff discussed the overall Ketchikan beach monitoring project and results through the 2018 season. SAWC provided information on the beach monitoring for 2019 recreational season and the Watershed Management Plan that is being developed to address environmental issues throughout Ketchikan. (Now former) DEC Cruise Ship program manager, Ed White, gave an update on cruise ships treatment and monitoring results, as well as the air scrubber systems. Also, on April 5th, staff from DEC, SAWC and KIC met with

Ketchikan's Point Higgins Elementary School 4th grade students and their teachers on Ketchikan Creek to share information on stream ecosystem and health, and how the community can help improvement water quality.

On November 12, 2019, SAWC and KIC staff presented the results of the 2019 beach monitoring season at a public meeting at the Ketchikan Public Library. KIC staff presented information about the monitoring approach, and SAWC staff presented data results, the summer 2019 algal bloom, the upcoming 2020 monitoring program and discussed next steps associated with the Watershed Management Plan. DEC Cruise Ship Program staff presented a summary of the cruise ship season and answer questions.

During 2020, a general press release was distributed on May 14th to provide information on the 2020 season monitoring program and to highlight the improved beach website https://www.epa.gov/beaches. The website included an at-a-glance interactive map, a listserv signup to get beach update emails, as well as monitoring reports and press releases. To further notify beach goers as they walked onto the local beaches, the City of Ketchikan and Ketchikan Gateway Borough posted warning advisory signs when elevated bacteria levels were present in the marine waters. In addition, weekly social media posts were made on DEC and Ketchikan Events Facebook pages (Figure 15), and a local radio spot provided a short daily reminder to visit the Ketchikan Beach website before heading to the beach. A local radio interview on May 28 provided more insight into the 2020 monitoring season with predictive model development and lack of cruise ships along the Ketchikan coastline. The improved community outreach is detailed in a communication plan. SAWC staff will present data results and discuss next steps in the beach monitoring program and the Watershed Management Plan in early 2021.

The Beach monitoring project is funded by the EPA's BEACH Act Grant, and the Watershed Management Plan project is funded by DEC's ACWA Grant Program.

Figure 17. Example Facebook post highlighting beaches with recreation advisories.

8. CONCLUSIONS

Eleven of 13 monitoring sites failed to meet one or both of the fecal coliform criteria protecting the harvesting use for two or more years (Table 4). Eleven of 13 failed to meet the 10% of samples criterion for fecal coliform bacteria for two or more years. Nine of 13 monitoring sites failed to meet the geometric mean criterion for fecal coliform bacteria.

Eleven of 13 monitoring sites failed to meet one or both of the enterococci criteria protecting the contact recreation use for two or more years during this study (Table 9). Eleven of 13 sites failed to meet the 10% of samples criterion for enterococci for two or more years. Seven of 13 sites failed to meet the geometric mean criterion for enterococci.

The human bacteroidetes ID was detected at all of the monitoring locations for one or more years. Dog bacteroidetes were detected at 12 of 13 sites (all except Mountain Point Surprise Beach). Gull bacteroidetes were

detected at 11 of the 13 sites (all except Rotary Beach Park and Mountain Point Surprise Beach). Table 14 provides a summary of the microbial source tracking results.

Given the numerous potential bacteria sources to the coastal beaches monitored, several sources may be contributing to the elevated bacteria levels at each location, with influence from air and water temperature and precipitation. The DEC-funded Watershed Management Plan (ACWA Grant 19-04) will encompass the entire Ketchikan area, and will evaluate management options to reduce water pollution with a focus on reducing bacteria entering Ketchikan freshwater watersheds and coastal marine waters from known diverse point and nonpoint bacteria discharges and sources. This plan, being developed in collaboration with tribal, local, and state governments and the Ketchikan community, has a draft and final versions scheduled for completion in winter and spring 2021, respectively, and will be posted on the Alaska Beach Program website.

During the 2021 recreational season, limited bacteria testing (twice monthly) is planned along with the use of a predictive modeling tool to forecast beach bacteria levels. The testing and modeling will allow DEC to continue providing important information to the community. The Virtual Beach model is designed to develop site-specific statistical models for the prediction of pathogen indicator levels at recreational beaches (https://www.epa.gov/ceam/virtual-beach-vb).

The monitoring program and management plan will help support the development of recommendations for best management practices and wastewater treatment to reduce bacteria levels along the Ketchikan coastline. All bacteria sources will need to be better controlled to improve Ketchikan's marine waters.

9. REFERENCES

Alaska Department of Environmental Conservation. 2020. 18 AAC 70, Water Quality Standards. Amended as of March 5, 2020.

U.S. Environmental Protection Agency. 2014. National Beach Guidance and Required Performance Criteria for Grants, 2014 Edition (dated July 31, 2014). EPA-823-B-14-001.

Alaska Department of Environmental Conservation. 2020. Ketchikan BEACH Water Quality Monitoring and Pathogen Detection Quality Assurance Project Plan (dated February 2020).

Alaska Department of Environmental Conservation. 2020. Ketchikan BEACH Monitoring Handbook (dated February 2020).

Alaska Department of Environmental Conservation. 2019. 2017-2019 Ketchikan Beach Monitoring Comprehensive Report (dated January 28, 2020).

Alaska Department of Environmental Conservation. 2019. Ketchikan Beach Monitoring 2017-2018 Field Report (dated February 12, 2019, Updated April 19, 2019).

Alaska Department of Environmental Conservation. 2018. Ketchikan Beach Monitoring July –September 2017 report (dated January 31, 2018).

10. APPENDIX A: 2020 SITE PHOTOS*

*select photos from each site throughout the sampling season. Contact SAWC for all site photos.

11. KNUDSON COVE

Knudson Cove, August 11, 2020. (SAWC photo)

Knudson Cove, July 27, 2020. (SAWC photo)

Knudson Cove, July 6, 2020. (SAWC photo)

Knudson Cove, June 17, 2020. (SAWC photo)

12. SOUTH POINT HIGGINS

South Point Higgins, June 17, 2020. (SAWC photo)

South Point Higgins with people near shore, July 22, 2020. (SAWC photo)

South Point Higgins sampling, August 4, 2020. (SAWC photo)

13. SHULL

Shull, June 17, 2020. (SAWC photo)

Shull with tide pond. July 13, 2020. (SAWC photo)

Shull with waterfowl. August 18, 2020. (SAWC photo)

14. SUNSET

Beach at Sunset Rd. September 17, 2020. (SAWC photo)

Beach at Sunset Rd. July 6, 2020. (SAWC photos)

Beach at Sunset Rd. August 11, 2020. (SAWC photo)

15. SOUTH REFUGE COVE

South Refuge Cove, June 17, 2020. (SAWC photo)

South Refuge Cove, July 13, 2020. (SAWC photo)

South Refuge Cove, August 11, 2020. (SAWC photo)

16. THOMAS BASIN

Thomas Basin, June 17, 2020. (SAWC photo)

Thomas Basin, July 22, 2020. (SAWC photo)

Fishing at Thomas Basin, August 25, 2020. (SAWC photo)

17. SEAPORT BEACH

Seaport Beach, June 9, 2020. (SAWC photo)

Sampling at Seaport Beach, July 6, 2020. (SAWC photo)

Waterfowl at Seaport Beach, August 18, 2020. (SAWC photo)

18. ROTARY PARK POOL

Rotary Park Pool, June 9, 2020. (SAWC photo)

Sampling at Rotary Park Pool, July 6, 2020. (SAWC photo)

Sampling at Rotary Park Pool, August 25, 2020. (SAWC photo)

19. ROTARY PARK BEACH

Rotary Park Beach, May 27, 2020. (SAWC photo)

Sampling at Rotary Park Beach, July 6, 2020. (SAWC photo)

Rotary Park Beach, August 25, 2020. (SAWC photo)

20. MOUNTAIN POINT SURPRISE BEACH

Sampling at Mountain Point Surprise Beach, May 27, 2020. (SAWC photo)

Mountain Point Surprise Beach, June 17, 2020. (SAWC photo)

Sampling at Mountain Point Surprise Beach, August 4, 2020. (SAWC photo)

21. MOUNTAIN POINT CULTURAL FOOD BEACH

Sampling at Mountain Point Cultural Food Beach, June 3, 2020. (SAWC photo)

Sampling at Mountain Point Cultural Food Beach, July 22, 2020. (SAWC photo)

Sampling at Mountain Point Cultural Food Beach, August 4, 2020. (SAWC photo)

22. HERRING COVE

Herring Cove beach, May 27, 2020. (SAWC photo)

Recreation at Herring Cove beach, June17, 2020. (SAWC photo)

Trash at Herring Cove beach, August 11, 2020. (SAWC photo)

Appendix B. Sanitary Survey Summary Tables with Comparison to Analytical Results 2017-2020

Notes on 2019 Summary Tables:

In the following tables, missing and erroneous rainfall data in sanitary survey forms were replaced with weather station data from the nearest weather station, downloaded from the National Climate Data Center online database (https://www.ncdc.noaa.gov/cdo-web/). Station "Ketchikan 10 N" data were applied to Knudson Cove, South Point Higgins, Shull, Sunset, and South Refuge Cove. Station "Ketchikan Airport" data were applied to Thomas Basin, Seaport Beach, Rotary Park Pool, Rotary Park Beach, Mountain Point Surprise Beach, Mountain Point Cultural Food, and Herring Cove. Daily precipitation totals from the day prior to the sampling event were considered "<24 hours", totals from two days prior were "<48 hours", and totals from three days prior were "<72 hours."

Missing and erroneous tidal phase data were replaced based on the following: "low" tide was considered +/- 2 hours from low tide time; "high" tide was considered +/- 2 hours from high tide time; flood tide was the time between low and high tide; ebb tide was the time between high and low tide.

Where appropriate, qualitative notes about visual turbidity were converted to the following categories: "clear", "cloudy/murky", "oily film", or "other." More detailed information about visual turbidity was moved to the "Notes" column.

HERRING COVE 2020

Sample Location	Sample Date	Year	Sample Time	Fecal cfu/100 ml	Entero MPN/100 ml	Rainfall			air temp	marine water temp	weather	Wind		tidal phase - based on time
						<24 hr	<48 hr	<72 hr				Direction	Speed (mph)	
Herring	5/21	2020	8:15	65	10	0.05	0.23	0.23	10.2	10.6	cloudy, overcast	NW	light and variable	flooding
Herring	5/27	2020	7:45	33	<10	0.00	0.14	0.41	11.1	11.4	Mostly cloudy	NW	0	ebbing
Herring	6/3	2020	6:31	32	30	0.42	2.71	3.14	10.8	9.0	overcast	N/A	0	flooding
Herring	6/9	2020	7:09	32	63	0.02	0.12	0.12	12.2	11.9	Overcast	NE	4	ebbing
Herring	6/17	2020	6:30	26	<10	0.00	0.00	0.00	14.7	11.1	mostly sunny	E	3	flooding
Herring	6/22	2020	5:36	39	30	0.07	0.14	0.21	11.9	11.4	light rain	E	7	ebbing
Herring	7/3	2020	7:21	46	<10	0.03	0.12	0.12	15.4	12.1	Cloudy	NE	1	flooding
Herring	7/6	2020	5:35	82	<10	0.04	0.04	0.04	14.6	13.0	Cloudy	NW	2	ebbing
Herring	7/13	2020	14:15	15	<10	0	0.02	0.74	15.1	14.3	cloudy	S	5	flooding
Herring	7/22	2020	5:53	101	20	0.00	0.69	1.50	15.3	12.4	mostly cloudy	NW	3	ebbing
Herring	7/27	2020	12:48	13	10	0.63	1.93	1.98	19.9	12.6	Partly Cloudy	W	6	flooding
Herring	8/4	2020	5:13	464	706	3.95	4.34	4.74	14.6	12.7	Rainy	SE	7	ebbing
Herring	8/11	2020	12:39	136	30	0.07	0.39	1.03	17.0	14.4	Cloudy	W	6	flooding
Herring	8/18	2020	4:09	250	246	0.69	1.53	3.42	16.4	13.9	light rain	NW	2	ebbing
Herring	8/25	2020	1:21	239	41	0.48	0.78	2.12	13.9	11.8	rain	S	5	flooding
Herring	9/1	2020	5:23	194	134	0.43	0.97	1.28	14.7	12.4	cloudy	S	1	ebbing
Herring	9/9	2020	12:22	22	10	0.00	0.00	0.00	19.1	16.5	sunny	NW	4	flooding
Herring	9/17	2020	4:05	434	350	0.00	0.00	0.00	13.3	14.6	clear	N	3	ebbing

HERRING COVE 2020 CONT.

Date	Debris		Vegetation		Turbidity (NTU)	pH	adults	children	# boats	swimming	walking	boating	fishing	# water fowl	# dogs	Sewage odor/presence	Notes
	shore	water	shore (%)	water (%)													
5/21	none	none	1	1	1.7	8.76	0	0	0	no	no	no	1 kayaking	100	0	none	15 seals
5/27	none	none	1	1	1.37	8.35	0	0	0	0	0	0	0	0	0	none	1 harbor seal
6/3	none	none	1	1	0.80	8.42	1	0	5	0	0	1	5 (fishing)	4	0	none	3 birds
6/9	none	none	1	1	1.67	8.38	2	0	3	0	0	2	3	0	0	none	2 harbor seals
6/17	bait bag, empty	1 broken buzz bomb (for fishing)	0	0	1.37	8.55	8	0	4 fishing	0	1	4	7	0	0	-	
6/22	10 ft tube		5	5	1.63	7.15	6	0	8	0	0	8	6	0	0		creek outflow
7/3			1	1	1.05	8.53	12		2			2	10				
7/6			5	1	0.44	8.04	9		2			0	9				
7/13	-	-	5	5	0.71	8.17	6	1	7	0	0	10	6	0	0	-	
7/22			2	2	0.59	7.24	2	0	0	0	0	0	2	0	0		
7/27	Tube/ pipe	-	1	1	0.94	8.03	9	1	1	0	0	2	9	0	0	-	
8/4	-	-	1	1	1.35	7.4	0	0	0	0	0	0	0	12	0		tides were still high, tall waves
8/11	-	-	5	0	0.93	7.88	2	0	0	0	0	0	2	30 seagulls	0	-	
8/18	-	-	5	1	1.14	7.55	0	0	0	0	0	0	0	1 blue heron	0	-	
8/25	-	-	0	0	1.28	7.78	0	0	0	0	0	0	0	8	0	-	

9/1	-	-	1	0	0.65	7.22	0	0	0	0	0	0	0	Unknown	0	-	Couldn't estimate # of birds in large flock (dark), lots of wildlife noises
9/9			0	0	0.67	7.84	2	3	1	0	5	0	0	5 seagulls	0		All people were lounging. More harbor seals and seagulls up stream, not included in counts.
9/17			0	0	0.40	8.21			0	0	0	0	0	0	0		Too dark to see if there was any wildlife

KNUDSON COVE 2020

Sample Location	Sample Date	Year	Sample Time	Fecal cfu/100 ml	Entero MPN/100 ml	Rainfall			air temp	marine water temp	weather	Wind		tidal phase - based on time
						<24 hr	<48 hr	<72 hr				Direction	Speed (mph)	
Knudson	5/21	2020	5:08	12	30	0.05	0.23	0.23	11.0	13.1	cloudy, overcast	NW	light and variable	ebb
Knudson	5/27	2020	10:44	7	10	0.00	0.14	0.41	12.0	12.3	Mostly cloudy	NW	0	flooding
Knudson	6/3	2020	3:41	8	<10	0.42	2.71	3.14	10.8	11.7	sprinkling	N/A	0	ebbing
Knudson	6/9	2020	10:09	5	<10	0.02	0.12	0.12	16.2	12.5	Overcast	E	5	flooding
Knudson	6/17	2020	3:34	39	<10	0.00	0.00	0.00	13.4	15.1	mostly cloudy	SE	4	ebbing
Knudson	6/22	2020	8:29	70	10	0.07	0.14	0.21	14.1	13.0	light rain	E	7	flooding
Knudson	7/3	2020	4:02	5	<10	0.03	0.12	0.12	14.4	13.4	Cloudy	SE	2	ebbing
Knudson	7/6	2020	9:06	3	<10	0.04	0.04	0.04	15.9	14.0	Cloudy	SW	1	flooding
Knudson	7/13	2020	10:26	23	20	0	0.02	0.74	18.5	15.3	cloudy	S	8	ebbing
Knudson	7/22	2020	9:19	31	31	0.00	0.69	1.50	16.9	14.5	mostly cloudy	W	3	flooding
Knudson	7/27	2020	9:50	77	10	0.63	1.93	1.98	23.1	13.8	Partly Cloudy	W	5	ebbing
Knudson	8/4	2020	9:11	12	<10	3.95	4.34	4.74	14.5	15.3	Rainy	SE	14	flooding
Knudson	8/11	2020	9:19	8	<10	0.07	0.39	1.03	18.4	14.5	Cloudy	W	5	ebbing
Knudson	8/18	2020	7:26	202	97	0.69	1.53	3.42	15.5	14.0	Cloudy	SW	5	flooding
Knudson	8/25	2020	9:22	31	10	0.48	0.78	2.12	16.2	15.0	light rain	S	7	ebbing
Knudson	9/1	2020	9:13	90	10	0.43	0.97	1.28	14.3	12.6	cloudy	S	10	flooding
Knudson	9/9	2020	8:26	188	52	0.00	0.00	0.00	19.8	16.0	cloudy	NW	5	ebbing
Knudson	9/17	2020	8:35	18	<10	0.00	0.00	0.00	12.5	13.4	clear	N	2	flooding

KNUDSON COVE 2020 CONT.

Date	Debris		Vegetation		Turbidity (NTU)	pH	adults	children	# boats	swimming	walking	boating	fishing	# water fowl	# dogs	Sewage odor/presence	Notes
	shore	water	shore (%)	water (%)													
5/21	none	oily film, little amount	10	10	1.71	8.37	0	0	10	no	no	no	no	3 eagles, 1 robin	0	none	There are sanitary facilities on site but not visible from sampling
5/27	none	small chunk of Styrofoam	10	10	1.71	8.38	2	3	40	0	2	0	3	2	0	none	scattered spots of oil film in water
6/3	gas tank on ramp	none	15	15	0.82	8.36	0	0	~40	0	0	0	0	0	0	none	1 harbor seal, 2 eagles
6/9	none	oily film	1	15	2.64	8.32	0	0	~40	0	0	0	0	0	0	none	oily film, more oil than previous times
6/17	-	oily film	5	0	0.86	8.40	0	0	40	0	0	0	0	0	0	slight fish carcass smell	by creek outflow
6/22		1 buoy, oil	15	15	4.06	8.20	0	0	30	0	0	0	0	0	0	None	stream outflow, some oil (very little)
7/3			20	20	0.70	8.22	7		100		2	5			1		oily film
7/6			20	20	1.09	8.16	2		30		2	0	0				oily film
7/13	-	-	9	5	0.82	7.85	4	0	30	0	0	4	4	0	0	-	
7/22	Metal	Bike	25	25	0.98	7.69	3	0	2	0	1	2	0	2 ducks	1		Rust color water, oil and lots of it
7/27	-	-	40	40	0.80	6.72	3	0	2	0	0	3	0	0	0	-	Dark rust color, foam in water, which is likely from creek, oil
8/4	-	oil sheen	10	5	1.31	8.00	3	0	40	0	3	0	0	5	0		
8/11	-	-	20	5	0.66	7.21	9	2	40	-	9	2	-	8	0	-	2 boats in use

8/18	Metal soda can	Oil	10	2	2.47	7.30	3	1	40	0	2	2	0	18	0	-	1 boat in use
8/25	-	oil	20	5	0.44	8.09	3	0	~40	0	1	2	0	3	0	-	1 person taking boat out of water
9/1	-	dead fish, oil sheen	15	0	1.10	7.49	4	0	40	0	0	4	0	2 ducks	0	-	skiff onshore
9/9	washed up skiff	oil	20	0	1.06	7.76	10	3	3 in use, 40 in marina	0	5	4	0	2 ducks	0		
9/17	dead fish	oil sheen	20	0	1.37	7.93	dead fish	oil sheen	20	0	0	0	0	36	1		Small amount of dog poop on the dock

MOUNTAIN POINT CULTURAL FOODS 2020

Sample Location	Sample Date	Year	Sample Time	Fecal cfu/100 ml	Entero MPN/100 ml	Rainfall			air temp	marine water temp	weather	Wind		tidal phase - based on time
						<24 hr	<48 hr	<72 hr				Direction	Speed (mph)	
Mtn P Culture	5/21	2020	7:51	4	<10	0.05	0.23	0.23	9.5	11.9	cloudy, overcast	NW	light and variable	flooding
Mtn P Cultural	5/27	2020	8:02	10	<10	0.00	0.14	0.41	9.6	11.8	Mostly cloudy	NW	5 mph	ebbing
Mtn P Culture	6/3	2020	6:12	4	<10	0.42	2.71	3.14	9.8	11.5	overcast	S	5	flooding
Mtn P Cultural	6/9	2020	7:27	6	10	0.02	0.12	0.12	13.2	12.6	Overcast	NE	6	ebbing
Mtn P Culture	6/17	2020	6:10	7	<10	0.00	0.00	0.00	13.7	13.4	partly cloudy	E	2	flooding
Mtn P Cultural	6/22	2020	5:55	21	10	0.07	0.14	0.21	11.5	13.2	light rain	E	10	ebbing
Mtn P Culture	7/3	2020	7:03	22	41	0.03	0.12	0.12	14.9	13.6	Cloudy	NE	1	flooding
Mtn P Cultural	7/6	2020	5:54	28	<10	0.04	0.04	0.04	15.4	13.9	Cloudy	NW	2	ebbing
Mtn P Culture	7/13	2020	13:52	12	10	0	0.02	0.74	16.1	15.1	cloudy	S	5	flooding
Mtn P Cultural	7/22	2020	6:17	82	121	0.00	0.69	1.50	15.4	15.0	mostly cloudy	NW	1	ebbing
Mtn P Culture	7/27	2020	12:22	12	10	0.63	1.93	1.98	18.6	15.0	Partly Cloudy	W	6	ebbing
Mtn P Cultural	8/4	2020	5:35	124	109	3.95	4.34	4.74	14.0	15.1	Rainy	SE	7	ebbing
Mtn P Culture	8/11	2020	12:19	406	85	0.07	0.39	1.03	15.9	15.6	Cloudy	W	6	flooding
Mtn P Culture	8/18	2020	4:27	162	119	0.69	1.53	3.42	15.5	14.2	light rain	NW	2	ebbing
Mtn P Culture	8/25	2020	12:59	85	20	0.48	0.78	2.12	14.4	14.5	light rain	S	5	flooding
Mtn P Cultural	9/1	2020	5:46	26	31	0.43	0.97	1.28	14.4	13.6	light rain	S	5	ebbing
Mtn P Culture	9/9	2020	12:00	112	31	0.00	0.00	0.00	19.4	16.0	sunny	NW	6	flooding
Mtn P Cultural	9/17	2020	4:33	114	144	0.00	0.00	0.00	14.6	14.2	clear	N	3	ebbing

MOUNTAIN POINT CULTURAL FOODS 2020 CONT.

Date	Debris		Vegetation		Turbidity (NTU)	pH	adults	children	# boats	swimming	walking	boating	fishing	# water fowl	# dogs	Sewage odor/presence	Notes
	shore	water	shore (%)	water (%)													
5/21	none	none	25	25	2.66	8.46	0	0	0	no	no	no	no	1 raven, 2 crow	0	sulfur	Odor is in wetland between parking and beach
5/27	none	none	30	30	2.34	8.45	0	0	0	0	0	0	0	0	0	sulfur	
6/3	none	none	70	70	0.60	8.38	0	0	6	0	0	0	8 (fishing)	0	0	none	3 eagles
6/9	none	none	25	25	1.94	8.33	0	0	3	0	0	0	3	0	0	none	
6/17	1 broken turbidi meter vial	-	10	20	1.35	8.48	0	0	3 fishing	0	0	3	0	0	0	slight sulfur smell	
6/22			35	35	1.53	8.44	0	0	4	0	0	4	0	0	0	sulfur	
7/3			55	55	1.87	8.52											
7/6			40	40	0.60	8.31			2			0	0			Sulfur	
7/13	-	-	35	35	0.63	8.39	1	0	2	0	0	0	0	0	0	-	
7/22	washed up beer can		40	40	0.47	8.24	0	0	0	0	0	0	0	0	0		
7/27	-	-	75	75	1.14	8.26	5	2	1	3	4	0	0	0	0	-	
8/4	-	-	30	30	4.15	8.04	0	0	0	0	0	0	0	0	0	sulfur like	
8/11	-	-	60	75	0.80	8.00	0	0	1	0	0	0	0	2	0	-	Same boat that was at Mtn. Surprise
8/18	-	-	25	10	0.99	7.86	0	0	0	0	0	0	0	1 seagull	0	-	
8/25	-	-	90	40	1.05	8.12	0	0	0	0	0	0	0	3	0	sulfur	
9/1	-	beer can	70	5	0.66	7.85	0	0	0	0	0	0	0	1	0	sulfur	odor was strong
9/9			70	10	0.66	7.95	3	0	1	0	0	0	0	0	0	see comment	Heard an eagle, but didn't see it. It smelled like sulfur at points, but

																smelled mostly earthy. 3 adults were sitting nearby.
9/17			50	10	0.45	8.24			50	10	0	0	0	0	0	earthy sulfur smell	Heard goose, but did not see it

MOUNTAIN POINT SURPRISE 2020

Sample Location	Sample Date	Year	Sample Time	Fecal cfu/100 ml	Entero MPN/100 ml	Rainfall			air temp	marine water temp	weather	Wind		tidal phase - based on time
						<24 hr	<48 hr	<72 hr				Direction	Speed (mph)	
Mtn P Surprise	5/21	2020	7:38	4	40	0.05	0.23	0.23	9.5	12.2	cloudy, overcast	NW	calm	flooding
Mtn P Surprise	5/27	2020	8:12	11	<10	0.00	0.14	0.41	10.8	11.6	Mostly cloudy	NW	5 mph	ebbing
Mtn P Surprise	6/3	2020	6:00	22	10	0.42	2.71	3.14	10.0	11.1	overcast	S	3	flooding
Mtn P Surprise	6/9	2020	7:47	5	10	0.02	0.12	0.12	13.2	12.2	Overcast	NE	6	ebbing
Mtn P Surprise	6/17	2020	5:56	19	<10	0.00	0.00	0.00	14.4	13.2	partly cloudy	E	2	flooding
Mtn P Surprise	6/22	2020	6:00	16	20	0.07	0.14	0.21	11.5	13.0	light rain	E	7	ebbing
Mtn P Surprise	7/3	2020	6:48	16	41	0.03	0.12	0.12	14.5	13.6	Cloudy	E	1	flooding
Mtn P Surprise	7/6	2020	6:11	35	10	0.04	0.04	0.04	14.7	13.7	Light rain	NW	2	ebbing
Mtn P Surprise	7/13	2020	13:38	2	10	0	0.02	0.74	16.0	15.2	cloudy	S	5	flooding
Mtn P Surprise	7/22	2020	6:29	24	<10	0.00	0.69	1.50	15.2	14.4	mostly cloudy	W	3	ebbing
Mtn P Surprise	7/27	2020	12:05	4	<10	0.63	1.93	1.98	19.5	15.1	Partly Cloudy	W	6	ebbing
Mtn P Surprise	8/4	2020	5:52	106	41	3.95	4.34	4.74	13.9	14.7	Rainy	SE	8	ebbing
Mtn P Surprise	8/11	2020	12:05	42	<10	0.07	0.39	1.03	16.3	15.2	Cloudy	W	6	ebbing
Mtn P Surprise	8/18	2020	4:44	52	41	0.69	1.53	3.42	16.1	14.6	light rain	NW	2	ebbing
Mtn P Surprise	8/25	2020	12:41	26	<10	0.48	0.78	2.12	14.5	14.4	light rain	S	5	flooding
Mtn P Surprise	9/1	2020	6:09	28	<10	0.43	0.97	1.28	14.6	13.5	light rain	S	5	ebbing
Mtn P Surprise	9/9	2020	11:39	18	10	0.00	0.00	0.00	18.2	15.0	sunny	NW	4	flooding
Mtn P Surprise	9/17	2020	5:10	28	10	0.00	0.00	0.00	14.1	13.6	clear	N	3	ebbing

MOUNTAIN POINT SURPRISE 2020 CONT.

Date	Debris		Vegetation		Turbidity (NTU)	pH	adults	children	# boats	swimming	walking	boating	fishing	# water fowl	# dogs	Sewage odor/presence	Notes
	shore	water	shore (%)	water (%)													
5/21	none	none	70	70	2.65	8.49	0	0	0	no	no	no	no	0	0	none	
5/27	none	none	25	25	2.62	8.45	0	0	0	0	0	0	0	0	0	none	
6/3	none	none	70	70	0.92	8.35	0	0	0	0	0	0	0	0	0	none	1 eagle
6/9	none	none	40	40	1.88	8.33	0	0	1	0	0	0	1	0	0	none	1 eagle
6/17	small piece of 2x4 wood	-	50	30	1.60	8.43	0	0	0	0	0	0	0	0	0	-	
6/22			60	60	1.65	8.42	0	0	1	0	0	1	0	0	0	None	
7/3			70	70	1.50	8.43										sulfur	
7/6			50	50	0.52	8.3			1			0	0				
7/13	-	-	30	30	1.80	8.14	0	0	0	0	0	0	0	0	0	-	
7/22			55	55	0.46	8.21	0	0	0	0	0	0	0	0	0		
7/27	2x4	-	60	60	0.94	8.37	3	1	0	0	4	0	0	0	1	-	
8/4	-	-	50	30	13.33	8.01	0	0	0	0	0	0	0	0	0		
8/11	-	-	60	20	0.66	8.01	0	0	1	0	0	0	0	3	0	-	Same boat that was at Mtn. P Culture
8/18	-	-	30	70	0.68	7.88	0	0	0	0	0	0	0	0	0	-	
8/25	-	-	60	30	0.92	8.07	1	0	1	0	0	1	0	0	0	-	Third turbidity value was high due to a smudge on the vial, so it was not used when determining the average turbidity value.
9/1	-	-	60	45	0.94	7.84	0	0	0	0	0	0	0	2	0	sulfur	
9/9			75	20	0.87	7.95	0	0	1 passing	0	0	0	0	4 seagulls	0		

9/17			60	70	0.58	8.15			60	70	0	0	0	0	0	trash odor above beach	At the top of the picture for this beach you can see the boat

SOUTH REFUGE COVE 2020

Sample Location	Sample Date	Year	Sample Time	Fecal cfu/100 ml	Entero MPN/100 ml	Rainfall			air temp	marine water temp	weather	Wind		tidal phase - based on time
						<24 hr	<48 hr	<72 hr				Direction	Speed (mph)	
Refuge	5/21	2020	6:15	5	<10	0.05	0.23	0.23	9.5	10.9	cloudy, overcast	NW	10	ebb
Refuge	5/27	2020	9:40	<1	<10	0.00	0.14	0.41	12.7	11.5	Mostly cloudy	NW	5 mph	ebbing
Refuge	6/3	2020	4:56	24	20	0.42	2.71	3.14	9.6	10.1	overcast	N/A	0	ebbing
Refuge	6/9	2020	8:57	4	<10	0.02	0.12	0.12	14.5	11.8	Overcast	E	10	ebbing
Refuge	6/17	2020	4:43	3	10	0.00	0.00	0.00	11.8	12.5	cloudy	E	5	ebbing
Refuge	6/22	2020	7:16	9	20	0.07	0.14	0.21	12.6	12.2	light rain	SE	8	ebbing
Refuge	7/3	2020	5:18	30	<10	0.03	0.12	0.12	13.7	12.2	Cloudy	SE	2	ebbing
Refuge	7/6	2020	7:48	33	41	0.04	0.04	0.04	17.6	13.5	Cloudy	N	1	ebbing
Refuge	7/13	2020	11:35	6	10	0	0.02	0.74	14.4	13.7	cloudy	SE	5	ebbing
Refuge	7/22	2020	8:02	9	10	0.00	0.69	1.50	15.4	13.9	cloudy	NW	7	ebbing
Refuge	7/27	2020	10:45	6	<10	0.63	1.93	1.98	16.2	14.0	Partly Cloudy	W	5	ebbing
Refuge	8/4	2020	7:49	16	<10	3.95	4.34	4.74	13.8	14.2	Rainy	SE	13	ebbing
Refuge	8/11	2020	10:29	<2	<10	0.07	0.39	1.03	14.3	14.2	Cloudy	W	5	ebbing
Refuge	8/18	2020	6:13	42	31	0.69	1.53	3.42	15.9	14.6	rain	SW	4	ebbing
Refuge	8/25	2020	10:48	9	<10	0.48	0.78	2.12	13.6	13.4	light rain	SE	6	ebbing
Refuge	9/1	2020	7:57	44	<10	0.43	0.97	1.28	14.0	13.2	light rain	S	6	flooding
Refuge	9/9	2020	9:36	10	20	0.00	0.00	0.00	16.3	14.7	mostly cloudy	NW	6	ebbing
Refuge	9/17	2020	7:08	28	20	0.00	0.00	0.00	13.5	12.8	clear	N	2	ebbing

SOUTH REFUGE COVE 2020 CONT.

Date	Debris		Vegetation		Turbidity (NTU)	pH	adults	children	# boats	swimming	walking	boating	fishing	# water fowl	# dogs	Sewage odor/presence	Notes
	shore	water	shore (%)	water (%)													
5/21	none	none	10	10	4.84	8.3	0	0	0	no	no	no	no	0	0	none	Creek outflow
5/27	none	none	5	1	8.27	8.3	2	0	0	0	2	0	0	0	0	none	
6/3	none	none	30	30	0.80	8.4	0	0	0	0	0	0	0	0	0	none	1 brown marten
6/9	none	none	20	20	1.12	8.3	0	0	0	0	0	0	0	0	0	none	1 harbor seal
6/17	rope	-	5	10	1.61	8.43	0	0	0	0	0	0	0	0	0	-	
6/22			40	40	1.83	8.3	0	0	1	0	0	0	0	1 seagull	0	None	
7/3			30	30	1.67	8.2											
7/6			30	30	1.42	8.3						0	0	5			
7/13	-	-	35	35	0.67	8.30	0	0	0	0	0	0	0	0	0	-	
7/22			50	30	0.89	8.2	0	0	0	0	0	0	0	0	0		
7/27	-	-	35	35	0.89	8.5	3	4	0	0	7	0	0	0	0	-	
8/4	1 tire	-	40	30	3.51	7.9	0	0	0	0	0	0	0	0	0		
8/11	-	-	30	20	0.90	7.9	0	0	0	0	0	0	0	0	0	-	
8/18	Tire	-	30	40	0.65	7.80	0	0	0	0	0	0	0	0	0	-	
8/25	-	-	20	10	0.91	8.00	0	0	0	0	0	0	0	0	0	-	
9/1	-	-	20	5	0.66	8.30	0	0	0	0	0	0	0	5	0	-	
9/9			30	20	0.65	7.93	1	2	0	0	3	0	0	0	0		
9/17	tire		50	15	0.97	8.1	tire		50	15	0	0	0	2	0	smoke	

ROTARY BEACH 2020

Sample Location	Sample Date	Year	Sample Time	Fecal cfu/100 ml	Entero MPN/100 ml	Rainfall			air temp	marine water temp	weather	Wind		tidal phase - based on time
						<24 hr	<48 hr	<72 hr				Direction	Speed (mph)	
Rotary Beach	5/21	2020	7:17	26	10	0.05	0.23	0.23	10.1	11.5	cloudy, overcast	NW	light and variable	flooding
Rotary Beach	5/27	2020	8:40	6	<10	0.00	0.14	0.41	11.8	12.3	Mostly cloudy	NW	0	ebbing
Rotary Beach	6/3	2020	5:46	17	20	0.42	2.71	3.14	11.2	11.1	overcast	SE	4	flooding
Rotary Beach	6/9	2020	8:01	4	<10	0.02	0.12	0.12	13.4	12.3	Overcast	NE	7	ebbing
Rotary Beach	6/17	2020	5:33	12	<10	0.00	0.00	0.00	12.9	13.2	partly cloudy	E	3	flooding
Rotary Beach	6/22	2020	6:24	17	192	0.07	0.14	0.21	12.1	12.8	light rain	E	7	ebbing
Rotary Beach	7/3	2020	6:22	18	20	0.03	0.12	0.12	15.9	13.6	Cloudy	E	1	flooding
Rotary Beach	7/6	2020	6:35	23	<10	0.04	0.04	0.04	14.0	13.1	Light rain	NW	2	ebbing
Rotary Beach	7/13	2020	13:05	8	<10	0	0.02	0.74	16.3	15.5	cloudy	S	5	ebbing
Rotary Beach	7/22	2020	6:50	18	<10	0.00	0.69	1.50	14.8	14.3	mostly cloudy	W	3	ebbing
Rotary Beach	7/27	2020	11:44	20	10	0.63	1.93	1.98	17.1	15.6	Partly Cloudy	NW	6	ebbing
Rotary Beach	8/4	2020	6:23	58	52	3.95	4.34	4.74	13.6	14.5	Rainy	SE	8	ebbing
Rotary Beach	8/11	2020	11:48	4	<10	0.07	0.39	1.03	15.4	15.4	Cloudy	W	4	ebbing
Rotary Beach	8/18	2020	5:12	60	<10	0.69	1.53	3.42	17.5	14.7	light rain	NW	3	ebbing
Rotary Beach	8/25	2020	12:09	6	<10	0.48	0.78	2.12	13.9	14.2	light rain	S	5	flooding
Rotary Beach	9/1	2020	6:44	46	30	0.43	0.97	1.28	13.7	14.2	rain	S	5	ebbing
Rotary Beach	9/9	2020	11:01	10	<10	0.00	0.00	0.00	19.8	16.2	sunny	NW	5	ebbing
Rotary Beach	9/17	2020	5:47	14	10	0.00	0.00	0.00	12.4	13.3	clear	N	3	ebbing

ROTARY BEACH 2020 CONT.

Date	Debris		Vegetation		Turbidity (NTU)	pH	adults	children	# boats	swimming	walking	boating	fishing	# water fowl	# dogs	Sewage odor/presence	Notes
	shore	water	shore (%)	water (%)													
5/21	none	none	60	0	4.17	8.39	0	0	0	no	no	no	no	1 seagull	0	none	Creek outflow nearby
5/27	none	none	40	40	3.23	8.54	3	0	0	0	3	0	0	2	2	none	
6/3	coffee creamer box	none	10	10	1.91	8.30	0	0	1	0	0	0	1	4 geese, Canadian	0	none	1 bird
6/9	none	none	70	70	1.61	8.47	0	0	0	0	0	0	0	0	0	none	1 bird
6/17	-	-	20	90	1.62	8.43	0	0	0	0	0	0	0	0	0	-	
6/22			50	50	2.63	8.42	0	0	0	0	0	0	0	0	0	None	
7/3			40	5	3.85	8.36	4				4						
7/6	hotel key card		60	40	0.52	8.33						0	0				
7/13	-	-	75	75	1.46	8.41	2	0	0	0	2	0	0	0	0	-	
7/22			65	65	0.63	8.27	0	0	0	0	0	0	0	1	0		
7/27	-	-	40	40	1.08	8.4	0	0	0	0	0	0	0	0	0	-	
8/4	-	-	30	15	5.61	8.03	0	0	0	0	0	0	0	0	0	faint sewer smell	
8/11	Plastic	-	50	95	0.96	7.81	6	3	0	0	9	0	0	2	0	-	
8/18	-	-	30	50	1.31	7.94	0	0	0	0	0	0	0	0	0	-	
8/25	-	-	15	80	1.48	7.83	0	0	0	0	0	0	0	0	0	-	
9/1	-	-	30	0	1.59	7.97	1	0	0	0	1	0	0	25 seagulls	1	-	
9/9			60	50	0.72	8.12	3	0	0	0	1	0	0	23 seagulls	1		2 adults lounging on the beach
9/1			10	0	0.63	8.23			10	0	0	0	0	8	0		Tide was ebbing at a noticeable rate

ROTARY POOL 2020

Sample Location	Sample Date	Year	Sample Time	Fecal cfu/100 ml	Entero MPN/100 ml	Rainfall			air temp	marine water temp	weather	Wind		tidal phase - based on time
						<24 hr	<48 hr	<72 hr				Direction	Speed (mph)	
Rotary Pool	5/21	2020	7:25	9	20	0.05	0.23	0.23	9.8	12.1	cloudy, overcast	NW	light and variable	flooding
Rotary Pool	5/27	2020	8:27	5	<10	0.00	0.14	0.41	11.4	13.2	Mostly cloudy	NW	0	ebbing
Rotary Pool	6/3	2020	5:50	144	617	0.42	2.71	3.14	9.3	11.1	overcast	SE	4	flooding
Rotary Pool	6/9	2020	7:53	97	171	0.02	0.12	0.12	13.6	12.1	Overcast	NE	7	ebbing
Rotary Pool	6/17	2020	5:41	20	10	0.00	0.00	0.00	12.4	15.6	partly cloudy	E	3	flooding
Rotary Pool	6/22	2020	6:17	88	3448	0.07	0.14	0.21	11.4	12.2	light rain	E	7	ebbing
Rotary Pool	7/3	2020	6:33	2001 (CG)	30	0.03	0.12	0.12	14.9	12.4	Cloudy	E	1	flooding
Rotary Pool	7/6	2020	6:32	4	41	0.04	0.04	0.04	16.8	13.5	Light rain	NW	2	ebbing
Rotary Pool	7/13	2020	13:18	2	<10	0	0.02	0.74	15.9	17.6	cloudy	S	5	flooding
Rotary Pool	7/22	2020	6:42	75	31	0.00	0.69	1.50	16.4	14.1	mostly cloudy	W	3	ebbing
Rotary Pool	7/27	2020	11:51	507	51	0.63	1.93	1.98	16.5	15.6	Partly Cloudy	NW	6	ebbing
Rotary Pool	8/4	2020	6:09	436	323	3.95	4.34	4.74	14.4	14.4	Rainy	SE	8	ebbing
Rotary Pool	8/11	2020	11:35	14	<10	0.07	0.39	1.03	14.8	16.1	Cloudy	W	4	ebbing
Rotary Pool	8/18	2020	5:04	132	31	0.69	1.53	3.42	17.6	15.1	light rain	NW	3	ebbing
Rotary Pool	8/25	2020	12:19	59	10	0.48	0.78	2.12	13.4	13.9	light rain	S	5	flooding
Rotary Pool	9/1	2020	6:29	110	30	0.43	0.97	1.28	15.1	13.1	rain	S	5	ebbing
Rotary Pool	9/9	2020	11:11	12	213	0.00	0.00	0.00	18.3	19.2	sunny	NW	5	ebbing
Rotary Pool	9/17	2020	5:34	10	20	0.00	0.00	0.00	13.6	12.4	clear	N	3	ebbing

ROTARY POOL 2020 CONT.

Date	Debris		Vegetation		Turbidity (NTU)	pH	adults	children	# boats	swimming	walking	boating	fishing	# water fowl	# dogs	Sewage odor/presence	Notes
	shore	water	shore (%)	water (%)													
5/21	none	none	5	5	3.93	8.23	0	0	0	no	no	no	no	0	0	none	
5/27	none	none	5	5	5.33	8.27	3	0	0	0	3	0	0	2	2	none	
6/3	none	none	5	0	2.61	8.28	0	0	0	0	0	0	0	4 geese, Canadian	0	none	
6/9	none	none	10	10	1.54	8.27	0	0	0	0	0	0	0	0	0	none	
6/17	hot dog bun bag	-	10	0	7.81	8.10	0	0	0	0	0	0	0	0	0	-	
6/22			5	5	2.75	8.35	0	0	0	0	0	0	0	0	0	None	
7/3			5	5	3.48	8.04	4				4						
7/6			5	5	2.38	8.09						0	0				
7/13	-	-	5	15	3.21	8.25	8	3	0	0	11	0	0	0	6	-	Bacteria film on surface, not oily
7/22	fire from night before		5	5	1.51	7.99	0	0	0	0	0	0	0	1	0		
7/27	Wood	Wood	1	1	1.78	8.09	6	13	0	13	6	0	0	0	2	-	
8/4	broken plastic bin	-	2	2	2.72	7.69	0	0	0	0	0	0	0	0	0		
8/11	Metal soda can	-	0	0	2.76	8.18	6	3	0	0	9	0	0	0	0	-	
8/18	-	-	2	5	2.71	7.64	0	0	0	0	0	0	0	0	0	-	
8/25	-	-	1	10	2.62	8.06	0	0	0	0	0	0	0	0	0	-	
9/1	-	-	1	0	5.04	7.72	0	0	0	0	0	0	0	1	0	-	
9/9			5	10	7.62	8.10	4	9	0	4	9	0	0	0	0		1 adult and 4 children at picnic table. 1 adult lounging with 1 baby in carrier (baby was not included in number of people). 2 adults and 2 children arriving at beach as we left (not included in count)
9/17			0	0	1.94	7.84			0	0	0	0	0	0	0		

SEAPORT 2020

Sample Location	Sample Date	Year	Sample Time	Fecal cfu/100 ml	Entero MPN/100 ml	Rainfall			air temp	marine water temp	weather	Wind		tidal phase - based on time
						<24 hr	<48 hr	<72 hr				Direction	Speed (mph)	
Seaport	5/21	2020	6:50	48	10	0.05	0.23	0.23	11.2	11.3	cloudy, overcast	NW	calm	ebb
Seaport	5/27	2020	8:56	5	<10	0.00	0.14	0.41	10.9	11.7	Mostly cloudy	NW	0	ebbing
Seaport	6/3	2020	7:44	11	<10	0.42	2.71	3.14	13.9	10.7	rain	SE	10	flooding
Seaport	6/9	2020	8:14	<10	10	0.02	0.12	0.12	13.7	12.4	Overcast	NE	6	ebbing
Seaport	6/17	2020	7:38	6	<10	0.00	0.00	0.00	18.4	13.0	partly cloudy	E	4	flooding
Seaport	6/22	2020	6:36	5	20	0.07	0.14	0.21	11.5	12.5	light rain	E	8	ebbing
Seaport	7/3	2020	6:03	6	<10	0.03	0.12	0.12	15.2	12.8	Cloudy	E	1	ebbing
Seaport	7/6	2020	6:48	7	<10	0.04	0.04	0.04	15.4	13.2	Cloudy	NW	2	ebbing
Seaport	7/13	2020	12:20	10	10	0	0.02	0.74	16.3	14.4	cloudy	S	5	ebbing
Seaport	7/22	2020	7:07	15	10	0.00	0.69	1.50	14.7	14.0	mostly cloudy	NW	4	ebbing
Seaport	7/27	2020	11:30	16	<10	0.63	1.93	1.98	15.4	15.3	Partly Cloudy	NW	6	ebbing
Seaport	8/4	2020	6:47	152	155	3.95	4.34	4.74	13.8	14.1	Rainy	SE	11	ebbing
Seaport	8/11	2020	11:18	10	<10	0.07	0.39	1.03	16.0	15.5	Cloudy	NW	5	ebbing
Seaport	8/18	2020	5:29	36	10	0.69	1.53	3.42	15.3	12.2	rain	NW	3	ebbing
Seaport	8/25	2020	11:51	8	10	0.48	0.78	2.12	14.2	13.4	light rain	SW	7	ebbing
Seaport	9/1	2020	7:07	12	31	0.43	0.97	1.28	14.4	13.2	cloudy	S	5	ebbing
Seaport	9/9	2020	10:40	4	20	0.00	0.00	0.00	19.3	15.3	sunny	NW	5	ebbing
Seaport	9/17	2020	9:24	6	<10	0.00	0.00	0.00	15.0	14.1	clear	NE	0	ebbing

SEAPORT 2020 CONT.

Date	Debris		Vegetation		Turbidity (NTU)	pH	adults	children	# boats	swimming	walking	boating	fishing	# water fowl	# dogs	Sewage odor/presence	Notes
	shore	water	shore (%)	water (%)													
5/21	none	none	30	30	2.19	8.30	0	0	0	no	no	no	no	1 seagull	0	none	One harbor seal
5/27	none	none	35	35	2.44	8.60	0	0	0	0	0	0	0	30	0	none	
6/3	none	none	30	30	0.80	8.31	0	0	0	0	0	0	0	0	0	none	
6/9	none	none	50	50	1.22	8.44	0	0	0	0	0	0	0	0	0	none	
6/17	tire, half of it underground	-	10	70	2.45	8.32	0	0	1 passing by	0	0	1	0	0	0	-	by creek outflow
6/22	two tires		40	40	1.93	8.38	0	0	0	0	0	0	0	0	0	None	
7/3			30	30	0.63	8.31											
7/6			40	20	2.48	8.28			2			0	0				
7/13	tire, half buried	-	50	50	1.33	8.33	0	0	0	0	0	0	0	0	0	-	Handheld wouldn't turn on, had to go to office. Problem was resolved
7/22			30	30	0.47	8.27	0	0	0	0	0	0	0	25	0		
7/27	Tire	-	45	35	1.17	8.54	0	0	2	0	0	0	0	1	0	-	
8/4	rusty metal pieces	-	60	40	5.14	8.03	0	0	0	0	0	0	0	14	0		
8/11	Large piece of metal that is always there.	-	50	80	0.65	8.26	0	0	0	0	0	0	0	0	0	-	
8/18	large metal things (see pictures)	-	40	30	1.08	7.73	1	0	1	0	0	1	0	20 seagulls	0	-	
8/25	Tire and meal frames	-	90	70	1.41	7.89	0	0	0	0	0	0	0	15	0	-	
9/1	plastic piece, tire, metal column	-	50	30	0.89	8.01	0	0	2 passed by	0	0	0	0	70 seagulls, 4 geese	0	-	
9/9	2 tires		50	70	0.64	7.89	0	0	0	0	0	0	0	~70 seagulls	0		Bird count is an estimate, they were close together and

																hard to count. Water was calm, so wave height is an estimate.
9/17	tire		50	10	0.99	8.17	tire		50	10	0	0	0	64	0	decaying animal	Gate was closed, so we had to come back

SHULL 2020

Sample Location	Sample Date	Year	Sample Time	Fecal cfu/100 ml	Entero MPN/100 ml	Rainfall			air temp	marine water temp	weather	Wind		tidal phase - based on time
						<24 hr	<48 hr	<72 hr				Direction	Speed (mph)	
Shull	5/21	2020	5:50	8	10	0.05	0.23	0.23	10.7	9.5	cloudy, overcast	NW	10	ebb
Shull	5/27	2020	10:10	24	<10	0.00	0.14	0.41	11.4	10.4	Mostly cloudy	NW	10 mph	ebbing
Shull	6/3	2020	4:25	51	10	0.42	2.71	3.14	8.9	8.1	overcast	N/A	0	ebbing
Shull	6/9	2020	9:28	20	<10	0.02	0.12	0.12	15.4	11.7	Overcast	E	5	ebbing
Shull	6/17	2020	4:17	46	20	0.00	0.00	0.00	12.2	10.4	mostly cloudy	SE	5	ebbing
Shull	6/22	2020	7:49	2001 (CG)	96	0.07	0.14	0.21	12.6	10.2	sprinkle	E	9	ebbing
Shull	7/3	2020	4:42	4	<10	0.03	0.12	0.12	14.2	11.6	Cloudy	SE	3	ebbing
Shull	7/6	2020	8:28	12	10	0.04	0.04	0.04	14.8	12.3	Cloudy	N	1	flooding
Shull	7/13	2020	11:04	3	<10	0	0.02	0.74	14.4	13.4	cloudy	SW	3	ebbing
Shull	7/22	2020	8:39	18	<10	0.00	0.69	1.50	15.4	12.4	mostly cloudy	W	4	flooding
Shull	7/27	2020	10:22	14	20	0.63	1.93	1.98	16.1	13.8	Partly Cloudy	W	5	ebbing
Shull	8/4	2020	8:31	194	40	3.95	4.34	4.74	13.5	13.0	Rainy	SE	13	flooding
Shull	8/11	2020	9:59	8	<10	0.07	0.39	1.03	13.7	13.5	Partly cloudy	W	5	ebbing
Shull	8/18	2020	6:45	224	160	0.69	1.53	3.42	14.4	12.7	Cloudy	SW	5	ebbing
Shull	8/25	2020	10:09	64	<10	0.48	0.78	2.12	13.8	13.2	overcast	SE	6	ebbing
Shull	9/1	2020	8:34	122	10	0.43	0.97	1.28	13.3	10.9	light rain	S	7	flooding
Shull	9/9	2020	9:06	78	30	0.00	0.00	0.00	17.6	14.8	mostly sunny	NW	5	ebbing
Shull	9/17	2020	7:54	32	<10	0.00	0.00	0.00	11.7	11.5	clear	N	2	flooding

SHULL 2020 CONT.

Date	Debris		Vegetation		Turbidity (NTU)	pH	adults	children	# boats	swimming	walking	boating	fishing	# water fowl	# dogs	Sewage odor/presence	Notes
	shore	water	shore (%)	water (%)													
5/21	none	none	2	2	4.81	8.2	0	0	0	no	no	no	no	6 ravens, 3 seagulls	0	none	Creek outflow
5/27	none	none	2	2	4.38	8.5	1	0	0	0	1	0	0	0	0	none	1 harbor seal
6/3	Tire	none	5	15	3.71	7.9	0	0	0	0	0	0	0	0	0	none	2 harbor seals
6/9	none	none	5	5	1.53	8.6	1	0	0	0	1	0	0	0	0	none	
6/17	-	-	5	10	3.37	8.02	0	0	0	0	0	0	0	0	0	-	by creek outflow
6/22			< 5	< 5	12.87	8.3	0	0	0	0	0	0	0	0	0	None	creek outflow
7/3	log		5	5	1.04	8.2											
7/6			1	1	0.75	8.6	1				1	0	0				five crab pots in water
7/13	-	-	35	35	0.49	8.30	0	0	0	0	0	0	0	0	0	-	
7/22			1	1	0.81	8.3	0	0	0	0	0	0	0	0	0		
7/27	Rope, wood	-	10	1	0.78	8.1	0	0	0	0	0	0	0	0	0	-	slight rust color, dog poop just before beach on hill
8/4	small metal pieces	-	25	25	6.16	8	0	0	0	0	0	0	0	18	0		dog poop above beach
8/11	Some kind of tube and plastic? See pictures.	-	10	0	0.73	8	2	0	0	0	2	0	0	8	1	-	Fresh dog poop near entrance to beach
8/18	Plastic	Crushed beer can and	15	10	5.40	7.6	0	0	0	0	0	0	0	50 seagulls, 12 geese	0	-	

		a metal grate														
8/25	-	-	1	0	0.99	7.89	0	0	0	0	0	0	0	85	0	-	Waves of different heights, recorded highest wave
9/1	metal	-	25	5	3.96	8	0	0	0	0	0	0	0	100 gulls	0	-	
9/9			10	35	2.90	7.87	0	0	1 passing	0	0	0	0	68 seagulls	0		Murky water
9/17	trash		5	0	1.05	8.20	trash		5	0	0	0	0	110	0	smoke	Trash from picture is likely from a bear

SOUTH POINT HIGGINS 2020

Sample Location	Sample Date	Year	Sample Time	Fecal cfu/100 ml	Entero MPN/100 ml	Rainfall			air temp	marine water temp	weather	Wind		tidal phase - based on time
						<24 hr	<48 hr	<72 hr				Direction	Speed (mph)	
SP Higgins	5/21	2020	5:35	53	51	0.05	0.23	0.23	10.6	11.4	cloudy, overcast	NW	10	ebb
SP Higgins	5/27	2020	10:25	8	10	0.00	0.14	0.41	11.8	11.2	Mostly cloudy	NW	0	ebbing
SP Higgins	6/3	2020	4:05	109	160	0.42	2.71	3.14	9.9	10.5	overcast	SE	2	ebbing
SP Higgins	6/9	2020	9:50	16	74	0.02	0.12	0.12	15.3	12.2	Overcast	E	6	ebbing
SP Higgins	6/17	2020	3:58	32	332	0.00	0.00	0.00	14.0	12.9	mostly cloudy	SE	4	ebbing
SP Higgins	6/22	2020	8:09	343	20	0.07	0.14	0.21	12.9	12.1	sprinkle	E	9	ebbing
SP Higgins	7/3	2020	4:25	122	75	0.03	0.12	0.12	13.9	13.0	Cloudy	SE	3	ebbing
SP Higgins	7/6	2020	8:46	34	<10	0.04	0.04	0.04	14.1	13.6	Cloudy	SW	1	flooding
SP Higgins	7/13	2020	10:45	<1	<10	0	0.02	0.74	16.9	13.8	cloudy	S	8	ebbing
SP Higgins	7/22	2020	8:59	437	2235	0.00	0.69	1.50	16.8	14.1	mostly cloudy	W	3	flooding
SP Higgins	7/27	2020	10:05	14	<10	0.63	1.93	1.98	18.3	14.5	Partly Cloudy	W	5	ebbing
SP Higgins	8/4	2020	8:52	62	92	3.95	4.34	4.74	13.7	14.1	Rainy	SE	14	flooding
SP Higgins	8/11	2020	9:40	6	<10	0.07	0.39	1.03	15.0	13.5	Cloudy	W	5	ebbing
SP Higgins	8/18	2020	7:06	154	63	0.69	1.53	3.42	14.4	13.8	Cloudy	SW	5	flooding
SP Higgins	8/25	2020	9:44	8	<10	0.48	0.78	2.12	15.3	13.6	overcast	SE	6	ebbing
SP Higgins	9/1	2020	8:53	56	<10	0.43	0.97	1.28	13.4	13.2	light rain	S	10	flooding
SP Higgins	9/9	2020	8:45	74	10	0.00	0.00	0.00	16.8	14.5	cloudy	NW	5	ebbing
SP Higgins	9/17	2020	8:16	18	10	0.00	0.00	0.00	12.9	12.9	clear	N	2	flooding

SOUTH POINT HIGGINS 2020 CONT.

Date	Debris		Vegetation		Turbidity (NTU)	pH	adults	children	# boats	swimming	walking	boating	fishing	# water fowl	# dogs	Sewage odor/presence	Notes
	shore	water	shore (%)	water (%)													
5/21	none	none	20	20	6.35	8.4	0	0	0	no	no	no	no	0	0	none	
5/27	none	none	40	40	2.99	8.4	1	2	0	0	3	0	0	1	0	none	
6/3	none	none	40	40	1.65	8.3	0	0	0	0	0	0	0	0	0	none	1 harbor seal
6/9	none	none	25	25	1.95	8.3	0	0	0	0	0	0	0	0	0	none	1 harbor seal
6/17	-	-	30	25	1.87	8.37	0	0	0	0	0	0	0	1	0	-	
6/22			30	30	2.93	8.3	0	0	0	0	0	0	0	0	0	None	smoldering fire on beach
7/3			60	60	0.88	8.3											
7/6		beer can	40	25	0.51	8.3	3	2			5	0	0				smoldering fire
7/13	-	-	18	5	1.12	8.2	0	0	0	0	0	0	0	0	0	-	
7/22			10	10	0.96	8.2	11	5	0	2	14	0	0	0	0		
7/27	-	-	20	20	1.05	8.1	2	2	0	0	4	0	0	0	0	-	rust color
8/4	-	-	40	30	4.66	8.00	1	2	0	0	3	0	0	0	0		tall waves
8/11	-	-	5	5	0.77	7.8	0	0	0	0	0	0	0	0	0	-	A lot of trash (cardboard from various food items) on edge of beach by firepit.
8/18	-	-	15	15	0.96	7.73	2	0	0	0	2	0	0	0	1	-	
8/25	-	-	5	0	0.43	7.90	0	2	0	0	2	0	0	3	3	-	Local told us that a green house has raw seage outflow pipe
9/1	-	-	25	20	0.73	8	0	0	0	0	0	0	0	3	0	-	
9/9			10	0	0.88	7.81	7	0	1 passing	0	1	0	0	0	3		
9/17			10	0	1.73	8.1			10	0	0	0	0	0	0		

SUNSET BEACH 2020

Sample Location	Sample Date	Year	Sample Time	Fecal cfu/100 ml	Entero MPN/100 ml	Rainfall			air temp	marine water temp	weather	Wind		tidal phase - based on time
						<24 hr	<48 hr	<72 hr				Direction	Speed (mph)	
Sunset	5/21	2020	6:02	18	94	0.05	0.23	0.23	10.0	10.8	cloudy, overcast	NW	10	ebb
Sunset	5/27	2020	9:50	31	83	0.00	0.14	0.41	10.4	11.4	Mostly cloudy	NW	10 mph	ebbing
Sunset	6/3	2020	4:42	23	30	0.42	2.71	3.14	10.3	10.3	overcast	N/A	0	ebbing
Sunset	6/9	2020	9:14	21	231	0.02	0.12	0.12	14.1	12.5	Overcast	E	5	ebbing
Sunset	6/17	2020	4:31	8	10	0.00	0.00	0.00	12.5	12.8	cloudy	E	5	ebbing
Sunset	6/22	2020	7:30	12	20	0.07	0.14	0.21	11.6	12.2	sprinkle	E	8	ebbing
Sunset	7/3	2020	5:02	41	<10	0.03	0.12	0.12	15.4	12.4	Cloudy	SE	2	ebbing
Sunset	7/6	2020	8:05	18	20	0.04	0.04	0.04	14.6	13.5	Cloudy	N	1	ebbing
Sunset	7/13	2020	11:21	7	10	0	0.02	0.74	15.1	13.5	cloudy	SE	5	ebbing
Sunset	7/22	2020	8:18	68	20	0.00	0.69	1.50	15.6	14.1	mostly cloudy	W	1	ebbing
Sunset	7/27	2020	10:34	20	10	0.63	1.93	1.98	15.5	14.0	Partly Cloudy	W	5	ebbing
Sunset	8/4	2020	8:03	210	41	3.95	4.34	4.74	14.1	14.2	Rainy	SE	13	ebbing
Sunset	8/11	2020	10:17	12	<10	0.07	0.39	1.03	14.0	14.2	Cloudy	W	5	ebbing
Sunset	8/18	2020	6:24	300	10	0.69	1.53	3.42	14.5	14.4	Cloudy	SW	4	ebbing
Sunset	8/25	2020	10:32	14	10	0.48	0.78	2.12	14.4	13.4	overcast	SE	6	ebbing
Sunset	9/1	2020	8:12	40	<10	0.43	0.97	1.28	14.1	13.2	light rain	S	6	flooding
Sunset	9/9	2020	9:23	<2	10	0.00	0.00	0.00	16.3	15.0	mostly cloudy	NW	6	ebbing
Sunset	9/17	2020	7:26	24	<10	0.00	0.00	0.00	13.4	12.8	clear	N	2	flooding

SUNSET BEACH 2020 CONT.

Date	Debris		Vegetation		Turbidity (NTU)	pH	adults	children	# boats	swimming	walking	boating	fishing	# water fowl	# dogs	Sewage odor/presence	Notes
	shore	water	shore (%)	water (%)													
5/21	none	fun sized twix wrapper	60	60	19.6	8.32	0	0	0	no	no	no	no	2	0	none	
5/27	none	none	90	90	35.4	8.53	0	0	0	0	0	0	0	0	0	none	
6/3	paint can, more inland	none	40	40	0.97	8.33	0	0	0	0	0	0	0	0	0	none	
6/9	none	none	50	50	2.24	8.44	0	0	0	0	0	0	0	0	0	none	
6/17	top of beer bottle	-	40	40	1.44	8.39	0	0	0	0	0	0	0	0	0	-	
6/22	1 tire		35	35	2.08	8.37	0	0	1	0	0	0	0	0	0	None	1 barge
7/3			60	40	2.51	8.29											
7/6			65	25	1.83	8.35	4	3			7	0	0		3		oily film
7/13	-	-	20	20	0.67	8.25	5	2	0	0	7	0	0	0	0	-	
7/22			55	45	6.82	8.28	0	0	0	0	0	0	0	0	0		
7/27	Wooden plank	-	30	50	1.43	8.17	0	0	0	0	0	0	0	0	0	-	
8/4	-	-	40	40	13.10	7.97	0	0	0	0	0	0	0	0	0		
8/11	-	-	20	10	1.93	7.95	1	0	0	0	1	0	0	0	0	-	
8/18	-	-	20	5	7.02	7.89	0	0	0	0	0	0	0	0	0	-	
8/25	Piece of wood	-	40	1	1.34	7.96	0	0	0	0	0	0	0	1	0	-	
9/1	-	-	25	5	1.81	8.62	4	0	0	0	4	0	0	1	4	-	
9/9			30	5	0.83	7.91	2	0	0	0	2	0	0	0	2		
9/17			50	60	1.78	8.06			50	60	0	0	0	5	0	smoke	

THOMAS BASIN 2020

Sample Location	Sample Date	Year	Sample Time	Fecal cfu/100 ml	Entero MPN/100 ml	Rainfall			air temp	marine water temp	weather	Wind		tidal phase - based on time
						<24 hr	<48 hr	<72 hr				Direction	Speed (mph)	
Thomas Basin	5/21	2020	6:37	30	31	0.05	0.23	0.23	11.7	8.7	cloudy, overcast	NW	calm	ebb
Thomas Basin	5/27	2020	9:16	16	10	0.00	0.14	0.41	9.8	14.3	Mostly cloudy	NW	0	ebbing
Thomas Basin	6/3	2020	5:34	30	10	0.42	2.71	3.14	12.5	8.5	overcast	S	3	ebbing
Thomas Basin	6/9	2020	8:29	23	52	0.02	0.12	0.12	15.2	11.4	Overcast	SE	5	ebbing
Thomas Basin	6/17	2020	5:13	33	<10	0.00	0.00	0.00	14.7	11.9	partly cloudy	E	3	flooding
Thomas Basin	6/22	2020	6:51	96	106	0.07	0.14	0.21	11.8	11.3	light rain	E	8	ebbing
Thomas Basin	7/3	2020	5:43	28	<10	0.03	0.12	0.12	15.6	12.3	Cloudy	NE	1	ebbing
Thomas Basin	7/6	2020	7:20	21	20	0.04	0.04	0.04	16.7	12.8	Cloudy	NW	1	ebbing
Thomas Basin	7/13	2020	12:03	168	41	0	0.02	0.74	17.7	13.5	cloudy	SE	4	ebbing
Thomas Basin	7/22	2020	7:34	19	<10	0.00	0.69	1.50	16.2	12.7	mostly cloudy	NW	4	ebbing
Thomas Basin	7/27	2020	11:13	55	52	0.63	1.93	1.98	19.2	13.6	Partly Cloudy	W	6	ebbing
Thomas Basin	8/4	2020	7:14	324	620	3.95	4.34	4.74	14.4	13.1	Rainy	SE	8	ebbing
Thomas Basin	8/11	2020	10:57	26	10	0.07	0.39	1.03	16.8	13.9	Cloudy	NW	4	ebbing
Thomas Basin	8/18	2020	5:49	190	241	0.69	1.53	3.42	15.5	12.6	rain	W	3	ebbing
Thomas Basin	8/25	2020	11:26	166	41	0.48	0.78	2.12	14.5	12.9	overcast/light rain	SE	4	ebbing
Thomas Basin	9/1	2020	7:30	260	63	0.43	0.97	1.28	14.9	12.2	rain	S	6	flooding
Thomas Basin	9/9	2020	10:18	42	<10	0.00	0.00	0.00	18.9	15.3	sunny	NW	5	ebbing
Thomas Basin	9/17	2020	6:36, FR 6:42	166	20	0.00	0.00	0.00	14.8	13.2	clear	N	3	ebbing

THOMAS BASIN 2020 CONT.

Date	Debris		Vegetation		Turbidity (NTU)	pH	adults	children	# boats	swimming	walking	boating	fishing	# water fowl	# dogs	Sewage odor/presence	Notes
	shore	water	shore (%)	water (%)													
5/21	none	sock	30	30	2.80	8.2	0	0	40	no	no	no	no	1 bird	0	none	One harbor seal
5/27	none	none	40	10	2.65	8.31	1	0	100	0	1	0	0	0	0	none	
6/3	none	oily film, scattered	30	30	0.89	8.2	0	0	~100	0	0	0	0	0	0	none	
6/9	none	cigarette end	70	70	0.96	8.35	0	0	~100	0	0	0	0	0	0	none	
6/17	-	-	60	20	1.63	8.25	0	0	100	0	0	0	0	0	0	-	by creek outflow
6/22		oil	50	5	2.77	8.38	0	0	100	0	0	0	0	0	0	none	creek outflow, lots of oil
7/3	traffic cone		30	3	0.60	8.2			40								
7/6			35	35	0.48	8.11			100			0	0				
7/13	-	plastic or paper bag	70	70	1.06	8.1	3	0	100	0	2	0	1	0	0	-	small oil film
7/22	Traffic cone, wood		30	20	0.75	7.9	0	0	0	0	0	0	0	0	0		Two narrow streaks of oil, about a 1' to 1.5' in length
7/27	Wood	-	30	30	2.44	8	0	0	1	0	0	0	0	0	0	-	
8/4	green netting	-	10	5	2.25	7.75	4	4	100	0	0	4	0	0	0		little bit of oil, about two sheens of oil size of finger
8/11	Plastic and cloth. See pictures.	-	40	20	1.34	7.8	8	0	100	0	0	5	3	2	1	-	
8/18	Plastic	-	40	20	1.75	7.31	0	0	100	0	0	0	0	7	0	-	

8/25	Plastic	Dead fish, oil	60	10	1.32	7.85	5	4	~100	0	0	0	9	2	1	-	Only 3 people with fishing poles, but everyone was counted as fishing
9/1	dead fish, net	dead fish, oil sheen	30	0	2.45	8.30	0	0	100	0	0	0	0	40	0	dead fish, farm like smell	"it smells like a barn" (in other words) it smells like animal feces
9/9		oil sheen	85	20	1.06	7.70	7	0	100	0	7	0	0	13 gulls	0	dead fish	
9/17	dead fish	dead fish	30	0	0.84	7.64	dead fish	dead fish	30	0	0	0	0	18	0	dead fish	

KNUDSON COVE 2019

Sample Date/Time	Fecal Coliform (cfu/100 ml)	Entero-cocci (MPN/100 ml)	MST results	Rainfall (inches)			Temperature (°C)		Weather	Direction	Speed (mph)	Tidal phase
				<24 hr	<48 hr	<72 hr	Air	Marine Water				
5/15 4:12 AM	5 (4)	<10 (<10)		0.02	0.02	0.02	13.8	11.3	overcast	NW	5	low
5/22 4:12 AM	3	<10		0.2	0.2	0.2	13.8	11.3	overcast	NW	5	high
5/29 5:47 AM	20	<10		0	0	0	16.6	15.8	sunny and clear			low
6/5 10:50 AM	2	31		0.5	0.36	0.42	12.8	12.8	overcast/misting	NA	0	low
6/11 11:30 AM	58	52		0.5	0.7	0.7	16.4	15.8	rain			ebb
6/19 8:36 AM	14	10		0.24	0.76	0.96	14.5	15.3				low
6/25 9:55 AM	23	41		0	0.4	0.67	18	16.3	sunny and overcast	SE	3	ebb
7/2 7:11 AM	239	121		0	0	0	17.2	17.7	overcast	NA	0	low
7/10 11:00 AM	3	<10		0.02	0.02	0.02	25	15.6		NA	0	ebb
7/17 8:03 AM	194	369		0.38	0.47	0.47	15.1	17.6	light rain			low
7/23 9:14 AM	4	<10		0	0	0	14	13	slight rain with wind and lightning	NA	0	ebb
7/29 6:14 AM	46	<10	human = 9.18e+2; dog = DNQ; gull = ND	0.31	0.44	1.25	15	16.6	rain	NA	0	low
8/7 11:34 AM	3 (1)	<10 (<10)		0	0	0	17.5	19.1	sunny and clear		slight/weak	low
8/13 7:22 AM	125	84		0	0	0.2	14.3	17.8	sunny	NA	0	low
8/21 7:57 AM	456	309		3.19	3.19	3.66	16.2	15.9	rain	NA	0	ebb
9/4 7:53 AM	66	20		0.63	0.63	0.63	14.4	15.6	sunny and clear	NA	0	ebb
9/10 5:57 AM	44	<10		0	0	0	12.2	15.4	clear	NA	0	low
9/18 6:41 AM	12	121		0.31	0.79	0.79	9.7	13.4	sunny and clear	NA	0	ebb

Knudson Cove 2019

Sample Date/Time	Debris (%)		Vegetation (%)		Visual Turbidity	# adults	# children	# boats	# swimming	# walking	# boating	# fishing	# water fowl	# dogs	other	Sewage odor/ presence	Notes
	On shore	In water	On shore	In water													
5/15 4:12 AM	0	0	15	20									2			None	no sewage odor present
5/22 4:12 AM	N	N	15	20	other	0	0	0	0	0	0		2			No	
5/29 5:47 AM					clear												
6/5 10:50 AM					clear	8				Y		Y				none	tourist boating, marina employees, fishermen, boaters, no water contact.
6/11 11:30 AM	some				clear	0	0	10			parked						Outfall
6/19 8:36 AM					clear			lots				Y					common collector pipe is visible
6/25 9:55 AM	0	0	15	10	clear	30+		25 (harbor)		Y	Y	X	5	2			outcrop divides beach end of pipe is not in sight; 13 kayaks
7/2 7:11 AM	5	0	40	10	cloudy/ murky	15+	0	Harbor	0	0	15+			0	3 eagles, 2 ravens, 10+ songbirds	none	pipe passes by sample location; end is exposed; shore was sludge like, beach grass is dominant, starfish
7/10 11:00 AM			15		cloudy/ murky			boat harbor									tourists present; sanitary water pipe ends at -2' tide
7/17 8:03 AM					clear								1			common collector outflow pipe end visible	
7/23 9:14 AM	0	0	0	0	cloudy/ murky	3	0	0					0	0	0	none	common collector pipe outfall present; bathrooms at marina; bloom-like green material on water's edge
7/29 6:14 AM			3-4	0	clear	0	0	4	0	0	0	0	3				some dog poop in parking lot;
8/7 11:34 AM	2	2	30	10	clear	0	0	many - marina					0	0	1 sea lion		
8/13 7:22 AM	0	0	15	20	cloudy/ murky	0	0	many - marina	0	0	2	0	0	0	0	none	one common collector pipe
8/21 7:57 AM	2	0	15	15	cloudy/ murky	0	0	3	0	0	0	0	0	0	0	mystery brown water?	bathrooms nearby; extremely turbid brown water, stormwater pipes or other flow present on beach
9/4 7:53 AM	10	10	15	15	other	0	0	3	0	0	0	0	0	1	0	none	bathrooms nearby; 1 sewage outfall pipe
9/10 5:57 AM	5	0	0	0	cloudy/ murky	0	0	0	0	0	0	0	3	0	0	none	bathrooms nearby, one collector pipe
9/18 6:41 AM	10	0	15	15	cloudy/ murky	0	0	0	0	0	0	0	0	0	0	slight	bathrooms nearby; 1 outflow

SOUTH POINT HIGGINS 2019

Sample Date/Time	Fecal Coliform (cfu/100 ml)	Entero-cocci (MPN/100 ml)	MST results	Rainfall (inches)			Temperature (°C)		Weather	Direction	Speed (mph)	Tidal phase
				<24 hr	<48 hr	<72 hr	Air	Marine Water				
5/15 4:40 AM	52	<10		0.02	0.02	0.02	12.2	10.2	rain	NW	5	low
5/22 4:40 AM	7 (8)	<10 (<10)		0.2	0.2	0.2	12.2	10.2	rain	NW	5	high
5/29 5:33 AM	12	<10		0	0	0	16.5	15.7	sunny and clear			low
6/5 11:20 AM	25	<10		0.5	0.36	0.42	13.3	12.2	overcast			flood
6/11 11:45 AM	181	130		0.5	0.7	0.7	15.1	14.4	rain			ebb
6/19 8:23 AM	76	10		0.24	0.76	0.96	14.7	15.1				low
6/25 10:25 AM	16	10		0	0.4	0.67	14.5	14.7	sunny and clear			ebb
7/2 6:50 AM	68	97		0	0	0	15.1	15.2	overcast	S	2	low
7/10 11:25 AM	6	<10		0.02	0.02	0.02	18.2	16.3		NA	0	ebb
7/17 7:41 AM	66	20		0.38	0.47	0.47	14.7	14.7	light rain			low
7/23 9:26 AM	10	<10		0	0	0	13	11.4	slight rain with wind and lightning	E	2-3	low
7/29 5:57 AM	160	10		0.31	0.44	1.25	16.6	12.7	rain	NA	0	low
8/7 11:54 AM	7	<10		0	0	0	16	17.5	sunny and clear		light/med	low
8/13 7:05 AM	43 (55)	10 (10)		0	0	0.2	14.1	15.4	sunny	NA	0	low
8/21 8:11 AM	176	74		3.19	3.19	3.66	14.3	15.2	rain	N	2-3	ebb
9/4 8:08 AM	27	10		0.63	0.63	0.63	13	14	sunny and clear		1-2	ebb
9/10 5:40 AM	187	10	human = DNQ; dog = ND; gull = DNQ	0	0	0	13.2	13	clear	NA	0	low
9/18 6:53 AM	12	63		0.31	0.79	0.79	9.2	1.8	sunny and clear	NA	0	ebb

South Point Higgins 2019

Sample Date/Time	Debris (%)		Vegetation (%)		visual turbidity	# adults	# children	# boats	# swimming	# walking	# boating	# fishing	# water fowl	# dogs	other	Sewage odor/ presence	Notes
	On shore	In water	On shore	In water													
5/15 4:40 AM	0	0	15	10	cloudy/ murky												
5/22 4:40 AM	N	N	15	10	cloudy/ murky	0	0	0	0	0	0		0	0			
5/29 5:33 AM					clear												
6/5 11:20 AM					clear	2				2				1		none	large school of bait fish (see picture) in cove; discussion w/ 2 women about project
6/11 11:45 AM					cloudy/ murky	0	0	0	0	0	0						
6/19 8:23 AM					clear			5									
6/25 10:25 AM	0	0	5	5	clear	1					9			1			
7/2 6:50 AM	0	0	25	5	clear	0	0	5	0	0	0			0	eagles	0	small chop. Lots of tide pool activity. Many cucibs, many starfish, warm sustained wind.
7/10 11:25 AM					cloudy/ murky	4											noticeable turbidity near shore, weird algae clustered near shore
7/17 7:41 AM					clear			2									
7/23 9:26 AM	0	0	15	0	clear	1	0	0					0	1	0	none	dog poop on the beach; more unidentified algae bloom on shoreline; some wood debris/fire leaving
7/29 5:57 AM	clean		3	7	clear	0	0	0	0	0	0	0	0	0	0	none	state ferry in distance
8/7 11:54 AM	0	0	20	5	clear	0	0						0	0	0		boats present?
8/13 7:05 AM	11	0	10	7		0	0	0	0	0	0	0	0	0	0	none	
8/21 8:11 AM	2	0	15	15	other	0	0	0	0	0	0	0	0	0	0	none	
9/4 8:08 AM	0	0	0	10	cloudy/ murky	0	0	0	0	0	0	0	0	1	0	none	water has unusual smell. Not sewage, not ocean-y
9/10 5:40 AM	0	0	10	15	clear	0	0	0	0	0	0	0	0	0	0	none	
9/18 6:53 AM	0	0	10	10	clear	0	0	1	0	0	0	0	0	0	0	none	whales offshore

SHULL 2019

Sample Date/Time	Fecal Coliform (cfu/100 ml)	Entero-cocci (MPN/100 ml)	MST results	Rainfall (inches)			Temperature (°C)		Weather	Direction	Speed (mph)	Tidal phase
				<24 hr	<48 hr	<72 hr	Air	Marine Water				
5/15 9:05 AM	3	<10		0.02	0.02	0.02	18.1	10.7	overcast			high
5/22 9:05 AM	13	20		0.2	0.2	0.2	18.1	10.7	overcast			low
5/29 5:21 AM	3 (2)	<10 (<10)		0	0	0	16.7	15.4	sunny and clear			low
6/5 11:48 AM	15	<10		0.5	0.36	0.42	12.8	12.4	overcast	SW		flood
6/11 12:00 PM	276	199		0.5	0.7	0.7	15.3	13.8	rain			ebb
6/19 8:11 AM	34	<10		0.24	0.76	0.96	14.4	15.2				low
6/25 10:44 AM	15	<10		0	0.4	0.67	14.5	14.4	sunny and overcast	SE	8	ebb
7/2 6:35 AM	37	52		0	0	0	15.4	14.9	overcast	S	3	low
7/10 11:35 AM	12	<10		0.02	0.02	0.02	17.8	15.9		W	5	ebb
7/17 7:24 AM	116	108		0.38	0.47	0.47	13.4	13.1	light rain			low
7/23 9:32 AM	16	<10		0	0	0	17.2	12.4	slight rain with wind and lightning	NA	0	low
7/29 5:46 AM	41	20		0.31	0.44	1.25	16.9	12.7	rain	NA	0	low
8/7 12:10 PM	19	10		0	0	0	16.3	16.9	sunny and clear		light	low
8/13 6:51 AM	15	10		0	0	0.2	13.5	15.1	sunny	NA	0	low
8/21 8:24 AM	Confluent Growth (2001)	386 (379)		3.19	3.19	3.66	14.5	12.2	rain	NA	0	ebb
9/4 8:22 AM	53	<10		0.63	0.63	0.63	14.6	13.7	sunny and clear	NA	0	ebb
9/10 5:25 AM	95	754	human = DNQ; dog = ND; gull = 3.60e+3	0	0	0	13.2	14.4	sunny and clear	NA	0	low
9/18 7:18 AM	19	20		0.31	0.79	0.79	13	12.8	sunny and clear	NA	0	low

Shull 2019

Sample Date/Time	Debris (%)		Vegetation (%)		visual turbidity	# adults	# children	# boats	# swimming	# walking	# boating	# fishing	# water fowl	# dogs	other	Sewage odor/ presence	Notes
	On shore	In water	On shore	In water													
5/15 9:05 AM			5	0	clear								3				
5/22 9:05 AM			15	0	clear												
5/29 5:21 AM					clear												
6/5 11:48 AM					clear	1				1			0	0	0	none	
6/11 12:00 PM					other	0	0								1 seal		water color was orange/red
6/19 8:11 AM					clear												rusty orange water color
6/25 10:44 AM			15	10									2				
7/2 6:35 AM	1	0	10	5	cloudy/ murky	0	0	0	0	0	0		0	0		none	small chop. Warm wind coming from the south. Flow stream w/ good flow.
7/10 11:35 AM					clear			2									fresh water from nearby stream to consider
7/17 7:24 AM					cloudy/ murky												reddish brown water, cloudy; many shells are similar rust color as the water
7/23 9:32 AM	0	0	0	0	cloudy/ murky	0	0	0					0	0	0	none	lots of rusty debris on shore; shallow, turbid water; rougher waves than usual
7/29 5:46 AM	some trash		0	0	cloudy/ murky	0	0	0	0	0	0	0	3	0		none	water is rusty, orange, cloudy; much more freshwater input from Whipple Creek than normal; "2-3 birds"
8/7 12:10 PM	2	0	0	0	clear	0	0						12				
8/13 6:51 AM	10	0	0	0	cloudy/ murky	0	0	2	0	0	1	0	6	0	0	none	
8/21 8:24 AM	0	0	5	10	cloudy/ murky	0	0	10	0	0	0	0	20	0	0	none	Whipple Creek flowing a lot
9/4 8:22 AM	10	0	0	0	cloudy/ murky	0	0	1	0	0	0	0	25	0	0	none	
9/10 5:25 AM	10	0	0	0	clear	0	0	0	0	0	0	0	0	0	0	none	
9/18 7:18 AM	15	0	0	0	clear	0	0	0	0	0	0	0	20	0	0	none	

SUNSET 2019

Sample Date/Time	Fecal Coliform (cfu/100 ml)	Entero-cocci (MPN/100 ml)	MST results	Rainfall (inches)			Temperature (°C)		Weather	Direction	Speed (mph)	Tidal phase
				<24 hr	<48 hr	<72 hr	Air	Marine Water				
5/15 8:49 AM	17	10		0.02	0.02	0.02	16.9	16.8	overcast			flood
5/22 8:49 AM	15	<10		0.2	0.2	0.2	16.9	16.8	overcast			low
5/29 5:02 AM	7	<10		0	0	0	16.8	15.4	sunny and clear			low
6/5 12:02 PM	43 (39)	<10 (<10)		0.5	0.36	0.42	12.6	15.4	overcast	SW	10	flood
6/11 12:10 PM	18	<10		0.5	0.7	0.7	15.9	14.9	rain			ebb
6/19 8:02 AM	12	<10		0.24	0.76	0.96	14.7	14.9				low
6/25 10:55 AM	12	10		0	0.4	0.67	14.6	13.8	sunny and clear	SE	12	ebb
7/2 6:21 AM	165	301		0	0	0	15.3	15	overcast	SE	4	low
7/10 11:55 AM	7	<10		0.02	0.02	0.02	16.9	16		NA	8	low
7/17 7:16 AM	87	31		0.38	0.47	0.47	14	14.4	light rain			low
7/23 9:50 AM	14	<10		0	0	0	12.2	10	slight rain with wind and lightning	NA	0	low
7/29 5:19 AM	14	10	human = DNQ; dog = ND; gull = ND	0.31	0.44	1.25	17.8	15.3	rain	NA	0	low
8/7 12:20 PM	5	<10		0	0	0	17.7	18.1	sunny and clear		light	low
8/13 6:40 AM	16	<10		0	0	0.2	13.5	15.3	sunny	NA	0	low
8/21 8:34 AM	190	156		3.19	3.19	3.66	13.2	13.5	rain	NA	0	ebb
9/4 8:37 AM	196	<10		0.63	0.63	0.63	13.1	13.4	sunny and clear	NA	0	ebb
9/10 5:15 AM	9	<10		0	0	0	12.9	13.2	clear	NA	0	low
9/18 7:18 AM	9	148		0.31	0.79	0.79	9.9	12.7	sunny and clear	NA	0	ebb

Sunset 2019

Sample Date/Time	Debris (%)		Vegetation (%)		visual turbidity	# adults	# children	# boats	# swimming	# walking	# boating	# fishing	# water fowl	# dogs	other	Sewage odor/ presence	Notes
	On shore	In water	On shore	In water													
5/15 8:49 AM			20	15	cloudy/ murky												lots of kelp where I sampled
5/22 8:49 AM			20	15	cloudy/ murky												lots of kelp where I sampled
5/29 5:02 AM					clear												
6/5 12:02 PM					cloudy/ murky	0	0						0	0	0	none	
6/11 12:10 PM					clear	1	0										
6/19 8:02 AM					clear								3				
6/25 10:55 AM			20	15	cloudy/ murky								3		2 ravens on beach		exposed to waves
7/2 6:21 AM	0	0	40		clear	0	0	0	0	0	0		0	0	I hear chickens clucking	none	the ground is still wet from outgoing tide. Odor of rotting seaweed. Large…of starfish at water's edge.
7/10 11:55 AM					other												more unidentified sludge on edges of water
7/17 7:16 AM					cloudy/ murky											sulfuric smell	reddish color
7/23 9:50 AM	0	0	0	0	cloudy/ murky	4	0	1			4		0	0	0	none	
7/29 5:19 AM	0	0	10	10	clear	0	0	0	0	0	0	0	0	0	0	none	
8/7 12:20 PM	0	0	1	1	clear	0	0	1					1	0	0		1 barge, dog poop on beach
8/13 6:40 AM	0	0	13	22	clear	0	0	1	0	0	0	0	0	0	0	none	1 barge
8/21 8:34 AM	0	10	0	0	cloudy/ murky	0	0	1	0	0	0	0	6	0	0	none	
9/4 8:37 AM	0	0	20	20	cloudy/ murky	0	0	0	0	0	0	0	0	0	0	none	
9/10 5:15 AM	0	0	15	15	clear	0	0	0	0	0	0	0	0	0	0	none	
9/18 7:18 AM	0	0	10	10	clear	1	0	0	0	0	0	0	0	1	0	none	

SOUTH REFUGE COVE 2019

Sample Date/Time	Fecal Coliform (cfu/100 ml)	Entero-cocci (MPN/100 ml)	MST results	Rainfall (inches)			Temperature (°C)		Weather	Direction	Speed (mph)	Tidal phase
				<24 hr	<48 hr	<72 hr	Air	Marine Water				
5/15 8:44 AM	6	<10		0.02	0.02	0.02	18.1	10.9	overcast			flood
5/22 5:41 AM	6	<10		0.2	0.2	0.2	11.6	NA	rain	S		ebb
5/29 4:56 AM	48	<10		0	0	0	16.7	15.4	sunny and clear			low
6/5 12:15 PM	7	<10		0.5	0.36	0.42	13.5	12.6	overcast	SW	5	flood
6/11 12:20 PM	163 (155)	2851 (3448)		0.5	0.7	0.7	15.9	15.1	rain			ebb
6/19 7:56 AM	2	<10		0.24	0.76	0.96	14.3	14.7				low
6/25 11:07 AM	13	<10		0	0.4	0.67	15.2	14	sunny and clear	SE	4	low
7/2 6:15 AM	58	31		0	0	0	15.6	14.9	overcast	SE	4	low
7/10 12:00 PM	5	<10		0.02	0.02	0.02	18.7	15.8				low
7/17 7:05 AM	28	10		0.38	0.47	0.47	16.1	14.6	light rain			low
7/23 9:58 AM	4	<10		0	0	0	12.1	10	slight rain with wind and lightning	NA	0	low
7/29 5:16 AM	16	97	human = DNQ; dog = 8.08e+2; gull = ND	0.31	0.44	1.25	16.9	15.5	rain	NA	0	low
8/7 12:32 PM	7	20		0	0	0	17.4	17.1	sunny and clear	NA	0	low
8/13 6:32 AM	17	<10		0	0	0.2	17.5	15.3	sunny	NA	0	low
8/21 8:43 AM	184	118		3.19	3.19	3.66	12.3	12	rain	S	4-5	low
9/4 8:45 AM	12	10		0.63	0.63	0.63	13.6	14.3	sunny and clear	NA	0	ebb
9/10 5:10 AM	8 (22)	<10 (<10)		0	0	0	12.8	13.5	clear	NA	0	low
9/18 7:37 AM	6	52		0.31	0.79	0.79	12.4	12.7	sunny and clear	NA	0	low

South Refuge Cove 2019

Sample Date/Time	Debris (%)		Vegetation (%)		visual turbidity	# adults	# children	# boats	# swimming	# walking	# boating	# fishing	# water fowl	# dogs	other	Sewage odor/ presence	Notes
	On shore	In water	On shore	In water													
5/15 8:44 AM					cloudy/murky												
5/22 5:41 AM	present	present	15	10	clear												
5/29 4:56 AM					clear												
6/5 12:15 PM					cloudy/murky										2 songbirds	none	
6/11 12:20 PM					cloudy/murky												
6/19 7:56 AM					clear												
6/25 11:07 AM	0	0	15	20	clear	3				3							stormwater pipe in water
7/2 6:15 AM	5	0	10	5	cloudy/murky	0	0	2	0	0	0		0	0		none	outhouse; outcrop w/ exposed pipe; 1 barge and 1 tug
7/10 12:00 PM					clear	3											outcrop with damage to pipe near sampling location
7/17 7:05 AM					clear												
7/23 9:58 AM	0	0	0	0	clear	5	0	2			5		0	0	0	none	some boat wreck debris on shore; dog poop on beach
7/29 5:16 AM	some debris		5	0	clear	0	0	0	0	0	0	0	0	0	0	none	bathrooms nearby;
8/7 12:32 PM	0	0	2	0	clear			1					1		1 animal		
8/13 6:32 AM	0	0	0	10		0	0	0	0	0	0	0	0	0	0	none	
8/21 8:43 AM	10	50	15	10	clear	0	0	0	0	0	0	0	0	0	0	none	
9/4 8:45 AM	10	0	0	0		0	0	0	0	0	0	0	0	0	0	none	5+ fish carcasses
9/10 5:10 AM	10	0	0	15	clear	0	0	0	0	0	0	0	0	0	0	none	
9/18 7:37 AM	5	0	0	0	clear	0	0	0	0	0	0	0	0	0	0	none	one outflow nearby

THOMAS BASIN 2019

Sample Date/Time	Fecal Coliform (cfu/100 ml)	Entero-cocci (MPN/100 ml)	MST results	Rainfall (inches)			Temperature (°C)		Weather	Direction	Speed (mph)	Tidal phase
				<24 hr	<48 hr	<72 hr	Air	Marine Water				
5/15 8:10 AM	55	256		1	0.15	0.15	16.9	16.4	overcast			flood
5/22 6:13 AM	11	<10		0	0.24	0.24	9.5	9.1	rain	SE	5	ebb
5/29 4:33 AM	6	<10		0	0	0	16.2	15.5	sunny and clear		slight	low
6/5 9:48 AM	12	10		0.1	0.28	0.45	11.7	12.2	overcast	W		low
6/11 12:50 PM	214	487		1.38	2.5	2.51	15.7	14.2	rain			low
6/19 7:31 AM	16 (18)	20 (20)		0.28	1.17	1.37	15.6	14.9				low
6/25 11:35 AM	12	10		0	0.27	0.76	14.8	14.5	sunny and clear	SE	5	low
7/2 5:47 AM	74	41		0	0	0	17.4	14.8	overcast	N	0	low
7/10 12:21 PM	9	<10		0	0	0	21.9	16.5				low
7/17 6:40 AM	431	984		1.6	1.62	1.62	14.8	13.6	light rain			low
7/23 10:20 AM	42	10		0.18	0.18	0.18	14.1	12	slight rain with wind and lightning	NA	0	low
7/29 4:44 AM	38	<10		0.16	0.24	1.13	14	14.2	rain	S	3-4	low
8/7 1:00 PM	11	<10		0	0	0	17.2	18.3	sunny and clear		light	low
8/13 6:10 AM	37	10		0	0	0.13	14.5	13.2	sunny	NA	0	low
8/21 9:04 AM	258	450		4.85	5.39	5.52	14.3	13.6	rain	NA	0	low
9/4 9:09 AM	62	1024		0.55	0.55	0.55	14.7	13.8	sunny and clear	NA	0	low
9/10 4:41 AM	76	63	human = DNQ; dog = DNQ; gull = 3.38e+3	0	0	0	13.1	14.5	clear	NA	0	low
9/18 7:59 AM	48	144		0.01	0.99	0.99	10.9	12.5	sunny and clear	NA	0	low

Thomas Basin 2019

Sample Date/Time	Debris (%)		Vegetation (%)		visual turbidity	# adults	# children	# boats	# swimming	# walking	# boating	# fishing	# water fowl	# dogs	other	Sewage odor/ presence	Notes
	On shore	In water	On shore	In water													
5/15 8:10 AM			10	15	cloudy/murky	2		Harbor		2							biggest roach seen on rocks. 2 walkers
5/22 6:13 AM	present	present	5	2	cloudy/murky	0	0	0	0	0	0		0	0	2 seals		first flush 3 weeks
5/29 4:33 AM					cloudy/murky												
6/5 9:48 AM					clear	Y											tourist area but not for water contact
6/11 12:50 PM					cloudy/murky			marina								sulfuric	water smells like sulfur
6/19 7:31 AM					clear			several									cloudy, brownish water
6/25 11:35 AM	0	0	30	20	clear	45+		100+		25		4	X				no water coming out of stormwater pipe; 3 in boat nearby, ASUKA II in sight
7/2 5:47 AM	2	0	5	10	cloudy/murky	6	0	Harbor	0	6	harbor 20+		0	0			stormwater pipes trickle; many fish (salmon) in schools. Large freshwater stream passing by. Water is considerably colder than other sites.
7/10 12:21 PM					cloudy/murky	7		boat harbor									the sediment was easily churned
7/17 6:40 AM					cloudy/murky										several land birds		flooding lightly in street above sample site; storm drains currently flowing; water a brownish color
7/23 10:20 AM	0	0	0	0	cloudy/murky	12		many - marina					0	0	1 seal	slight sewage odor	water was slightly brown
7/29 4:44 AM	mud, trash	oil sheen	0	0	oily film	0	0	many in harbor	0	0	0	0	7	0	fish jumping	slight	storm drain;
8/7 1:00 PM			10	5	clear	6		many - marina				6			1 seal, dead salmon		
8/13 6:10 AM	25	17	0	0	oily film	0	0	many - marina	0	0	0	0	0	0	0	none	1 bathroom nearby; white sludge; trash on shore
8/21 9:04 AM	15	10	65	40	clear	3	0	1	0	0	0	0	0	0	0	none	
9/4 9:09 AM	20	25	15	0	cloudy/murky	0	0	0	0	0	0	0	0	0	0	yes	1 storm outfall
9/10 4:41 AM	20	25	0	0	cloudy/murky	0	0	0	0	0	0	0	0	0	0	strong	bathrooms nearby; 1 stormwater pipe; very strong sewage smell; many dead fish
9/18 7:59 AM	20	20	15	15	clear	0	0	0	0	0	0	0	3	0	0	awful smell	nearby bathrooms; 1 outflow; particularly bad smells

SEAPORT 2019

Sample Date/Time	Fecal Coliform (cfu/100 ml)	Entero-cocci (MPN/100 ml)	MST results	Rainfall (inches)			Temperature (°C)		Weather	Direction	Speed (mph)	Tidal phase
				<24 hr	<48 hr	<72 hr	Air	Marine Water				
5/15 7:11 AM	2	<10		1	0.15	0.15	16.1	16.4	overcast			flood
5/22 9:28 AM	<1	<10		0	0.24	0.24	10.4	9.6	rain	SE	10	ebb
5/29 4:17 AM	3	<10		0	0	0	16.5	15.3	sunny and clear		low	low
6/5 9:15 AM	3	<10		0.1	0.28	0.45	10.6	12.2	overcast	NA	0	low
6/11 1:05 PM	79	20		1.38	2.5	2.51	16.4	14.8	rain			low
6/19 7:17 AM	6	<10		0.28	1.17	1.37	16.3	14.7				low
6/25 2:36 PM	6 (8)	<10 (<10)		0	0.27	0.76	21.5	17.5	sunny and clear	SE	3	low
7/2 5:35 AM	145	20		0	0	0	15.2	15.6	overcast	NA	0	low
7/10 12:45 PM	3	<10		0	0	0	22.4	18.6				low
7/17 6:21 AM	63	20		1.6	1.62	1.62	15.3	15.1	light rain			low
7/23 10:42 AM	22 (18)	<10 (<10)		0.18	0.18	0.18	12.2	11	slight rain with wind and lightning	SE	4	low
7/29 4:29 AM	12	<10		0.16	0.24	1.13	18.2	15.4	rain	NA	0	low
8/7 1:10 PM	6	<10		0	0	0	16.2	18	sunny and clear		med/light	low
8/13 5:52 AM	21	20		0	0	0.13	15.3	14.2	sunny	NA	0	low
8/21 9:15 AM	10	<10		4.85	5.39	5.52	14.5	13.2	rain	ND	1-2	low
9/4 9:20 AM	3	<10		0.55	0.55	0.55	14.6	13.5	sunny and clear	NA	0	low
9/10 4:25 AM	163	20	human = ND; dog = ND; gull = 1.21e+3	0	0	0	12.8	14.5	clear	N	3-4	low
9/18 8:15 AM	17	173		0.01	0.99	0.99	10.9	12.5	sunny and clear	NA	0	low

Seaport 2019

Sample Date/Time	Debris (%)		Vegetation (%)		visual turbidity	# adults	# children	# boats	# swimming	# walking	# boating	# fishing	# water fowl	# dogs	other	Sewage odor/ presence	Notes
	On shore	In water	On shore	In water													
5/15 7:11 AM			25	15	clear			2									
5/22 9:28 AM	0	0	15	40	cloudy/ murky	0	0	0	0	0	0		8	0			
5/29 4:17 AM				lots	cloudy/ murky												
6/5 9:15 AM					clear	0	0							0			also collected beach mussels and algal/phytoplankton sample at location
6/11 1:05 PM					clear	0	0	0									
6/19 7:17 AM			lots		clear								10				
6/25 2:36 PM	3	0	25	90	clear			4			1						took some time to get authorized to use non NIST certified thermometer. This is where we restarted samples
7/2 5:35 AM			45		clear	0	0	0	0	0	0		0	0	2 young deer	none	flow stream near sample site at a trickle. There is no noticeable wind compared to other beaches. It was interesting how near they were to the water, the deer. Water is quite still. Beach is teaming with small creature movement. A lot of water is held on the beach by kelp and algae.
7/10 12:45 PM					clear												dock 100 m away
7/17 6:21 AM					cloudy/ murky								20				
7/23 10:42 AM	0	0	50	50	clear	0	0	5					0	0	0	none	lots of seaweed on sore, choppy rough seas
7/29 4:29 AM	some debris on rocks		15	75	cloudy/ murky	0	0	1	0	0	0	0	13	0	0	none	
8/7 1:10 PM	0	0	10	2	clear	0	0						21	0			
8/13 5:52 AM	15	15	10	60	cloudy/ murky	0	0	1	0	0	0	0	20	0	0	none	cruise ship
8/21 9:15 AM	0	0	25	25	clear	0	0	2	0	0	0	0	8	0	0	none	
9/4 9:20 AM	0	0	20	20	cloudy/ murky	0	0	0	0	0	0	0	0	0	0	none	
9/10 4:25 AM	15	0	20	20	too dark	0	0	1	0	0	0	0	0	0	0	none	
9/18 8:15 AM	0	0	25	30	clear	0	0	0	0	0	0	0	0	0	0	none	

ROTARY PARK POOL 2019

Sample Date/Time	Fecal Coliform (cfu/100 ml)	Entero-cocci (MPN/100 ml)	MST results	Rainfall (inches)			Temperature (°C)		Weather	Direction	Speed (mph)	Tidal phase
				<24 hr	<48 hr	<72 hr	Air	Marine Water				
5/15 6:50 AM	6	<10		1	0.15	0.15	16.4	16.3	overcast			flood
5/22 8:42 AM	<1	<10		0	0.24	0.24	10.4	10.8	showers	SE	5	low
5/29 4:01 AM	9	10		0	0	0	16.4	16.1	sunny and clear			low
6/5 8:45 AM	6	10		0.1	0.28	0.45	10.8	12.8	overcast			low
6/11 1:20 PM	206	1576		1.38	2.5	2.51	16.6	12.2	rain			low
6/19 7:01 AM	<2	20		0.28	1.17	1.37	16.1	17.2				low
6/25 2:48 PM	19	52		0	0.27	0.76	19.4	22.4	sunny and clear	NA	0	low
7/2 5:18 AM	142 (112)	52 (108)		0	0	0	16.1	15.2	overcast	WSW	3	low
7/10 1:00 PM	11	<10		0	0	0	19.4	19.6		NA	0	low
7/17 6:07 AM	390	2851		1.6	1.62	1.62	16.3	14.3	light rain			low
7/23 10:59 AM	26	<10		0.18	0.18	0.18	11.3	16.5	slight rain with wind and lightning	NA	0	low
7/29 4:12 AM	66	41	human = ND; dog = DNQ; gull = ND	0.16	0.24	1.13	16.8	16.3	rain	NA	0	low
8/7 1:23 PM	84	<10		0	0	0	17.7	18.5	sunny and clear			low
8/13 5:39 AM	20	<10		0	0	0.13	16.8	16.3	sunny	NA	0	low
8/21 9:25 AM	Confluent Growth (2001)	372		4.85	5.39	5.52	13.9	14.2	rain	N	3-4	low
9/4 9:33 AM	22	52		0.55	0.55	0.55	14.3	14.8	sunny and clear	NA	0	low
9/10 4:14 AM	3	<10		0	0	0	14.9	17.2	clear	NA	0	low
9/18 8:28 AM	5	<10		0.01	0.99	0.99	13.5	13.4	sunny and clear	NA	0	low

Rotary Park Pool 2019

Sample Date/Time	Debris (%)		Vegetation (%)		visual turbidity	# adults	# children	# boats	# swimming	# walking	# boating	# fishing	# water fowl	# dogs	other	Sewage odor/ presence	Notes
	On shore	In water	On shore	In water													
5/15 6:50 AM			5	15	cloudy/murky			4		1				1			1 walker, cruise ships passing, 2 com boats, clear water (not what was marked in turbidity note…)
5/22 8:42 AM	0	0	10	40	cloudy/murky	0	0	0	0	0	0		0	0			
5/29 4:01 AM					clear											slight sewage smell	
6/5 8:45 AM					clear	5	10			Y	Y				eagles		tidepoolers, 2 offshore boats
6/11 1:20 PM					cloudy/murky	6				Y							murky brown
6/19 7:01 AM					clear												water is brownish
6/25 2:48 PM			5	25	clear	4	5							1			some turbidity; dog swimming in the pool; child recently got out of it
7/2 5:18 AM	0	0	5	20	clear	0	0	1	0	0	Y		6		birds	none	site of duplicate sample. Cooler temperature. The wind is warm.
7/10 1:00 PM					cloudy/murky	10	11		2								this is a recreational pool that holds water for a long period of time before draining. It is only cleaned by the exchange of large tides
7/17 6:07 AM					Clear			3									
7/23 10:59 AM	0	0	0	0	cloudy/murky	21	0	0					0	0	0	none	storm drains nearby, 2 restrooms nearby, people on tour groups, water was murky with oil slick, beach was fairly clean
7/29 4:12 AM	0	0	10	0	cloudy/murky	0	0	2	0	0	0	0	0	0	0	none	bathrooms nearby
8/7 1:23 PM	0	3	2	0	cloudy/murky	1	2	0	2								bathrooms closed; murky brown/tea color
8/13 5:39 AM					cloudy/murky	0	0	1	0	0	0	0	0	0	0	none	bathrooms nearby; 1 cruise ship
8/21 9:25 AM	0	0	0	0	clear	0	0	0	0	0	0	0	4	0	0	none	bathrooms nearby
9/4 9:33 AM	0	0	0	0	cloudy/murky	0	0	0	0	0	0	0	0	0	0	none	bathrooms nearby
9/10 4:14 AM	0	0	0	0	clear	0	0	0	0	0	0	0	0	0	0	none	bathrooms nearby
9/18 8:28 AM	10	0	0	0	clear	0	0	0	0	0	0	0	0	0	0	none	nearby bathrooms

ROTARY PARK BEACH 2019

Sample Date/Time	Fecal Coliform (cfu/100 ml)	Entero-cocci (MPN/100 ml)	MST results	Rainfall (inches)			Temperature (°C)		Weather	Direction	Speed (mph)	Tidal phase
				<24 hr	<48 hr	<72 hr	Air	Marine Water				
5/15 6:52 AM	10	<10		1	0.15	0.15	15.1	16.7	overcast			flood
5/22 6:38 AM	8	<10		0	0.24	0.24	11	9.8	showers	SE	5	ebb
5/29 3:56 AM	11	<10		0	0	0	16.4	15.3	sunny and clear			low
6/5 8:55 AM	7	<10		0.1	0.28	0.45	10.6	12.8	overcast	NA	0	low
6/11 1:15 PM	Confluent Growth (2001)	84		1.38	2.5	2.51	16.4	15.1	rain			low
6/19 6:56 AM	10	10		0.28	1.17	1.37	16.1	16.4	sunny and clear			low
6/25 2:43 PM	9	<10		0	0.27	0.76	18.6	17.1	sunny and clear	SW	4	low
7/2 5:22 AM	46	197		0	0	0	15.6	15.5	overcast	WSW	5	low
7/10 1:05 PM	16 (8)	<10 (10)		0	0	0	18.4	17.6		SE	8	low
7/17 6:12 AM	272	269		1.6	1.62	1.62	15.3	15.1	light rain			low
7/23 10:56 AM	24	10		0.18	0.18	0.18	10.7	12	slight rain with wind and lightning	NA	0	low
7/29 4:14 AM	37	30	human = 1.35e+3; dog = DNQ; gull = ND	0.16	0.24	1.13	14.9	15.5	rain	NA	0	low
8/7 1:30 PM	8	<10		0	0	0	15.2	18	sunny and clear		light	low
8/13 5:45 AM	51	<10		0	0	0.13	16.8	16.5	sunny	NA	0	low
8/21 9:23 AM	94	50		4.85	5.39	5.52	14.6	13.7	rain	NA	0	low
9/4 9:24 AM	118	20		0.55	0.55	0.55	14.4	14	sunny and clear	NA	0	low
9/10 4:17 AM	6	10		0	0	0	14.9	14.7	clear	NA	0	low
9/18 8:25 AM	25	20		0.01	0.99	0.99	12.7	13.8	sunny and clear	NA	0	low

Rotary Park Beach 2019

Sample Date/Time	Debris (%)		Vegetation (%)		visual turbidity	# adults	# children	# boats	# swimming	# walking	# boating	# fishing	# water fowl	# dogs	other	Sewage odor/ presence	Notes
	On shore	In water	On shore	In water													
5/15 6:52 AM					clear	1		4			Y			1			1 walker, 2 com boats
5/22 6:38 AM	0	0	15	20	clear	0	0	0	0	0	0		0	0			
5/29 3:56 AM					clear												
6/5 8:55 AM					clear	2	4			6					eagles		most using beach since 2-3 low tide
6/11 1:15 PM					cloudy/murky											Yes	1 outflow stormwater
6/19 6:56 AM		some		lots	clear												high waves/turbulence
6/25 2:43 PM			5	10	clear	4	3			Y			1				
7/2 5:22 AM	0	0	20	25	cloudy/murky	0	0	0	0	0	0		3	0	none	none	significant waves, f/w/ stream trickle, high jelly count
7/10 1:05 PM					clear												
7/17 6:12 AM					cloudy/murky			2									organic debris, not identifiable
7/23 10:56 AM	0	60	0	0	cloudy/murky	4	0	2					0	0	0	none	some activity; most people on other part of beach; very rough, turbid because of macro organic debris, 1-2' swells, very rough, heavy seas
7/29 4:14 AM	some woody debris	0	5	0	clear	0	0	2	0	0	0	0	0	0	0	none	less choppy than last time
8/7 1:30 PM	0	0	10	0	clear	3											bathrooms closed
8/13 5:45 AM	0	10	15	15	clear	0	0	1	0	0	0	0	30	0	0	none	1 cruise ship; lots of tree needles in water
8/21 9:23 AM	0	0	25	35	cloudy/murky	0	0	2	0	0	0	0	20	0	0	none	
9/4 9:24 AM	0	0	15	30	cloudy/murky	0	0	1	0	0	0	0	15	0	0	none	
9/10 4:17 AM	0	15	10	10	clear	6	0	0	0	0	0	0	0	0	0	none	bathrooms nearby, 1 stormwater pipe
9/18 8:25 AM	0	0	10	0	clear	0	0	0	0	0	0	0	0	0	0	none	bathrooms nearby

MOUNTAIN POINT SURPRISE BEACH 2019

Sample Date/Time	Fecal Coliform (cfu/100 ml)	Entero-cocci (MPN/100 ml)	MST results	Rainfall (inches)			Temperature (°C)		Weather	Direction	Speed (mph)	Tidal phase
				<24 hr	<48 hr	<72 hr	Air	Marine Water				
5/15 6:40 AM	21	<10		1	0.15	0.15	16.1	16.3	overcast			low
5/22 6:57 AM	8	<10		0	0.24	0.24	12.2	10.7	showers	SE	5	ebb
5/29 3:42 AM	4	<10		0	0	0	16.2	15.4	dark			low
6/5 8:30 AM	34	10		0.1	0.28	0.45	10.6	12.8	overcast	NA	0	low
6/11 1:45 PM	37	20		1.38	2.5	2.51	16.7	17.1	rain			low
6/19 6:35 AM	24	10		0.28	1.17	1.37	16.3	16.1	sunny and clear			ebb
6/25 3:00 PM	8	<10		0	0.27	0.76	18.1	16	sunny and clear	SE	3	low
7/2 5:10 AM	13	51		0	0	0	15.2	15	overcast	W	5	ebb
7/10 1:25 PM	4	<10		0	0	0	19.1	17.5		SE	4	low
7/17 5:57 AM	133 (118)	218 (384)		1.6	1.62	1.62	14.9	16.8	light rain			low
7/23 11:09 AM	10	<10		0.18	0.18	0.18	11.1	12.5	slight rain with wind and lightning	NA	0	low
7/29 3:50 AM	82	<10	human = 1.94e+3; dog = ND; gull = ND	0.16	0.24	1.13	15.1	16	rain	S	3-4	low
8/7 1:40 PM	30	<10		0	0	0	16.8	17.7	sunny and clear		light	low
8/13 5:30 AM	58	10		0	0	0.13	16.1	16.6	sunny	NA	0	low
8/21 9:35 AM	52	41		4.85	5.39	5.52	14.1	13.9	rain	NA	0	low
9/4 9:45 AM	16	<10		0.55	0.55	0.55	14.4	14.8	sunny and clear	NA	0	ebb
9/10 3:52 AM	13	<10		0	0	0	16.2	15.4	clear	NA	0	low
9/18 8:32 AM	13	10		0.01	0.99	0.99	12.4	13.7	sunny and clear	NA	0	low

Mountain Point Surprise Beach 2019

Sample Date/Time	Debris (%)		Vegetation (%)		visual turbidity	# adults	# children	# boats	# swimming	# walking	# boating	# fishing	# water fowl	# dogs	other	Sewage odor/ presence	Notes
	On shore	In water	On shore	In water													
5/15 6:40 AM	0	0	5	15	clear												
5/22 6:57 AM	0	0	15	15	clear	0	0	0	0	0	0		3	0	1 seal		
5/29 3:42 AM					clear			4									
6/5 8:30 AM					cloudy/murky	0	0	0							10 eagles		wave action in large eel grass bed
6/11 1:45 PM					cloudy/murky	2						Y					3 storm drain outlets
6/19 6:35 AM		some			clear												
6/25 3:00 PM	0	0	10	0	clear												
7/2 5:10 AM	2	0	5	10	clear	0	0	0	0	0	0		2	0		none	significant chop,
7/10 1:25 PM					clear	18	7	3	8								8 divers, 100 m away; some sludge like material near shore
7/17 5:57 AM					clear			3							2 eagles		
7/23 11:09 AM	0	0	0	0	clear	0	0	0					0	0	lots of starfish, jellyfish		water was clear except at land/water margin
7/29 3:50 AM	lots of trash, animal carcass	fairly clear of debris	15	1	clear	0	0	1	0	0	0	0	0	0	0	none	lots of trash on beach
8/7 1:40 PM	0	0	15	5	clear	3	0	0	3				0	0			snorkelers
8/13 5:30 AM	10	0	0	0	clear	0	0	0	0	0	0	0	3	0	3 eagles	none	dead carcass on rocks
8/21 9:35 AM	0	0	10	10	clear	0	0	3	0	0	0	0	0	0	0	none	
9/4 9:45 AM	0	0	0	0	clear	0	0	2	0	0	0	0	0	0	0	none	
9/10 3:52 AM	0	0	100	20	too dark	0	0	0	0	0	0	0	0	0	0	none	large amounts of seaweed; lots of bioluminescence; many bird feathers in water
9/18 8:32 AM	0	0	40	10	clear	0	0	0	0	0	2	0	0	0	0	none	

MOUNTAIN POINT CULTURAL FOOD 2019

Sample Date/Time	Fecal Coliform (cfu/100 ml)	Entero-cocci (MPN/100 ml)	MST results	Rainfall (inches)			Temperature (°C)		Weather	Direction	Speed (mph)	Tidal phase
				<24 hr	<48 hr	<72 hr	Air	Marine Water				
5/15 6:27 AM	18	<10		1	0.15	0.15	16.3	16.3	overcast			low
5/22 7:04 AM	9	10		0	0.24	0.24	11.5	10.8	showers	SE	5	ebb
5/29 3:35 AM	61	41		0	0	0	16.2	15.6	dark			low
6/5 8:15 AM	11	20		0.1	0.28	0.45	11.7	12.8	overcast	NA	0	low
6/11 1:35 PM	86	323		1.38	2.5	2.51	16.1	15.8	rain			low
6/19 6:27 AM	526	620		0.28	1.17	1.37	16.2	16.4	sunny and clear			ebb
6/25 3:05 PM	28	50		0	0.27	0.76	18	16	sunny and clear	SE	5	low
7/2 5:00 AM	214	857		0	0	0	15.4	16.1	overcast	W	4	ebb
7/10 1:30 PM	9	<10		0	0	0	19.8	17.5				low
7/17 5:50 AM	247	934		1.6	1.62	1.62	13.4	13.8	light rain			ebb
7/23 11:19 AM	152	259		0.18	0.18	0.18	12	13.7	slight rain with wind and lightning	NA	0	low
7/29 3:44 AM	131	41	human = ND; dog = ND; gull = ND	0.16	0.24	1.13	16.3	16.2	rain	NA	0	low
8/7 1:51 PM	45	20		0	0	0	17.8	17.8	sunny and clear	NA	0	low
8/13 5:19 AM	104	51		0	0	0.13	16.4	17.1	sunny	NA	0	low
8/21 9:42 AM	86	84		4.85	5.39	5.52	14.4	14.1	rain	NA	0	low
9/4 9:52 AM	209 (210)	20 (20)		0.55	0.55	0.55	14.2	14.6	sunny and clear	NA	0	low
9/10 3:45 AM	20	<10		0	0	0	15.4	16.2	clear	NA	0	low
9/18 8:48 AM	131	97		0.01	0.99	0.99	13.3	12.7	sunny and clear	NA	0	low

Mountain Point Cultural Food 2019

Sample Date/Time	Debris (%)		Vegetation (%)		visual turbidity	# adults	# children	# boats	# swimming	# walking	# boating	# fishing	# water fowl	# dogs	other	Sewage odor/ presence	Notes
	On shore	In water	On shore	In water													
5/15 6:27 AM			5	20	clear			4			4					odor from beach grass	3 com boats, 1 skiff
5/22 7:04 AM	N	N	15	10	cloudy/murky	0	0	0	0	0	0		8	0			
5/29 3:35 AM					clear												
6/5 8:15 AM					cloudy/murky	1						Y					waves and stream inflow increasing turbidity; boats just offshore/commercial and sport; lots of sea urchins red/purple
6/11 1:35 PM					clear			3			Y					sulfur smell	sharp sulfur and sewage smell
6/19 6:27 AM					clear											slight sulfuric smell	
6/25 3:05 PM	0	0	15	20	clear			8							2 eagles		sulfuric odor from grass/bog; water is unusually clear, lacking sediment
7/2 5:00 AM	0	0	15	0	clear	2	0	2	0	0	0		3	0			2 fishing boats
7/10 1:30 PM					clear			3							3 ravens, 3 eagles		an outcrop/treatment plant is not far from this location
7/17 5:50 AM					clear										3 eagles	sulfuric	
7/23 11:19 AM	0	0	0	0	clear	0	0	0					0	0	0	slight sulfur	one restroom 200 yards away
7/29 3:44 AM		some debris	35	5	too dark	0	0	0	0	0	0	0	0	0	0	strong, present far away from site	there was a strong sewage smell even as we drove up to the site; bathrooms nearby
8/7 1:51 PM	0	0	15	0	clear	0	0	2					0	0	0		
8/13 5:19 AM	0	0	20	5	cloudy/murky	0	0	1	0	0	0	0	0	0	0	sewage smell in parking lot	1 cruise ship; sulfuric smell; unidentified brown algae in water; lots of sediment
8/21 9:42 AM	0	5	60	25	clear	0	0	0	0	0	0	0	0	0	0	none	
9/4 9:52 AM	0	0	90	10	cloudy/murky	0	0	0	0	0	0	0	0	0	0	none	
9/10 3:45 AM	0	0	100	20	too dark	0	0	0	0	0	0	0	0	0	0	yes, strongly	nearby bathrooms, sewage discharge nearby; unusually heavy amount of beach seaweed; lots of bioluminescence
9/18 8:48 AM	0	0	40	20	clear	0	0	0	0	0	2	0	0	0	0	none	bathrooms nearby

HERRING COVE 2019

Sample Date/Time	Fecal Coliform (cfu/100 ml)	Entero-cocci (MPN/100 ml)	MST results	Rainfall (inches)			Temperature (°C)		Weather	Direction	Speed (mph)	Tidal phase
				<24 hr	<48 hr	<72 hr	Air	Marine Water				
5/15 6:15 AM	30	<10		1	0.15	0.15	14	14.7	overcast	NA	0	low
5/22 7:15 AM	12	<10		0	0.24	0.24	10.7	9.6	showers	SE	lo	ebb
5/29 3:11 AM	14	<10		0	0	0	16.4	15.7	dark		medium	low
6/5 7:48 AM	18	<10		0.1	0.28	0.45	10	12.8	overcast	NA	0	low
6/11 2:00 PM	113	41		1.38	2.5	2.51	15.1	16.2	rain			low
6/19 6:15 AM	36	10		0.28	1.17	1.37	15.3	16.5	cloudy			ebb
6/25 3:15 PM	15	<10		0	0.27	0.76	20.4	17	sunny and clear			flood
7/2 4:45 AM	171	213		0	0	0	15.1	14.3	overcast	SE	2	ebb
7/10 1:45 PM	8	<10		0	0	0						low
7/17 5:35 AM	386	565		1.6	1.62	1.62	17.7	13.4	light rain			ebb
7/23 11:32 AM	36	10		0.18	0.18	0.18	12.6	10.1	slight rain with wind and lightning	NA	0	low
7/29 3:28 AM	104 (92)	20 (20)		0.16	0.24	1.13	18.6	13.2	rain	NA	0	low
8/7 2:05 PM	33	<10		0	0	0	16.3	17.8	sunny and clear		med/ strong	low
8/13 5:02 AM	215	613		0	0	0.13	14.4	13.8	cloudy	NA	0	low
8/21 9:56 AM	184	63		4.85	5.39	5.52	14.1	13.7	rain	NA	0	low
9/4 10:02 AM	239	262		0.55	0.55	0.55	12.6	14.3	sunny and clear	NA	0	low
9/10 3:26 AM	>400	2595	human = DNQ; dog = 5.47e+2; gull = 1.99e+4	0	0	0	16.2	15.5	clear	NA	0	low
9/18 9:04 AM	216 (202)	185 (173)		0.01	0.99	0.99	11.8	13.8	sunny and clear	NA	0	low

Herring Cove 2019

Sample Date/Time	Debris (%)		Vegetation (%)		visual turbidity	# adults	# children	# boats	# swimming	# walking	# boating	# fishing	# water fowl	# dogs	other	Sewage odor/ presence	Notes
	On shore	In water	On shore	In water													
5/15 6:15 AM	0	0	10	5	clear	1											one person fishing
5/22 7:15 AM	some	0	5	5	cloudy/ murky	0	0	0	0	0	0		12	0			waves
5/29 3:11 AM					clear			2									
6/5 7:48 AM					clear			lots of trawlers near shore			Y				2 eagles		lots of crabs in eel grass,
6/11 2:00 PM					cloudy/ murky	10		5								yes, sulfuric	water was reddish orange and murky; sewage smell
6/19 6:15 AM					clear	3		2					6				people fishing in water; 2 boats fishing near shore
6/25 3:15 PM			5		clear	3		6				3			4 eagles		construction up creek. Unusual! Commercial vessel very close.
7/2 4:45 AM	0	0	5	0	clear	7	0	4	0	0	Y	Y	Y	0	bear, eagles	none	1 bear, multiple (10+) eagles, 5 fishing on beach
7/10 1:45 PM					clear												
7/17 5:35 AM					clear	3									1 bear, 4 eagles		
7/23 11:32 AM	0	0	0	0	clear	2	0	3				2	0	0	6 eagles and 2 seals	none	
7/29 3:28 AM	0	0	0	0	clear	0	0								2-3 seals, 3-4 eagles	none	lots of bioluminescence on sand and in water
8/7 2:05 PM	0	0	0	0	clear	3						3	0		1 seal, dead salmon		dog poop observed on beach
8/13 5:02 AM	0	0	0	0	clear	0	0	1	0	0	1	1	20	0	0	none	
8/21 9:56 AM	0	0	0	0	clear	1	0	0	0	0	0	0	3	0	0	none	
9/4 10:02 AM	10	0	0	0	cloudy/ murky	3	0	0	0	0	0	0	0	0	0	none	
9/10 3:26 AM	0	0	0	0	too dark	0	0	0	0	0	0	0	0	0	1 bear	none	
9/18 9:04 AM	10	0	0	0	clear	2	0	0	0	0	1	0	0	0	1 seal	none	

KNUDSON COVE 2018

Knudson Cove Sanitary Survey Summary Table

2018 Sampling Date	Sample Collection Time	Rainfall " in <24 hr	Rainfall " in <48 hr	Rainfall " in <72 hr	>72 hr Since Last Rain Event	Air Temp F	Marine Water Temp C / F	Weather	Wind		Tide		Beach Conditions				Visual Turbidity	#People at Beach		#Boats	Beach Activity				Wildlife, Domestic Animal Presence		Fecal Coliform Result	Enterococcus Result	MST Results
									Direction	Speed	Elevation	Phase	Debris		% Vegetation			#Adults	#Children		g	Walking	Fishing	Boating	Waterfowl	Dogs	cfu/100 ml	MPN/100 ml	
													onshore	in water	onshore	in water													
17-May	7:39 AM	0.00	0.00	0.00	0.00	51	10.0	sunny, clear	NNW	5	low -3.6, high 15.5	ebbing	random construction	none	30	20	cloudy, murky	40	0	75	n/a	✓	n/a	✓	0	0	28 (26)	2595 (2603)	
22-May	2:50 PM	0.82	4.28	5.22	5.22	48	8.8	cloudy, overcast, rain	ESE	8	low 0.6, high 13.7	flooding	none	none	30	30	cloudy, murky	0	0	75	n/a	n/a	n/a	✓	10	0	144	341	
31-May	6:15 AM	0.00	0.00	0.15	0.44	43	6.0	sunny, clear	none	0	low -1.5, high 14.0	ebbing	random construction cebris (tire, foam)	none	10	60	clear	0	0	75	n/a	n/a	n/a	✓	5	0	26	20	
6-Jun	3:00 PM	1.21	1.30	1.80	2.13	50	5.8	cloudy, overcast, rain	SE	15	low 2.4, high 12.2	flooding	none	none	50	30	clear	0	0	75	n/a	n/a	n/a	✓	0	0	15	<10	
14-Jun	6:00 AM	0.02	0.18	0.27	0.28	51	7.5	cloudy, overcast, fog	SE	5	low -4.1, high 15.6	ebbing	rusted screw driver, various construction debris	none	40	30	clear	0	0	75	n/a	n/a	n/a	✓	5	0	11	<10	
20-Jun	2:00 PM	0.00	0.00	0.00	0.00	80	19.9	partly cloudy	W	4	low 0.6, high 14.3	flooding	wood planks, rubber	none	10	5	clear	3	0	75	n/a	n/a	n/a	✓	0	0	6	<10	
27-Jun	5:30 AM	0.00	0.00	0.01	0.67	50	9.0	cloudy, overcast	SE	3	low -1.3, high 13.6	ebbing	none	none	5	10	clear	4	0	75	n/a	n/a	n/a	✓	7	0	17	<10	
2-Jul	12:00 PM	0.00	0.00	0.12	0.66	62	7.9	sunny, clear	NNW	11	low -0.4, high 13.3	flooding	none	none	30	30	clear	50	20	75	n/a	n/a	n/a	✓	0	0	9	74	
12-Jul	5:10 AM	0.19	0.20	0.23	0.23	55	10.5	cloudy, overcast	WSW	0	low -3.5, high 15.0	ebbing	various construction debris	none	30	40	clear	0	0	75	n/a	n/a	n/a	✓	2	0	18	20	
18-Jul	1:10 PM	0.00	0.48	0.69	0.69	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	2	20	
26-Jul	4:35 AM	0.00	0.00	0.00	0.00	61	62	sunny, clear	NW	5	low -0.5, high 13.3	ebbing	rubber, metal	none	20	20	d/m	0	0	0	n/a	n/a	n/a	✓	1	0	32	20	
1-Aug	12:24 PM	0.00	0.00	0.00	0.00	57	64.2	sunny, clear	SE	9	low 2.7, high 14	flooding	rope, metal scrap, lumber	none	1	0	clear	1	0	5	n/a	n/a	n/a	✓	0	0	6	20	
9-Aug	4:25 AM	1.71	1.74	1.74	1.74	60	61.5	cloudy	n/a	0	low -2.2, high 14.1	ebbing	none	none	20	20	clear	0	0	d/m	n/a	n/a	n/a	✓	0	0	8	10	Human, Gull
16-Aug	12:07 PM	0.00	0.00	0.39	0.39	60	61.5	overcast	NNW	6	low 0.4, high 15.4	flooding	metal scraps	none	10	10	clear	3	0	3	n/a	n/a	n/a	✓	0	0	3 (2)	<10 (10)	
23-Aug	4:50 AM	0.00	0.21	0.42	0.42	59	60.4	cloudy, overcast	n/a	0	low 0.5, high 12.8	ebbing	none	none	0	0	clear	1	0	d/m	n/a	n/a	✓	✓	0	heard barking dog	94	86	
30-Aug	10:46 AM	0.05	0.07	0.56	0.56	60	61.1	overcast	n/a	0	low 2.6, high 15.07	flooding	none	none	0	0	clear	10	0	100	n/a	✓	✓	✓	10	0	3	<10	
5-Sep	12:45 PM	0.42	0.48	0.48	0.56	57	9.9	cloudy, overcast, rain	n/a	0	low 4.6, high 12.0	ebbing	none	none	50	30	clear	15	0	100	n/a	✓	n/a	✓	0	0	42 (37)	173 (131)	
12-Sep	10:20 AM	0.00	0.00	0.00	0.02	53	8.5	sunny, clear, cloudy, overcast	N	7	low -1.6, high 17.3	flooding	none	none	30	10	clear	0	0	75	n/a	n/a	n/a	✓	6	0	3	<10	

n/a - not applicable

d/m - data missing

Potential sources = private sewer treatment system outfall(s), individual septic tanks, wildlife, pet feces, boats in harbor areas.

kayakers, zodiak tours, tourists, guides

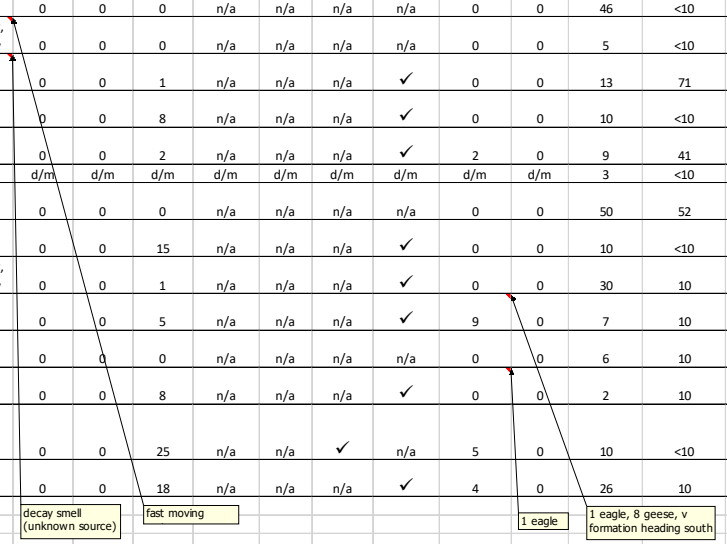
tourists on boats/kayak tours

BEACON HILL 2018

Beacon Hill Sanitary Survey Summary Table

2018 Sampling Date	Sample Collection Time	Rainfall " in <24 hr	Rainfall " in <48 hr	Rainfall " in <72 hr	>72 hr Since Last Rain Event	Air Temp F	Marine Water Temp C / F	Weather	Wind		Tide		Beach Conditions				Visual Turbidity	#People at Beach		#Boats	Beach Activity				Wildlife, Domestic Animal Presence		Fecal Coliform Result	Enterococcus Result	MST Results
									Direction	Speed	Elevation	Phase	Debris		% Vegetation			#Adults	#Children		Swimming	Walking	Fishing	Boating	Waterfowl	Dogs			
													onshore	in water	onshore	in water											cfu/100 ml	MPN/100 ml	
17-May	8:12 AM	0.00	0.00	0.00	0.00	54	10.3	sunny, clear	NNW	5	low -3.6, high 15.5	ebbing	none	none	50	30	clear	2	0	n/a	n/a	n/a	n/a	n/a	0	0	3	183	
22-May	2:41 PM	0.82	4.28	5.22	5.22	48	9.0	cloudy, overcast, rain	ESE	8	low 0.6, high 13.7	flooding	none	none	80	80	clear	0	0	0	n/a	n/a	n/a	n/a	0	0	26	30	
31-May	6:32 AM	0.00	0.00	0.15	0.44	43	6.0	sunny, clear	n/a	0	low -1.5, high 14.0	ebbing	plastic bag	none	80	90	clear	0	0	1	n/a	n/a	n/a	✓	0	0	0	<10	
6-Jun	2:40 PM	1.21	1.30	1.80	2.13	50	5.6	cloudy, overcast, rain	SE	15	low 2.4, high 12.2	flooding	none	none	70	70	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	1	0	15	<10	
14-Jun	6:18 AM	0.02	0.18	0.27	0.28	51	7.2	cloudy, overcast	N	3	low -4.1, high 15.6	ebbing	none	none	100	60	clear	0	0	0	n/a	n/a	n/a	n/a	0	0	46	<10	Human, Dog, Gull
20-Jun	2:30 PM	0.00	0.00	0.00	0.00	80	16.8	sunny, clear	W	5	low 0.6, high 14.3	flooding	none	none	15	50	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	0	0	5	<10	
27-Jun	5:50 AM	0.00	0.00	0.01	0.67	50	8.6	cloudy, overcast	SE	3	low -1.3, high13.63	ebbing	none	none	80	60	clear	0	0	1	n/a	n/a	n/a	✓	0	0	13	71	
2-Jul	11:45 AM	0.00	0.00	0.12	0.66	62	9.0	sunny, clear	NNW	11	low -0.4, high 13.3	flooding	none	styrofoam	70	60	clear	0	0	8	n/a	n/a	n/a	✓	0	0	10	<10	
12-Jul	5:30 AM	0.19	0.20	0.23	0.23	55	9.9	cloudy, overcast	WSW	0	low -3.5, high 15.0	ebbing	none	none	60	20	clear	0	0	2	n/a	n/a	n/a	✓	2	0	9	41	
18-Jul	1:20 PM	0.00	0.48	0.69	0.69	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	3	<10	
26-Jul	4:50 AM	0.00	0.00	0.00	0.00	61	62.7	sunny, clear	d/m	5	low -0.7, high 13.3	ebbing	none	none	60	80	d/m	0	0	0	n/a	n/a	n/a	n/a	0	0	50	52	
1-Aug	12:06 PM	0.00	0.00	0.00	0.00	61	60.8	sunny, clear	SE	9	low 2.7, high 14	flooding	none	none	50	50	clear	0	0	15	n/a	n/a	n/a	✓	0	0	10	<10	
9-Aug	4:46 AM	1.71	1.74	1.74	1.74	60	61.3	rain	n/a	0	low -2.2, high 14.1	d/m	none	none	20	20	cloudy, murky	0	0	1	n/a	n/a	n/a	✓	0	0	30	10	
16-Aug	11:54 AM	0.00	0.00	0.39	0.39	59.3	60.9	cloudy	N	10	low 0.4, high 15.4	flooding	none	none	60	60	clear	0	0	5	n/a	n/a	n/a	✓	9	0	7	10	
23-Aug	4:37 AM	0.00	0.21	0.42	0.42	59.7	60.4	cloudy, overcast	n/a	0	low 0.5, high 12.8	ebbing	none	none	0	0	very clear	0	0	0	n/a	n/a	n/a	n/a	0	0	6	10	
30-Aug	11:05 AM	0.05	0.07	0.56	0.56	58	60.4	cloudy, overcast	SE	d/m	low 2.6, high 15.07	flooding	none	none	80	95	clear	0	0	8	n/a	n/a	n/a	✓	0	0	2	10	
5-Sep	1:00 PM	0.42	0.48	0.48	0.56	57	9.5	cloudy, overcast, rain	n/a	0	low 4.6, hgih 12.0	ebbing	none	none	40	60	clear	0	0	25	n/a	n/a	✓	n/a	5	0	10	<10	
12-Sep	10:00 AM	0.00	0.00	0.00	0.02	51	7.5	cloudy, overcast	N	7	low -1.6, high 17.3	flooding	none	none	40	40	clear	0	0	18	n/a	n/a	n/a	✓	4	0	26	10	

n/a - not applicable
d/m - data missing
Potential sources = private sewer treatment system outfall(s), individual septic tanks, wildlife.



SOUTH POINT HIGGINS 2018

South Point Higgins Sanitary Survey Summary Table

2018 Sampling Date	Sample Collection Time	Rainfall " in <24 hr	Rainfall " in <48 hr	Rainfall " in <72 hr	>72 hr Since Last Rain Event	Air Temp F	Marine Water Temp C / F	Weather	Wind		Tide		Beach Conditions				Visual Turbidity	#People at Beach		#Boats	Beach Activity				Wildlife, Domestic Animal Presence		Fecal Coliform Result	Enterococcus Result	MST Results
									Direction	Speed	Elevation	Phase	Debris		% Vegetation			#Adults	#Children		Swimming	Walking	Fishing	Boating	Waterfowl	Dogs			
													onshore	in water	onshore	in water											cfu/100 ml	MPN/100 ml	
17-May	8:40 AM	0.00	0.00	0.00	0.00	54	9.8	sunny, clear	n/a	0	low -3.6, high 15.5	ebbing	none	none	30	10	clear	15	5	d/m	n/a	✓	n/a	✓	6	0	5	31.0	
22-May	2:25 PM	0.82	4.28	5.22	5.22	48	8.2	cloudy, overcast	ESE	8	low 0.6, high13.7	flooding	none	none	20	5	clear	0	0	0	n/a	n/a	n/a	n/a	0	0	84	61	
31-May	12:45 PM	0.00	0.00	0.15	0.44	44	4.5	sunny, clear	n/a	0	low -1.5, high 14.0	ebbing	none	none	10	10	clear	0	0	0	n/a	n/a	n/a	n/a	15	0	48 (56)	60 (70)	
6-Jun	2:25 PM	1.21	1.30	1.80	2.13	50	5.8	d/m	SE	15	low 2.4, high 12.2	flooding	none	none	20	20	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	0	0	31	<10	
14-Jun	6:40 AM	0.02	0.18	0.27	0.28	51	6.4	cloudy, overcast	N	3	low -4.1, high 15.6	ebbing	none	none	30	0	clear	0	0	1	n/a	n/a	n/a	✓	5	0	65	410	
20-Jun	2:55 PM	0.00	0.00	0.00	0.00	80	15.0	sunny, clear	W	5	low 0.6, high 14.3	flooding	none	none	20	10	cloudy, murky	4	7	0	n/a	✓	n/a	n/a	0	1	8	<10	
27-Jun	6:10 AM	0.00	0.00	0.01	0.67	51	7.0	cloudy, overcast	SE	3	low -1.3, high 13.6	ebbing	none	none	5	10	clear	0	0	3	n/a	n/a	n/a	✓	0	0	22	<10	
2-Jul	11:30 AM	0.00	0.00	0.12	0.66	59	8.2	sunny, clear	NNW	9	low -0.4, high 13.3	flooding	none	none	40	10	clear	3	11	0	✓	✓	n/a	n/a	0	0	11	<10	
12-Jul	5:50 AM	0.19	0.20	0.23	0.23	54	8.8	cloudy, overcast	SW	0	low -3.5, high 15.0	ebbing	batteries	none	20	0	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	4	0	136	350	
18-Jul	12:50 PM	0.00	0.48	0.69	0.69	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	2	<10	
26-Jul	5:10 AM	0.00	0.00	0.00	0.00	61	59.9	sunny, clear	d/m	7	low -0.7, high 13.3	ebbing	none	none	50	10	clear	0	0	1	n/a	n/a	n/a	✓	0	0	236	134	
1-Aug	11:53 AM	0.00	0.00	0.00	0.00	57	60.9	sunny, clear	ESE	9	low 2.7, high 14	flooding	none	none	0	0	clear	2	5	1	n/a	✓	n/a	n/a	0	0	33	30	
9-Aug	4:18 AM	1.71	1.74	1.74	1.74	60	61.5	cloudy	d/m	4	low -2.2, high 14.1	ebbing	none	none	20	20	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	0	0	168	241	Human, Dog, Gull
16-Aug	11:38 AM	0.00	0.00	0.39	0.39	58.2	57.3	overcast	N	10	low 0.4, high 15.4	flooding	none	none	30	30	clear	3	1	0	n/a	✓	n/a	n/a	0	0	5	<10	
23-Aug	4:20 AM	0.00	0.21	0.42	0.42	59.3	59.3	cloudy, overcast	n/a	0	low 0.5, high 12.8	ebbing	none	none	0	0	d/m	0	0	0	n/a	n/a	n/a	n/a	0	0	19	31	
30-Aug	11:28 AM	0.05	0.07	0.56	0.56	58	57.9	cloudy, overcast	n/a	0	low 0.26, high 15.07	flooding	none	none	0	0	clear	0	0	0	n/a	✓	n/a	n/a	2	0	3	10	
5-Sep	1:20 PM	0.42	0.48	0.48	0.56	57	8.1	cloudy, overcast, rain	NNW	5	low 4.6, high 12.0	ebbing	beer cans, pallets	d/m	20	10	clear	0	0	3	n/a	n/a	n/a	✓	3	0	3	<10	
12-Sep	9:40 AM	0.00	0.00	0.00	0.02	51	7.5	sunny, clear, cloudy, overcast	NNW	5	low -1.6, high 17.3	flooding	none	none	30	5	clear	0	0	0	n/a	n/a	n/a	n/a	0	0	28	279	

n/a - not applicable

d/m - data missing

Potential sources = private/public sewer treatment system outfall(s), public treatment system emergency bypasses, individual septic tanks, wildlife, pet feces.

lots of water movement

people foraging at low tide

saw bunch humpbacks

SHULL 2018

Shull Sanitary Survey Summary Table

2018 Sampling Date	Sample Collection Time	Rainfall " in <24 hr	Rainfall " in <48 hr	Rainfall " in <72 hr	>72 hr Since Last Rain Event	Air Temp F	Marine Water Temp C / F	Weather	Wind		Tide		Beach Conditions				Visual Turbidity	#People at Beach		#Boats	Beach Activity				Wildlife, Domestic Animal Presence		Fecal Coliform Result	Enterococcus Result	MST Results
									Direction	Speed	Elevation	Phase	Debris		% Vegetation			#Adults	#Children		Swimming	Walking	Fishing	Boating	Waterfowl	Dogs			
													onshore	in water	onshore	in water											cfu/100 ml	MPN/100 ml	
17-May	9:15 AM	0.00	0.00	0.00	0.00	56	10.3	sunny, clear	NNW	10	low -3.6, high 15.5	flooding	none	none	30	0	clear	0	0	0	n/a	n/a	n/a	n/a	60	0	3	30	
22-May	2:15 PM	0.82	4.28	5.22	5.22	48	8.9	cloudy, overcast, rain	ESE	8	low 0.6, high 13.7	flooding	none	none	40	20	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	0	0	132	20	
31-May	7:45 AM	0.00	0.00	0.15	0.44	46	4.3	sunny, clear	NNW	6	low -1.5, high 14.0	ebbing	none	none	50	50	clear	2	0	1	n/a	✓	n/a	✓	30	0	27	<10	
6-Jun	2:05 PM	1.21	1.30	1.80	2.13	50	5.8	cloudy, overcast, rain	SE	15	low 2.4, high 12.2	flooding	none	none	60	60	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	0	0	22 (29)	41 (30)	
14-Jun	6:55 AM	0.02	0.18	0.27	0.28	51	6.5	cloudy, overcast, rain	N	3	low -4.1, high 15.6	ebbing	scrap metal	none	50	100	clear	0	0	2	n/a	n/a	n/a	✓	5	0	118	144	
20-Jun	3:10 PM	0.00	0.00	0.00	0.00	75	16.2	sunny, clear	W	4	low 0.6, high 14.3	flooding	none	none	15	15	cloudy, murky	1	1	0	n/a	✓	n/a	n/a	0	0	6	<10	
27-Jun	6:30 AM	0.00	0.00	0.01	0.67	51	7.1	cloudy, overcast	SSE	0	low -1.3, high 13.6	ebbing	various cable & pipe debris	none	70	20	clear	0	0	0	n/a	n/a	n/a	n/a	5	0	15	20	
2-Jul	11:10 AM	0.00	0.00	0.12	0.66	59	9.2	sunny, clear	NNW	9	low -0.4, high 13.3	flooding	none	none	60	30	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	0	0	26	<10	
12-Jul	6:10 AM	0.19	0.20	0.23	0.23	54	9.0	cloudy, overcast	SSW	3	low -3.5, high 15.0	ebbing	none	none	70	10	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	1	0	14	<10	
18-Jul	12:30 PM	0.00	0.48	0.69	0.69	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	5	20	
26-Jul	5:24 AM	0.00	0.00	0.00	0.00	61	60.9	sunny, clear	d/m	7	low -0.7, high 13.3	ebbing	none	none	>10	>10	clear	0	0	0	n/a	n/a	n/a	n/a	7	0	4	<10	
1-Aug	11:43 AM	0.00	0.00	0.00	0.00	57	61.5	sunny, clear	ESE	9	low 2.7, high 14	flooding	none	none	>1	>1	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	20	0	12 (9)	<10 (<10)	
9-Aug	4:00 AM	1.71	1.74	1.74	1.74	60	60.7	cloudy	d/m	0	low -2.2, high 14.1	ebbing	none	none	20	20	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	0	0	119	727	Human, Dog, Gull
16-Aug	11:22 AM	0.00	0.00	0.39	0.39	58.1	d/m	overcast	N	10	low 0.4, high 15.4		none	some metal scraps	50	50	clear	0	0	0	n/a	n/a	n/a	n/a	50	0	16	181	
23-Aug	4:06 AM	0.00	0.21	0.42	0.42	57.2	60.0	cloudy, overcast	n/a	0	low 0.5, high 12.8	ebbing	none	none	0	0	clear	0	0	0	n/a	n/a	n/a	n/a	0	0	13	10	
30-Aug	11:46 AM	0.05	0.07	0.56	0.56	57	58.6	cloudy, overcast, rain	SE	10	low 0.26, high 15.07	flooding	none	none	0	0	d/m	6	0	0	n/a	✓	n/a	n/a	120	0	25	<10	
5-Sep	1:40 PM	0.42	0.48	0.48	0.56	57	8.3	cloudy, overcast, rain	NNW	5	low 4.6, high 12.0	ebbing	filleted fish carcasses	paper	70	30	clear	0	0	0	n/a	n/a	n/a	n/a	15	0	49	10.0	
12-Sep	9:15 AM	0.00	0.00	0.00	0.02	51	6.5	cloudy, overcast	NNW	5	low -1.6, high 17.3	flooding	none	none	40	10	clear	0	0	0	n/a	n/a	n/a	n/a	40	0	33	20	

n/a - not applicable
d/m - data missing
Potential sources = private/public sewer treatment system outfall(s), public treatment system emergency bypasses, individual septic tanks, wildlife, pet feces.

Strange smell (like Fritos) away from water; tons of crabs

SUNSET 2018

Sunset Sanitary Survey Summary Table

2018 Sampling Date	Sample Collection Time	Rainfall " in <24 hr	Rainfall " in <48 hr	Rainfall " in <72 hr	>72 hr Since Last Rain Event	Air Temp F	Marine Water Temp C / F	Weather	Wind		Tide		Beach Conditions				Visual Turbidity	#People at Beach		#Boats	Beach Activity				Wildlife, Domestic Animal Presence		Fecal Coliform Result	Enterococcus Result	MST Results
									Direction	Speed	Elevation	Phase	Debris		% Vegetation			#Adults	#Children		Swimming	Walking	Fishing	Boating	Waterfowl	Dogs			
													onshore	in water	onshore	in water											cfu/100 ml	MPN/100 ml	
17-May	9:35 AM	0.00	0.00	0.00	0.00	56	10.4	d/m	NNW	5	low -3.6, high 15.5	flooding	none	none	20	10	clear	2	0	0	n/a	✓	n/a	n/a	0	2	3	20	
22-May	2:00 PM	0.82	4.28	5.22	5.22	49	9.1	cloudy, overcast, rain	ESE	8	low 0.6, high 13.7	flooding	none	none	30	60	clear	0	0	0	n/a	n/a	n/a	n/a	0	0	48	63	
31-May	8:10 AM	0.00	0.00	0.15	0.44	48	4.9	sunny, clear	NW	6	low -1.5, high 14.0	ebbing	random parts on beach	none	30	10	clear	0	0	0	n/a	n/a	n/a	n/a	10	0	51	<10	
6-Jun	1:50 PM	1.21	1.30	1.80	2.13	50	6.0	cloudy, overcast, rain	SE	5	low 2.4, high 12.2	ebbing	none	none	0	0	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	10	0	11	<10	
14-Jun	7:20 AM	0.02	0.18	0.27	0.28	51	6.2	cloudy, overcast, rain	NNW	8	low -4.1, high 15.6	ebbing	weird plastic rings	weird plastic rings	50	80	clear	0	0	0	n/a	n/a	n/a	n/a	1	0	31	31	
20-Jun	3:30 PM	0.00	0.00	0.00	0.00	72	16.2	sunny, clear	W	9-12	low 0.6, high 14.3	flooding	none	none	5	5	clear	2	0	0	n/a	✓	n/a	n/a	0	0	4	10	
27-Jun	6:50 AM	0.00	0.00	0.01	0.67	51	8.2	cloudy, overcast	SSE	0	low -1.3, high 13.6	ebbing	food trash (bags, cups/lids)	none	40	5	clear	0	0	1	n/a	n/a	n/a	✓	1	0	12	<10	
2-Jul	10:55 AM	0.00	0.00	0.12	0.66	60	9.2	sunny, clear	N	9	low -0.4, high 13.3	flooding	none	none	60	60	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	0	0	21(17)	<10 (<10)	
12-Jul	6:40 AM	0.19	0.20	0.23	0.23	54	8.9				low -3.5, high 15.0	ebbing															28	<10	
18-Jul	12:15 PM	0.00	0.48	0.69	0.69	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	5	<10	
26-Jul	5:36 AM	0.00	0.00	0.00	0.00	61	61.5	sunny, clear	d/m	7	low -0.7, high 13.3	ebbing	none	none	20	10	clear	0	0	0	n/a	n/a	n/a	n/a	0	0	67	61	
1-Aug	11:31 AM	0.00	0.00	0.00	0.00	59	59.7	sunny, clear	ESE	9	low 2.7, high 14	flooding	none	none	1	1	clear	0	0	0	n/a	n/a	n/a	n/a	0	0	8	10	
9-Aug	5:05 AM	1.71	1.74	1.74	1.74	60	61.5	rain	SE	2	low -2.2, high 14.1	ebbing	none	none	10	10	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	0	0	93	187	Human, Dog, Gull
16-Aug	12:24 PM	0.00	0.00	0.39	0.39	59.3	57.3	cloudy	NNW	8	low 0.4, high 15.4	flooding	some litter	none	40	40	clear	1	0	1	n/a	n/a	n/a	✓	0	0	13	<10	
23-Aug	5:09 AM	0.00	0.21	0.42	0.42	59.0	59.9	cloudy, overcast	n/a	0	low 0.5, high 12.8	ebbing	too dark to determine	too dark to determine	too dark to determine	too dark to determine	too dark to determine	0	0	0	n/a	n/a	n/a	n/a	0	0	81	41	
30-Aug	11:58 AM	0.05	0.07	0.56	0.56	56.8	57	rain	S	n/a	low 0.26, high 15.07	d/m	lots of ?? Loose	none	0	0	clear	1	0	0	n/a	n/a	n/a	n/a	3	0	8	10	
5-Sep	2:00 PM	0.42	0.48	0.48	0.56	57	8.2	cloudy, overcast	WNW	6	low 4.6, high 12.0	ebbing	none	none	40	40	clear	0	0	2	n/a	n/a	n/a	✓	0	0	23	10	
12-Sep	9:00 AM	0.00	0.00	0.00	0.02	51	7.5	cloudy, overcast, foggy	NNW	5	low -1.6, high 17.3	d/m	none	none	60	10	cloudy, murky, oily film	0	0	0	n/a	n/a	n/a	n/a	0	0	50	<10	

n/a - not applicable

d/m - data missing

very rough waters

10 seals watching

Potential sources = private/public sewer treatment system outfall(s), individual septic tanks, wildlife, pet feces.

REFUGE COVE 2018

Refuge Cove Sanitary Survey Summary Table

2018 Sampling Date	Sample Collection Time	Rainfall " in <24 hr	Rainfall " in <48 hr	Rainfall " in <72 hr	>72 hr Since Last Rain Event	Air Temp F	Marine Water Temp C / F	Weather	Wind		Tide		Beach Conditions				Visual Turbidity	#People at Beach		#Boats	Beach Activity				Wildlife, Domestic Animal Presence		Fecal Coliform Result	Enterococcus Result	MST Results
									Direction	Speed	Elevation	Phase	Debris		% Vegetation			#Adults	#Children		Swimming	Walking	Fishing	Boating	Waterfowl	Dogs			
													onshore	in water	onshore	in water											cfu/100 ml	MPN/100 ml	
17-May	9:50 AM	0.00	0.00	0.00	0.00	56	10.2	sunny, clear	NNW	10	low -3.6, high 15.5	flooding	none	none	50	50	clear	0	0	0	n/a	n/a	n/a	n/a	0	0	5	74.0	
22-May	1:45 PM	0.82	4.28	5.22	5.22	49	8.4	cloudy, overcast	ESE	8	low 0.6, high 13.7	flooding	plastic bags, food trash	none	50	50	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	0	0	64	95	
31-May	8:36 AM	0.00	0.00	0.15	0.44	50	5.1	sunny, clear	NW	6	low -1.5, high 14.0	ebbing	plastic bag	none	80	100	clear	0	0	0	n/a	n/a	n/a	n/a	6	0	49	<10	
6-Jun	1:15 PM	1.21	1.30	1.80	2.13	50	5.5	cloudy, overcast	SE	18	low 2.4, high 12.2	flooding	none	none	80	90	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	5	0	18	41	
14-Jun	7:36 AM	0.02	0.18	0.27	0.28	51	6.0	cloudy, overcast	NNW	8	low -4.1, high 15.6	ebbing	plastic bags, paper plates	none	90	60	clear	1	1	0	n/a	✓	n/a	n/a	10	0	33	10	
20-Jun	12:40 PM	0.00	0.00	0.00	0.00	65	13.7	cloudy, overcast	W	4 to 12	low 0.6, high 14.3	ebbing	none	none	20	30	clear	0	0	0	n/a	n/a	n/a	n/a	0	0	6	<10	
27-Jun	7:00 AM	0.00	0.00	0.01	0.67	51	8.4	cloudy, overcast	SE	6	low -1.3, high 13.6	ebbing	food garbage (pizza box, bags, cigarettes)	none	80	80	clear	0	0	1	n/a	n/a	n/a	✓	0	0	10	20	
2-Jul	10:30 AM	0.00	0.00	0.12	0.66	60	8.5	sunny, clear	N	9	low -0.4, high 13.3	flooding	food trash (pizza box, plastic bags)	none	70	60	cloudy, murky	5	2	0	n/a	✓	n/a	n/a	0	0	15	<10	
12-Jul	6:50 AM	0.19	0.20	0.23	0.23	54	8.9	cloudy, overcast	SW	3	low -3.5, high 15.0	ebbing	none	none	80	80	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	0	0	22 (26)	<10 (10)	
18-Jul	12:00 PM	0.00	0.48	0.69	0.69	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	7	<10	
26-Jul	5:47 AM	0.00	0.00	0.00	0.00	61	60.8	sunny, clear	d/m	7	low -0.7, high 13.3	ebbing	none	none	60	d/m	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	0	0	22 (19)	20 (31)	
1-Aug	11:25 AM	0.00	0.00	0.00	0.00	57	59.9	sunny, clear	d/m	7	low 2.7, high 14	flooding	none	none	10	10	d/m	0	0	0	n/a	n/a	n/a	n/a	0	0	1	20	
9-Aug	5:12 AM	1.71	1.74	1.74	1.74	58	61	cloudy	SE	2	low -2.2, high 14.1	ebbing	none	none	20	20	d/m	0	0	0	n/a	n/a	n/a	n/a	0	0	53	97	Human, Gull
16-Aug	11:47 AM	0.00	0.00	0.39	0.39	59.1	57.0	overcast	N	10	low 0.4, high 15.4	flooding	none	none	20	20	d/m	0	0	0	n/a	n/a	n/a	n/a	20	0	3	<10	
23-Aug	5:20 AM	0.00	0.21	0.42	0.42	59	59.7	cloudy, overcast	n/a	0	low 0.5, high 12.8	ebbing	none	none	0	0	clear	0	0	0	n/a	n/a	n/a	✓	20	0	16	10	
30-Aug	12:12 PM	0.05	0.07	0.56	0.56	57	56.3	cloudy, overcast	ESE	10	low 0.26, high 15.07	flooding	none	none	0	0	clear	1	0	0	n/a	✓	n/a	n/a	0	1	88	<10	
5-Sep	2:10 PM	0.42	0.48	0.48	0.56	57	8.2	partly cloudy, rain	WNW	6	low 4.6, high 12.0	ebbing	none	none	80	60	clear	0	0	0	n/a	n/a	n/a	n/a	3	0	55	<10	
12-Sep	8:50 AM	0.00	0.00	0.00	0.02	51	6.5	cloudy, overcast	NNW	5	low -1.6, high 17.3	ebbing	none	none	40	30	clear	0	0	0	n/a	n/a	n/a	n/a	8	0	25	41	

n/a - not applicable
d/m - data missing

temperature decrease with rainfall

2 cruise ships coming into port

mink came close to samplers and watched

Potential sources = private/public sewer treatment system outfall(s), public treatment system emergency bypasses, individual septic tanks, wildlife, pet feces.

THOMAS BASIN 2018

Thomas Basin Sanitary Survey Summary Table

2018 Sampling Date	Sample Collection Time	Rainfall " in <24 hr	Rainfall " in <48 hr	Rainfall " in <72 hr	>72 hr Since Last Rain Event	Air Temp F	Marine Water Temp C / F	Weather	Wind		Tide		Beach Conditions				Visual Turbidity	#People at Beach		#Boats	Beach Activity				Wildlife, Domestic Animal Presence		Fecal Coliform Result	Enterococcus Result	MST Results
									Direction	Speed	Elevation	Phase	Debris		% Vegetation			#Adults	#Children		Swimming	Walking	Fishing	Boating	Waterfowl	Dogs			
													onshore	in water	onshore	in water											cfu/100 ml	MPN/100 ml	
17-May	12:10 PM	0.00	0.00	0.00	0.00	60	10.3	sunny, clear	NNW	8	low -3.6, high 15.5	flooding	none	none	20	40	slightly turbid	0	0	50	n/a	n/a	n/a	✓	0	0	1.0	10.0	
22-May	1:10 PM	0.82	4.28	5.22	5.22	49	8.5	cloudy, overcast	ESE	8	low 0.6, high 13.7	ebbing	none	none	50	50	cloudy, murky, oily film	0	0	50	n/a	n/a	n/a	✓	5	0	81.0	51.0	
31-May	9:20 AM	0.00	0.00	0.15	0.44	52	4.6	sunny, clear	NNW	7	low -1.5, high 14.0	flooding	cigarettes, chip bags, etc.	none	30	20	clear, oily film	0	0	50	n/a	n/a	n/a	✓	4	0	12.0	41.0	
6-Jun	12:45 PM	1.21	1.30	1.80	2.13	49	4.3	cloudy, overcast, rain	SE	14	low 2.4, high 12.2	ebbing	none	none	30	80	cloudy, murky	0	0	50	n/a	n/a	n/a	✓	0	0	139.0	173.0	
14-Jun	8:15 AM	0.02	0.18	0.27	0.28	53	4.9	cloudy, overcast	N	10	low -4.1, high 15.6	flooding	cigarettes	none	10	10	cloudy, very murky	0	0	50	n/a	n/a	n/a	✓	0	0	19.0	20.0	
20-Jun	11:45 AM	0.00	0.00	0.00	0.00	65	14.5	sunny, clear	W	4	low 0.6, high 14.3	ebbing	none	none	80	10	d/m	d/m	d/m	50	n/a	✓	✓	✓	0	d/m	9.0	<10	
27-Jun	7:35 AM	0.00	0.00	0.01	0.67	51	7.6	cloudy, overcast	SE	6	low -1.3, high 13.6	flooding	none	none	60	5	clear	3	0	50	n/a	✓	✓	✓	0	0	19.0	10.0	
2-Jul	10:00 AM	0.00	0.00	0.12	0.66	59	8.2	sunny, clear	N	9	low -0.4, high 13.3	ebbing	none	none	80	20	clear	30	0	50	n/a	✓	n/a	✓	0	0	41.0	<10	
12-Jul	7:30 AM	0.19	0.20	0.23	0.23	55	8.2	cloudy, overcast	WSW	0	low -3.5, high 15.0	flooding	food debris	none	0	20	cloudy, murky	0	0	50	n/a	n/a	n/a	✓	0	0	37.0	30.0	
18-Jul	11:30 AM	0.00	0.48	0.69	0.69	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	19.0	52.0	
26-Jul	6:12 AM	0.00	0.00	0.00	0.00	61	59.9	sunny, clear	d/m	6	low -0.7, high 13.3	ebbing	none	none	70	0	clear	0	0	50	n/a	n/a	n/a	✓	0	0	23.0	52.0	
1-Aug	10:45 AM	0.00	0.00	0.00	0.00	59	63	cloudy, overcast	ESE	8	low 2.7, high 14	flooding	none	none	25	0	clear	2	0	50	n/a	✓	n/a	✓	0	0	21 (24)	63 (52)	
9-Aug	5:40 AM	1.71	1.74	1.74	1.74	58	61.0	rain	SE	4	low -2.2, high 14.1	flooding	none	none	10	10	cloudy, murky	0	0	50	n/a	n/a	n/a	✓	0	0	CONF (250)	2755.0	Human, Dog, Gull
16-Aug	10:21 AM	0.00	0.00	0.39	0.39	61.3	58.1	overcast	NNW	10	low 0.4, high 15.4	ebbing	none	none	30	30	cloudy, murky	>50	0	50	n/a	✓	✓	✓	0	0	14.0	74.0	
23-Aug	5:43 AM	0.00	0.21	0.42	0.42	59	59.3	cloudy, overcast	NW	2	low 0.5, high 12.8	ebbing	none	salmon carcasses	0	0	clear	0	0	50	n/a	n/a	n/a	✓	0	0	59	496	
30-Aug	9:59 AM	0.05	0.07	0.56	0.56	58	58.4	cloudy, overcast	SE	3	low 0.26, high 15.07	flooding	none	none	30	2	clear	100	10	50	n/a	✓	✓	✓	12	0	49	350	
5-Sep	2:50 PM	0.42	0.48	0.48	0.56	59	9.7	partly cloudy	WNW	6	low 4.6, high 12.0	ebbing	none	none	60	60	clear	5	0	50	n/a	✓	n/a	✓	2	0	72	528	
12-Sep	8:15 AM	0.00	0.00	0.00	0.02	51	7.8	cloudy, overcast	N	5	low -1.6, high 17.3	ebbing	liquor bottles	none	60	10	clear, oily film	3	0	50	n/a	n/a	n/a	✓	8	0	26	130	

n/a - not applicable
d/m - data missing

road construction so less foot traffic

24 salmon

5 harbor seals

Potential sources = private/public sewer treatment system outfall(s), public treatment system emergency bypasses, sewer line breaks, individual septic tanks, wildlife, pet feces, boats in harbor areas.

SEAPORT 2018

Seaport Sanitary Survey Summary Table

2018 Sampling Date	Sample Collection Time	Rainfall " in <24 hr	Rainfall " in <48 hr	Rainfall " in <72 hr	>72 hr Since Last Rain Event	Air Temp F	Marine Water Temp C / F	Weather	Wind		Tide		Beach Conditions				Visual Turbidity	#People at Beach		#Boats	Beach Activity				Wildlife, Domestic Animal Presence		Fecal Coliform Result	Enterococcus Result	MST Results
									Direction	Speed	Elevation	Phase	Debris		% Vegetation			#Adults	#Children		g	Walking	Fishing	Boating	Waterfowl	Dogs			
													onshore	in water	onshore	in water											cfu/100 ml	MPN/100 ml	
17-May	10:40 AM	0.00	0.00	0.00	0.00	60	12.1	sunny, clear	NNW	3	low -3.6, high 15.5	flooding	none	none	10	90	cloudy, murky	5	0	3	n/a	✓	n/a	✓	50	0	<1	<10	
22-May	12:54 PM	0.82	4.28	5.22	5.22	49	8.7	cloudy, overcast	ESE	8	low 0.6, high 13.7	ebbing	none	none	60	80	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	10	0	51.0	10.0	
31-May	9:50 AM	0.00	0.00	0.15	0.44	52	5.2	sunny, clear	NNW	7	low -1.5, high 14.0	flooding	none	none	60	60	clear	0	0	0	n/a	n/a	n/a	n/a	50	0	33.0	<10	
6-Jun	12:25 PM	1.21	1.30	1.80	2.13	50	5.7	cloudy, overcast, rain	SE	14	low 2.4, high 12.2	ebbing	none	none	60	90	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	30	0	13.0	30.0	
14-Jun	8:40 AM	0.02	0.18	0.27	0.28	53	6.5	cloudy, overcast	N	10	low -4.1, high 15.6	flooding	none	none	d/m	d/m	cloudy, murky	0	0	2	n/a	n/a	n/a	✓	2	0	16.0	10.0	
20-Jun	12:08 PM	0.00	0.00	0.00	0.00	65	15.9	cloudy	W	4	low 0.6, high 14.3	ebbing	small rusted metal debris	none	30	85	clear	0	0	0	n/a	n/a	n/a	n/a	0	0	3.0	20.0	
27-Jun	7:55 AM	0.00	0.00	0.01	0.67	54	8.5	cloudy, overcast	SE	6	low -1.3, high 13.6	flooding	none	none	80	20	clear	0	0	3	n/a	n/a	n/a	✓	0	0	8 (8)	<10 (<10)	
2-Jul	9:40 AM	0.00	0.00	0.12	0.66	59	8.4	sunny, clear	N	9	low -0.4, high 13.3	ebbing	none	none	95	50	clear	0	0	0	n/a	n/a	n/a	n/a	15	0	3.0	<10	
12-Jul	7:55 AM	0.19	0.20	0.23	0.23	54	9.7	cloudy, overcast	WSW	0	low -3.5, high 15.0	flooding	none	none	60	60	cloudy, murky	0	0	5	n/a	n/a	n/a	✓	0	0	5.0	10.0	
18-Jul	11:05 AM	0.00	0.48	0.69	0.69	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	3.0	>10	
26-Jul	7:31 AM	0.00	0.00	0.00	0.00	61	60.0	sunny, clear	d/m	d/m	low -0.7, high 13.3	d/m	none	none	5	5	clear	0	0	0	n/a	n/a	n/a	n/a	20	0	6.0	<10	
1-Aug	10:26 AM	0.00	0.00	0.00	0.00	61	62.4	sunny, clear	ESE	8	low 2.7, high 14	ebbing	none	none	5	0	clear	0	0	1	n/a	n/a	n/a	✓	40	0	5.0	<10	
9-Aug	6:50 AM	1.71	1.74	1.74	1.74	60	61.3	cloudy, rain	n/a	0	low -2.2, high 14.1	flooding	none	none	30	30	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	>30	0	26.0	52.0	Human, Dog, Gull
16-Aug	10:02 AM	0.00	0.00	0.39	0.39	59.1	59.9	overcast	NNW	6	low 0.4, high 15.4	ebbing	none	none	30	30	clear	3	1	1	n/a	✓	n/a	✓	20	0	5.0	<10	
23-Aug	6:01 AM	0.00	0.21	0.42	0.42	59	57.3	cloudy, overcast	NW	2	low 0.5, high 12.8	flooding	none	none	0	0	clear	0	0	0	n/a	n/a	n/a	n/a	30	0	<1	<10	
30-Aug	9:36 AM	0.05	0.07	0.56	0.56	58	57.7	cloudy, overcast	SE	3	low 0.26, high 15.07	flooding	some metal debris	seastars, juvenile dungies	60	20	clear	2	0	0	n/a	n/a	n/a	n/a	25	0	4.0	10.0	
5-Sep	3:00 PM	0.42	0.48	0.48	0.56	59	9.7	partly cloudy	WNW	6	low 4.6, high 12.0	ebbing	none	none	10	80	clear	0	0	2	n/a	n/a	n/a	✓	40	0	<1	10.0	
12-Sep	8:00 AM	0.00	0.00	0.00	0.02	51	8.0	cloudy, overcast	N	5	low -1.6, high 17.3	ebbing	tubing	none	60	20	clear	0	0	3	n/a	n/a	n/a	✓	30	0	63.0	<10	
n/a - not applicable																										2 eagles			
d/m - data missing																													
Potential sources = private/public sewer treatment system outfall(s), public treatment system emergency bypasses, sewer line breaks, individual septic tanks, wildlife, pet feces, boat launch area.																													

ROTARY PARK POOL 2018

Rotary Pool Sanitary Survey Summary Table

2018 Sampling Date	Sample Collection Time	Rainfall " in <24 hr	Rainfall " in <48 hr	Rainfall " in <72 hr	>72 hr Since Last Rain Event	Air Temp F	Marine Water Temp C / F	Weather	Wind		Tide		Beach Conditions				Visual Turbidity	#People at Beach		#Boats	Beach Activity				Wildlife, Domestic Animal Presence		Fecal Coliform Result	Enterococcus Result	MST Results
									Direction	Speed	Elevation	Phase	Debris		% Vegetation			#Adults	#Children		Swimming	Walking	Fishing	Boating	Waterfowl	Dogs			
													onshore	in water	onshore	in water											cfu/100 ml	MPN/100 ml	
17-May	11:03 AM	0.00	0.00	0.00	0.00	60	11.0	sunny, clear	NNW	5	low -3.6, high 15.5	flooding	none	none	none	none	clear	25	50	0	✓	✓	n/a	n/a	5	0	<1	20.0	
22-May	12:45 PM	0.82	4.28	5.22	5.22	50	8.9	cloudy, overcast, rain	ESE	4	low 0.6, high 13.7	ebbing	none	none	10	0	clear	4	10	d/m	n/a	✓	n/a	✓	0	0	39 (17)	30 (20)	
31-May	10:05 AM	0.00	0.00	0.15	0.44	52	6.8	sunny, clear	NNW	7	low -1.5, high 14.0	flooding	none	none	10	0	clear	15	0	0	n/a	✓	n/a	n/a	0	0	23.0	10.0	
6-Jun	12:10 PM	1.21	1.30	1.80	2.13	50	7.0	cloudy, overcast, rain	SE	14	low 2.4, high 12.2	ebbing	none	none	10	10	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	3	0	36.0	30.0	
14-Jun	9:00 AM	0.02	0.18	0.27	0.28	53	6.1	cloudy, overcast	NNW	10	low -4.1, high 15.6	flooding	none	none	0	0	cloudy, murky	19	2	0	n/a	✓	n/a	n/a	0	0	169.0	145.0	
9-Aug	6:00 AM	1.71	1.74	1.74	1.74	60	61.4	rain	SE	2	low -2.2, high 14.1	flooding	none	none	0	0	clear	0	0	0	n/a	n/a	n/a	n/a	0	0	131.0	336.0	Human, Dog, Gull
16-Aug	9:51 AM	0.00	0.00	0.39	0.39	59.3	57.5	overcast	NNW	6	low 0.4, high 15.4	ebbing	none	none	10	10	clear	2	0	0	n/a	✓	n/a	n/a	0	0	9.0	10.0	
23-Aug	6:52 AM	0.00	0.21	0.42	0.42	59	61.1	cloudy, overcast	n/a	0	low 0.5, high 12.8	flooding	none	none	0	0	d/m	0	0	0	n/a	n/a	n/a	n/a	0	0	24.0	31.0	
30-Aug	9:29 AM	0.05	0.07	0.56	0.56	58	57.3	cloudy, overcast	d/m	1	low 0.26, high 15.07	ebbing	none	none	1	3	clear	2	0	0	n/a	✓	n/a	n/a	0	0	4 (6)	10 (<10)	
5-Sep	3:15 PM	0.42	0.48	0.48	0.56	59	11.5	partly cloudy	WNW	6	low 4.6, high 12.0	ebbing	none	none	20	5	clear	0	0	0	n/a	n/a	n/a	n/a	3	0	3.0	<10	
12-Sep	7:55 AM	0.00	0.00	0.00	0.02	51	6.0	cloudy, overcast	NW	3	low -1.6, high 17.3	ebbing	none	none	10	0	clear	0	0	0	n/a	n/a	n/a	n/a	0	0	25.0	309.0	

n/a - not applicable

d/m - data missing

Potential sources = private/public sewer treatment system outfall(s), public treatment system emergency bypasses, sewer line breaks, individual septic tanks, wildlife, pet feces.

school students visiting beach

ROTARY PARK BEACH 2018

		Rotary Beach Sanitary Survey Summary Table																										
2018 Sampling Date	Sample Collection Time	Rainfall " in <24 hr	Rainfall " in <48 hr	Rainfall " in <72 hr	>72 hr Since Last Rain Event	Air Temp F	Marine Water Temp C / F	Weather	Wind		Tide		Beach Conditions				Visual Turbidity	#People at Beach		#Boats	Beach Activity				Wildlife, Domestic Animal Presence		Fecal Coliform Result	Enterococcus Result	MST Results
									Direction	Speed	Elevation	Phase	Debris		% Vegetation			#Adults	n		g	Walking	Fishing	Boating	l	Dogs			
													onshore	in water	onshore	in water											cfu/100 ml	MPN/100 ml	
20-Jun	11:20 AM	0.00	0.00	0.00	0.00	d/m	15.7	sunny, clear	SSE	12	low 0.6, high 14.3	ebbing	none	none	30	20	clear	2	2	0	✓	✓	n/a	n/a	0	2	13.0	10.0	
27-Jun	8:10 AM	0.00	0.00	0.01	0.67	53	8.7	cloudy, overcast	ESE	6	low -1.3, high 13.6	flooding	candy wrappers	none	70	0	clear	0	0	0	n/a	n/a	n/a	n/a	0	0	26.0	10.0	
2-Jul	9:20 AM	0.00	0.00	0.12	0.66	59	8.5	sunny, clear	N	9	low -0.4, high 13.3	ebbing	none	none	40	0	clear	12	0	0	n/a	✓	n/a	n/a	4	0	8.0	<10	
12-Jul	8:10 AM	0.19	0.20	0.23	0.23	54	10.0	cloudy, overcast	W	0	low -3.5, high 15.0	flooding	none	none	20	0	cloudy, murky	4	2	5	n/a	✓	n/a	✓	6	1	8.0	<10	
18-Jul	10:50 AM	0.00	0.48	0.69	0.69	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	4.0	10.0	
26-Jul	6:30 AM	0.00	0.00	0.00	0.00	61	60.0	sunny, clear	d/m	6	low -0.7, high 13.3	d/m	none	none	5	5	clear	0	0	0	n/a	n/a	n/a	n/a	20	0	13.0	<10	
1-Aug	10:08 AM	0.00	0.00	0.00	0.00	57	61.8	cloudy, overcast	SSE	7	low 2.7, high 14	ebbing	none	none	10	0	clear	2	3	0	n/a	✓	n/a	n/a	25	0	5.0	10.0	
n/a - not applicable																													
d/m - data missing																													
Potential sources = private/public sewer treatment system outfall(s), public treatment system emergency bypasses, sewer line breaks, individual septic tanks, wildlife, pet feces.																													

MOUNTAIN POINT SURPRISE BEACH 2018

Mountain Point Surprise Beach Sanitary Survey Summary Table

2018 Sampling Date	Sample Collection Time	Rainfall " in <24 hr	Rainfall " in <48 hr	Rainfall " in <72 hr	>72 hr Since Last Rain Event	Air Temp F	Marine Water Temp C / F	Weather	Wind		Tide		Beach Conditions				Visual Turbidity	#People at Beach		#Boats	Beach Activity				Wildlife, Domestic Animal Presence		Fecal Coliform Result	Enterococcus Result	MST Results
									Direction	Speed	Elevation	Phase	Debris		% Vegetation			#Adults	#Children		Swimming	Walking	Fishing	Boating	Waterfowl	Dogs			
													onshore	in water	onshore	in water											cfu/100 ml	MPN/100 ml	
20-Jun	11:05 AM	0.00	0.00	0.00	0.00	d/m	15	n/a	SSE	12	low 0.6, high 14.3	ebbing	d/m	d/m	d/m	d/m	clear	0	0	15	n/a	n/a	n/a	✓	0	0	15 (11)	<10 (<10)	
27-Jun	8:40 AM	0.00	0.00	0.01	0.67	55	d/m	cloudy, overcast	ESE	6	low -1.3, high 13.6	flooding	lots of trash (clothes, food packaging)	none	80	5	clear	0	0	3	n/a	n/a	n/a	✓	4	0	23.0	<10	
2-Jul	8:50 AM	0.00	0.00	0.12	0.66	60	8.4	sunny, clear	NNW	10	low -0.4, high 13.3	ebbing	lots of trash (clothes, food items)	none	60	20	clear	20	0	8	✓	n/a	n/a	✓	5	0	9.0	<10	
12-Jul	8:40 AM	0.19	0.20	0.23	0.23	56	8.9	cloudy, overcast	SW	0	low -3.5, high 15.0	flooding	lots of trash	none	70	70	clear	0	0	8	n/a	n/a	n/a	✓	8	0	3.0	<10	
18-Jul	10:30 AM	0.00	0.48	0.69	0.69	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	2.0	<10	
26-Jul	6:53 AM	0.00	0.00	0.00	0.00	61	60.9	sunny, clear	d/m	6	low -0.7, high 13.3	d/m	none	none	80	95	clear	0	0	0	n/a	n/a	n/a	n/a	0	0	9.0	<10	
1-Aug	9:55 AM	0.00	0.00	0.00	0.00	59	61.3	cloudy, overcast	ESE	8	low 2.7, high 14	ebbing	trash pile leading up to beach	none	50	50	cloudy, murky	15	0	3	✓	n/a	✓	✓	0	0	5.0	51.0	

n/a - not applicable

d/m - data missing

8 snorkelers in

Potential sources = private/public sewer treatment system outfall(s), public treatment system emergency bypasses, sewer line breaks, individual septic tanks, wildlife, pet feces.

MOUNTAIN POINT CULTURAL FOOD 2018

Mountain Point Cultural Food Sanitary Survey Summary Table

2018 Sampling Date	Sample Collection Time	Rainfall " in <24 hr	Rainfall " in <48 hr	Rainfall " in <72 hr	>72 hr Since Last Rain Event	Air Temp F	Marine Water Temp C / F	Weather	Wind		Tide		Beach Conditions				Visual Turbidity	#People at Beach		#Boats	Beach Activity				Wildlife, Domestic Animal Presence		Fecal Coliform Result	Enterococcus Result	MST Results
									Direction	Speed	Elevation	Phase	Debris		% Vegetation			#Adults	#Children		Swimming	Walking	Fishing	Boating	Waterfowl	Dogs			
													onshore	in water	onshore	in water													
17-May	11:15 AM	0.00	0.00	0.00	0.00	60	11.5	sunny, clear	NNW	2	low 0.6, high 14.3	flooding	none	none	50	80	clear	10	0	10	n/a	✓	✓	✓	4	0	8.0	10.0	
22-May	12:26 PM	0.82	4.28	5.22	5.22	50	9.0	cloudy, overcast, rain	SE	3	low 0.6, high 13.7	ebbing	various types of trash (beer, chip bags)	none	60	20	clear	0	0	3	n/a	n/a	n/a	✓	0	0	46.0	106.0	
31-May	10:20 AM	0.00	0.00	0.15	0.44	52	5.8	sunny, clear	NNW	7	low -1.5, high 14.0	flooding	beer cans	none	40	20	clear	0	0	15	n/a	n/a	n/a	✓	0	0	21.0	20.0	
6-Jun	11:52 AM	1.21	1.30	1.80	2.13	51	5.5	cloudy, overcast, rain	SE	8	low 2.4, high 12.2	ebbing	none	none	60	50	cloudy, murky	0	0	15	n/a	n/a	n/a	✓	3	0	103.0	121.0	
14-Jun	9:15 AM	0.02	0.18	0.27	0.28	55	7.0	partly cloudy	NNW	9	low -4.1, high 15.6	flooding	none	none	80	80	clear	0	0	10	n/a	n/a	n/a	✓	20	0	9.0	<10	
9-Aug	6:15 AM	1.71	1.74	1.74	1.74	60	61.5	rain	SE	3	low -2.2, high 14.1	flooding	none	none	50	50	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	0	0	43.0	51.0	Human, Dog, Gull
16-Aug	9:38 AM	0.00	0.00	0.39	0.39	57.3	60.2	overcast	NNW	6	low 0.4, high 15.4	ebbing	none	none	70	70	clear	0	0	4	n/a	n/a	n/a	✓	0	0	4.0	10.0	
23-Aug	6:16 AM	0.00	0.21	0.42	0.42	59	59.2	cloudy, overcast	Wind	2	low 0.5, high 12.8	flooding	none	none	0	0	clear	3	0	2	n/a	✓	✓	✓	2 to 5	1	<1 (<1)	<10 (<10)	
30-Aug	9:14 AM	0.05	0.07	0.56	0.56	57.0	58.6	cloudy, overcast	n/a	0	low 0.26, high 15.07	ebbing	none	none	70	80	clear	8	0	1	n/a	✓	n/a	✓	0	0	4.0	40.0	
5-Sep	3:20 PM	0.42	0.48	0.48	0.56	59	8.9	partly cloudy	WNW	6	low 4.6, high 12.0	ebbing	none	none	90	90	clear	0	0	4	n/a	n/a	n/a	✓	3	0	118.0	414.0	
12-Sep	7:30 AM	0.00	0.00	0.00	0.02	51	8.0	cloudy, overcast	NW	3	low -1.6, high 17.3	ebbing	none	none	100	30	clear	0	0	1	n/a	n/a	n/a	✓	5	0	98 (90)	183 (181)	

n/a - not applicable

d/m - data missing

eagles

Potential sources = private/public sewer treatment system outfall(s), public treatment system emergency bypasses, sewer line breaks, individual septic tanks, wildlife, pet feces.

HERRING COVE 2018

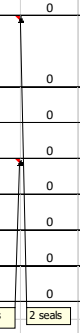
Herring Sanitary Survey Summary Table

2018 Sampling Date	Sample Collection Time	Rainfall " in <24 hr	Rainfall " in <48 hr	Rainfall " in <72 hr	>72 hr Since Last Rain Event	Air Temp F	Marine Water Temp C / F	Weather	Wind		Tide		Beach Conditions				Visual Turbidity	#People at Beach		#Boats	Beach Activity				Wildlife, Domestic Animal Presence		Fecal Coliform Result	Enterococcus Result	MST Results
									Direction	Speed	Elevation	Phase	Debris		% Vegetation			#Adults	#Children		Swimming	Walking	Fishing	Boating	Waterfowl	Dogs			
													onshore	in water	onshore	in water											cfu/100 ml	MPN/100 ml	
17-May	11:35 AM	0.00	0.00	0.00	0.00	60	12.5	sunny, clear	NNW	2	low -3.6, high 15.5	flooding	none	none	0	0	clear	5	0	0	n/a	✓	n/a	n/a	20	0	2.0	31.0	
22-May	11:58 AM	0.82	4.28	5.22	5.22	50	9.2	cloudy, overcast, rain	SE	3	low 0.6, high 13.7	ebbing	none	none	0	10	cloudy, murky	1	0	0	n/a	✓	n/a	✓	4	1	94.0	30.0	
31-May	10:50 AM	0.00	0.00	0.15	0.44	55	5.9	sunny, clear	NNW	6	low -1.5, high 14.0	flooding	none	none	0	0	clear	0	0	0	n/a	n/a	n/a	n/a	15	0	9.0	<10	
6-Jun	11:17 AM	1.21	1.30	1.80	2.13	51	3.5	cloudy, overcast	SE	5	low 2.4, high 12.2	ebbing	none	none	0	0	cloudy, murky	0	0	0	n/a	n/a	n/a	n/a	10	0	123.0	109.0	
14-Jun	9:30 AM	0.02	0.18	0.27	0.28	55	6.5	partly cloudy	NNW	9	low -4.1, high 15.6	flooding	none	none	0	20	clear	16	2	9	n/a	✓	✓	✓	9	0	32 (28)	10 (<10)	
20-Jun	10:40 AM	0.00	0.00	0.00	0.00	d/m	16.7	sunny, clear	SSE	12	low 0.6, high 14.3	ebbing	d/m	d/m	d/m	d/m	clear	10	0	7	n/a	n/a	✓	✓	4	0	67.0	<10	
27-Jun	8:57 AM	0.00	0.00	0.01	0.67	55	8.7	cloudy, overcast	E	5	low -1.3, high 13.6	flooding	none	none	0	0	clear	25	4	10	n/a	✓	✓	✓	25	0	13.0	<10	
2-Jul	8:30 AM	0.00	0.00	0.12	0.66	59	8.5	sunny, clear	NNW	10	low -0.4, high 13.3	ebbing	none	none	0	0	clear	12	2	9	n/a	✓	✓	✓	25	0	18.0	10.0	
12-Jul	9:00 AM	0.19	0.20	0.23	0.23	56	8.7	cloudy, overcast	SSW	0	low -3.5, high 15.0	flooding	none	none	0	5	clear	18	0	0	n/a	n/a	✓	n/a	25	0	33.0	41.0	
18-Jul	10:10 AM	0.00	0.48	0.69	0.69	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	d/m	32 (31)	20 (30)	
26-Jul	7:10 AM	0.00	0.00	0.00	0.00	61	61.3	sunny, clear	d/m	6	low -0.7, high 13.3	d/m	metal pipes	none	0	0	clear	0	0	0	n/a	n/a	n/a	n/a	2	0	45.0	<10	
1-Aug	9:28 AM	0.00	0.00	0.00	0.00	57	60.2	cloudy, overcast	ESE	7	low 2.7, high 14	ebbing	eroded small scrap metal	none	2	0	clear	0	0	0	n/a	n/a	n/a	n/a	9	0	18.0	20.0	
9-Aug	6:30 AM	1.71	1.74	1.74	1.74	60	51.4	cloudy, rain	SE	2	low -2.2, high 14.1	flooding	small metal	none	0	0	clear	0	0	0	n/a	n/a	n/a	n/a	20	0	210.0	201.0	Human, Dog, Gull
16-Aug	9:19 AM	0.00	0.00	0.39	0.39	57.2	59.7	overcast	NNW	6	low 0.4, high 15.4	ebbing	none	none	2	2	clear	2	3	0	n/a	✓	✓	n/a	50	0	81.0	31.0	
23-Aug	6:30 AM	0.00	0.21	0.42	0.42	59	58.6	cloudy, overcast	n/a	0	low 0.5, high 12.8	flooding	none	none	0	0	clear	2	0	0	n/a	✓	✓	n/a	40	0	246.0	156.0	
30-Aug	8:59 AM	0.05	0.07	0.56	0.56	60.9	58.9	cloudy, overcast	SE	8	low 0.26, high 15.07	ebbing	metal	none	2	1	clear	5	0	0	n/a	n/a	✓	n/a	25	0	56.0	20.0	
5-Sep	3:40 PM	0.42	0.48	0.48	0.56	59	9.0	partly cloudy	WNW	6	low 4.6, high 12.0	flooding	fish carcasses	none	0	0	clear	1	0	0	n/a	n/a	✓	n/a	50	0	318.0	457.0	
12-Sep	7:17 AM	0.00	0.00	0.00	0.02	50	7.0	cloudy, overcast	NW	3	low -1.6, high 17.3	ebbing	fish carcasses	none	0	0	clear	4	0	1	n/a	n/a	✓	n/a	100	0	213.0	414.0	

n/a - not applicable

d/m - data missing

Potential sources = private/public sewer treatment system outfall(s), public treatment system emergency bypasses, sewer line breaks, individual septic tanks, wildlife, pet feces.



2017 DATA

Knudson Cove Sanitary Survey summary table																							
2017 sample date	Sample collection time	rainfall " in <24 hr	rainfall " in <48 hr	rainfall " in <72 hr	air temp	rain intensity	sky conditions	wave intensity	tidal phase	visual turbidity	#people in water	#people out water	#people at beach	Boating - #people	Fishing - #people	Walking - #people	wildlife, domestic animal presence				Fecal coliform result	Enterococcus result	MST results
																	gulls	shorebirds	ducks	eagles	cfu/100 ml	MPN/100 ml	
18-Jul	11:15 AM		0.03		69	n/a	mostly cloudy	calm	ebbing	clear	0	75	0	20	5	30	0	0	0	2	16	5.1	
25-Jul	12:08 PM	0.20			59	n/a	partly sunny	normal	flooding	slightly turbid	0	50	0	35	0	15	15	5	0	0	5	3.0	
27-Jul	8:15 AM		0.33		56	misting	cloudy	calm	ebbing	clear	0	40	20	30	15	15	0	0	0	0	9	12.2	
31-Jul	10:52 AM			1.65	61	n/a	sunny	calm	ebbing	turbid	50	60	2	50	60	2	4	5	0	2	167	15.6	
9-Aug	5:25 AM			0	68	n/a	sunny	normal	ebbing	clear	0	0	2	0	0	2	0	4	8	0	98	1986.3	Human
15-Aug	9:15 AM	0.97			54	light rain	cloudy	calm	ebbing	clear	0	20	0	20	0	0	10	0	0	1	6 (9)	26.9 (26.3)	
23-Aug	8:58 AM		4.84		54	light rain	cloudy	calm	ebbing	slightly turbid	0	30	0	20	0	10	10	0	0	1	>200	488.4	
29-Aug	1:07 PM																				2	1.0	
13-Sep	12:35 PM		0		60	n/a	sunny	normal	low	slightly turbid	0	40	0	10	10	20	20	0	0	0	12	14.5	
Potential sources = private sewer treatment system outfall(s), individual septic tanks, wildlife, pet feces, boats in harbor areas.																							

Beacon Hill Sanitary Survey summary table

2017 sample date	Sample collection time	rainfall " in <24 hr	rainfall " in <48 hr	rainfall " in <72 hr	air temp	rain intensity	sky conditions	wave intensity	tidal phase	visual turbidity	#people in water	#people out water	#people at beach	Boating - #people	Fishing - #people	Walking - #people	wildlife, domestic animal presence			Fecal coliform result	Enterococcus result	MST results
																	gulls	shorebirds	eagles	cfu/100 ml	MPN/100 ml	
18-Jul	12:06 PM		0.03		66	n/a	mostly cloudy	normal	ebbing	clear	0	13	0	8	5	0	10	40	0	5	1	
25-Jul	11:47 AM	0.20			59	n/a	mostly cloudy	normal	flooding	clear	0	8	0	8		0	0	0	0	2	<1	
27-Jul	8:40 AM	0.33			55	n/a	cloudy	calm	ebbing											6	19.3	
31-Jul	11:12 AM			1.65	62	n/a	sunny	normal	ebbing	clear	0	60	0	30	30	0	0	2	3	6	26.6	
9-Aug	5:32 AM				68	n/a	sunny	normal	ebbing	clear	0	0	0	0	0	0	0	0	0	11	579.4	Human
15-Aug	9:51 AM	0.97			55	light rain	cloudy	calm	ebbing	clear	0	0	1	0	0	1	40	0	0	22	16.6	
23-Aug	9:22 AM		4.84		54	light rain	cloudy	calm	ebbing	clear	0	20	0	20	0	0	0	0	0	58	101.7	
29-Aug	12:50 PM		0.15		64	n/a	mostly sunny	calm	low	clear	0	35	0	35	0	0	3	0	0	18	7.2	
13-Sep	12:15 PM		0.00		60	n/a	sunny	normal	low	clear	0	30	0	30	0	0	3	0	0	8	9.7	

Potential sources = private sewer treatment system outfall(s), individual septic tanks, wildlife.

South Point Higgins Sanitary Survey summary table

2017 sampling date	Sample collection time	rainfall " in <24 hr	rainfall " in <48 hr	rainfall " in <72 hr	>72 hr since last rain	air temp	rain intensity	sky conditions	wave intensity	tidal phase	visual turbidity	#people in water	#people out water	#people at beach	Boating - #people	Fishing - #people	Walking - #people	Sunbathing - #people	wildlife, domestic animal presence				Fecal coliform result	Enterococcus result	MST results
																			gulls	shorebirds	ravens	dogs	cfu/100 ml	MPN/100 ml	
18-Jul	12:34 PM		0.03			66	n/a	cloudy	normal	ebbing	slightly turbid	0	0	0	0	0	0	0	0	0	0	0	<1	1.0	
25-Jul	11:17 AM	0.2				59	n/a	partly sunny	normal	flooding	clear	0	0	2	0	0	2	0	0	0	0	0	8	4.1	
27-Jul	9:14 AM	0.33				57		cloudy	normal	ebbing	clear	0	20	1	20	0	1	0	0	2	0	0	16 (2)	7.4 (23.8)	
31-Jul	11:37 AM			1.65		no data	no data	no data	no data	no data	clear	5	12	9	12	7	8	4	no data	no data	no data	no data	<1	13.1	
9-Aug	5:48 AM				0	68	n/a	sunny	normal	ebbing	clear	0	0	0	0	0	0	0	4	3	2	0	7 (3)	1119.9 (980.4)	Human
15-Aug	10:15 AM	0.97				55	heavy rain	cloudy	normal	ebbing	slightly turbid	0	0	0	0	0	0	0	2	0	0	0	161	82.3	
23-Aug	9:50 AM		4.84			54	light rain	cloudy	normal	flooding	turbid	0	0	4	0	0	4	0	0	0	0	0	37	46.2	
29-Aug	12:30 PM		0.15			66	n/a	mostly sunny	calm	low	clear	0	0	10	0	0	10	0	10	10	0	3	5	24.3	
13-Sep	11:55 AM		0			60	n/a	sunny	rough	ebbing	slightly turbid	0	0	0	0	0	0	0	0	0	0	0	2	9.5	

Potential sources = private/public sewer treatment system outfall(s), public treatment system emergency bypasses, individual septic tanks, wildlife, pet feces.

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Shull Sanitary Survey summary table

2017 sampling date	Sample collection time	rainfall " in <24 hr	rainfall " in <48 hr	rainfall " in <72 hr	>72 hr since last rain	air temp	rain intensity	sky conditions	wave intensity	tidal phase	visual turbidity	#people in water	#people out water	#people at beach	Boating - #people	Fishing - #people	Walking - #people	wildlife, domestic animal presence					Fecal coliform result	Enterococcus result	MST results
																		gulls	shorebirds	Great blue herons	ravens	dogs	cfu/100 ml	MPN/100 ml	
18-Jul	1:04 PM		0.03			68	n/a	partly sunny	normal	ebbing	clear	0	0	0	0	0	0	4	0	0	0	1	8	6.2	
25-Jul	10:43 AM	0.2				59	n/a	mostly cloudy	normal	flooding	turbid	0	0	0	0	0	0	15	0	0	0	0	167 (68)	124.6 (81.3)	
27-Jul	9:32 AM		0.33			56	misting	cloudy	normal	no data	clear	0	2	0	2	0	0	33	4	2	0	0	12	27.5	
31-Jul	11:55 AM			1.65		61	n/a	sunny	normal	ebbing	clear	0	4	0	2	2	0	45	5	0	2	0	6	20.6	
9-Aug	6:05 AM				0	64	n/a	sunny	normal	ebbing	clear	0	0	0	0	0	0	5	20	2	0	2	4	75.9	Human
15-Aug	11:00 AM	0.97				55	steady rain	cloudy	normal	ebbing	slightly turbid	0	0	0	0	0	0	2	0	0	0	0	27	50.4	
23-Aug	10:17 AM		4.84			54	heavy rain	cloudy	rough	flooding	turbid	0	0	0	0	0	0	50	0	0	0	0	33	28.1	
29-Aug	12:15 PM		0.15			66	n/a	mostly sunny	calm	ebbing	slightly turbid	0	5	0	0	0	5	30	20	0	0	1	16	3.0	
13-Sep	11:32 AM		0			59	n/a	sunny	rough	ebbing	clear	0	0	3	0	0	3	50	0	0	0	1	9	8.4	

Potential sources = private/public sewer treatment system outfall(s), public treatment system emergency bypasses, individual septic tanks, wildlife, pet feces.

Sunset Sanitary Survey summary table

2017 sampling date	Sample collection time	rainfall " in <24 hr	rainfall " in <48 hr	rainfall " in <72 hr	>72 hr since last rain	air temp	rain intensity	sky conditions	wave intensity	tidal phase	visual turbidity	#people in water	#people out water	#people at beach	Boating - #people	Fishing - #people	Walking - #people	Sunbathing - #people	wildlife, domestic animal presence				Fecal coliform result	Enterococcus result	MST results
																			gulls	shorebirds	eagles	dogs	cfu/100 ml	MPN/100 ml	
18-Jul	1:42 PM		0.03			69	n/a	mostly cloudy	calm	ebbing	turbid	0	0	0	0	0	0	0	0	0	0	0	<1 (<1)	4.1 (5.2)	
25-Jul	10:03 AM	0.2				59	n/a	mostly cloudy	normal	low	clear	0	0	0	0	0	0	0	10	5	0	0	16	8.5	
27-Jul	9:56 AM				0	68	n/a	sunny	normal	ebbing	clear	0	0	2	0	0	2	0	3	3	0	1	13	10.9	
31-Jul	12:13 PM			1.65		63	n/a	sunny	normal	ebbing	clear	0	1	0	0	0	1	0	4	0	2	1	41 (8)	34.1 (46.4)	
9-Aug	6:20 AM				0	62	n/a	sunny	normal	ebbing	clear	0	0	0	0	0	0	0	2	1	0	0	142	248.1	Human
15-Aug	8:58 AM	0.97				55	light rain	cloudy	normal	ebbing	clear	0	0	0	0	0	0	0	0	0	0	0	15	22.5	
23-Aug	10:45 AM		4.84			54	heavy rain	cloudy	calm	flooding	clear	0	0	0	0	0	0	0	0	0	0	0	51 (29)	33.7 (47.4)	
29-Aug	11:56 AM		0.145			66	n/a	mostly sunny	calm	ebbing	slighly turbid	0	0	6	0	0	0	6	10	0	0	1	3 (2)	<1 (8.5)	
13-Sep	11:15 AM		0			58	n/a	sunny	rough	ebbing	slighly turbid	0	0	1	0	0	1	0	0	0	0	0	17	9.5	

Potential sources = private/public sewer treatment system outfall(s), individual septic tanks, wildlife, pet feces.

Refuge Cove Sanitary Survey summary table

2017 sampling date	Sample collection time	rainfall " in <24 hr	rainfall " in <48 hr	rainfall " in <72 hr	>72 hr since last rain event	air temp	rain intensity	sky conditions	wave intensity	tidal phase	visual turbidity	#people in water	#people out water	#people at beach	Boating - #people	Fishing - #people	Walking - #people	wildlife, domestic animal presence			Fecal coliform result	Enterococcus result	MST results
																		gulls	shorebird	ravens	cfu/100 ml	MPN/100 ml	
19-Jul	2:45 PM			0.03		63	n/a	mostly sunny	normal	ebbing	slightly turbid	0	0	0	0	0	0	0	0	0	11	2.0	
24-Jul	10:43 AM		1.5			59	n/a	cloudy	calm	flooding	clear	0	0	0	0	0	0	0	0	0	11 (7)	6.1 (5.2)	
26-Jul	9:16 AM		0.5			56	light rain	cloudy	normal	ebbing	turbid	0	0	0	0	0	0	0	0	0	8	12.1	
1-Aug	1:46 PM		0.79			66	n/a	mostly sunny	normal	ebbing	clear	0	4	6	6	0	4	0	0	0	7	26.6	
8-Aug	7:00 AM				0	61	n/a	mostly sunny	normal	ebbing	clear	0	0	0	0	0	0	5	3	5	8 (15)	1299.7 (157.8)	Human
14-Aug	12:35 PM	0.49				56	n/a	cloudy	n/a	flooding	clear	0	0	0	0	0	0	0	0	0	6	21.3	
22-Aug	10:38 AM	4.53				60	heavy rain	cloudy	rough	flooding	turbid	0	0	0	0	0	0	20	0	0	69 (32)	81.6 (57.8)	
29-Aug	11:42 AM		0.15			66	n/a	mostly sunny	calm	ebbing	slightly turbid	0	0	0	0	0	0	30	0	0	7	13.0	
13-Sep	10:50 AM		0			57	n/a	sunny	rough	ebbing	clear	0	0	0	0	0	0	10	0	0	4	13.5	

Potential sources = private/public sewer treatment system outfall(s), public treatment system emergency bypasses, individual septic tanks, wildlife, pet feces.

Thomas Basin Sanitary Survey summary table

2017 sampling date	Sample collection time	rainfall " in <24 hr	rainfall " in <48 hr	rainfall " in <72 hr	>72 hr since last rain	air temp	rain intensity	sky conditions	wave intensity	tidal phase	visual turbidity	#people in water	#people out water	#people at beach	Boating - #people	Fishing - #people	Walking - #people	Sunbathing - #people	wildlife, domestic animal presence			Fecal coliform result	Enterococcus result	MST results
																			gulls	dogs	harbor seals	cfu/100 ml	MPN/100 ml	
19-Jul	1:58 PM		0.03			63	n/a	partly sunny	normal	ebbing	clear	0	8	8	0	3	5	0	0	0	0	5.0	2.0	
24-Jul	10:02 AM		1.5			59	n/a	cloudy	calm	high	slightly turbid	0	50	0	0	0	50	0	0	2	0	9.0	4.1	
26-Jul	8:37 AM		0.5			56	light rain	cloudy	normal	ebbing	slightly turbid	0	0	0	0	0	0	0	0	0	0	14.0	>2419.6	
1-Aug	1:12 PM	0.79				67	n/a	mostly sunny	calm	ebbing	slightly turbid	0	0	0	0	0	0	0	3	0	0	7.0	3.0	
8-Aug	5:50 AM				0	no data	n/a	mostly sunny	normal	ebbing	clear	0	8	0	0	0	4	4	0	0	0	42.0	86.2	Human, gull
14-Aug	11:55 AM	0.49				56	n/a	cloudy	calm	flooding	clear	0	30	100	20	10	100	0	0	0	0	36	156.5	
22-Aug	10:08 AM	4.53				60	heavy rain	cloudy	rough	flooding	turbid	0	0	10	0	0	10	0	0	0	10	CG (250)	137.4	
29-Aug	11:10 AM		0.15			66	n/a	mostly sunny	calm	ebbing	slightly turbid	0	17	0	0	7	10	0	0	0	0	<1	14.5	
13-Sep	10:20 AM		0			57	n/a	sunny	normal	ebbing	slightly turbid	0	0	20	0	2	18	0	15	0	0	13	70.3	

Potential sources = private/public sewer treatment system outfall(s), public treatment system emergency bypasses, sewer line breaks, individual septic tanks, wildlife, pet feces, boats in harbor areas.

Seaport Sanitary Survey summary table

2017 sampling date	Sample collection time	rainfall " in <24 hr	rainfall " in <48 hr	rainfall " in <72 hr	>72 hr since last rain event	air temp	rain intensity	sky conditions	wave intensity	tidal phase	visual turbidity	#people in water	#people out water	#people at beach	Boating - #people	Fishing - #people	Walking - #people	wildlife, domestic animal presence			Fecal coliform result	Enterococcus result	MST results
																		gulls	shorebirds	ravens	cfu/100 ml	MPN/100 ml	
19-Jul	1:26 PM			0.03		63	n/a	mostly cloudy	rough	ebbing	clear	0	0	0	0	0	0	15	0	0	3 (<1)	3 (3.1)	
24-Jul	9:33 AM		1.5			59	n/a	partly sunny	calm	flooding	clear	0	1	0	0	0	1	30	20	0	7.0	2.0	
26-Jul	7:17 AM		0.5			56	misting	cloudy	normal	ebbing	slightly turbid	0	5	0		0	0	10	5	0	3.0	7.3	
1-Aug	12:41 PM		0.79			67	n/a	mostly sunny	normal	ebbing	clear	0	4	0	4	0	0	10	40	7	4 (7)	3.1 (26.6)	
8-Aug	6:20 AM				0	60	n/a	mostly sunny	normal	ebbing	clear	0	0	0	0	0	0	0	8	0	21.0	204.6	Human
14-Aug	11:32 AM	0.49				55	misting	cloudy	calm	ebbing	clear	0	20	20	20	0	20	20	0	0	37.0	21.1	
22-Aug	9:47 AM	4.53				59	heavy rain	cloudy	rough	flooding	clear	0	0	0	0	0	0	20	0	0	CG (250)	250.0	
29-Aug	10:52 AM		0.15			66	n/a	mostly sunny	calm	ebbing	clear	0	6	0	6	0	0	20	0	0	41.0	135.4	
13-Sep	9:55 AM		0			56	n/a	mostly sunny	normal	ebbing	clear	0	0	0	0	0	0	35	0	3	21 (22)	12 (21.3)	

Potential sources = private/public sewer treatment system outfall(s), public treatment system emergency bypasses, sewer line breaks, individual septic tanks, wildlife, pet feces, boat launch area.

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		Rotary Sanitary Survey summary table																								
2017 sampling date	Sample collection time	rainfall " in <24 hr	rainfall " in <48 hr	rainfall " in <72 hr	>72 hr since last rain	air temp	rain intensity	sky conditions	wave intensity	tidal phase	visual turbidity	#people in water	#people out water	#people at beach	Boating - #people	Fishing - #people	Walking - #people	Swimming - #people	Sunbathing - #people	wildlife, domestic animal presence				Fecal coliform result	Enterococcus result	MST results
																				gulls	eagles	ravens	dogs	cfu/100 ml	MPN/100 ml	
19-Jul	12:58 PM			0.03		63	n/a	mostly cloudy	normal	ebbing	slightly turbid	2	16	18	0	0	18	2	0	0	2	0	0	6.0	3.0	
24-Jul	9:11 AM		1.5				n/a	mostly cloudy	calm	flooding	clear	2	21	14	0	1	18	2	0			0	2	68.0	45.7	
26-Jul	6:30 AM		0.5			57	misting	cloudy	normal	ebbing	slightly turbid	0	0	1	0	0	1	0	0	0	0	0	1	99 (137)	980.4 (579.4)	
1-Aug	12:22 PM		0.79			67	n/a	sunny	normal	ebbing	clear	9	2	21	1	1	15	9	6	17	0	0	4	9.0	47.4	
8-Aug	5:30 AM				0	60	n/a	mostly sunny	calm	ebbing	clear	0	0	0	0	0	0	0	0	0	0	18	0	27.0	980.4	Human, dog, gull
14-Aug	11:15 AM	0.49				55	n/a	cloudy	calm	ebbing	clear	0	10	3	10	0	3	0	0	0	0	0	0	21 (11)	69.7 (313.0)	
22-Aug	9:32 AM	4.53				59	heavy rain	cloudy	normal	flooding	clear	0	0	1	0	0	1	0	0	0	0	0	0	>200	1119.9	
29-Aug	10:40 AM		0.15			66	n/a	mostly sunny	calm	ebbing	clear	0	0	7	0	0	7	0	0	0	0	0	1	9.0	69.3	
13-Sep	9:38 AM		0			55	n/a	mostly sunny	normal	ebbing	slightly turbid	0	0	3	0	0	3	0	0	30	0	0	1	6.0	26.2	
Potential sources = private/public sewer treatment system outfall(s), public treatment system emergency bypasses, sewer line breaks, individual septic tanks, wildlife, pet feces.																										

23. APPENDIX C: CHAIN OF CUSTODY FORMS AND LABORATORY REPORTS FOR 2020[17]

[17] Earlier years available upon request

R&M ENGINEERING-KETCHIKAN, INC.
7180 Revilla Road, Ketchikan AK 99901
907-225-7917 x110 / jlarna@rmketchikan.com

Chain of Custody

Report Attention: Gretchen August	Phone Number: 907-465-5023
Company Name: AK DEC	Fax Number:
Address: 410 Willoughby Ave	Sampler Name (Print): Walter Robles
City, State, Zip Juneau AK 99811	Sampler Signature: Walter Robles

Sample Information

PLEASE DO NOT WRITE ON BOD BOTTLES/LIDS, USE PROVIDED REMOVABLE BLUE TAPE LABELS

Sample Location	Sample Matrix (water, drinking, storm)	Date	Time	Grab/Comp	Analysis Requested
Knudson 1	Beach	5-21-20	5:08	Grab	FC/ ENTERO
Knudson 2 FR			5:35		
SP HI 6			5:50		
SHULL			6:02		
Sunset			6:15		
S. Refuge			6:37		
Thomas			6:50		
Seaport			7:17		
Rat Pool			7:25		
Rat Beach			7:38		
Mtn Surprise			7:51		
Mtn Cultural			8:15		
Herring					

FIELD NOTES: Shift down times by one (1) slot. Knudson 1 & 2 (FR) were sampled at the same time.

Tracking Information

Relinquished By:	Date	Time	Received By:	Date	Time
				5/21/20	0850
				temp	= 8.0°C

R&M ENGINEERING-KETCHIKAN, INC.
7180 Revilla Road, Ketchikan AK 99901
907-225-7917 x110 / jlarna@rmketchikan.com

Chain of Custody

Report Attention: Gretchen Angat	Phone Number:
Company Name: ADEC	Fax Number:
Address: 410 Willoughby Ave	Sampler Name (Print): Walter Robles
City, State, Zip Juneau AK 99811	Sampler Signature: Walter Robles

Sample Information

PLEASE DO NOT WRITE ON BOD BOTTLES/LIDS, USE PROVIDED REMOVABLE BLUE TAPE LABELS

Sample Location	Sample Matrix (waste, drinking, storm)	Date	Time	Grab/Comp	Analysis Requested
Herring	Beach	5/27	7:45	Grab	FC/ENTRO
Mtn P Cult.	↓	↓	8:02	↓	↓
Mtn P Surp.			8:12		
Rotary Pool			8:27		
Rotary Beach			8:40		
Seaport			8:56		
Thomas Basin			9:16		
S. Refuge			9:40		
Sunset			9:50		
Shull			10:10		
SP Higgens			10:25		
SP Higgens FR	↓	↓	10:25	↓	↓
Knudson			10:44		

FIELD NOTES: Temp. vial was taken at Mtn. Pt. Surprise beach

Tracking Information

Relinquished By:	Date	Time	Received By:	Date	Time
			[signature] Temp = 7.0 °C	5/27/17	1300

R&M ENGINEERING-KETCHIKAN, INC.
7180 Revilla Road, Ketchikan AK 99901
907-225-7917 x110 / jlarna@rmketchikan.com

Chain of Custody

Report Attention:	Gretchen Augat	Phone Number:	# 907-465-5023
Company Name:	ADEC	Fax Number:	
Address:	410 Willoughby Ave	Sampler Name (Print):	Walter Robles
City, State, Zip	Juneau AK. ~~99801~~ 99811	Sampler Signature:	Walter Robles

Sample Information

PLEASE DO NOT WRITE ON BOD BOTTLES/LIDS. USE PROVIDED REMOVABLE BLUE TAPE LABELS

Sample Location	Sample Matrix (waste, drinking, storm)	Date	Time	Grab/Comp	Analysis Requested
Knudson	Beach	6/3/20	3:41	Grab	FC / ENTERO
SP Higgens	↓	↓	4:05	↓	↓
Shull			4:26		
Shull FR			4:25		
~~[illegible]~~			~~4:25~~		
Sunset			4:47		
Refuge			4:56		
Thomas			5:24		
Seaport			*		
Rotary Bench			5:46		
Rotary Pool			5:50		
Surprise			6:00		
Cultural			6:12		
Herring			6:31		

FIELD NOTES: Seaport was inaccessible due to closed fence *

* R&M: Seaport received @ 0845 jf
sample taken by WR @ 0744 jf

Tracking Information

Relinquished By:	Date	Time	Received By:	Date	Time
			north end - jf	6/3/20	0650
			south end - jf	6/3/20	0725

temp = 8.5°C

R&M

R&M ENGINEERING-KETCHIKAN, INC.
7180 Revilla Road, Ketchikan AK 99901
907-225-7917 x110 / jlarna@rmketchikan.com

Chain of Custody

Report Attention: Gretchen Angat	Phone Number: 907-465-~~67~~ 5023 WR
Company Name: AK DEC	Fax Number:
Address: 410 Willoughby Ave	Sampler Name (Print): Walter Robles
City, State, Zip Juneau, AK 99811	Sampler Signature: Walter Robles

Sample Information

PLEASE DO NOT WRITE ON BOD BOTTLES/LIDS, USE PROVIDED REMOVABLE BLUE TAPE LABELS

Sample Location	Sample Matrix (water, drinking, storm)	Date	Time	Grab/Comp	Analysis Requested
Herring	Beach	6/9/20	7:09	Grab	EC/ENTROCT
Mtn. P Cultural	↓	↓	7:27	↓	↓
Mtn. P Surprise			7:47		
Rotary Pool			7:53		
Rotary Beach			8:01		
Seaport			8:14		
Thomas Basin			8:29		
Refuge			~~9:37~~ WR		
Sunset			9:14		
Sunset FR			"		
Shull			9:28		
SP Higgens			9:50		
Knudson	↓	↓	10:09	↓	↓

FIELD NOTES: Refuge time ~~is~~ WR is 8:57

Tracking Information

Relinquished By:	Date	Time	Received By:	Date	Time
			[signature]	~~6/9~~ 6/9/20	1040

temp = 7.5° C

R&M ENGINEERING-KETCHIKAN, INC.
7180 Revilla Road, Ketchikan AK 99901
907-225-7917 x110 / jlama@rmketchikan.com

Chain of Custody

Report Attention:	GRETCHEN AUGAT	Phone Number:	907 465 5023
Company Name:	AK DEC	Fax Number:	
Address:	410 WILLOUGHBY AVE	Sampler Name (Print):	Walter Robles
City, State, Zip	JUNEAU, AK 99811	Sampler Signature:	Walter Robles

Sample Information

PLEASE DO NOT WRITE ON BOD BOTTLES/LIDS, USE PROVIDED REMOVABLE BLUE TAPE LABELS

Sample Location	Sample Matrix (waste, drinking, storm)	Date	Time	Grab/Comp	Analysis Requested
Knudson	Beach	6/17	3:34	Grab	EC/Enterco
SP Higgins	↓	↓	3:58	↓	↓
Shuttle			4:17		
Sunset			4:31		
Refuge			4:43		
Refuge FR			"		
Thomas			5:13		
Seaport			~~7~~:36		
Rotary ~~Pool~~ B			5:33		
Rotary Pool			5:41		
Mtn Surprise			5:56		
Mtn Cultural			6:10		
Herring	↓	↓	6:30	↓	↓

FIELD/LAB NOTES: Seaport closed, stop by Three Arrows. Able to access on third stop.

Tracking Information

Relinquished By:	Date	Time	Received By:	Date	Time
Walter Robles	6/17/20	8:12	[illegible]	6/17/20	0730
					0845

Temp @ 0730 = 4.5°C
@ 0845 = 8.0°C

R&M ENGINEERING-KETCHIKAN, INC.
7180 Revilla Road, Ketchikan AK 99901
907-225-7917 x110 / jlarna@rmketchikan.com

Chain of Custody

Report Attention: Gretchen Augat	Phone Number: 907-465-5023
Company Name: ADEC	Fax Number:
Address: 410 Willoughby Ave.	Sampler Name (Print): KEENAN SANDERSON
City, State, Zip Juneau, AK 99811	Sampler Signature:

Sample Information

PLEASE DO NOT WRITE ON BOD BOTTLES/LIDS, USE PROVIDED REMOVABLE BLUE TAPE LABELS

Sample Location	Sample Matrix (waste, drinking, storm)	Date	Time	Grab/Comp	Analysis Requested
Herring	Beach	6/22	05:30	Grab	EC/ENTERO
Mtn. Cultural	↓	↓	05:55	↓	↓
Mtn. Surprise			06:00		
Rotary Beach			06:17		
Rotary Pool			06:24		
Seaport			06:36		
Thomas			06:51		
Thomas EB			11		
Refuge			07:16		
Sunset			07:50		
Shull			07:49		
SP Higgins			08:09		
Knudson	↓	↓	08:29	↓	↓

FIELD NOTES:

Tracking Information

Relinquished By:	Date	Time	Received By:	Date	Time
KEENAN SANDERSON	06/22/2020	08:40	Jlarna	6/22/20	0940
			temp = 7.5°C		

R&M

R&M ENGINEERING-KETCHIKAN, INC.
7180 Revilla Road, Ketchikan AK 99901
907-225-7917 x110 / jlarna@rmketchikan.com

Chain of Custody

Report Attention: Gretchen Augat	Phone Number: 907-465-5023
Company Name: ADEC	Fax Number:
Address: 410 Willoughby Ave	Sampler Name (Print): Walter Bolden
City, State, Zip Juneau AK, 99811	Sampler Signature: Walter Bolden

Sample Information

PLEASE DO NOT WRITE ON BOD BOTTLES/LIDS, USE PROVIDED REMOVABLE BLUE TAPE LABELS

Sample Location	Sample Matrix (waste, drinking, storm)	Date	Time	Grab/Comp	Analysis Requested
Knudson	Beach	7/3	4:02	Grab	EC/Entero
SP Higgins	↓	↓	4:25	↓	↓
Shull			4:42		
Sunset			5:02		
Refuge			5:18		
Thomas			5:43		
Seaport			6:03		
Seaport FB			#6:12		
Rotary Beach			6:22		
Rotary Pool			6:33		
Mtn. Surprise			6:48		
Mtn. Cultural			7:03		
Herring	↓	↓	7:21	↓	↓

FIELD NOTES:

Tracking Information

Relinquished By:	Date	Time	Received By:	Date	Time
Walter Bolden	7/3/20	9:10	[signature]	7/3	0940

no temp blank

R&M ENGINEERING-KETCHIKAN, INC.
7180 Revilla Road, Ketchikan AK 99901
907-225-7917 x110 / jlarna@rmketchikan.com

Chain of Custody

Report Attention: Gretchen August	Phone Number: 907-465-5023
Company Name: AK DEC	Fax Number:
Address: 410 Willoughby Ave	Sampler Name (Print): Walther Robles
City, State, Zip Juneau, AK 99811	Sampler Signature: Walther Robles

Sample Information

PLEASE DO NOT WRITE ON BOD BOTTLES/LIDS, USE PROVIDED REMOVABLE BLUE TAPE LABELS

Sample Location	Sample Matrix (waste, drinking, storm)	Date	Time	Grab/Comp	Analysis Requested
Herring	Beach	7/6	5:35	Grab	FC/ENTERO
Mtn. Cult	↓	↓	5:54	↓	↓
Mtn. Surprise			6:N		
Rat. Pool			6:32		
Rat. Beach			6:35		
Seapost			6:46		
Rat. Pool ER			6:32		
Thomas			7:20		
Refuge			7:48		
Sunset			8:05		
Shull			8:29		
SP Higgins			8:46		
Knudson	↓	↓	9:06	↓	↓

FIELD NOTES:
Water: 1030
AC: 1140

Tracking Information

Relinquished By:	Date	Time	Received By:	Date	Time
Walther Robles	7/6/20	8:24	[signature]	7/6	0850

R&M ENGINEERING-KETCHIKAN, INC.
7180 Revilla Road, Ketchikan AK 99901
907-225-7917 x 110 or jlarna@rmketchikan.com

Wastewater Samples Chain of Custody

Report Attention:	Gretchen Augat	Phone Number:	907-465-5023
Company Name:	AK DEC	Email:	
Address:	410 Willoughby Ave	Sampler Name (Print):	Walter Robles
City, State, Zip:	Juneau, AK 99811	Sampler Signature:	Walter Robles

Sample Information

Sample Location	Sample Matrix	Date	Time	Grab/Comp	Analysis Requested
Knudson	Beach	7/13	10:26	Grab	FC/ENTERO
Higgins	Beach	"	10:45	Grab	FC/ENTERO
Shull	Beach	"	11:04	Grab	FC/ENTERO
Sunset	Beach	"	11:21	Grab	FC/ENTERO
Refuge	Beach	"	11:35	Grab	FC/ENTERO
Thomas	Beach	"	12:03	Grab	FC/ENTERO
Seaport	Beach	"	12:20	Grab	FC/ENTERO
Rotary Beach	Beach	"	1:05	Grab	FC/ENTERO
Rotary Beach FR	Beach	"	"	Grab	FC/ENTERO
Rotary Pool	Beach	"	1:18	Grab	FC/ENTERO
Mtn. Surprise	Beach	"	1:38	Grab	FC/ENTERO
Mtn. Cultural	Beach	"	1:57	Grab	FC/ENTERO
Herring	Beach	"	2:15	Grab	FC/ENTERO

DUE TO PROCEDURE AND REGULATION, FAILURE TO COMPLY WITH SAMPLING INSTRUCTIONS & REQUIREMENTS, OR EXCEEDANCE OF TIME/TEMPERATURE LIMITS, MAY RESULT IN SAMPLE REJECTION AND ASSOCIATED RE-SAMPLING FEES.

FIELD/LAB NOTES:

Tracking Information

Relinquished By:	Date	Time	Received By:	Date	Time
Walter Robles	7/13	3:05	JL	7/13/20	1510

temp = 8.0°C

R&M

R&M ENGINEERING-KETCHIKAN, INC.
7180 Revilla Road, Ketchikan AK 99901
907-225-7917 x110 / jlarna@rmketchikan.com

Chain of Custody

Report Attention: Gretchen Augat	Phone Number: 907-465-5023
Company Name: AK DEC	Fax Number:
Address: 410 Willoughby Ave	Sampler Name (Print): Walter Robles
City, State, Zip Juneau, AK 99811	Sampler Signature: Walter Robles

Sample Information

PLEASE DO NOT WRITE ON BOD BOTTLES/LIDS, USE PROVIDED REMOVABLE BLUE TAPE LABELS

Sample Location	Sample Matrix (waste, drinking, storm)	Date	Time	Grab/Comp	Analysis Requested
Knudson	Marine	7/27	9:50	Grab	FC/ENTERO
Higgins	↓	↓	10:05	↓	↓
Shull			10:22		
Sunset			10:34		
Refuge			10:45		
Thomas			11:18		
Seaport			11:30		
Rot. Beach			11:44		
Rot. Pool			11:51		
Mtn. Surprise			12:05		
Mtn. Cultural			12:22		
Mtn. Cultural FR			11		
Herring	↓	↓	12:48	↓	↓

FIELD NOTES: FC @ 1615
ENTC @ 1545

Tracking Information

Relinquished By:	Date	Time	Received By:	Date	Time
			[signature]	7/27/20	1320
			temp = 7.0°		

R&M ENGINEERING-KETCHIKAN, INC.
7180 Revilla Road, Ketchikan AK 99901
907-225-7917 x 110 or jlarna@rmketchikan.com

Wastewater Samples Chain of Custody

Facility Name: Gretchen Augat	Phone Number: 907-465-5023
Analysis Results To: ADEC	Email:
Address: 410 Willoughby Way	Sampler Name (Print): Walter Robles
City, State, Zip: Juneau, AK 99811	Sampler Signature: Walter Robles

Sample Information

Sample Location	Sample Matrix	Date	Time	Grab/Comp	Analysis Requested
Herring	Marine	8/4	5:13	Grab	FC/ENTERO
Herring FR	"	"	"	"	"
Mtn. Cultural	"	"	5:35	"	"
Mtn. Surprise	"	"	5:52	"	"
Rat. Pool	"	"	6:09	"	"
Rat. Beach	"	"	6:23	"	"
Seaport	"	"	6:47	"	"
Thomas	"	"	7:14	"	"
Refuge	"	"	7:49	"	"
Sunset	"	"	8:03	"	"
Shull	"	"	8:31	"	"
SP Higgins	"	"	8:52	"	"
Knudson	"	"	9:11	"	"

DUE TO PROCEDURE AND REGULATION, FAILURE TO COMPLY WITH SAMPLING INSTRUCTIONS & REQUIREMENTS, OR EXCEEDANCE OF TIME/TEMPERATURE LIMITS, MAY RESULT IN SAMPLE REJECTION AND ASSOCIATED RE-SAMPLING FEES.

FIELD/LAB NOTES: 2020

Tracking Information

Relinquished By:	Date	Time	Received By:	Date	Time
Walter Robles	8/4	4:33	[signature]	8/4/20	0945
			temp = 6.5°C		

R&M ENGINEERING-KETCHIKAN, INC.
7180 Revilla Road, Ketchikan AK 99901
907-225-7917 x 110 or jlarna@rmketchikan.com

Wastewater Samples Chain of Custody

Facility Name: AK DEC	Phone Number: 907-465-5023
Analysis Results To: Gretchen Augat	Email:
Address: 410 Willoughby Ave	Sampler Name (Print): Jesse Endert
City, State, Zip: Juneau, AK 99811	Sampler Signature:

Sample Information

Sample Location	Sample Matrix	Date	Time	Grab/Comp	Analysis Requested
Knudson	marine	8/11/20	9:19	Grab	FC/Entero
Knudson FR	"	"	"	"	"
SP Higgins	"	"	9:40	"	"
Shull	"	"	9:59	"	"
Sunset	"	"	10:17	"	"
Refuge	"	"	10:29	"	"
Thomas	"	"	10:57	"	"
Seaport	"	"	11:18	"	"
Rot. Beach	"	"	11:35	"	"
Rot. Pool	"	"	11:48	"	"
Mtn Surprise	"	"	12:05	"	"
Mtn Cultural	"	"	12:19	"	"
Herring	"	"	12:39	"	"

DUE TO PROCEDURE AND REGULATION, FAILURE TO COMPLY WITH SAMPLING INSTRUCTIONS & REQUIREMENTS, OR EXCEEDANCE OF TIME/TEMPERATURE LIMITS, MAY RESULT IN SAMPLE REJECTION AND ASSOCIATED RE-SAMPLING FEES.

FIELD/LAB NOTES: temp = 8.5°C

Tracking Information

Relinquished By:	Date	Time	Received By:	Date	Time
	8/11/20	1:19	JE	8/11	1325
	8/11/20	1:19			

R&M ENGINEERING-KETCHIKAN, INC.
7180 Revilla Road, Ketchikan AK 99901
907-225-7917 x 110 or jlarna@rmketchikan.com

Wastewater Samples Chain of Custody

Facility Name: DEC	Phone Number: 907 465 5023
Analysis Results To: Gretchen Augat	Email: gretchen.augat@alaska.gov
Address: 410 Willoughby Ave Suite 303	Sampler Name (Print): Jesse Endert
City, State, Zip: Juneau, AK 99801	Sampler Signature:

Sample Information

Sample Location	Sample Matrix	Date	Time	Grab/Comp	Analysis Requested
Herring	Marine	8/18/20	4:09	Grab	FC - Entero
Mtn Point Cultural			4:27		
Mtn Point Surprise			4:44		
Rotary Pool			5:04		
Rotary Beach			5:12		
Seaport			5:29		
Thomas			5:49		
Refuge			6:13		
Sunset			6:24		
Shull			6:45		
Higgins			7:06		
Higgins FR			"		
Knudson			7:26		

DUE TO PROCEDURE AND REGULATION, FAILURE TO COMPLY WITH SAMPLING INSTRUCTIONS & REQUIREMENTS, OR EXCEEDANCE OF TIME/TEMPERATURE LIMITS, MAY RESULT IN SAMPLE REJECTION AND ASSOCIATED RE-SAMPLING FEES.

FIELD/LAB NOTES:
Entero @ 1045
Fecal @ 1120

Tracking Information

Relinquished By:	Date	Time	Received By:	Date	Time
	8/18/20	7:45		8/18/20	1900

R&M ENGINEERING-KETCHIKAN, INC.
7180 Revilla Road, Ketchikan AK 99901
907-225-7917 x 110 or jlarna@rmketchikan.com

Wastewater Samples Chain of Custody

Facility Name: AK DEC	Phone Number: 907-465-5023
Analysis Results To: Gretchen Augat	Email:
Address: 410 Willoughby Ave	Sampler Name (Print): Walter Robles
City, State, Zip: Juneau, AK 99811	Sampler Signature: Walter Robles

Sample Information

Sample Location	Sample Matrix	Date	Time	Grab/Comp	Analysis Requested
Knudson	Marine	8/25	9:22	Grab	FC/Entero
SP Higgins	↓	↓	9:44	↓	↓
Shull			10:09		
Shull FR			"		
Sunset			10:32		
Refuge			10:48		
Thomas			11:26		
Seaport			11:51		
Rot. Beach			12:09		
Rot. Pool			12:19		
Mth. Surprise			12:41		
Mth. Cultural			12:59		
Herring	↓	↓	13:21	↓	↓

DUE TO PROCEDURE AND REGULATION, FAILURE TO COMPLY WITH SAMPLING INSTRUCTIONS & REQUIREMENTS, OR EXCEEDANCE OF TIME/TEMPERATURE LIMITS, MAY RESULT IN SAMPLE REJECTION AND ASSOCIATED RE-SAMPLING FEES.

FIELD/LAB NOTES:

Tracking Information

Relinquished By:	Date	Time	Received By:	Date	Time
				8/25/20	1440 (9.0)

R&M

R&M ENGINEERING-KETCHIKAN, INC.
7180 Revilla Road, Ketchikan AK 99901
907-225-7917 x110 / jlarna@rmketchikan.com

Chain of Custody

Report Attention: Gretchen Augat	Phone Number: 907-465-5023
Company Name: AK DEC	Fax Number:
Address: 410 Willoughby Ave	Sampler Name (Print): Walter Robles
City, State, Zip Juneau, AK 99811	Sampler Signature: Walter Robles

Sample Information

PLEASE DO NOT WRITE ON BOD BOTTLES/LIDS, USE PROVIDED REMOVABLE BLUE TAPE LABELS

Sample Location	Sample Matrix (water, drinking, storm)	Date	Time	Grab/Comp	Analysis Requested
Herring	Marine	9/1	5:23	Grab	FC/ENTER
Mm. P. Cultural			5:46		
Mm. P. Surprise			6:09		
Rotary Pool			6:29		
Rotary Beach			6:44		
Seaport			7:07		
Thomas			7:30		
Refuge			7:57		
Sunset			8:12		
Skull			8:34		
SP Higgins			8:53		
Knudson			9:13		
Sunset ER			8:12		

FIELD NOTES:

Tracking Information

Relinquished By:	Date	Time	Received By:	Date	Time
Walter Robles	9/1/20	9:31		9/1/20	0940

R&M

R&M ENGINEERING-KETCHIKAN, INC.
7180 Revilla Road, Ketchikan AK 99901
907-225-7917 x 110 or jlarna@rmketchikan.com

Wastewater Samples Chain of Custody

Facility Name: AK DEC	Phone Number: 907-465-5023
Analysis Results To: Gretch Augat	Email:
Address: 410 Willoughby Ave	Sampler Name (Print): Walter Robles Jesse Gadow
City, State, Zip: Juneau, AK 99811	Sampler Signature: [signature]

Sample Information

Sample Location	Sample Matrix	Date	Time	Grab/Comp	Analysis Requested
Knudson	Marine	9/9/20	8:26	Grab	FC/ENTERO
SP Higgins	↓	↓	8:45	↓	↓
Shull			9:06		
Sunset			9:23		
Refuge			9:36		
Refuge FR			"		
Thomas			10:18		
Seaport			10:40		
Rot. Beach			11:01		
Rot. Pool			11:11		
Mtn. Surprise			11:39		
Mtn. Cultural			12:00		
Herring	↓	↓	12:22	↓	↓

DUE TO PROCEDURE AND REGULATION, FAILURE TO COMPLY WITH SAMPLING INSTRUCTIONS & REQUIREMENTS, OR EXCEEDANCE OF TIME/TEMPERATURE LIMITS, MAY RESULT IN SAMPLE REJECTION AND ASSOCIATED RE-SAMPLING FEES.

FIELD/LAB NOTES:

Tracking Information

Relinquished By:	Date	Time	Received By:	Date	Time
[signature]	9/9/20	1:03	[signature]	9/9/20	1330
				temp = 6.0°C	

R&M ENGINEERING-KETCHIKAN, INC.
7180 Revilla Road, Ketchikan AK 99901
907-225-7917 x 110 or jlarna@rmketchikan.com

Wastewater Samples Chain of Custody

Facility Name: AK DEC	Phone Number: 907-465-5023
Analysis Results To: Gretchen Augat	Email:
Address: 410 Willoughby Ave	Sampler Name (Print): Jesse Endert
City, State, Zip: Juneau, AK 99811	Sampler Signature: Jesse Lynn Endert

Sample Information

Sample Location	Sample Matrix	Date	Time	Grab/Comp	Analysis Requested
Herring	Marine	9/17	4:04	Grab	FC / Entero
Mtn. P. Cultural	↓	↓	4:33	↓	↓
Mtn. P. Surprise			5:10		
Rotary Pool			5:34		
Rotary Beach			5:47		
Seaport			9:24		
Thomas			6:36		
S. Refuge			7:08		
Sunset			7:26		
Shull			7:54		
S. P. Higgins			8:16		
Knudson			8:35		
Thomas FR	↓	↓	6:42	↓	↓

DUE TO PROCEDURE AND REGULATION, FAILURE TO COMPLY WITH SAMPLING INSTRUCTIONS & REQUIREMENTS, OR EXCEEDANCE OF TIME/TEMPERATURE LIMITS, MAY RESULT IN SAMPLE REJECTION AND ASSOCIATED RE-SAMPLING FEES.

FIELD/LAB NOTES:

Tracking Information

Relinquished By:	Date	Time	Received By:	Date	Time
Jesse Endert	9/17/20	9:50		9/17/20	1010

temp = 11.5°C

Source Molecular

Revision 1.1
Effective Date
2/1/19

Source Molecular Corporation
15280 NW 79th Court Suite 107, Miami Lakes, FL 33016 USA
Tel: (1) 786-220-0379 Fax: (1) 786-513-2733
Email: info@sourcemolecular.com

Company Name:_____ Contact Name:_____

Contact Email:_____ Filterer's name: JILL LARNA / R&M

Contact Phone:_____ Filterer's Signature: _____

Filters submitted to Source Molecular

Sample ID	Date of Sample Collection	Site ID	Total Volume Filtered (mL)	# of filters for this sample	Date Filtered	Time Filtration Started	Time Filter Frozen	Tube Box Number/ Position	Comments
1 - SHULL	9-1-2020		100	1	9-1-20	1345			
2 - S.P. HIGGINS	↓		100	1	↓	1350			
3 - M.P. SURPRISE	↓		100	1	↓	1355			
4 - ROT. BEACH	↓		100	1	↓	1400			
5 - ROT. POOL	↓		100	1	↓	1405			
6 - SUNSET	↓		100	1	↓	1410			
7 - KNUDSON	↓		100	1	↓	1415			
8 - M.P. CULTURE	↓		100	1	↓	1420			
9 - THOMAS	↓		100	1	↓	1425			
10 - REFUGE	↓		100	1	↓	1430			
11 - HERRING	↓		100	1	↓	1435			
12 - SEAPORT	↓		100	1	↓	1440			

Project Number: _____ Page: 1 of 1

Chain Of Custody Record

Revision 1.2
Effective Date 8/20/2018

Source Molecular

Source Molecular Corporation
15280 NW 79th CT Suite 107 Miami Lakes, FL 33016
Tel: (1) 786-220-0379 Fax: (1) 786-513-2733
Email: info@sourcemolecular.com

Company Name	AK Dept. Env. Cons. / SE AK Watershed Coalition / Ketchikan Indian Community
Contact Name(s)	Gretchen Augat, Rebecca Bellmore, Walter Robles, Jesse Ender
Send Results To	(email) Gretchen.augat@alaska.gov, rebecca@seakwatersheds.org, 907-288-9381, wrobles@kictribe.org, jender@kictribe.org
Phone	907-465-5023, 907-205-4028 x 3, 907-
Address	410 Willoughby Ave
City/State/Zip	Juneau, AK 99811
Billing Info	PO#: ☐ Will call with credit card

Analysis Requested (see pg. 2) Mark boxes with "X"

Sample ID	Dog Bacteroidetes ID; Target 1	Gull Fecal ID	Human Bacteroidetes ID - Dore'i				Comments (i.e. special requests, # of containers)	Collection Date	Collection Time
Herring	X	X	X					8/1/20	
Mtn. Pt. Cultural	X	X	X					8/1/20	
Mtn. Pt. Surprise	X	X	X					8/1/20	
Rotary Pool	X	X	X					8/1/20	
Rotary Beach	X	X	X					8/1/20	
Seaport	X	X	X					8/1/20	
Thomas	X	X	X					8/1/20	
Refuge	X	X	X					8/1/20	
Sunset	X	X	X					8/1/20	
Small	X	X	X					8/1/20	
SP Higgins	X	X	X					8/1/20	
Knudson	X	X	X					8/1/20	
								8/1/20	

Completed by Client:
Relinquished By: Walter Robles
Signature: Walter Robles
Date/Time: 8/2/20 7:08 AM

To protect confidentiality, confirmation and results will only be sent to email address provided or authorized by contact provided. Signed form indicates agreement with the test limitations on the back of this form and the company's terms of use found here: sourcemolecular.com/about-sourcemolecular/privacy_statement/.

Completed by Source Molecular:
Temperature: 5.2°C
Thermometer: 001
Cooler Number: RM038
Received/Filtered: Anusha
Signature: Anu
Date/Time: 9/3/2020; 10:26AM

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ADEC Division of Water
Attn: Gretchen Augat
410 Willoughby Ave
Jumeau, AK 99811

Ketchikan BEACH

Sampler: Walter Robles
Date: 5/21/2020
Time: 0508-0815
Matrix: marine
Type: grab

LAB RECEIVING
Date: 5/21/2020
Time: 850

LAB REPORTING
Date: 5/22/2020
Time: 1615

ANALYST: JML

Lab #	Sample Name	Analysis	Date Tested	Time Tested	Results	Units	MRL	Method
28573	**KB - Knudson**	**FC**	5/21/2020	1215	**12**	**cfu / 100 ml**	1.0	9222D
		entero	5/21/2020	1100	**30**	**MPN / 100 ml**	10.0	D6503
28574	**KB - S. Pt. Higgins**	**FC**	5/21/2020	1215	**53**	**cfu / 100 ml**	1.0	9222D
		entero	5/21/2020	1100	**51**	**MPN / 100 ml**	10.0	D6503
28575	**KB - Shull**	**FC**	5/21/2020	1215	**8**	**cfu / 100 ml**	1.0	9222D
		entero	5/21/2020	1100	**10**	**MPN / 100 ml**	10.0	D6503
28576	**KB - Sunset**	**FC**	5/21/2020	1215	**18**	**cfu / 100 ml**	1.0	9222D
		entero	5/21/2020	1100	**94**	**MPN / 100 ml**	10.0	D6503
28577	**KB - S. Refuge**	**FC**	5/21/2020	1215	**5**	**cfu / 100 ml**	1.0	9222D
		entero	5/21/2020	1100	**<10**	**MPN / 100 ml**	10.0	D6503
28578	**KB - Thomas**	**FC**	5/21/2020	1215	**30**	**cfu / 100 ml**	1.0	9222D
		entero	5/21/2020	1100	**31**	**MPN / 100 ml**	10.0	D6503
28579	**KB - Seaport**	**FC**	5/21/2020	1215	**48**	**cfu / 100 ml**	1.0	9222D
		entero	5/21/2020	1100	**10**	**MPN / 100 ml**	10.0	D6503
28580	**KB - Rotary Pool**	**FC**	5/21/2020	1215	**9**	**cfu / 100 ml**	1.0	9222D
		entero	5/21/2020	1100	**20**	**MPN / 100 ml**	10.0	D6503
28581	**KB - Rotary Beach**	**FC**	5/21/2020	1215	**26**	**cfu / 100 ml**	1.0	9222D
		entero	5/21/2020	1100	**10**	**MPN / 100 ml**	10.0	D6503
28582	**KB - Mt. Surprise**	**FC**	5/21/2020	1215	**4**	**cfu / 100 ml**	1.0	9222D
		entero	5/21/2020	1100	**40**	**MPN / 100 ml**	10.0	D6503
28583	**KB - Mt. Cultural**	**FC**	5/21/2020	1215	**4**	**cfu / 100 ml**	1.0	9222D
		entero	5/21/2020	1100	**<10**	**MPN / 100 ml**	10.0	D6503
28584	**KB - Herring**	**FC**	5/21/2020	1215	**65**	**cfu / 100 ml**	1.0	9222D
		entero	5/21/2020	1100	**10**	**MPN / 100 ml**	10.0	D6503
28585	**KB - Knudson FR**	**FC**	5/21/2020	1215	**18**	**cfu / 100 ml**	1.0	9222D
		entero	5/21/2020	1100	**30**	**MPN / 100 ml**	10.0	D6503

samples for enterococci analysis were diluted 1:10 to eliminate the potential interference of Bacillus

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ADEC Division of Water
Attn: Gretchen Augat
410 Willoughby Ave
Jumeau, AK 99811

Ketchikan BEACH

Sampler: Walter Robles
Date: 5/27/2020
Time: 0745-1044
Matrix: marine
Type: grab

LAB RECEIVING
Date: 5/27/2020
Time: 1300

LAB REPORTING
Date: 5/28/2020
Time: 1530

ANALYST: JML

Lab #	Sample Name	Analysis	Date Tested	Time Tested	Results	Units	MRL	Method
28595	**KB - Herring**	**FC**	5/27/2020	1440	**33**	**cfu / 100 ml**	1.0	9222D
		entero	5/27/2020	1345	**<10**	**MPN / 100 ml**	10.0	D6503
28596	**KB - Mt Pt Cultural**	**FC**	5/27/2020	1440	**10**	**cfu / 100 ml**	1.0	9222D
		entero	5/27/2020	1345	**<10**	**MPN / 100 ml**	10.0	D6503
28597	**KB - Mt Pt Surprise**	**FC**	5/27/2020	1440	**11**	**cfu / 100 ml**	1.0	9222D
		entero	5/27/2020	1345	**<10**	**MPN / 100 ml**	10.0	D6503
28598	**KB - Rotary Pool**	**FC**	5/27/2020	1440	**5**	**cfu / 100 ml**	1.0	9222D
		entero	5/27/2020	1345	**<10**	**MPN / 100 ml**	10.0	D6503
28599	**KB - Rotary Beach**	**FC**	5/27/2020	1440	**6**	**cfu / 100 ml**	1.0	9222D
		entero	5/27/2020	1345	**10**	**MPN / 100 ml**	10.0	D6503
28600	**KB - Seaport**	**FC**	5/27/2020	1440	**5**	**cfu / 100 ml**	1.0	9222D
		entero	5/27/2020	1345	**<10**	**MPN / 100 ml**	10.0	D6503
28601	**KB - Thomas**	**FC**	5/27/2020	1440	**16**	**cfu / 100 ml**	1.0	9222D
		entero	5/27/2020	1345	**10**	**MPN / 100 ml**	10.0	D6503
28602	**KB - S. Refuge**	**FC**	5/27/2020	1440	**<1**	**cfu / 100 ml**	1.0	9222D
		entero	5/27/2020	1345	**<10**	**MPN / 100 ml**	10.0	D6503
28603	**KB - Sunset**	**FC**	5/27/2020	1440	**31**	**cfu / 100 ml**	1.0	9222D
		entero	5/27/2020	1345	**83**	**MPN / 100 ml**	10.0	D6503
28604	**KB - Shull**	**FC**	5/27/2020	1440	**24**	**cfu / 100 ml**	1.0	9222D
		entero	5/27/2020	1345	**<10**	**MPN / 100 ml**	10.0	D6503
28605	**KB - S. Pt. Higgins**	**FC**	5/27/2020	1440	**8**	**cfu / 100 ml**	1.0	9222D
		entero	5/27/2020	1345	**10**	**MPN / 100 ml**	10.0	D6503
28606	**KB - Knudson**	**FC**	5/27/2020	1440	**7**	**cfu / 100 ml**	1.0	9222D
		entero	5/27/2020	1345	**10**	**MPN / 100 ml**	10.0	D6503
28507	**KB - S. Pt. Higgins FR**	**FC**	5/27/2020	1440	**5**	**cfu / 100 ml**	1.0	9222D
		entero	5/27/2020	1345	**<10**	**MPN / 100 ml**	10.0	D6503

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ADEC Division of Water
Attn: Gretchen Augat
410 Willoughby Ave
Jumeau, AK 99811

Ketchikan BEACH

Sampler: Walter Robles
Date: 6/3/2020
Time: 0341-0744
Matrix: marine
Type: grab

LAB RECEIVING
Date: 6/3/2020
Time: 0650, 0725, 0845

LAB REPORTING
Date: 6/4/2020
Time: 1400

ANALYST: JML

Lab #	Sample Name	Analysis	Date Tested	Time Tested	Results	Units	MRL	Method
28632	**KB - Knudson**	**FC**	6/3/2020	0830	**8**	**cfu / 100 ml**	1.0	9222D
		entero	6/3/2020	0915	**<10**	**MPN / 100 ml**	10.0	D6503
28633	**KB - S. Pt. Higgins**	**FC**	6/3/2020	0830	**109**	**cfu / 100 ml**	1.0	9222D
		entero	6/3/2020	0915	**160**	**MPN / 100 ml**	10.0	D6503
28634	**KB - Shull**	**FC**	6/3/2020	0830	**51**	**cfu / 100 ml**	1.0	9222D
		entero	6/3/2020	0915	**10**	**MPN / 100 ml**	10.0	D6503
28635	**KB - Sunset**	**FC**	6/3/2020	0830	**23**	**cfu / 100 ml**	1.0	9222D
		entero	6/3/2020	0915	**30**	**MPN / 100 ml**	10.0	D6503
28636	**KB - S. Refuge**	**FC**	6/3/2020	0830	**24**	**cfu / 100 ml**	1.0	9222D
		entero	6/3/2020	0915	**20**	**MPN / 100 ml**	10.0	D6503
28637	**KB - Thomas**	**FC**	6/3/2020	0830	**30**	**cfu / 100 ml**	1.0	9222D
		entero	6/3/2020	0915	**10**	**MPN / 100 ml**	10.0	D6503
28638	**KB - Seaport**	**FC**	6/3/2020	0940	**11**	**cfu / 100 ml**	1.0	9222D
		entero	6/3/2020	1000	**<10**	**MPN / 100 ml**	10.0	D6503
28639	**KB - Rotary Beach**	**FC**	6/3/2020	0830	**17**	**cfu / 100 ml**	1.0	9222D
		entero	6/3/2020	0915	**20**	**MPN / 100 ml**	10.0	D6503
28640	**KB - Rotary Pool**	**FC**	6/3/2020	0830	**144**	**cfu / 100 ml**	1.0	9222D
		entero	6/3/2020	0915	**617**	**MPN / 100 ml**	10.0	D6503
28641	**KB - Mt. Surprise**	**FC**	6/3/2020	0830	**22**	**cfu / 100 ml**	1.0	9222D
		entero	6/3/2020	0915	**10**	**MPN / 100 ml**	10.0	D6503
28642	**KB - Mt. Cultural**	**FC**	6/3/2020	0830	**4**	**cfu / 100 ml**	1.0	9222D
		entero	6/3/2020	0915	**<10**	**MPN / 100 ml**	10.0	D6503
28643	**KB - Herring**	**FC**	6/3/2020	0830	**32**	**cfu / 100 ml**	1.0	9222D
		entero	6/3/2020	0915	**30**	**MPN / 100 ml**	10.0	D6503
28644	**KB - Shull FR**	**FC**	6/3/2020	0830	**73**	**cfu / 100 ml**	1.0	9222D
		entero	6/3/2020	0915	**51**	**MPN / 100 ml**	10.0	D6503

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Jumeau, AK 99811

Ketchikan BEACH

Sampler: Walter Robles
Date: 6/9/2020
Time: 0709-1009
Matrix: marine
Type: grab

LAB RECEIVING
Date: 6/9/2020
Time: 1040

LAB REPORTING
Date: 6/10/2020
Time: 1715

ANALYST: JML

Lab #	Sample Name	Analysis	Date Tested	Time Tested	Results	Units	MRL	Method
28676	**KB - Herring**	**FC**	6/9/2020	1420	**32**	**cfu / 100 ml**	1.0	9222D
		entero	6/9/2020	1210	**63**	**MPN / 100 ml**	10.0	D6503
28677	**KB - Mt Pt Cultural**	**FC**	6/9/2020	1420	**6**	**cfu / 100 ml**	1.0	9222D
		entero	6/9/2020	1210	**10**	**MPN / 100 ml**	10.0	D6503
28678	**KB - Mt Pt Surprise**	**FC**	6/9/2020	1420	**5**	**cfu / 100 ml**	1.0	9222D
		entero	6/9/2020	1210	**10**	**MPN / 100 ml**	10.0	D6503
28679	**KB - Rotary Pool**	**FC**	6/9/2020	1420	**97**	**cfu / 100 ml**	1.0	9222D
		entero	6/9/2020	1210	**171**	**MPN / 100 ml**	10.0	D6503
28680	**KB - Rotary Beach**	**FC**	6/9/2020	1420	**4**	**cfu / 100 ml**	1.0	9222D
		entero	6/9/2020	1210	**<10**	**MPN / 100 ml**	10.0	D6503
28681	**KB - Seaport**	**FC**	6/9/2020	1420	**<10**	**cfu / 100 ml**	1.0	9222D
		entero	6/9/2020	1210	**10**	**MPN / 100 ml**	10.0	D6503
28682	**KB - Thomas**	**FC**	6/9/2020	1420	**23**	**cfu / 100 ml**	1.0	9222D
		entero	6/9/2020	1210	**52**	**MPN / 100 ml**	10.0	D6503
28683	**KB - S. Refuge**	**FC**	6/9/2020	1420	**4**	**cfu / 100 ml**	1.0	9222D
		entero	6/9/2020	1210	**<10**	**MPN / 100 ml**	10.0	D6503
28684	**KB - Sunset**	**FC**	6/9/2020	1420	**21**	**cfu / 100 ml**	1.0	9222D
		entero	6/9/2020	1210	**231**	**MPN / 100 ml**	10.0	D6503
28685	**KB - Shull**	**FC**	6/9/2020	1420	**20**	**cfu / 100 ml**	1.0	9222D
		entero	6/9/2020	1210	**<10**	**MPN / 100 ml**	10.0	D6503
28686	**KB - S. Pt. Higgins**	**FC**	6/9/2020	1420	**16**	**cfu / 100 ml**	1.0	9222D
		entero	6/9/2020	1210	**74**	**MPN / 100 ml**	10.0	D6503
28687	**KB - Knudson**	**FC**	6/9/2020	1420	**5**	**cfu / 100 ml**	1.0	9222D
		entero	6/9/2020	1210	**<10**	**MPN / 100 ml**	10.0	D6503
28688	**KB - Sunset FR**	**FC**	6/9/2020	1420	**16**	**cfu / 100 ml**	1.0	9222D
		entero	6/9/2020	1210	**309**	**MPN / 100 ml**	10.0	D6503

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Jumeau, AK 99811

Ketchikan BEACH

Sampler: Walter Robles
Date: 6/17/2020
Time: 0334-0738
Matrix: marine
Type: grab

LAB RECEIVING
Date: 6/17/2020
Time: 0730 & 0845

LAB REPORTING
Date: 6/18/2020
Time: 1615

ANALYST: JML

Lab #	Sample Name	Analysis	Date Tested	Time Tested	Results	Units	MRL	Method
28733	**KB - Knudson**	**FC**	6/17/2020	1030	**39**	**cfu / 100 ml**	1.0	9222D
		entero	6/17/2020	0920	**<10**	**MPN / 100 ml**	10.0	D6503
28734	**KB - S. Pt. Higgins**	**FC**	6/17/2020	1030	**32**	**cfu / 100 ml**	1.0	9222D
		entero	6/17/2020	0920	**332**	**MPN / 100 ml**	10.0	D6503
28735	**KB - Shull**	**FC**	6/17/2020	1030	**46**	**cfu / 100 ml**	1.0	9222D
		entero	6/17/2020	0920	**20**	**MPN / 100 ml**	10.0	D6503
28736	**KB - Sunset**	**FC**	6/17/2020	1030	**8**	**cfu / 100 ml**	1.0	9222D
		entero	6/17/2020	0920	**10**	**MPN / 100 ml**	10.0	D6503
28737	**KB - S. Refuge**	**FC**	6/17/2020	1030	**3**	**cfu / 100 ml**	1.0	9222D
		entero	6/17/2020	0920	**10**	**MPN / 100 ml**	10.0	D6503
28738	**KB - Thomas**	**FC**	6/17/2020	1030	**33**	**cfu / 100 ml**	1.0	9222D
		entero	6/17/2020	0920	**<10**	**MPN / 100 ml**	10.0	D6503
28739	**KB - Seaport**	**FC**	6/17/2020	1030	**6**	**cfu / 100 ml**	1.0	9222D
		entero	6/17/2020	0920	**<10**	**MPN / 100 ml**	10.0	D6503
28740	**KB - Rotary Beach**	**FC**	6/17/2020	1030	**12**	**cfu / 100 ml**	1.0	9222D
		entero	6/17/2020	0920	**<10**	**MPN / 100 ml**	10.0	D6503
28741	**KB - Rotary Pool**	**FC**	6/17/2020	1030	**20**	**cfu / 100 ml**	1.0	9222D
		entero	6/17/2020	0920	**10**	**MPN / 100 ml**	10.0	D6503
28742	**KB - Mt. Surprise**	**FC**	6/17/2020	1030	**19**	**cfu / 100 ml**	1.0	9222D
		entero	6/17/2020	0920	**<10**	**MPN / 100 ml**	10.0	D6503
28743	**KB - Mt. Cultural**	**FC**	6/17/2020	1030	**7**	**cfu / 100 ml**	1.0	9222D
		entero	6/17/2020	0920	**<10**	**MPN / 100 ml**	10.0	D6503
28744	**KB - Herring**	**FC**	6/17/2020	1030	**26**	**cfu / 100 ml**	1.0	9222D
		entero	6/17/2020	0920	**<10**	**MPN / 100 ml**	10.0	D6503
28745	**KB - Refuge FR**	**FC**	6/17/2020	1030	**5**	**cfu / 100 ml**	1.0	9222D
		entero	6/17/2020	0920	**<10**	**MPN / 100 ml**	10.0	D6503

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ADEC Division of Water
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410 Willoughby Ave
Jumeau, AK 99811

Ketchikan BEACH

Sampler: Keenan Sanderson
Date: 6/22/2020
Time: 0536-0829
Matrix: marine
Type: grab

LAB RECEIVING
Date: 6/22/2020
Time: 900

LAB REPORTING
Date: 6/23/2020
Time: 1725

ANALYST: JML

Lab #	Sample Name	Analysis	Date Tested	Time Tested	Results	Units	MRL	Method
28766	**KB - Herring**	**FC**	6/22/2020	1200	**39**	**cfu / 100 ml**	1.0	9222D
		entero	6/22/2020	1120	**30**	**MPN / 100 ml**	10.0	D6503
28767	**KB - Mt Pt Cultural**	**FC**	6/22/2020	1200	**21**	**cfu / 100 ml**	1.0	9222D
		entero	6/22/2020	1120	**10**	**MPN / 100 ml**	10.0	D6503
28768	**KB - Mt Pt Surprise**	**FC**	6/22/2020	1200	**16**	**cfu / 100 ml**	1.0	9222D
		entero	6/22/2020	1120	**20**	**MPN / 100 ml**	10.0	D6503
28769	**KB - Rotary Beach**	**FC**	6/22/2020	1200	**17**	**cfu / 100 ml**	1.0	9222D
		entero	6/22/2020	1120	**192**	**MPN / 100 ml**	10.0	D6503
28770	**KB - Rotary Pool**	**FC**	6/22/2020	1200	**88**	**cfu / 100 ml**	1.0	9222D
		entero	6/22/2020	1120	**3,448**	**MPN / 100 ml**	10.0	D6503
28771	**KB - Seaport**	**FC**	6/22/2020	1200	**5**	**cfu / 100 ml**	1.0	9222D
		entero	6/22/2020	1120	**20**	**MPN / 100 ml**	10.0	D6503
28772	**KB - Thomas**	**FC**	6/22/2020	1200	**96**	**cfu / 100 ml**	1.0	9222D
		entero	6/22/2020	1120	**106**	**MPN / 100 ml**	10.0	D6503
28773	**KB - S. Refuge**	**FC**	6/22/2020	1200	**9**	**cfu / 100 ml**	1.0	9222D
		entero	6/22/2020	1120	**20**	**MPN / 100 ml**	10.0	D6503
28774	**KB - Sunset**	**FC**	6/22/2020	1200	**12**	**cfu / 100 ml**	1.0	9222D
		entero	6/22/2020	1120	**20**	**MPN / 100 ml**	10.0	D6503
28775	**KB - Shull**	**FC**	6/22/2020	1200	confluent growth	**cfu / 100 ml**	1.0	9222D
		entero	6/22/2020	1120	**96**	**MPN / 100 ml**	10.0	D6503
28776	**KB - S. Pt. Higgins**	**FC**	6/22/2020	1200	**343**	**cfu / 100 ml**	1.0	9222D
		entero	6/22/2020	1120	**20**	**MPN / 100 ml**	10.0	D6503
28777	**KB - Knudson**	**FC**	6/22/2020	1200	**70**	**cfu / 100 ml**	1.0	9222D
		entero	6/22/2020	1120	**10**	**MPN / 100 ml**	10.0	D6503
28778	**KB - Thomas FR**	**FC**	6/22/2020	1200	**103**	**cfu / 100 ml**	1.0	9222D
		entero	6/22/2020	1120	**62**	**MPN / 100 ml**	10.0	D6503

samples for enterococci analysis were diluted 1:10 to eliminate the potential interference of Bacillus

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ADEC Division of Water
Attn: Gretchen Augat
410 Willoughby Ave
Jumeau, AK 99811

Ketchikan BEACH

Sampler: Walter Robles
Date: 7/3/2020
Time: 0402-0721
Matrix: marine
Type: grab

LAB RECEIVING
Date: 7/3/2020
Time: 940

LAB REPORTING
Date: 7/4/2020
Time: 1330

ANALYST: JML

Lab #	Sample Name	Analysis	Date Tested	Time Tested	Results	Units	MRL	Method
28797	**KB - Knudson**	**FC**	7/3/2020	1145	**5**	**cfu / 100 ml**	1.0	9222D
		entero	7/3/2020	1020	**<10**	**MPN / 100 ml**	10.0	D6503
28798	**KB - S. Pt. Higgins**	**FC**	7/3/2020	1145	**122**	**cfu / 100 ml**	1.0	9222D
		entero	7/3/2020	1020	**75**	**MPN / 100 ml**	10.0	D6503
28799	**KB - Shull**	**FC**	7/3/2020	1145	**4**	**cfu / 100 ml**	1.0	9222D
		entero	7/3/2020	1020	**<10**	**MPN / 100 ml**	10.0	D6503
28800	**KB - Sunset**	**FC**	7/3/2020	1145	**41**	**cfu / 100 ml**	1.0	9222D
		entero	7/3/2020	1020	**<10**	**MPN / 100 ml**	10.0	D6503
28801	**KB - S. Refuge**	**FC**	7/3/2020	1145	**30**	**cfu / 100 ml**	1.0	9222D
		entero	7/3/2020	1020	**<10**	**MPN / 100 ml**	10.0	D6503
28802	**KB - Thomas**	**FC**	7/3/2020	1145	**28**	**cfu / 100 ml**	1.0	9222D
		entero	7/3/2020	1020	**<10**	**MPN / 100 ml**	10.0	D6503
28803	**KB - Seaport**	**FC**	7/3/2020	1145	**6**	**cfu / 100 ml**	1.0	9222D
		entero	7/3/2020	1020	**<10**	**MPN / 100 ml**	10.0	D6503
28804	**KB - Rotary Beach**	**FC**	7/3/2020	1145	**18**	**cfu / 100 ml**	1.0	9222D
		entero	7/3/2020	1020	**20**	**MPN / 100 ml**	10.0	D6503
28805	**KB - Rotary Pool**	**FC**	7/3/2020	1145	confluent growth	**cfu / 100 ml**	1.0	9222D
		entero	7/3/2020	1020	**30**	**MPN / 100 ml**	10.0	D6503
28806	**KB - Mt. Surprise**	**FC**	7/3/2020	1145	**16**	**cfu / 100 ml**	1.0	9222D
		entero	7/3/2020	1020	**41**	**MPN / 100 ml**	10.0	D6503
28807	**KB - Mt. Cultural**	**FC**	7/3/2020	1145	**22**	**cfu / 100 ml**	1.0	9222D
		entero	7/3/2020	1020	**41**	**MPN / 100 ml**	10.0	D6503
28808	**KB - Herring**	**FC**	7/3/2020	1145	**46**	**cfu / 100 ml**	1.0	9222D
		entero	7/3/2020	1020	**<10**	**MPN / 100 ml**	10.0	D6503
28809	**KB - Refuge FR**	**FC**	7/3/2020	1145	**3**	**cfu / 100 ml**	1.0	9222D
		entero	7/3/2020	1020	**<10**	**MPN / 100 ml**	10.0	D6503

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Jumeau, AK 99811

Ketchikan BEACH

Sampler: Walter Robles
Date: 7/6/2020
Time: 0535-0806
Matrix: marine
Type: grab

LAB RECEIVING
Date: 7/6/2020
Time: 850

LAB REPORTING
Date: 7/7/2020
Time: 1500

ANALYST: JML

Lab #	Sample Name	Analysis	Date Tested	Time Tested	Results	Units	MRL	Method
28819	**KB - Herring**	**FC**	7/6/2020	1140	**82**	**cfu / 100 ml**	1.0	9222D
		entero	7/6/2020	1030	**<10**	**MPN / 100 ml**	10.0	D6503
28820	**KB - Mt Pt Cultural**	**FC**	7/6/2020	1140	**28**	**cfu / 100 ml**	1.0	9222D
		entero	7/6/2020	1030	**<10**	**MPN / 100 ml**	10.0	D6503
28821	**KB - Mt Pt Surprise**	**FC**	7/6/2020	1140	**35**	**cfu / 100 ml**	1.0	9222D
		entero	7/6/2020	1030	**10**	**MPN / 100 ml**	10.0	D6503
28822	**KB - Rotary Pool**	**FC**	7/6/2020	1140	**4**	**cfu / 100 ml**	1.0	9222D
		entero	7/6/2020	1030	**41**	**MPN / 100 ml**	10.0	D6503
28823	**KB - Rotary Beach**	**FC**	7/6/2020	1140	**23**	**cfu / 100 ml**	1.0	9222D
		entero	7/6/2020	1030	**<10**	**MPN / 100 ml**	10.0	D6503
28824	**KB - Seaport**	**FC**	7/6/2020	1140	**7**	**cfu / 100 ml**	1.0	9222D
		entero	7/6/2020	1030	**<10**	**MPN / 100 ml**	10.0	D6503
28825	**KB - Thomas**	**FC**	7/6/2020	1140	**21**	**cfu / 100 ml**	1.0	9222D
		entero	7/6/2020	1030	**20**	**MPN / 100 ml**	10.0	D6503
28826	**KB - S. Refuge**	**FC**	7/6/2020	1140	**33**	**cfu / 100 ml**	1.0	9222D
		entero	7/6/2020	1030	**41**	**MPN / 100 ml**	10.0	D6503
28827	**KB - Sunset**	**FC**	7/6/2020	1140	**18**	**cfu / 100 ml**	1.0	9222D
		entero	7/6/2020	1030	**20**	**MPN / 100 ml**	10.0	D6503
28828	**KB - Shull**	**FC**	7/6/2020	1140	**12**	**cfu / 100 ml**	1.0	9222D
		entero	7/6/2020	1030	**10**	**MPN / 100 ml**	10.0	D6503
28829	**KB - S. Pt. Higgins**	**FC**	7/6/2020	1140	**34**	**cfu / 100 ml**	1.0	9222D
		entero	7/6/2020	1030	**<10**	**MPN / 100 ml**	10.0	D6503
28830	**KB - Knudson**	**FC**	7/6/2020	1140	**3**	**cfu / 100 ml**	1.0	9222D
		entero	7/6/2020	1030	**<10**	**MPN / 100 ml**	10.0	D6503
28831	**KB - Rotary Pool FR**	**FC**	7/6/2020	1140	confluent growth	**cfu / 100 ml**	1.0	9222D
		entero	7/6/2020	1030	**71**	**MPN / 100 ml**	10.0	D6503

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Ketchikan BEACH

Sampler: Walter Robles
Date: 7/13/2020
Time: 1026-1415
Matrix: marine
Type: grab

LAB RECEIVING
Date: 7/13/2020
Time: 1510

LAB REPORTING
Date: 7/15/2020
Time: 1130

ANALYST: JML

Lab #	Sample Name	Analysis	Date Tested	Time Tested	Results	Units	MRL	Method
28916	**KB - Knudson**	**FC**	7/13/2020	1700	**23**	**cfu / 100 ml**	1.0	9222D
		entero	7/13/2020	1545	**20**	**MPN / 100 ml**	10.0	D6503
28917	**KB - S. Pt. Higgins**	**FC**	7/13/2020	1700	**<1**	**cfu / 100 ml**	1.0	9222D
		entero	7/13/2020	1545	**<10**	**MPN / 100 ml**	10.0	D6503
28918	**KB - Shull**	**FC**	7/13/2020	1700	**3**	**cfu / 100 ml**	1.0	9222D
		entero	7/13/2020	1545	**<10**	**MPN / 100 ml**	10.0	D6503
28919	**KB - Sunset**	**FC**	7/13/2020	1700	**7**	**cfu / 100 ml**	1.0	9222D
		entero	7/13/2020	1545	**10**	**MPN / 100 ml**	10.0	D6503
28920	**KB - S. Refuge**	**FC**	7/13/2020	1700	**6**	**cfu / 100 ml**	1.0	9222D
		entero	7/13/2020	1545	**10**	**MPN / 100 ml**	10.0	D6503
28921	**KB - Thomas**	**FC**	7/13/2020	1700	**168**	**cfu / 100 ml**	1.0	9222D
		entero	7/13/2020	1545	**41**	**MPN / 100 ml**	10.0	D6503
28922	**KB - Seaport**	**FC**	7/13/2020	1700	**10**	**cfu / 100 ml**	1.0	9222D
		entero	7/13/2020	1545	**10**	**MPN / 100 ml**	10.0	D6503
28923	**KB - Rotary Beach**	**FC**	7/13/2020	1700	**8**	**cfu / 100 ml**	1.0	9222D
		entero	7/13/2020	1545	**<10**	**MPN / 100 ml**	10.0	D6503
28924	**KB - Rotary Pool**	**FC**	7/13/2020	1700	**2**	**cfu / 100 ml**	1.0	9222D
		entero	7/13/2020	1545	**<10**	**MPN / 100 ml**	10.0	D6503
28925	**KB - Mt. Surprise**	**FC**	7/13/2020	1700	**2**	**cfu / 100 ml**	1.0	9222D
		entero	7/13/2020	1545	**10**	**MPN / 100 ml**	10.0	D6503
28926	**KB - Mt. Cultural**	**FC**	7/13/2020	1700	**12**	**cfu / 100 ml**	1.0	9222D
		entero	7/13/2020	1545	**10**	**MPN / 100 ml**	10.0	D6503
28927	**KB - Herring**	**FC**	7/13/2020	1700	**15**	**cfu / 100 ml**	1.0	9222D
		entero	7/13/2020	1545	**<10**	**MPN / 100 ml**	10.0	D6503
28928	**KB - Rotary Beach FR**	**FC**	7/13/2020	1545	**11**	**cfu / 100 ml**	1.0	9222D
		entero	7/13/2020	1700	**10**	**MPN / 100 ml**	10.0	D6503

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Ketchikan BEACH

Sampler: Walter Robles
Date: 7/22/2020
Time: 0553-0919
Matrix: marine
Type: grab

LAB RECEIVING
Date: 7/22/2020
Time: 1015

LAB REPORTING
Date: 7/24/2020
Time: 1415

ANALYST: JML

Lab #	Sample Name	Analysis	Date Tested	Time Tested	Results	Units	MRL	Method
29015	**KB - Herring**	**FC**	7/22/2020	1345	**101**	**cfu / 100 ml**	1.0	9222D
		entero	7/22/2020	1200	**20**	**MPN / 100 ml**	10.0	D6503
29016	**KB - Mt Pt Cultural**	**FC**	7/22/2020	1345	**82**	**cfu / 100 ml**	1.0	9222D
		entero	7/22/2020	1200	**121**	**MPN / 100 ml**	10.0	D6503
29017	**KB - Mt Pt Surprise**	**FC**	7/22/2020	1345	**24**	**cfu / 100 ml**	1.0	9222D
		entero	7/22/2020	1200	**<10**	**MPN / 100 ml**	10.0	D6503
29018	**KB - Rotary Pool**	**FC**	7/22/2020	1345	**75**	**cfu / 100 ml**	1.0	9222D
		entero	7/22/2020	1200	**31**	**MPN / 100 ml**	10.0	D6503
29019	**KB - Rotary Beach**	**FC**	7/22/2020	1345	**18**	**cfu / 100 ml**	1.0	9222D
		entero	7/22/2020	1200	**<10**	**MPN / 100 ml**	10.0	D6503
29020	**KB - Seaport**	**FC**	7/22/2020	1345	**15**	**cfu / 100 ml**	1.0	9222D
		entero	7/22/2020	1200	**10**	**MPN / 100 ml**	10.0	D6503
29021	**KB - Thomas**	**FC**	7/22/2020	1345	**19**	**cfu / 100 ml**	1.0	9222D
		entero	7/22/2020	1200	**<10**	**MPN / 100 ml**	10.0	D6503
29022	**KB - S. Refuge**	**FC**	7/22/2020	1345	**9**	**cfu / 100 ml**	1.0	9222D
		entero	7/22/2020	1200	**10**	**MPN / 100 ml**	10.0	D6503
29023	**KB - Sunset**	**FC**	7/22/2020	1345	**68**	**cfu / 100 ml**	1.0	9222D
		entero	7/22/2020	1200	**20**	**MPN / 100 ml**	10.0	D6503
29024	**KB - Shull**	**FC**	7/22/2020	1345	**18**	**cfu / 100 ml**	1.0	9222D
		entero	7/22/2020	1200	**<10**	**MPN / 100 ml**	10.0	D6503
29025	**KB - S. Pt. Higgins**	**FC**	7/22/2020	1345	**437**	**cfu / 100 ml**	1.0	9222D
		entero	7/22/2020	1200	**2,235**	**MPN / 100 ml**	10.0	D6503
29026	**KB - Knudson**	**FC**	7/22/2020	1345	**31**	**cfu / 100 ml**	1.0	9222D
		entero	7/22/2020	1200	**31**	**MPN / 100 ml**	10.0	D6503
29027	**KB - Mt Pt Surprise FR**	**FC**	7/22/2020	1345	**25**	**cfu / 100 ml**	1.0	9222D
		entero	7/22/2020	1200	**20**	**MPN / 100 ml**	10.0	D6503

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Jumeau, AK 99811

Ketchikan BEACH

Sampler: Walter Robles
Date: 7/27/2020
Time: 0950-1248
Matrix: marine
Type: grab

LAB RECEIVING
Date: 7/27/2020
Time: 1320

LAB REPORTING
Date: 7/28/2020
Time: 1735

ANALYST: JML

Lab #	Sample Name	Analysis	Date Tested	Time Tested	Results	Units	MRL	Method
29064	**KB - Knudson**	**FC**	7/27/2020	1615	**77**	**cfu / 100 ml**	1.0	9222D
		entero	7/27/2020	1545	**10**	**MPN / 100 ml**	10.0	D6503
29065	**KB - S. Pt. Higgins**	**FC**	7/27/2020	1615	**14**	**cfu / 100 ml**	1.0	9222D
		entero	7/27/2020	1545	**<10**	**MPN / 100 ml**	10.0	D6503
29066	**KB - Shull**	**FC**	7/27/2020	1615	**14**	**cfu / 100 ml**	1.0	9222D
		entero	7/27/2020	1545	**20**	**MPN / 100 ml**	10.0	D6503
29067	**KB - Sunset**	**FC**	7/27/2020	1615	**20**	**cfu / 100 ml**	1.0	9222D
		entero	7/27/2020	1545	**10**	**MPN / 100 ml**	10.0	D6503
29068	**KB - S. Refuge**	**FC**	7/27/2020	1615	**6**	**cfu / 100 ml**	1.0	9222D
		entero	7/27/2020	1545	**<10**	**MPN / 100 ml**	10.0	D6503
29069	**KB - Thomas**	**FC**	7/27/2020	1615	**55**	**cfu / 100 ml**	1.0	9222D
		entero	7/27/2020	1545	**52**	**MPN / 100 ml**	10.0	D6503
29070	**KB - Seaport**	**FC**	7/27/2020	1615	**16**	**cfu / 100 ml**	1.0	9222D
		entero	7/27/2020	1545	**<10**	**MPN / 100 ml**	10.0	D6503
29071	**KB - Rotary Beach**	**FC**	7/27/2020	1615	**20**	**cfu / 100 ml**	1.0	9222D
		entero	7/27/2020	1545	**10**	**MPN / 100 ml**	10.0	D6503
29072	**KB - Rotary Pool**	**FC**	7/27/2020	1615	**507**	**cfu / 100 ml**	1.0	9222D
		entero	7/27/2020	1545	**51**	**MPN / 100 ml**	10.0	D6503
29073	**KB - Mt. Surprise**	**FC**	7/27/2020	1615	**4**	**cfu / 100 ml**	1.0	9222D
		entero	7/27/2020	1545	**<10**	**MPN / 100 ml**	10.0	D6503
29074	**KB - Mt. Cultural**	**FC**	7/27/2020	1615	**12**	**cfu / 100 ml**	1.0	9222D
		entero	7/27/2020	1545	**10**	**MPN / 100 ml**	10.0	D6503
29075	**KB - Herring**	**FC**	7/27/2020	1615	**13**	**cfu / 100 ml**	1.0	9222D
		entero	7/27/2020	1545	**10**	**MPN / 100 ml**	10.0	D6503
29076	**KB - Mt. Cultural FR**	**FC**	7/27/2020	1615	**5**	**cfu / 100 ml**	1.0	9222D
		entero	7/27/2020	1545	**<10**	**MPN / 100 ml**	10.0	D6503

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Jumeau, AK 99811

Ketchikan BEACH

Sampler: Walter Robles
Date: 8/4/2020
Time: 0513-0911
Matrix: marine
Type: grab

LAB RECEIVING
Date: 8/4/2020
Time: 0945

LAB REPORTING
Date: 8/5/2020
Time: 1620

ANALYST: JML

Lab #	Sample Name	Analysis	Date Tested	Time Tested	Results	Units	MRL	Method
29118	**KB - Herring**	**FC**	8/4/2020	1345	**464**	**cfu / 100 ml**	2.0	9222D
		entero	8/4/2020	1140	**706**	**MPN / 100 ml**	10.0	D6503
29119	**KB - Mt Pt Cultural**	**FC**	8/4/2020	1345	**124**	**cfu / 100 ml**	2.0	9222D
		entero	8/4/2020	1140	**109**	**MPN / 100 ml**	10.0	D6503
29120	**KB - Mt Pt Surprise**	**FC**	8/4/2020	1345	**106**	**cfu / 100 ml**	2.0	9222D
		entero	8/4/2020	1140	**41**	**MPN / 100 ml**	10.0	D6503
29121	**KB - Rotary Pool**	**FC**	8/4/2020	1345	**436**	**cfu / 100 ml**	2.0	9222D
		entero	8/4/2020	1140	**323**	**MPN / 100 ml**	10.0	D6503
29122	**KB - Rotary Beach**	**FC**	8/4/2020	1345	**58**	**cfu / 100 ml**	2.0	9222D
		entero	8/4/2020	1140	**52**	**MPN / 100 ml**	10.0	D6503
29123	**KB - Seaport**	**FC**	8/4/2020	1345	**152**	**cfu / 100 ml**	2.0	9222D
		entero	8/4/2020	1140	**155**	**MPN / 100 ml**	10.0	D6503
29124	**KB - Thomas**	**FC**	8/4/2020	1345	**324**	**cfu / 100 ml**	2.0	9222D
		entero	8/4/2020	1140	**620**	**MPN / 100 ml**	10.0	D6503
29125	**KB - S. Refuge**	**FC**	8/4/2020	1345	**16**	**cfu / 100 ml**	2.0	9222D
		entero	8/4/2020	1140	**<10**	**MPN / 100 ml**	10.0	D6503
29126	**KB - Sunset**	**FC**	8/4/2020	1345	**210**	**cfu / 100 ml**	2.0	9222D
		entero	8/4/2020	1140	**41**	**MPN / 100 ml**	10.0	D6503
29127	**KB - Shull**	**FC**	8/4/2020	1345	**194**	**cfu / 100 ml**	2.0	9222D
		entero	8/4/2020	1140	**40**	**MPN / 100 ml**	10.0	D6503
29128	**KB - S. Pt. Higgins**	**FC**	8/4/2020	1345	**62**	**cfu / 100 ml**	2.0	9222D
		entero	8/4/2020	1140	**92**	**MPN / 100 ml**	10.0	D6503
29129	**KB - Knudson**	**FC**	8/4/2020	1345	**12**	**cfu / 100 ml**	2.0	9222D
		entero	8/4/2020	1140	**<10**	**MPN / 100 ml**	10.0	D6503
29130	**KB - Herring FR**	**FC**	8/4/2020	1345	**452**	**cfu / 100 ml**	2.0	9222D
		entero	8/4/2020	1140	**613**	**MPN / 100 ml**	10.0	D6503

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R&M ENGINEERING-KETCHIKAN, INC.
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7180 REVILLA ROAD, SUITE 300, KETCHIKAN, ALASKA 99901
PHONE: 907-225-7917 FAX: 907-225-3441 www.rmketchikan.com

ADEC Division of Water
Attn: Gretchen Augat
410 Willoughby Ave
Jumeau, AK 99811

Ketchikan BEACH

Sampler: Jesse Endert
Date: 8/11/2020
Time: 0919-1239
Matrix: marine
Type: grab

LAB RECEIVING
Date: 8/11/2020
Time: 1325

LAB REPORTING
Date: 8/13/2020
Time: 1015

ANALYST: JML

Lab #	Sample Name	Analysis	Date Tested	Time Tested	Results	Units	MRL	Method
29181	**KB - Knudson**	**FC**	8/11/2020	1615	**8**	**cfu / 100 ml**	2.0	9222D
		entero	8/11/2020	1430	**<10**	**MPN / 100 ml**	10.0	D6503
29182	**KB - S. Pt. Higgins**	**FC**	8/11/2020	1615	**6**	**cfu / 100 ml**	2.0	9222D
		entero	8/11/2020	1430	**<10**	**MPN / 100 ml**	10.0	D6503
29183	**KB - Shull**	**FC**	8/11/2020	1615	**8**	**cfu / 100 ml**	2.0	9222D
		entero	8/11/2020	1430	**<10**	**MPN / 100 ml**	10.0	D6503
29184	**KB - Sunset**	**FC**	8/11/2020	1615	**12**	**cfu / 100 ml**	2.0	9222D
		entero	8/11/2020	1430	**<10**	**MPN / 100 ml**	10.0	D6503
29185	**KB - S. Refuge**	**FC**	8/11/2020	1615	**<2**	**cfu / 100 ml**	2.0	9222D
		entero	8/11/2020	1430	**<10**	**MPN / 100 ml**	10.0	D6503
29186	**KB - Thomas**	**FC**	8/11/2020	1615	**26**	**cfu / 100 ml**	2.0	9222D
		entero	8/11/2020	1430	**10**	**MPN / 100 ml**	10.0	D6503
29187	**KB - Seaport**	**FC**	8/11/2020	1615	**10**	**cfu / 100 ml**	2.0	9222D
		entero	8/11/2020	1430	**<10**	**MPN / 100 ml**	10.0	D6503
29188	**KB - Rotary Beach**	**FC**	8/11/2020	1615	**4**	**cfu / 100 ml**	2.0	9222D
		entero	8/11/2020	1430	**<10**	**MPN / 100 ml**	10.0	D6503
29189	**KB - Rotary Pool**	**FC**	8/11/2020	1615	**14**	**cfu / 100 ml**	2.0	9222D
		entero	8/11/2020	1430	**<10**	**MPN / 100 ml**	10.0	D6503
29190	**KB - Mt. Surprise**	**FC**	8/11/2020	1615	**42**	**cfu / 100 ml**	2.0	9222D
		entero	8/11/2020	1430	**<10**	**MPN / 100 ml**	10.0	D6503
29191	**KB - Mt. Cultural**	**FC**	8/11/2020	1615	**406**	**cfu / 100 ml**	2.0	9222D
		entero	8/11/2020	1430	**85**	**MPN / 100 ml**	10.0	D6503
29192	**KB - Herring**	**FC**	8/11/2020	1615	**136**	**cfu / 100 ml**	2.0	9222D
		entero	8/11/2020	1430	**30**	**MPN / 100 ml**	10.0	D6503
29193	**KB - Knudson FR**	**FC**	8/11/2020	1615	**8**	**cfu / 100 ml**	2.0	9222D
		entero	8/11/2020	1430	**10**	**MPN / 100 ml**	10.0	D6503

samples for enterococci analysis were diluted 1:10 to eliminate the potential interference of Bacillus

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ADEC Division of Water
Attn: Gretchen Augat
410 Willoughby Ave
Jumeau, AK 99811

Ketchikan BEACH

Sampler: Jesse Endert
Date: 8/18/2020
Time: 0409-0726
Matrix: marine
Type: grab

LAB RECEIVING
Date: 8/18/2020
Time: 0900

LAB REPORTING
Date: 8/20/2020
Time: 1510

ANALYST: JML

Lab #	Sample Name	Analysis	Date Tested	Time Tested	Results	Units	MRL	Method
29221	**KB - Herring**	**FC**	8/18/2020	1120	**250**	**cfu / 100 ml**	2.0	9222D
		entero	8/18/2020	1045	**246**	**MPN / 100 ml**	10.0	D6503
29222	**KB - Mt Pt Cultural**	**FC**	8/18/2020	1120	**162**	**cfu / 100 ml**	2.0	9222D
		entero	8/18/2020	1045	**119**	**MPN / 100 ml**	10.0	D6503
29223	**KB - Mt Pt Surprise**	**FC**	8/18/2020	1120	**52**	**cfu / 100 ml**	2.0	9222D
		entero	8/18/2020	1045	**41**	**MPN / 100 ml**	10.0	D6503
29224	**KB - Rotary Pool**	**FC**	8/18/2020	1120	**132**	**cfu / 100 ml**	2.0	9222D
		entero	8/18/2020	1045	**31**	**MPN / 100 ml**	10.0	D6503
29225	**KB - Rotary Beach**	**FC**	8/18/2020	1120	**60**	**cfu / 100 ml**	2.0	9222D
		entero	8/18/2020	1045	**<10**	**MPN / 100 ml**	10.0	D6503
29226	**KB - Seaport**	**FC**	8/18/2020	1120	**36**	**cfu / 100 ml**	2.0	9222D
		entero	8/18/2020	1045	**10**	**MPN / 100 ml**	10.0	D6503
29227	**KB - Thomas**	**FC**	8/18/2020	1120	**190**	**cfu / 100 ml**	2.0	9222D
		entero	8/18/2020	1045	**241**	**MPN / 100 ml**	10.0	D6503
29228	**KB - S. Refuge**	**FC**	8/18/2020	1120	**42**	**cfu / 100 ml**	2.0	9222D
		entero	8/18/2020	1045	**31**	**MPN / 100 ml**	10.0	D6503
29229	**KB - Sunset**	**FC**	8/18/2020	1120	**300**	**cfu / 100 ml**	2.0	9222D
		entero	8/18/2020	1045	**10**	**MPN / 100 ml**	10.0	D6503
29230	**KB - Shull**	**FC**	8/18/2020	1120	**224**	**cfu / 100 ml**	2.0	9222D
		entero	8/18/2020	1045	**160**	**MPN / 100 ml**	10.0	D6503
29231	**KB - S. Pt. Higgins**	**FC**	8/18/2020	1120	**154**	**cfu / 100 ml**	2.0	9222D
		entero	8/18/2020	1045	**63**	**MPN / 100 ml**	10.0	D6503
29232	**KB - Knudson**	**FC**	8/18/2020	1120	**202**	**cfu / 100 ml**	2.0	9222D
		entero	8/18/2020	1045	**97**	**MPN / 100 ml**	10.0	D6503
29233	**KB - S. Pt. Higgins FR**	**FC**	8/18/2020	1120	**144**	**cfu / 100 ml**	2.0	9222D
		entero	8/18/2020	1045	**30**	**MPN / 100 ml**	10.0	D6503

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ADEC Division of Water
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410 Willoughby Ave
Jumeau, AK 99811

Ketchikan BEACH

Sampler: Walter Robles
Date: 8/25/2020
Time: 0922-1321
Matrix: marine
Type: grab

LAB RECEIVING
Date: 8/25/2020
Time: 1440

LAB REPORTING
Date: 8/27/2020
Time: 1645

ANALYST: JML

Lab #	Sample Name	Analysis	Date Tested	Time Tested	Results	Units	MRL	Method
29275	**KB - Knudson**	**FC**	8/25/2020	1730	**31**	**cfu / 100 ml**	2.0	9222D
		entero	8/25/2020	1600	**10**	**MPN / 100 ml**	10.0	D6503
29276	**KB - S. Pt. Higgins**	**FC**	8/25/2020	1730	**8**	**cfu / 100 ml**	2.0	9222D
		entero	8/25/2020	1600	**<10**	**MPN / 100 ml**	10.0	D6503
29277	**KB - Shull**	**FC**	8/25/2020	1730	**64**	**cfu / 100 ml**	2.0	9222D
		entero	8/25/2020	1600	**<10**	**MPN / 100 ml**	10.0	D6503
29278	**KB - Sunset**	**FC**	8/25/2020	1730	**14**	**cfu / 100 ml**	2.0	9222D
		entero	8/25/2020	1600	**10**	**MPN / 100 ml**	10.0	D6503
29279	**KB - S. Refuge**	**FC**	8/25/2020	1730	**9**	**cfu / 100 ml**	2.0	9222D
		entero	8/25/2020	1600	**<10**	**MPN / 100 ml**	10.0	D6503
29280	**KB - Thomas**	**FC**	8/25/2020	1730	**166**	**cfu / 100 ml**	2.0	9222D
		entero	8/25/2020	1600	**41**	**MPN / 100 ml**	10.0	D6503
29281	**KB - Seaport**	**FC**	8/25/2020	1730	**8**	**cfu / 100 ml**	2.0	9222D
		entero	8/25/2020	1600	**10**	**MPN / 100 ml**	10.0	D6503
29282	**KB - Rotary Beach**	**FC**	8/25/2020	1730	**6**	**cfu / 100 ml**	2.0	9222D
		entero	8/25/2020	1600	**<10**	**MPN / 100 ml**	10.0	D6503
29283	**KB - Rotary Pool**	**FC**	8/25/2020	1730	**59**	**cfu / 100 ml**	2.0	9222D
		entero	8/25/2020	1600	**10**	**MPN / 100 ml**	10.0	D6503
29284	**KB - Mt. Surprise**	**FC**	8/25/2020	1730	**26**	**cfu / 100 ml**	2.0	9222D
		entero	8/25/2020	1600	**<10**	**MPN / 100 ml**	10.0	D6503
29285	**KB - Mt. Cultural**	**FC**	8/25/2020	1730	**85**	**cfu / 100 ml**	2.0	9222D
		entero	8/25/2020	1600	**20**	**MPN / 100 ml**	10.0	D6503
29286	**KB - Herring**	**FC**	8/25/2020	1730	**239**	**cfu / 100 ml**	2.0	9222D
		entero	8/25/2020	1600	**41**	**MPN / 100 ml**	10.0	D6503
29287	**KB - Shull FR**	**FC**	8/25/2020	1730	**48**	**cfu / 100 ml**	2.0	9222D
		entero	8/25/2020	1600	**<10**	**MPN / 100 ml**	10.0	D6503

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ADEC Division of Water
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Jumeau, AK 99811

Ketchikan BEACH

Sampler: Walter Robles
Date: 9/1/2020
Time: 0523-0913
Matrix: marine
Type: grab

LAB RECEIVING
Date: 9/1/2020
Time: 0940

LAB REPORTING
Date: 9/3/2020
Time: 0930

ANALYST: JML

Lab #	Sample Name	Analysis	Date Tested	Time Tested	Results	Units	MRL	Method
29311	**KB - Herring**	**FC**	9/1/2020	1105	**194**	**cfu / 100 ml**	2.0	9222D
		entero	9/1/2020	1145	**134**	**MPN / 100 ml**	10.0	D6503
29312	**KB - Mt Pt Cultural**	**FC**	9/1/2020	1105	**26**	**cfu / 100 ml**	2.0	9222D
		entero	9/1/2020	1145	**31**	**MPN / 100 ml**	10.0	D6503
29313	**KB - Mt Pt Surprise**	**FC**	9/1/2020	1105	**28**	**cfu / 100 ml**	2.0	9222D
		entero	9/1/2020	1145	**<10**	**MPN / 100 ml**	10.0	D6503
29314	**KB - Rotary Pool**	**FC**	9/1/2020	1105	**110**	**cfu / 100 ml**	2.0	9222D
		entero	9/1/2020	1145	**30**	**MPN / 100 ml**	10.0	D6503
29315	**KB - Rotary Beach**	**FC**	9/1/2020	1105	**46**	**cfu / 100 ml**	2.0	9222D
		entero	9/1/2020	1145	**30**	**MPN / 100 ml**	10.0	D6503
29316	**KB - Seaport**	**FC**	9/1/2020	1105	**12**	**cfu / 100 ml**	2.0	9222D
		entero	9/1/2020	1145	**31**	**MPN / 100 ml**	10.0	D6503
29317	**KB - Thomas**	**FC**	9/1/2020	1105	**260**	**cfu / 100 ml**	2.0	9222D
		entero	9/1/2020	1145	**63**	**MPN / 100 ml**	10.0	D6503
29318	**KB - S. Refuge**	**FC**	9/1/2020	1105	**44**	**cfu / 100 ml**	2.0	9222D
		entero	9/1/2020	1145	**<10**	**MPN / 100 ml**	10.0	D6503
29319	**KB - Sunset**	**FC**	9/1/2020	1105	**40**	**cfu / 100 ml**	2.0	9222D
		entero	9/1/2020	1145	**<10**	**MPN / 100 ml**	10.0	D6503
29320	**KB - Shull**	**FC**	9/1/2020	1105	**122**	**cfu / 100 ml**	2.0	9222D
		entero	9/1/2020	1145	**10**	**MPN / 100 ml**	10.0	D6503
29321	**KB - S. Pt. Higgins**	**FC**	9/1/2020	1105	**56**	**cfu / 100 ml**	2.0	9222D
		entero	9/1/2020	1145	**<10**	**MPN / 100 ml**	10.0	D6503
29322	**KB - Knudson**	**FC**	9/1/2020	1105	**90**	**cfu / 100 ml**	2.0	9222D
		entero	9/1/2020	1145	**10**	**MPN / 100 ml**	10.0	D6503
29323	**KB - Sunset FR**	**FC**	9/1/2020	1105	**32**	**cfu / 100 ml**	2.0	9222D
		entero	9/1/2020	1145	**<10**	**MPN / 100 ml**	10.0	D6503

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Attn: Gretchen Augat
410 Willoughby Ave
Jumeau, AK 99811

Ketchikan BEACH

Sampler: Walter Robles & Jesse Endert
Date: 9/9/2020
Time: 0826-1222
Matrix: marine
Type: grab

LAB RECEIVING
Date: 9/9/2020
Time: 1330

LAB REPORTING
Date: 9/11/2020
Time: 1000

ANALYST: JML

Lab #	Sample Name	Analysis	Date Tested	Time Tested	Results	Units	MRL	Method
29571	**KB - Knudson**	**FC**	9/9/2020	1530	**188**	**cfu / 100 ml**	2.0	9222D
		entero	9/9/2020	1430	**52**	**MPN / 100 ml**	10.0	D6503
29572	**KB - S. Pt. Higgins**	**FC**	9/9/2020	1530	**74**	**cfu / 100 ml**	2.0	9222D
		entero	9/9/2020	1430	**10**	**MPN / 100 ml**	10.0	D6503
29573	**KB - Shull**	**FC**	9/9/2020	1530	**78**	**cfu / 100 ml**	2.0	9222D
		entero	9/9/2020	1430	**30**	**MPN / 100 ml**	10.0	D6503
29574	**KB - Sunset**	**FC**	9/9/2020	1530	**<2**	**cfu / 100 ml**	2.0	9222D
		entero	9/9/2020	1430	**10**	**MPN / 100 ml**	10.0	D6503
29575	**KB - S. Refuge**	**FC**	9/9/2020	1530	**10**	**cfu / 100 ml**	2.0	9222D
		entero	9/9/2020	1430	**20**	**MPN / 100 ml**	10.0	D6503
29576	**KB - Thomas**	**FC**	9/9/2020	1530	**42**	**cfu / 100 ml**	2.0	9222D
		entero	9/9/2020	1430	**<10**	**MPN / 100 ml**	10.0	D6503
29577	**KB - Seaport**	**FC**	9/9/2020	1530	**4**	**cfu / 100 ml**	2.0	9222D
		entero	9/9/2020	1430	**20**	**MPN / 100 ml**	10.0	D6503
29578	**KB - Rotary Beach**	**FC**	9/9/2020	1530	**10**	**cfu / 100 ml**	2.0	9222D
		entero	9/9/2020	1430	**<10**	**MPN / 100 ml**	10.0	D6503
29579	**KB - Rotary Pool**	**FC**	9/9/2020	1530	**12**	**cfu / 100 ml**	2.0	9222D
		entero	9/9/2020	1430	**213**	**MPN / 100 ml**	10.0	D6503
29580	**KB - Mt. Surprise**	**FC**	9/9/2020	1530	**18**	**cfu / 100 ml**	2.0	9222D
		entero	9/9/2020	1430	**10**	**MPN / 100 ml**	10.0	D6503
29581	**KB - Mt. Cultural**	**FC**	9/9/2020	1530	**112**	**cfu / 100 ml**	2.0	9222D
		entero	9/9/2020	1430	**31**	**MPN / 100 ml**	10.0	D6503
29582	**KB - Herring**	**FC**	9/9/2020	1530	**22**	**cfu / 100 ml**	2.0	9222D
		entero	9/9/2020	1430	**10**	**MPN / 100 ml**	10.0	D6503
29583	**KB - Refuge FR**	**FC**	9/9/2020	1530	**18**	**cfu / 100 ml**	2.0	9222D
		entero	9/9/2020	1430	**20**	**MPN / 100 ml**	10.0	D6503

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Jumeau, AK 99811

Ketchikan BEACH

Sampler: Jesse Endert
Date: 9/17/2020
Time: 0404-0924
Matrix: marine
Type: grab

LAB RECEIVING
Date: 9/17/2020
Time: 1010

LAB REPORTING
Date: 9/20/2020
Time: 1310

ANALYST: JML

Lab #	Sample Name	Analysis	Date Tested	Time Tested	Results	Units	MRL	Method
29414	**KB - Herring**	**FC**	9/17/2020	1220	**434**	**cfu / 100 ml**	2.0	9222D
		entero	9/17/2020	1150	**350**	**MPN / 100 ml**	10.0	D6503
29415	**KB - Mt Pt Cultural**	**FC**	9/17/2020	1220	**114**	**cfu / 100 ml**	2.0	9222D
		entero	9/17/2020	1150	**144**	**MPN / 100 ml**	10.0	D6503
29416	**KB - Mt Pt Surprise**	**FC**	9/17/2020	1220	**28**	**cfu / 100 ml**	2.0	9222D
		entero	9/17/2020	1150	**10**	**MPN / 100 ml**	10.0	D6503
29417	**KB - Rotary Pool**	**FC**	9/17/2020	1220	**10**	**cfu / 100 ml**	2.0	9222D
		entero	9/17/2020	1150	**20**	**MPN / 100 ml**	10.0	D6503
29418	**KB - Rotary Beach**	**FC**	9/17/2020	1220	**14**	**cfu / 100 ml**	2.0	9222D
		entero	9/17/2020	1150	**10**	**MPN / 100 ml**	10.0	D6503
29419	**KB - Seaport**	**FC**	9/17/2020	1220	**6**	**cfu / 100 ml**	2.0	9222D
		entero	9/17/2020	1150	**<10**	**MPN / 100 ml**	10.0	D6503
29420	**KB - Thomas**	**FC**	9/17/2020	1220	**166**	**cfu / 100 ml**	2.0	9222D
		entero	9/17/2020	1150	**20**	**MPN / 100 ml**	10.0	D6503
29421	**KB - S. Refuge**	**FC**	9/17/2020	1220	**28**	**cfu / 100 ml**	2.0	9222D
		entero	9/17/2020	1150	**20**	**MPN / 100 ml**	10.0	D6503
29422	**KB - Sunset**	**FC**	9/17/2020	1220	**24**	**cfu / 100 ml**	2.0	9222D
		entero	9/17/2020	1150	**<10**	**MPN / 100 ml**	10.0	D6503
29423	**KB - Shull**	**FC**	9/17/2020	1220	**32**	**cfu / 100 ml**	2.0	9222D
		entero	9/17/2020	1150	**<10**	**MPN / 100 ml**	10.0	D6503
29424	**KB - S. Pt. Higgins**	**FC**	9/17/2020	1220	**18**	**cfu / 100 ml**	2.0	9222D
		entero	9/17/2020	1150	**10**	**MPN / 100 ml**	10.0	D6503
29425	**KB - Knudson**	**FC**	9/17/2020	1220	**18**	**cfu / 100 ml**	2.0	9222D
		entero	9/17/2020	1150	**<10**	**MPN / 100 ml**	10.0	D6503
29426	**KB - Thomas FR**	**FC**	9/17/2020	1220	**224**	**cfu / 100 ml**	2.0	9222D
		entero	9/17/2020	1150	**52**	**MPN / 100 ml**	10.0	D6503

samples for enterococci analysis were diluted 1:10 to eliminate the potential interference of Bacillus

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Tel: (1) 786-220-0379 Fax: (1) 786-513-2733
Email: info@sourcemolecular.com

ACCREDITED Certificate 4126.01
ISO 17025 Accredited Testing Laboratory

Fecal Host Quantification ID Test Results Report

Detection and quantification of the fecal host associated gene biomarker by quantitative Polymerase Chain Reaction (qPCR) DNA analytical technology

Submitter: Alaska Department of Environmental Conservation
Date Received/Processed: September 3, 2020
Report Generated: September 18, 2020

ND: Not Detected
DNQ: Detected Not Quantified

SM #	Sample ID	Date Collected	Time Collected	Analysis Requested	Marker Quantified	Result Unit
SM20I03104	Herring	9/1/2020		Human_HF183	ND	copies per 100ml
SM20I03105	Mtn. Pt. Cultural	9/1/2020		Human_HF183	3.22E+03	copies per 100ml
SM20I03106	Mtn. Pt. Surprise	9/1/2020		Human_HF183	1.24E+03	copies per 100ml
SM20I03107	Rotary Pool	9/1/2020		Human_HF183	DNQ	copies per 100ml
SM20I03108	Rotary Beach	9/1/2020		Human_HF183	DNQ	copies per 100ml
SM20I03109	Seaport	9/1/2020		Human_HF183	DNQ	copies per 100ml
SM20I03110	Thomas	9/1/2020		Human_HF183	5.77E+03	copies per 100ml
SM20I03111	Refuge	9/1/2020		Human_HF183	6.30E+02	copies per 100ml
SM20I03112	Sunset	9/1/2020		Human_HF183	7.63E+02	copies per 100ml
SM20I03113	Shull	9/1/2020		Human_HF183	1.02E+03	copies per 100ml
SM20I03114	SP Higgins	9/1/2020		Human_HF183	8.71E+02	copies per 100ml
SM20I03115	Knudson	9/1/2020		Human_HF183	1.31E+03	copies per 100ml

Reported Results Authorized By: Anda Quintero, Quality Manager

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Revision 1.4
Effective Date 12/12/19

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ACCREDITED Certificate 4126.01
ISO 17025 Accredited Testing Laboratory

Fecal Host Quantification ID Test Results Report

Detection and quantification of the fecal host associated gene biomarker by quantitative Polymerase Chain Reaction (qPCR) DNA analytical technology

Submitter: Alaska Department of Environmental Conserv
Date Received/Processed: September 3, 2020
Report Generated: September 18, 2020

SM #	Sample ID	Sample Type	Extraction Date	Analysis Date	Amount Processed	Amount Processed Unit	Analytical Volume (ul)
SM20I03104	Herring	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03105	Mtn. Pt. Cultural	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03106	Mtn. Pt. Surprise	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03107	Rotary Pool	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03108	Rotary Beach	Water	9/17/2020	9/18/2020	100	ml	2
SM20I03109	Seaport	Water	9/17/2020	9/18/2020	100	ml	2
SM20I03110	Thomas	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03111	Refuge	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03112	Sunset	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03113	Shull	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03114	SP Higgins	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03115	Knudson	Water	9/17/2020	9/17/2020	100	ml	2

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Laboratory Comments

Submitter: Alaska Department of Environmental Conservation

Report Generated: September 18, 2020

Non-Detect Results

In sample(s) classified as non-detect, the host-associated fecal gene biomarker(s) was either not detected in test replicates, one replicate was detected at a cycle threshold greater than 35 and the other was not, or one replicate was detected at a cycle threshold less than 35 and the other was not after repeated analysis.

Detected Results

In sample(s) classified as detected, the host-associated fecal gene biomarker(s) was detected in both test replicates suggesting that the host's fecal contamination is present in the sample(s). Copy number measurements reported are relative, not absolute, quantification.

Detected Not Quantified (DNQ) Results

In sample(s) classified as Detected Not Quantified (DNQ), the host-associated fecal biomarker was detected in both test replicates but in quantities below the limit of quantification. This result indicates that fecal indicators associated with the respective host was present in the sample(s) but in low concentrations.

Fecal Reference Samples

The client is encouraged to submit fecal samples from suspected sources in the surrounding area in order to gain a better understanding of the concentration of the host-associated biomarker with the regional population. A more precise interpretation would be available to the client with the submittal of such baseline samples.

Result Interpretations

The presence of the biomarker does not signify the presence or absence of that form of fecal pollution conclusively. The most reliable way to accurately test for contamination is to combine genetic testing with scientifically sound and adequate study design appropriate for the water quality questions to be answered or issues to be resolved.

Additional Testing

A portion of all samples has been frozen and will be archived for 3 months. The client is encouraged to perform additional tests on the sample(s) for other hosts suspected of contributing to the fecal contamination.

DNA Analytical Method Explanation

Water Samples: Each submitted water sample is filtered through 0.45 micron membrane filter(s). Each filter is placed in a separate, sterile 2ml disposable tube containing a unique mix of beads and lysis buffer. The sample is homogenized for 1min and the DNA extracted using the Generite DNA-EZ ST1 extraction kit (GeneRite, NJ), as per manufacturer's protocol. Devitations to these procedures may occur at the client's request.

Non-Water Samples: Each non-water sample submitted by the client is processed as per internal laboratory extraction procedures. An extracted DNA sample is proceed directly to PCR analysis. Details available upon request.

Amplifications to detect the target gene biomarker were run on an Applied Biosystems StepOnePlus real-time thermal cycler (Applied Biosystems, Foster City, CA) in a final reaction volume of 20ul sample extract, forward primer, reverse primer, probe and an optimized buffer. All assays are run in duplicate. Quantification is achieved by extrapolating target gene copy numbers from a standard curve generated from serial dilutions of known gene copy numbers.

For quality control purposes, a positive control and a negative control, were run alongside the sample(s) to ensure a properly functioning reaction and reveal any false negatives or false positives.

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Fecal Host Quantification ID Test Results Report

Detection and quantification of the fecal host associated gene biomarker by quantitative Polymerase Chain Reaction (qPCR) DNA analytical technology

Submitter: Alaska Department of Environmental Conservation
Date Received/Processed: September 3, 2020
Report Generated: September 18, 2020

ND: Not Detected
DNQ: Detected Not Quantified

SM #	Sample ID	Date Collected	Time Collected	Analysis Requested	Marker Quantified	Result Unit
SM20I03092	Herring	9/1/2020		Gull_Gull-4	9.19E+02	copies per 100ml
SM20I03093	Mtn. Pt. Cultural	9/1/2020		Gull_Gull-4	ND	copies per 100ml
SM20I03094	Mtn. Pt. Surprise	9/1/2020		Gull_Gull-4	DNQ	copies per 100ml
SM20I03095	Rotary Pool	9/1/2020		Gull_Gull-4	DNQ	copies per 100ml
SM20I03096	Rotary Beach	9/1/2020		Gull_Gull-4	DNQ	copies per 100ml
SM20I03097	Seaport	9/1/2020		Gull_Gull-4	ND	copies per 100ml
SM20I03098	Thomas	9/1/2020		Gull_Gull-4	7.94E+03	copies per 100ml
SM20I03099	Refuge	9/1/2020		Gull_Gull-4	DNQ	copies per 100ml
SM20I03100	Sunset	9/1/2020		Gull_Gull-4	ND	copies per 100ml
SM20I03101	Shull	9/1/2020		Gull_Gull-4	1.62E+03	copies per 100ml
SM20I03102	SP Higgins	9/1/2020		Gull_Gull-4	ND	copies per 100ml
SM20I03103	Knudson	9/1/2020		Gull_Gull-4	DNQ	copies per 100ml

Reported Results Authorized By: Anda Quintero, Quality Manager

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Submitter: Alaska Department of Environmental Conserv
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SM #	Sample ID	Sample Type	Extraction Date	Analysis Date	Amount Processed	Amount Processed Unit	Analytical Volume (ul)
SM20I03092	Herring	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03093	Mtn. Pt. Cultural	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03094	Mtn. Pt. Surprise	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03095	Rotary Pool	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03096	Rotary Beach	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03097	Seaport	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03098	Thomas	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03099	Refuge	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03100	Sunset	Water	9/17/2020	9/18/2020	100	ml	2
SM20I03101	Shull	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03102	SP Higgins	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03103	Knudson	Water	9/17/2020	9/17/2020	100	ml	2

Reported Results Authorized By: Anda Quintero, Quality Manager

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Laboratory Comments

Submitter: Alaska Department of Environmental Conservation

Report Generated: September 18, 2020

Non-Detect Results

In sample(s) classified as non-detect, the host-associated fecal gene biomarker(s) was either not detected in test replicates, one replicate was detected at a cycle threshold greater than 35 and the other was not, or one replicate was detected at a cycle threshold less than 35 and the other was not after repeated analysis.

Detected Results

In sample(s) classified as detected, the host-associated fecal gene biomarker(s) was detected in both test replicates suggesting that the host's fecal contamination is present in the sample(s). Copy number measurements reported are relative, not absolute, quantification.

Detected Not Quantified (DNQ) Results

In sample(s) classified as Detected Not Quantified (DNQ), the host-associated fecal biomarker was detected in both test replicates but in quantities below the limit of quantification. This result indicates that fecal indicators associated with the respective host was present in the sample(s) but in low concentrations.

Fecal Reference Samples

The client is encouraged to submit fecal samples from suspected sources in the surrounding area in order to gain a better understanding of the concentration of the host-associated biomarker with the regional population. A more precise interpretation would be available to the client with the submittal of such baseline samples.

Result Interpretations

The presence of the biomarker does not signify the presence or absence of that form of fecal pollution conclusively. The most reliable way to accurately test for contamination is to combine genetic testing with scientifically sound and adequate study design appropriate for the water quality questions to be answered or issues to be resolved.

Additional Testing

A portion of all samples has been frozen and will be archived for 3 months. The client is encouraged to perform additional tests on the sample(s) for other hosts suspected of contributing to the fecal contamination.

DNA Analytical Method Explanation

Water Samples: Each submitted water sample is filtered through 0.45 micron membrane filter(s). Each filter is placed in a separate, sterile 2ml disposable tube containing a unique mix of beads and lysis buffer. The sample is homogenized for 1min and the DNA extracted using the Generite DNA-EZ ST1 extraction kit (GeneRite, NJ), as per manufacturer's protocol. Devitations to these procedures may occur at the client's request.

Non-Water Samples: Each non-water sample submitted by the client is processed as per internal laboratory extraction procedures. An extracted DNA sample is proceed directly to PCR analysis. Details available upon request.

Amplifications to detect the target gene biomarker were run on an Applied Biosystems StepOnePlus real-time thermal cycler (Applied Biosystems, Foster City, CA) in a final reaction volume of 20ul sample extract, forward primer, reverse primer, probe and an optimized buffer. All assays are run in duplicate. Quantification is achieved by extrapolating target gene copy numbers from a standard curve generated from serial dilutions of known gene copy numbers.

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Fecal Host Quantification ID Test Results Report

Detection and quantification of the fecal host associated gene biomarker by quantitative Polymerase Chain Reaction (qPCR) DNA analytical technology

Submitter: Alaska Department of Environmental Conservation
Date Received/Processed: September 3, 2020
Report Generated: September 18, 2020

ND: Not Detected
DNQ: Detected Not Quantified

SM #	Sample ID	Date Collected	Time Collected	Analysis Requested	Marker Quantified	Result Unit
SM20I03080	Herring	9/1/2020		Dog_BacCan-UCD	ND	copies per 100ml
SM20I03081	Mtn. Pt. Cultural	9/1/2020		Dog_BacCan-UCD	DNQ	copies per 100ml
SM20I03082	Mtn. Pt. Surprise	9/1/2020		Dog_BacCan-UCD	ND	copies per 100ml
SM20I03083	Rotary Pool	9/1/2020		Dog_BacCan-UCD	DNQ	copies per 100ml
SM20I03084	Rotary Beach	9/1/2020		Dog_BacCan-UCD	ND	copies per 100ml
SM20I03085	Seaport	9/1/2020		Dog_BacCan-UCD	DNQ	copies per 100ml
SM20I03086	Thomas	9/1/2020		Dog_BacCan-UCD	9.08E+02	copies per 100ml
SM20I03087	Refuge	9/1/2020		Dog_BacCan-UCD	DNQ	copies per 100ml
SM20I03088	Sunset	9/1/2020		Dog_BacCan-UCD	5.53E+02	copies per 100ml
SM20I03089	Shull	9/1/2020		Dog_BacCan-UCD	DNQ	copies per 100ml
SM20I03090	SP Higgins	9/1/2020		Dog_BacCan-UCD	5.53E+02	copies per 100ml
SM20I03091	Knudson	9/1/2020		Dog_BacCan-UCD	DNQ	copies per 100ml

Reported Results Authorized By: Anda Quintero, Quality Manager

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SM20I03083	Rotary Pool	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03084	Rotary Beach	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03085	Seaport	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03086	Thomas	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03087	Refuge	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03088	Sunset	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03089	Shull	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03090	SP Higgins	Water	9/17/2020	9/17/2020	100	ml	2
SM20I03091	Knudson	Water	9/17/2020	9/17/2020	100	ml	2

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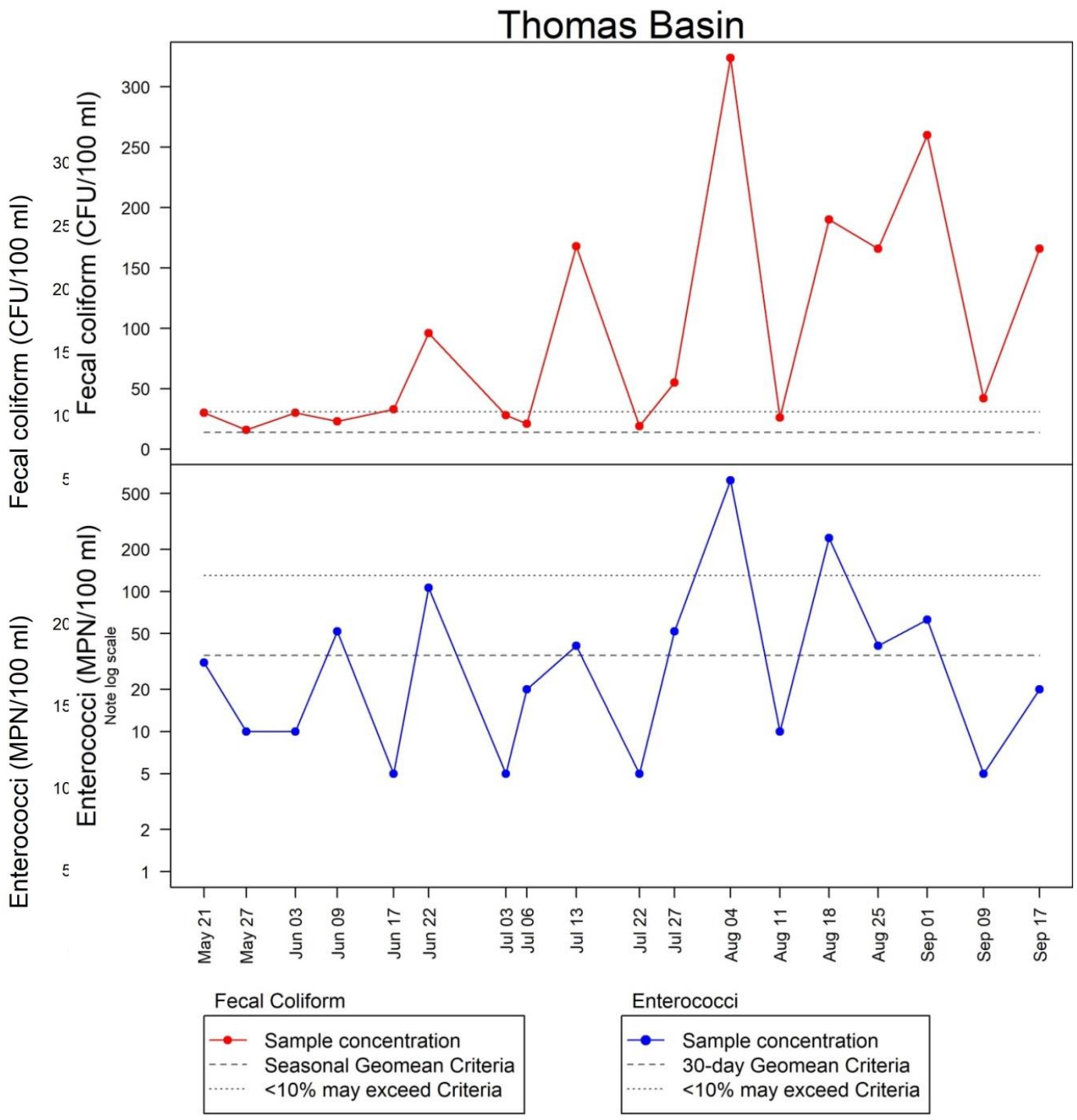
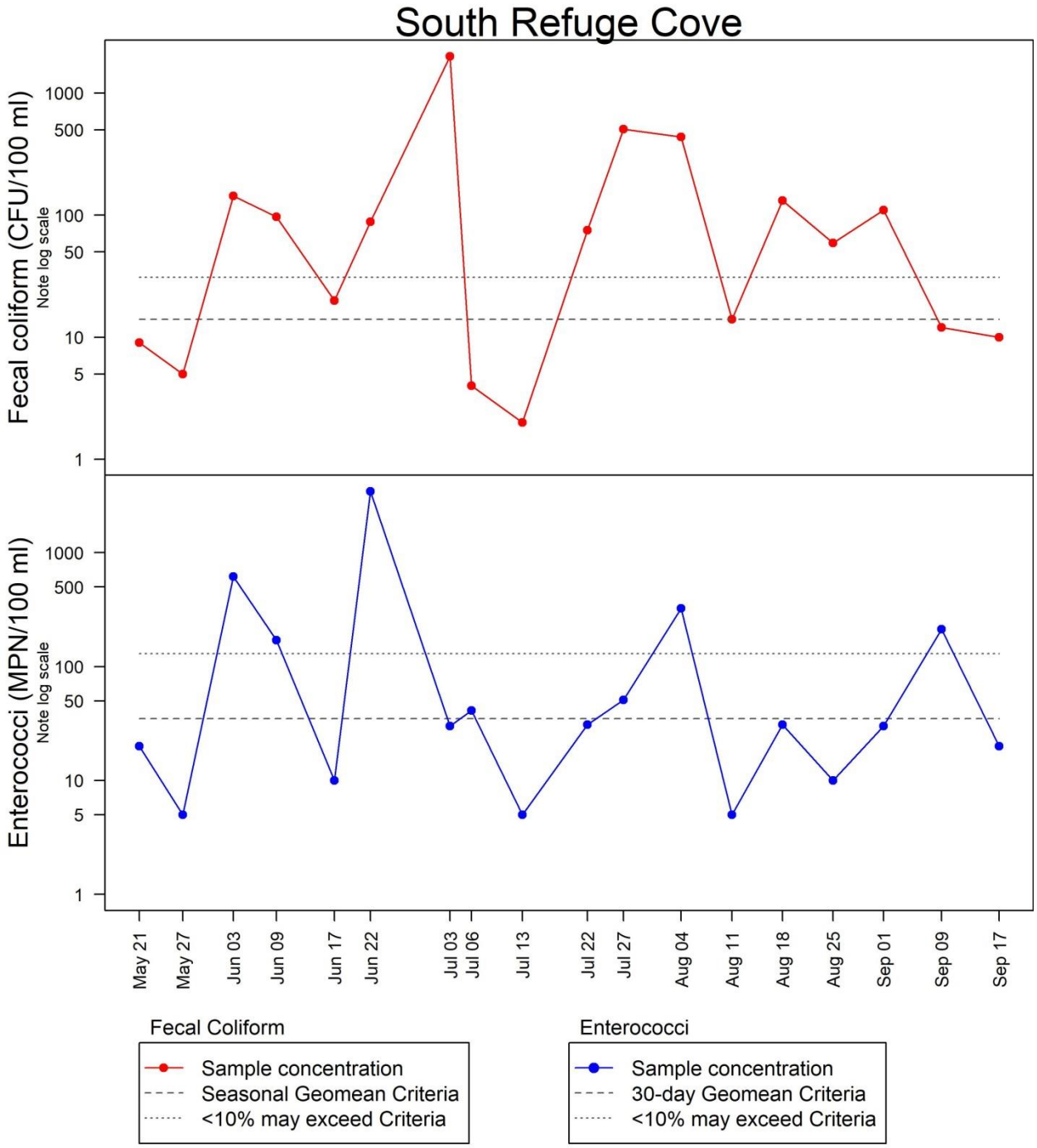
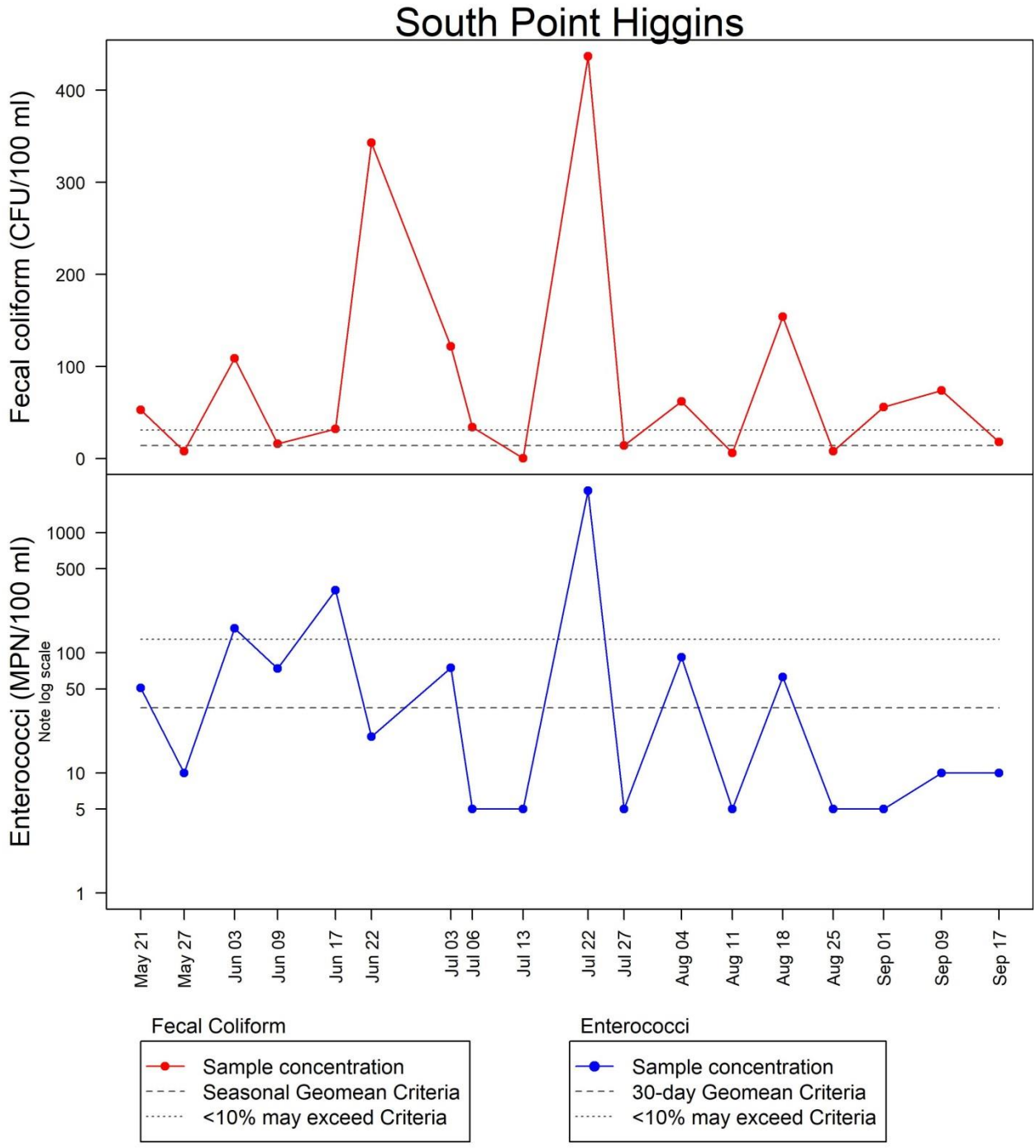
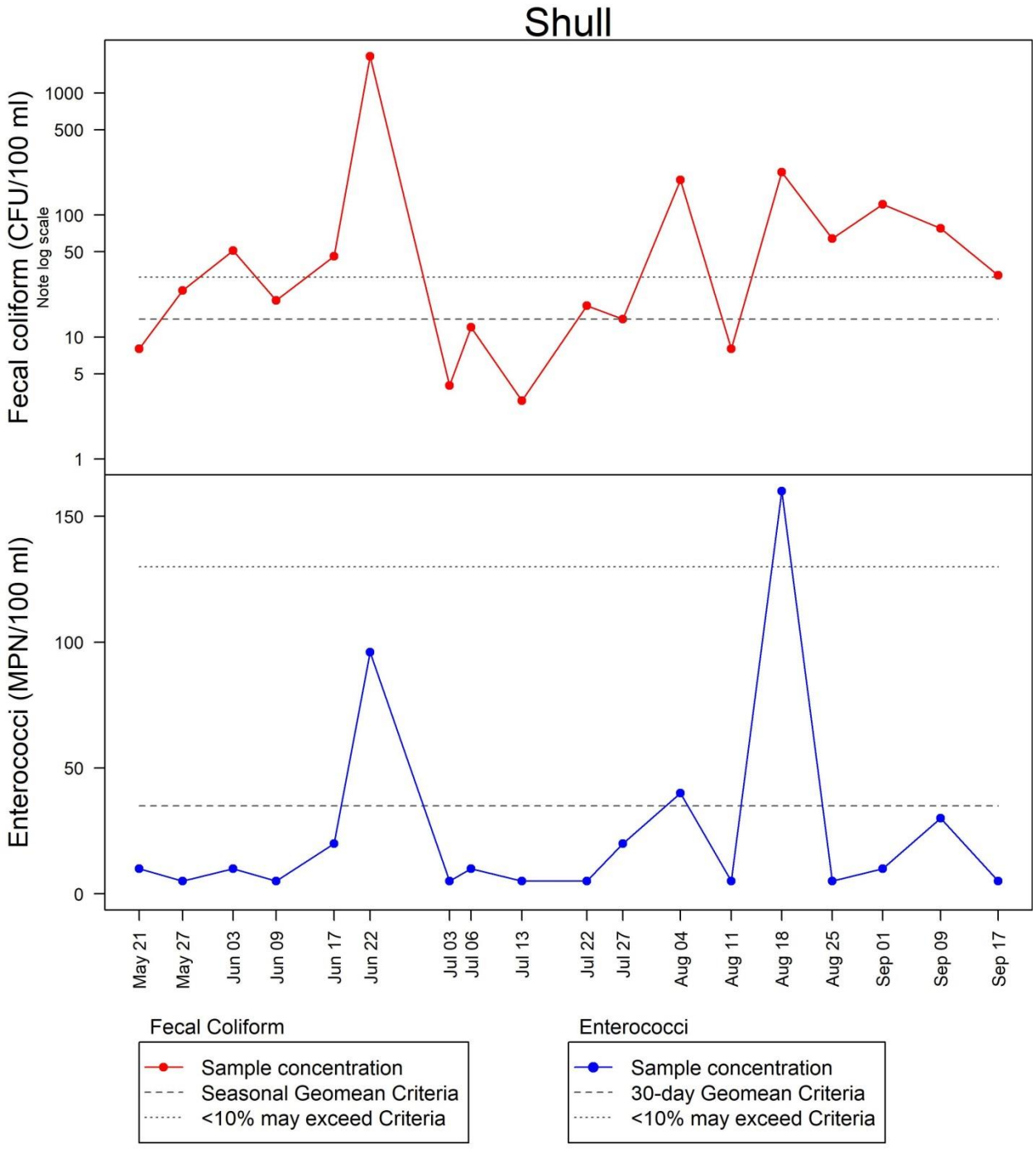
Appendix D: Bacteria concentration data in graphical form –2017-2020

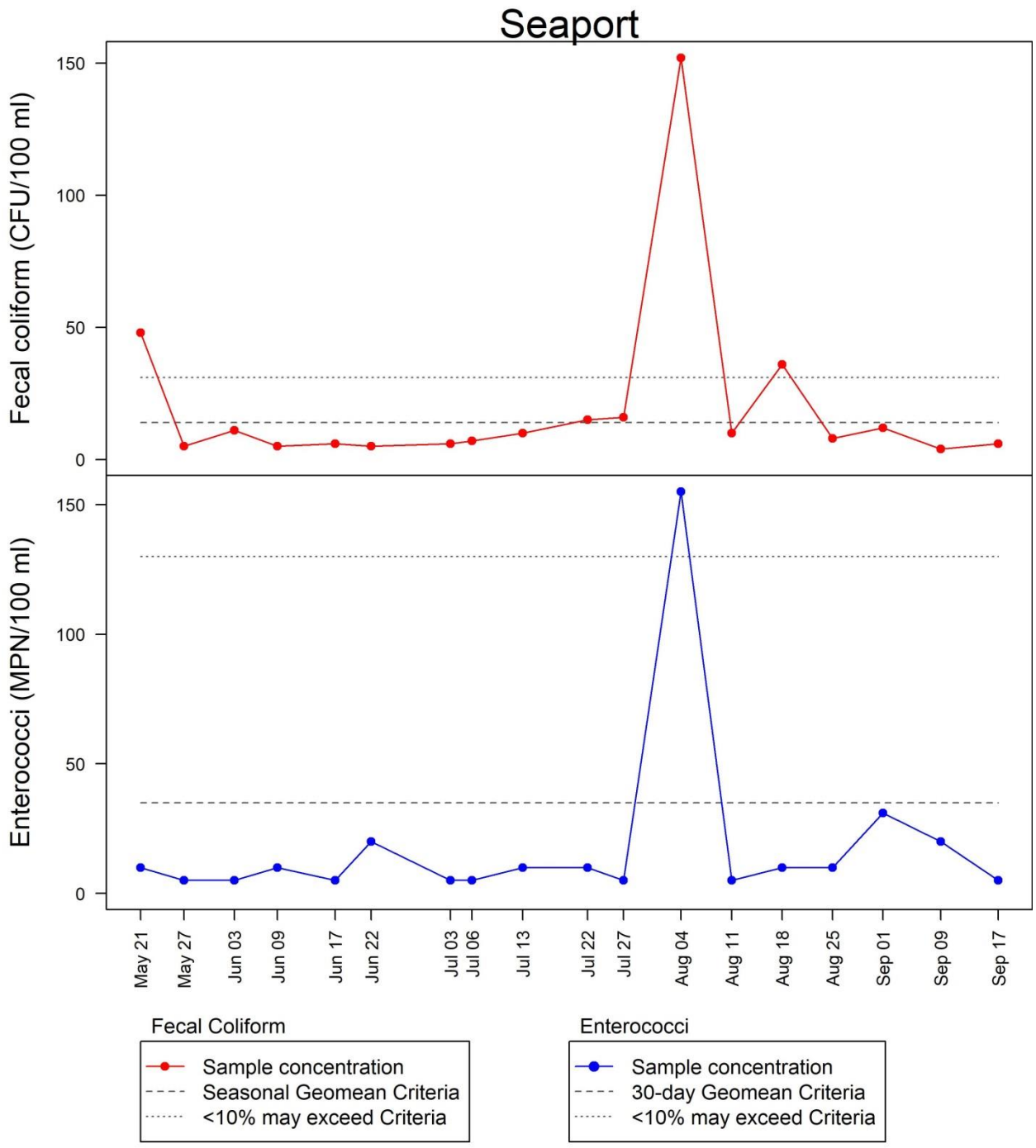
2020

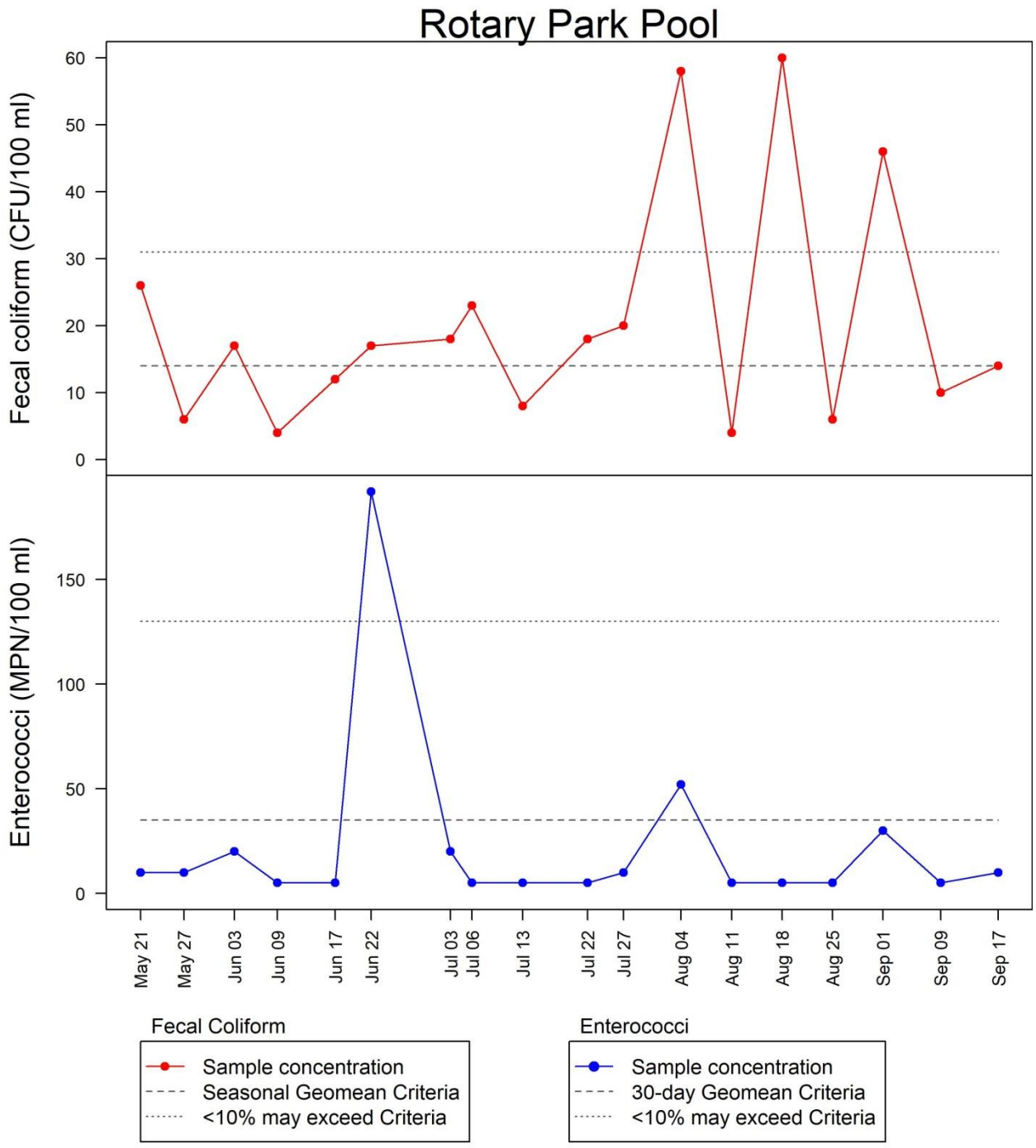

Thomas Basin
Fecal coliform (CFU/100 ml)
Enterococci (MPN/100 ml)
Note log scale
May 21
May 27
Jun 03
Jun 09
Jun 17
Jun 22
Jul 03
Jul 06
Jul 13
Jul 22
Jul 27
Aug 04
Aug 11
Aug 18
Aug 25
Sep 01
Sep 09
Sep 17
Fecal Coliform
Sample concentration
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean Criteria
<10% may exceed Criteria

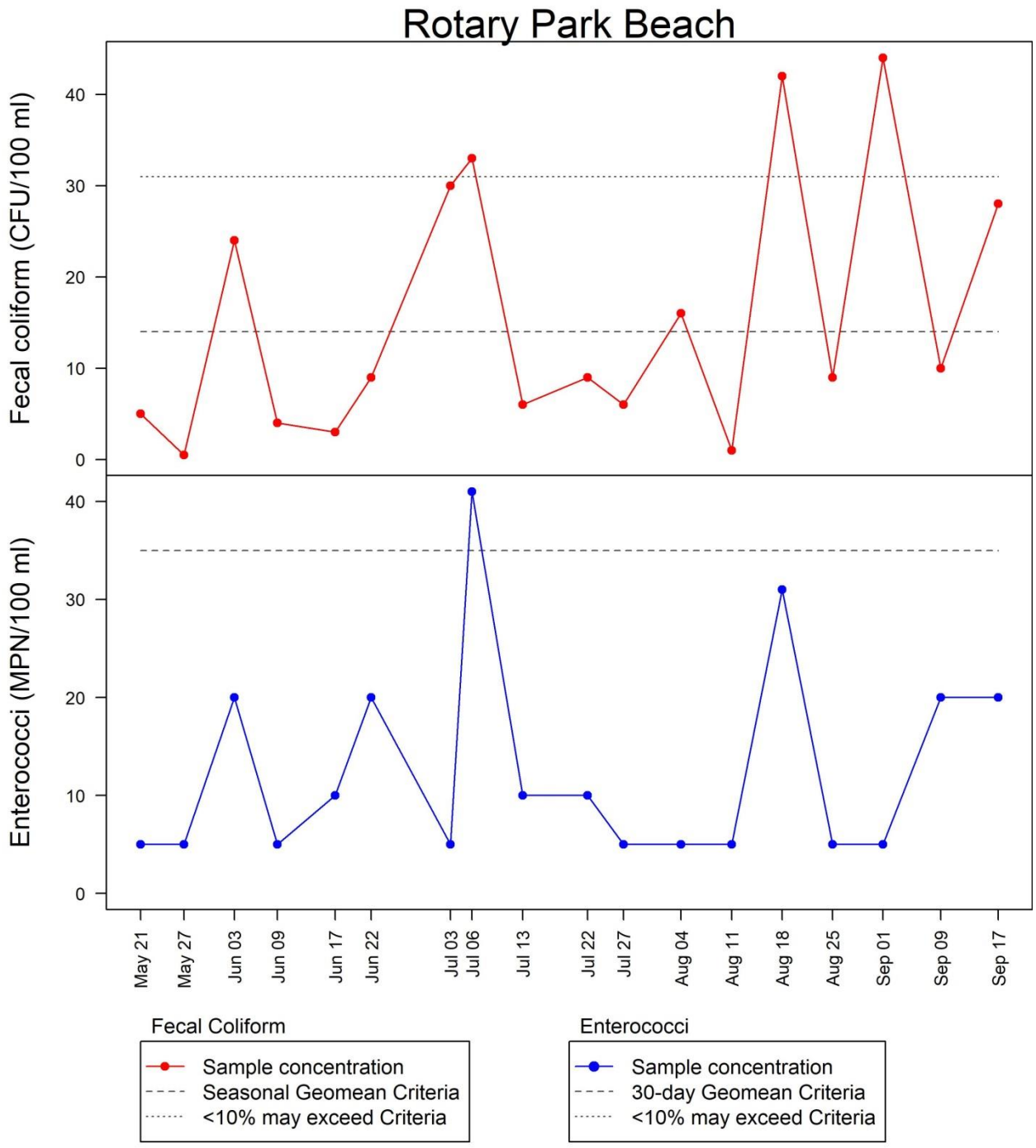

South Refuge Cove
Fecal coliform (CFU/100 ml)
Note log scale
1000
500
100
50
10
5
1
Enterococci (MPN/100 ml)
Note log scale
1000
500
100
50
10
5
1
May 21
May 27
Jun 03
Jun 09
Jun 17
Jun 22
Jul 03
Jul 06
Jul 13
Jul 22
Jul 27
Aug 04
Aug 11
Aug 18
Aug 25
Sep 01
Sep 09
Sep 17
Fecal Coliform
Sample concentration
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean Criteria
<10% may exceed Criteria

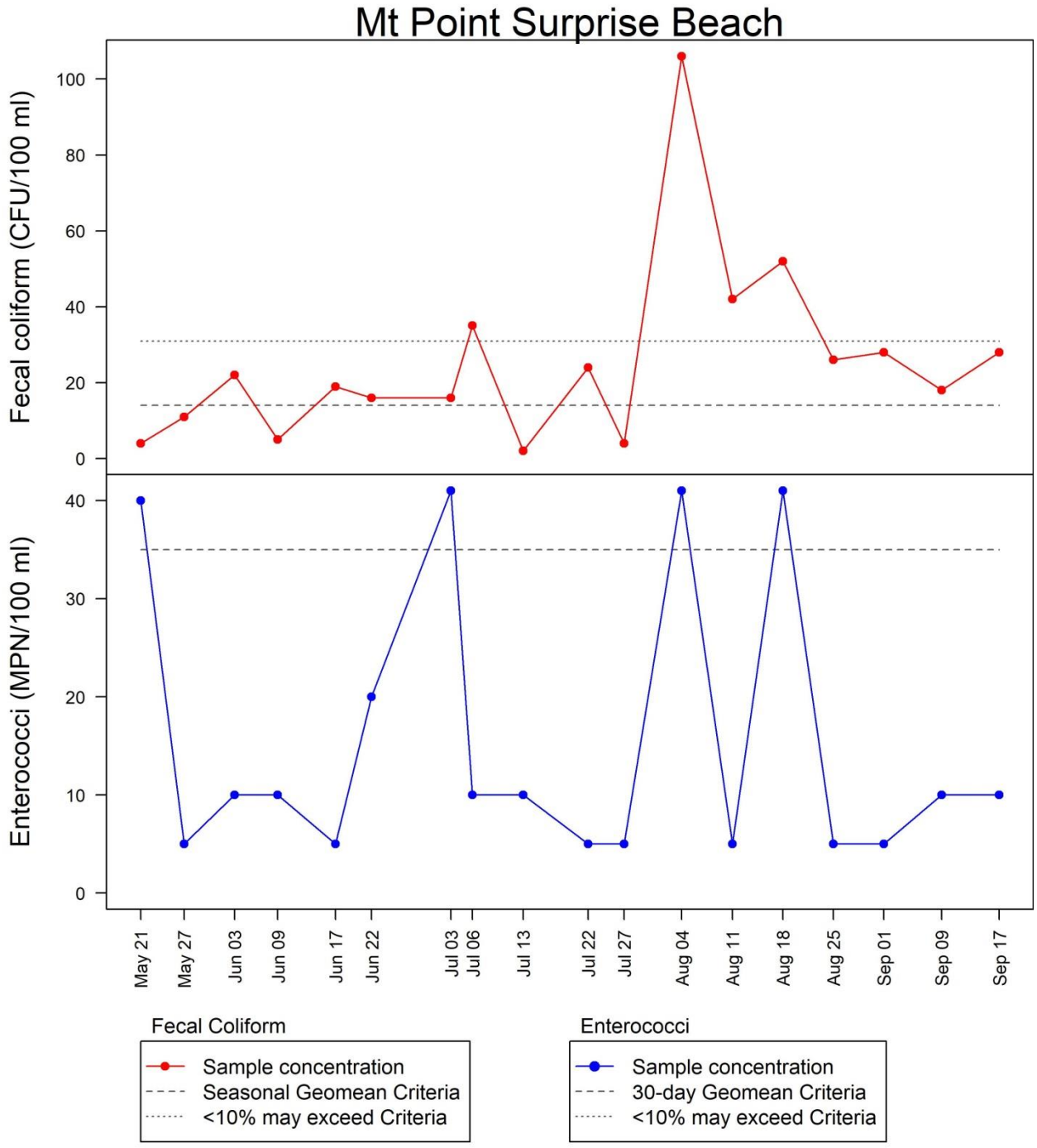

South Point Higgins
Fecal coliform (CFU/100 ml)
400
300
200
100
0
Enterococci (MPN/100 ml)
Note log scale
1000
500
100
50
10
5
1
May 21
May 27
Jun 03
Jun 09
Jun 17
Jun 22
Jul 03
Jul 06
Jul 13
Jul 22
Jul 27
Aug 04
Aug 11
Aug 18
Aug 25
Sep 01
Sep 09
Sep 17
Fecal Coliform
Sample concentration
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean Criteria
<10% may exceed Criteria

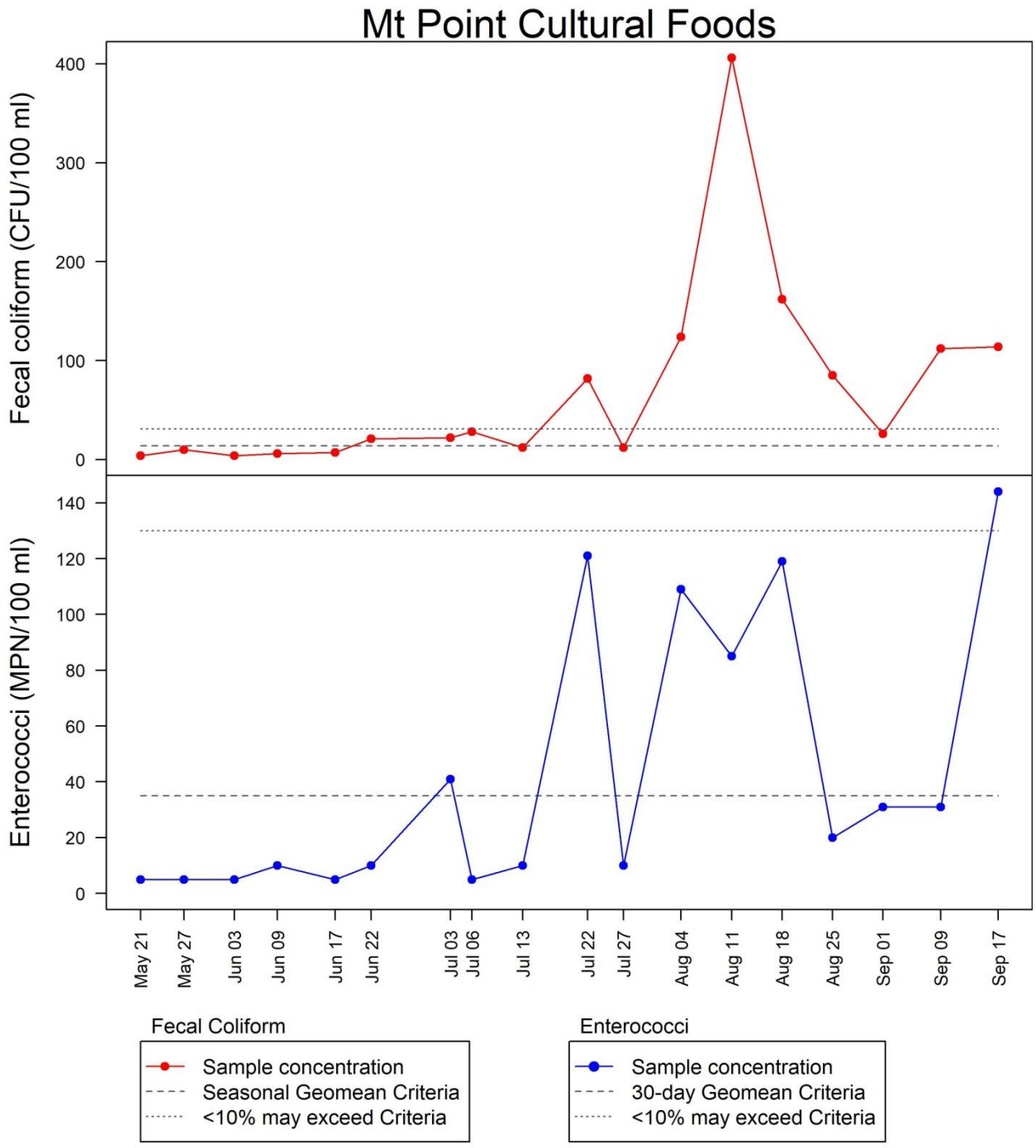

Shull
Fecal coliform (CFU/100 ml)
Note log scale
1000
500
100
50
10
5
1
Enterococci (MPN/100 ml)
150
100
50
0
May 21
May 27
Jun 03
Jun 09
Jun 17
Jun 22
Jul 03
Jul 06
Jul 13
Jul 22
Jul 27
Aug 04
Aug 11
Aug 18
Aug 25
Sep 01
Sep 09
Sep 17
Fecal Coliform
Sample concentration
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean Criteria
<10% may exceed Criteria

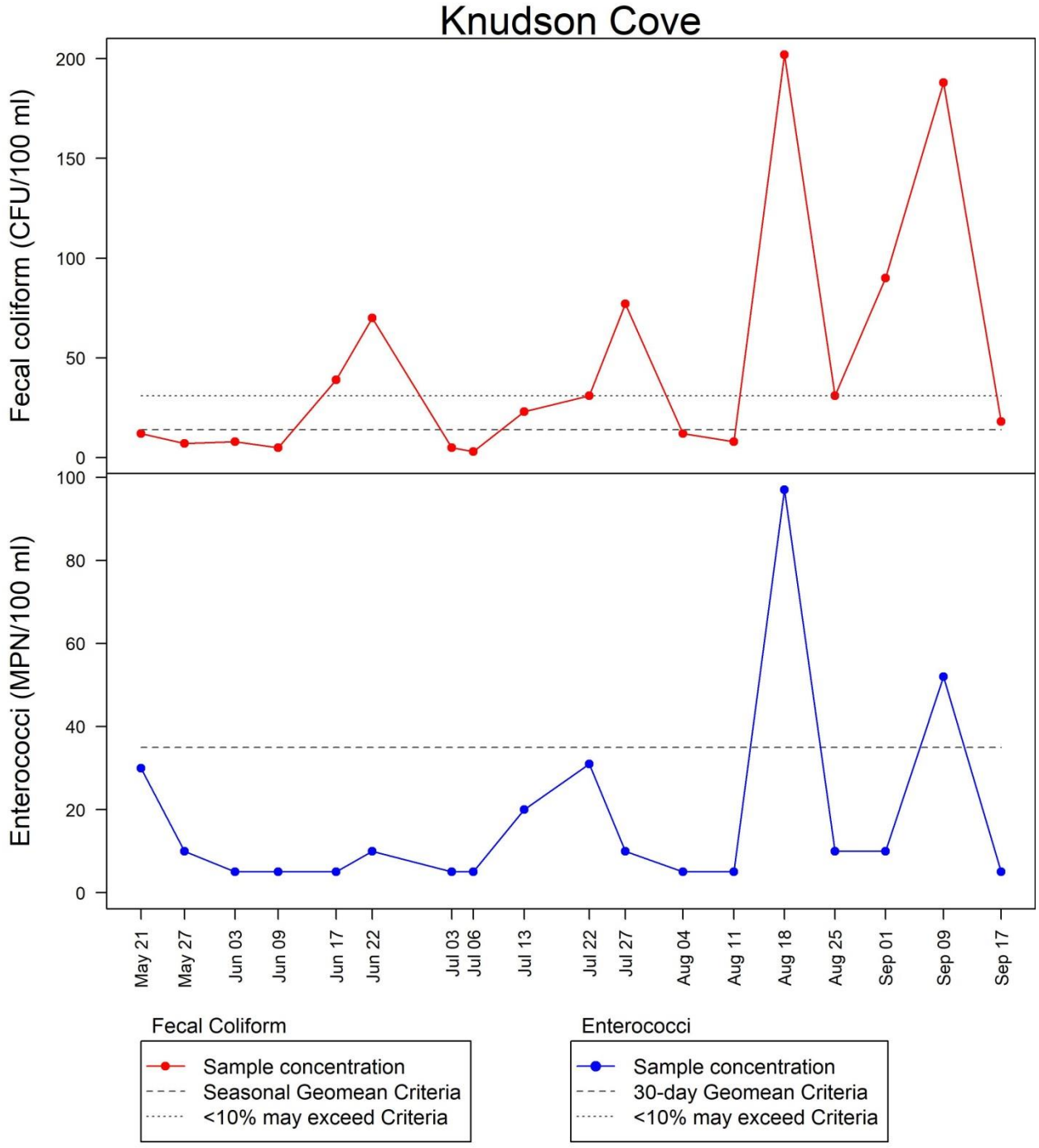

Seaport
Fecal coliform (CFU/100 ml)
150
100
50
0
Enterococci (MPN/100 ml)
150
100
50
0
May 21
May 27
Jun 03
Jun 09
Jun 17
Jun 22
Jul 03
Jul 06
Jul 13
Jul 22
Jul 27
Aug 04
Aug 11
Aug 18
Aug 25
Sep 01
Sep 09
Sep 17
Fecal Coliform
Sample concentration
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean Criteria
<10% may exceed Criteria

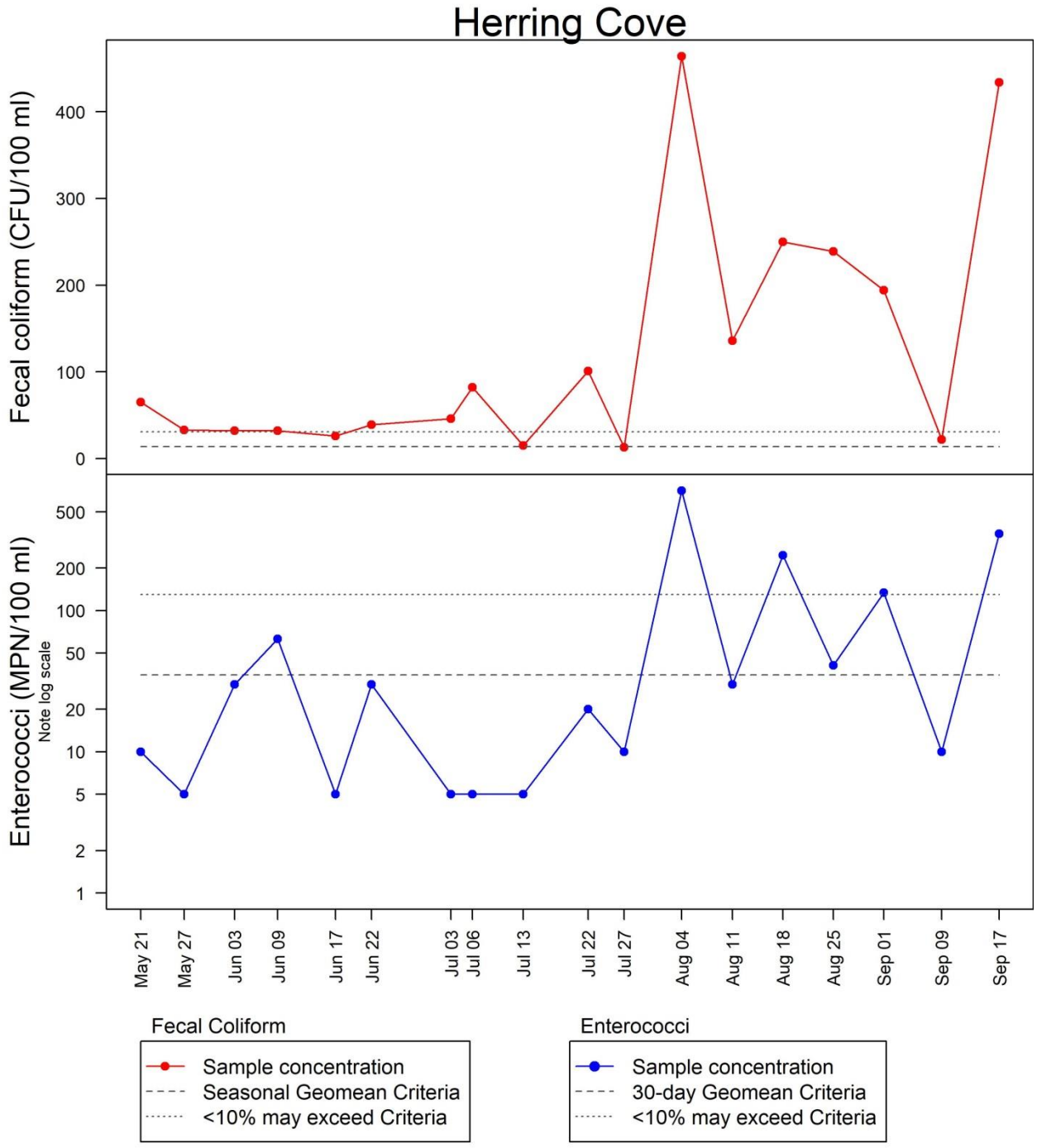

Rotary Park Pool
Fecal coliform (CFU/100 ml)
0
10
20
30
40
50
60
Enterococci (MPN/100 ml)
0
50
100
150
May 21
May 27
Jun 03
Jun 09
Jun 17
Jun 22
Jul 03
Jul 06
Jul 13
Jul 22
Jul 27
Aug 04
Aug 11
Aug 18
Aug 25
Sep 01
Sep 09
Sep 17
Fecal Coliform
Sample concentration
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean Criteria
<10% may exceed Criteria


Rotary Park Beach
Fecal coliform (CFU/100 ml)
Enterococci (MPN/100 ml)
0
10
20
30
40
May 21
May 27
Jun 03
Jun 09
Jun 17
Jun 22
Jul 03
Jul 06
Jul 13
Jul 22
Jul 27
Aug 04
Aug 11
Aug 18
Aug 25
Sep 01
Sep 09
Sep 17
Fecal Coliform
Sample concentration
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean Criteria
<10% may exceed Criteria

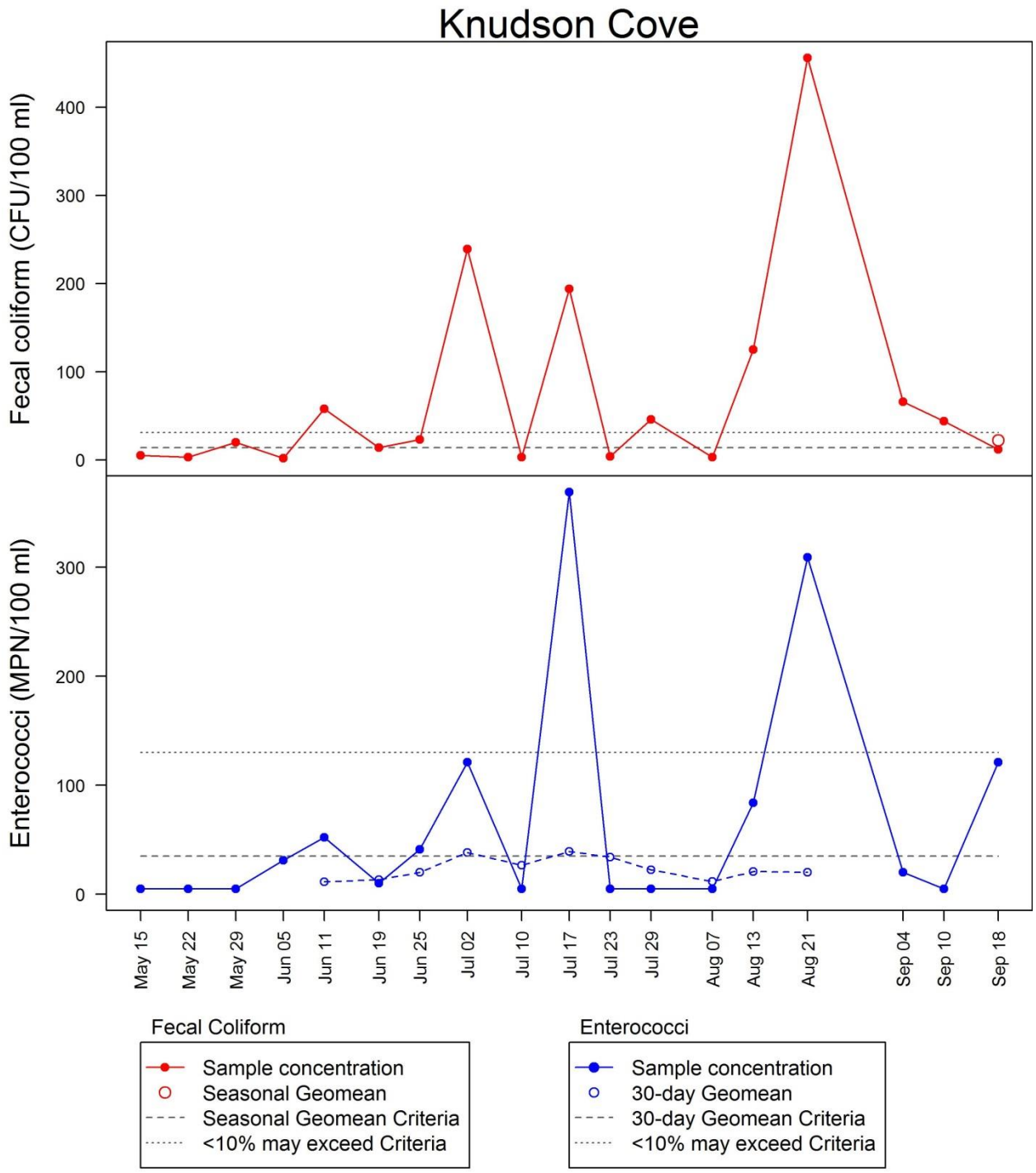

Mt Point Surprise Beach
Fecal coliform (CFU/100 ml)
0
20
40
60
80
100
Enterococci (MPN/100 ml)
0
10
20
30
40
May 21
May 27
Jun 03
Jun 09
Jun 17
Jun 22
Jul 03
Jul 06
Jul 13
Jul 22
Jul 27
Aug 04
Aug 11
Aug 18
Aug 25
Sep 01
Sep 09
Sep 17
Fecal Coliform
Sample concentration
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean Criteria
<10% may exceed Criteria

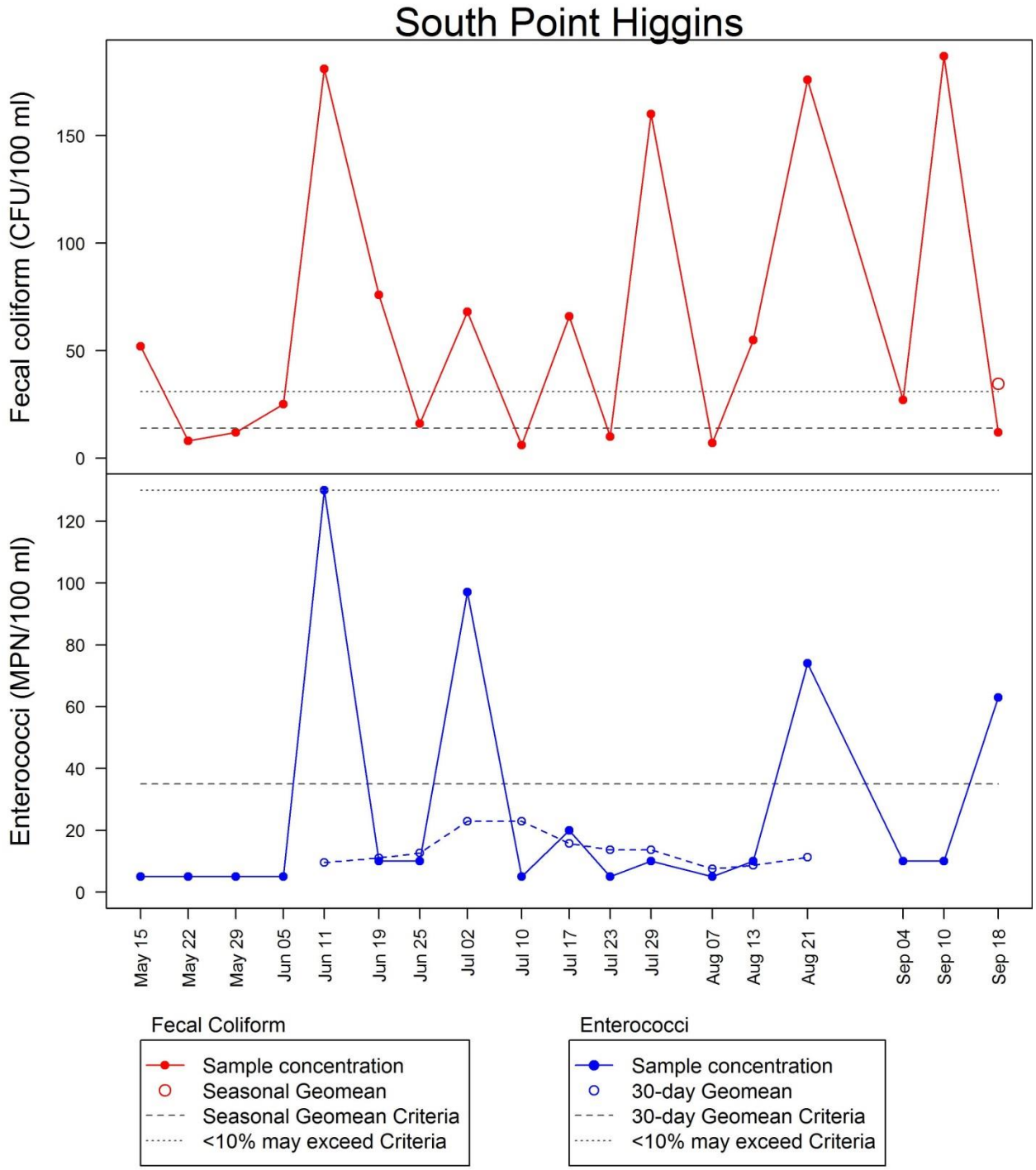

Mt Point Cultural Foods
Fecal coliform (CFU/100 ml)
0
100
200
300
400
Enterococci (MPN/100 ml)
0
20
40
60
80
100
120
140
May 21
May 27
Jun 03
Jun 09
Jun 17
Jun 22
Jul 03
Jul 06
Jul 13
Jul 22
Jul 27
Aug 04
Aug 11
Aug 18
Aug 25
Sep 01
Sep 09
Sep 17
Fecal Coliform
Sample concentration
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean Criteria
<10% may exceed Criteria

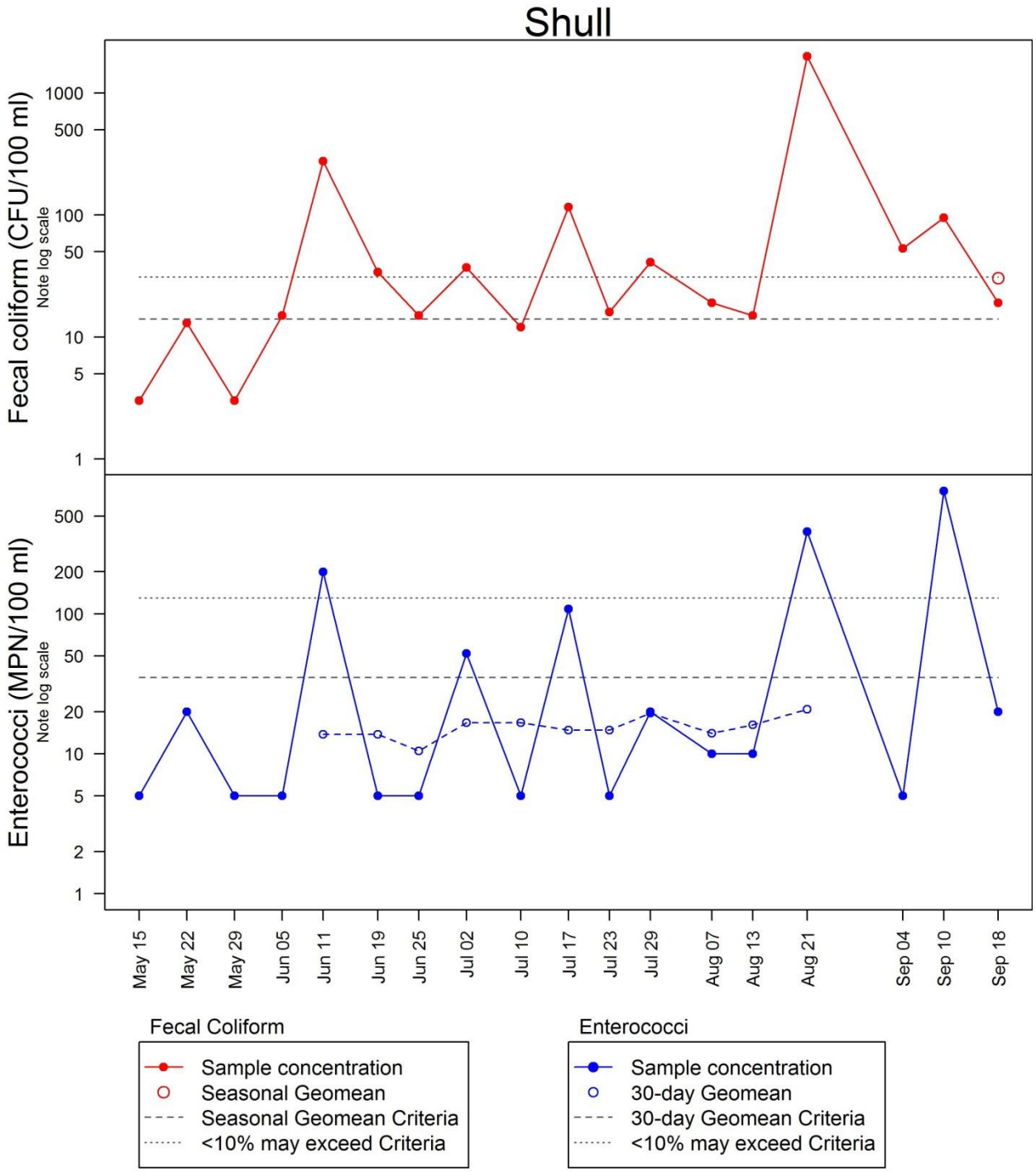

Knudson Cove
Fecal coliform (CFU/100 ml)
200
150
100
50
0
Enterococci (MPN/100 ml)
100
80
60
40
20
0
May 21
May 27
Jun 03
Jun 09
Jun 17
Jun 22
Jul 03
Jul 06
Jul 13
Jul 22
Jul 27
Aug 04
Aug 11
Aug 18
Aug 25
Sep 01
Sep 09
Sep 17
Fecal Coliform
Sample concentration
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean Criteria
<10% may exceed Criteria

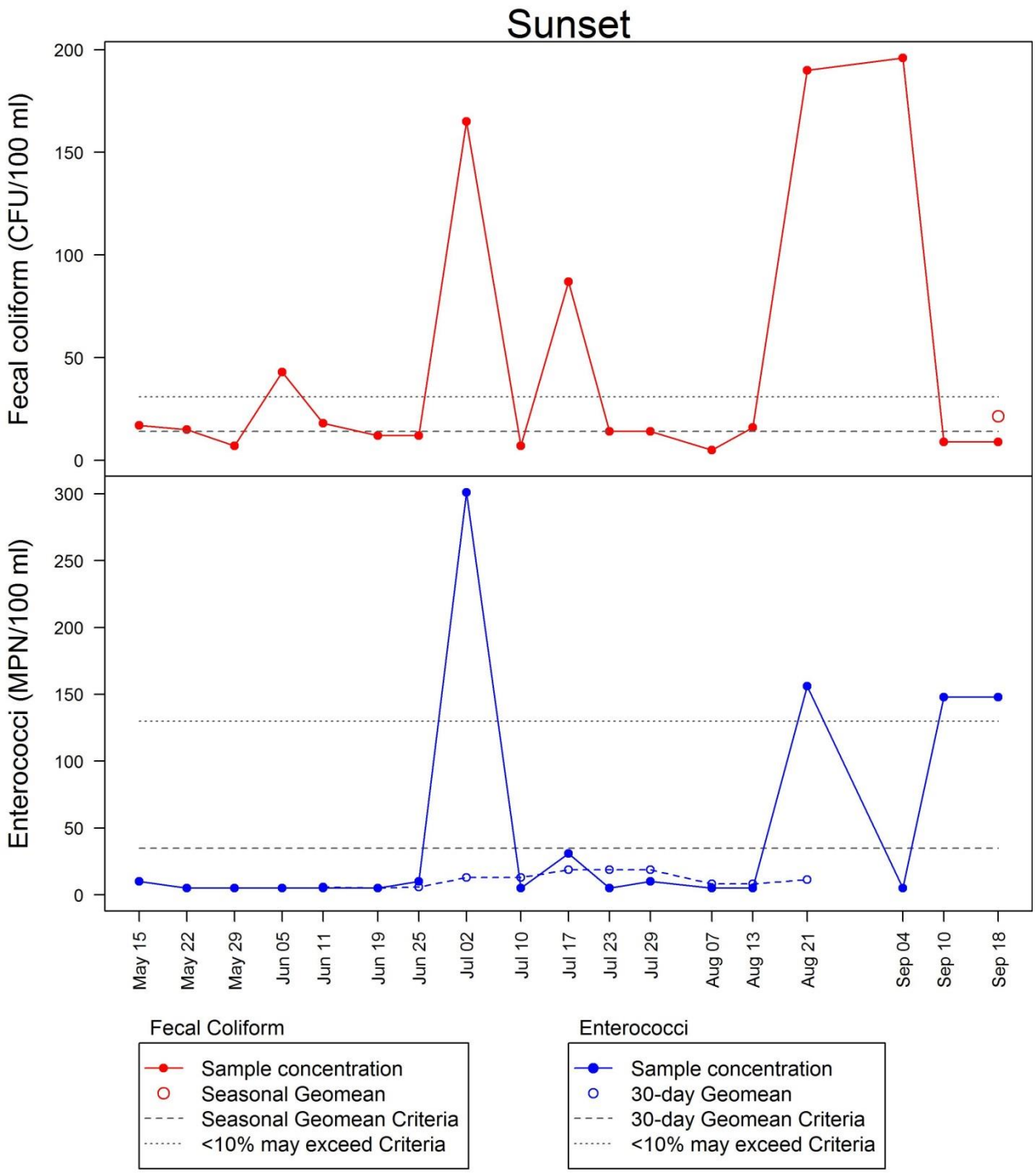

Herring Cove
Fecal coliform (CFU/100 ml)
0
100
200
300
400
Enterococci (MPN/100 ml)
Note log scale
1
2
5
10
20
50
100
200
500
May 21
May 27
Jun 03
Jun 09
Jun 17
Jun 22
Jul 03
Jul 06
Jul 13
Jul 22
Jul 27
Aug 04
Aug 11
Aug 18
Aug 25
Sep 01
Sep 09
Sep 17
Fecal Coliform
Sample concentration
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean Criteria
<10% may exceed Criteria

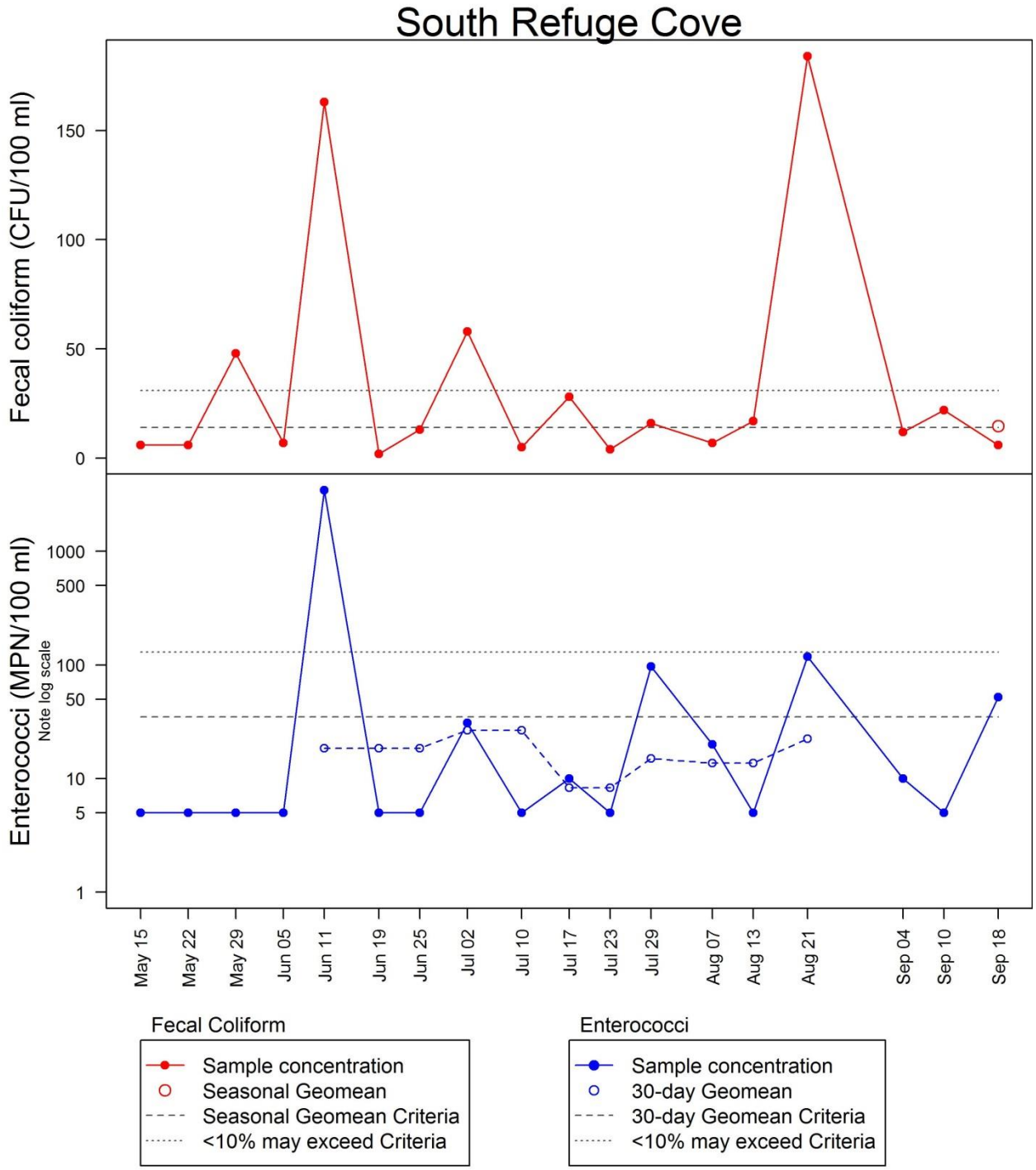
2019

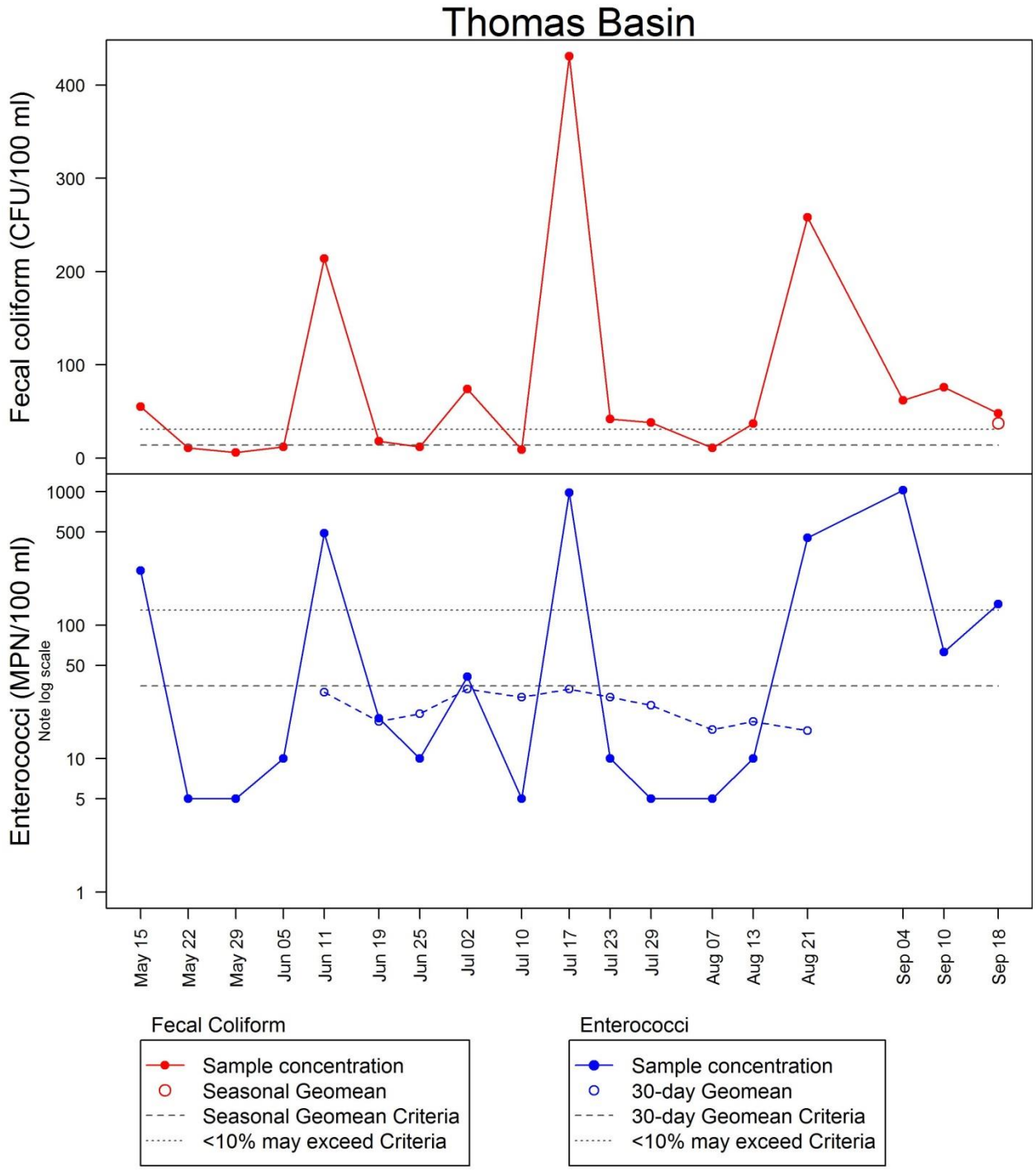

Knudson Cove
Fecal coliform (CFU/100 ml)
0
100
200
300
400
Enterococci (MPN/100 ml)
0
100
200
300
May 15
May 22
May 29
Jun 05
Jun 11
Jun 19
Jun 25
Jul 02
Jul 10
Jul 17
Jul 23
Jul 29
Aug 07
Aug 13
Aug 21
Sep 04
Sep 10
Sep 18
Fecal Coliform
Sample concentration
Seasonal Geomean
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean
30-day Geomean Criteria
<10% may exceed Criteria

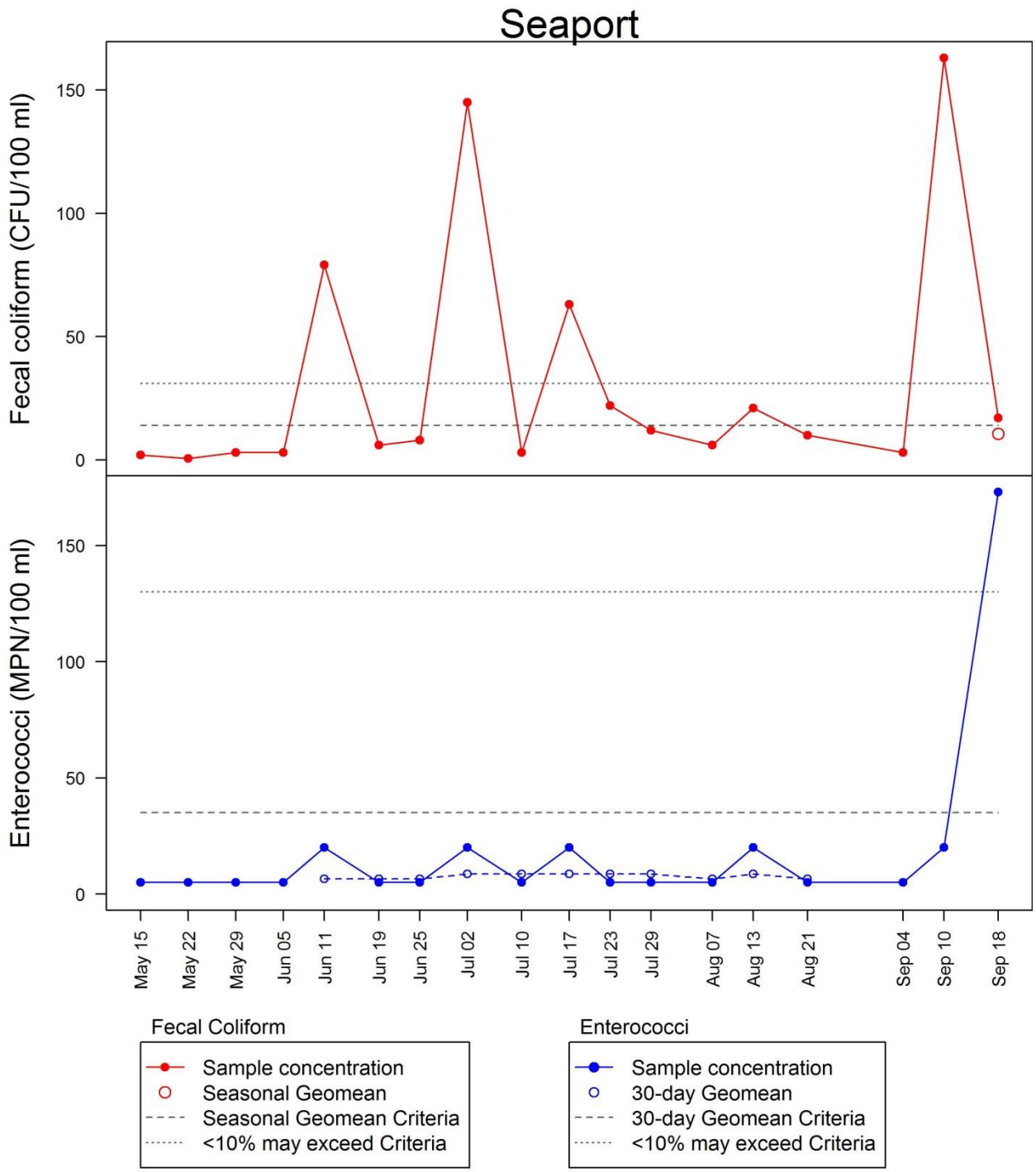

South Point Higgins
Fecal coliform (CFU/100 ml)
0
50
100
150
Enterococci (MPN/100 ml)
0
20
40
60
80
100
120
May 15
May 22
May 29
Jun 05
Jun 11
Jun 19
Jun 25
Jul 02
Jul 10
Jul 17
Jul 23
Jul 29
Aug 07
Aug 13
Aug 21
Sep 04
Sep 10
Sep 18
Fecal Coliform
Sample concentration
Seasonal Geomean
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean
30-day Geomean Criteria
<10% may exceed Criteria

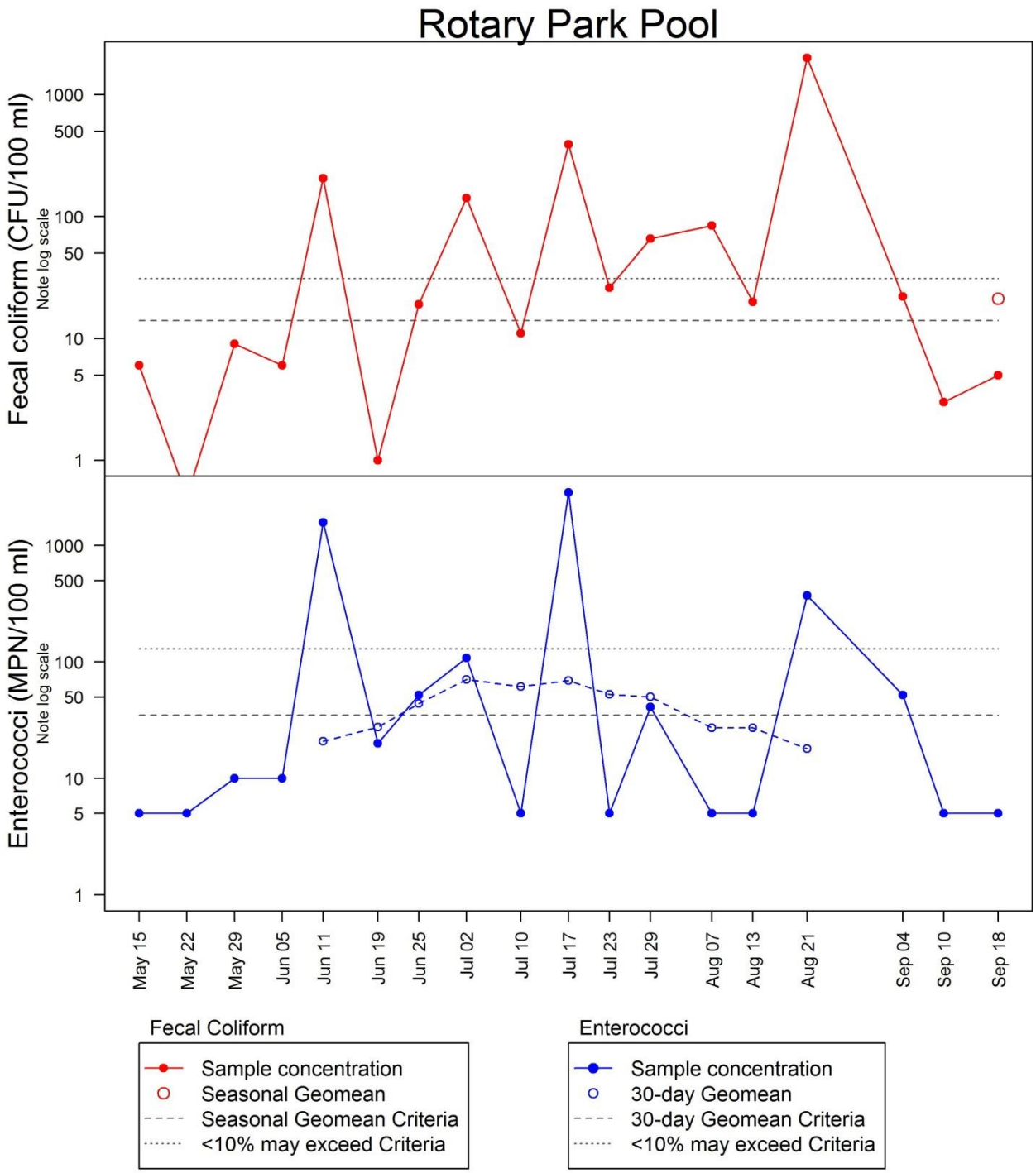

Shull
Fecal coliform (CFU/100 ml)
Note log scale
1000
500
100
50
10
5
1
Enterococci (MPN/100 ml)
Note log scale
500
200
100
50
20
10
5
2
1
May 15
May 22
May 29
Jun 05
Jun 11
Jun 19
Jun 25
Jul 02
Jul 10
Jul 17
Jul 23
Jul 29
Aug 07
Aug 13
Aug 21
Sep 04
Sep 10
Sep 18
Fecal Coliform
Sample concentration
Seasonal Geomean
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean
30-day Geomean Criteria
<10% may exceed Criteria

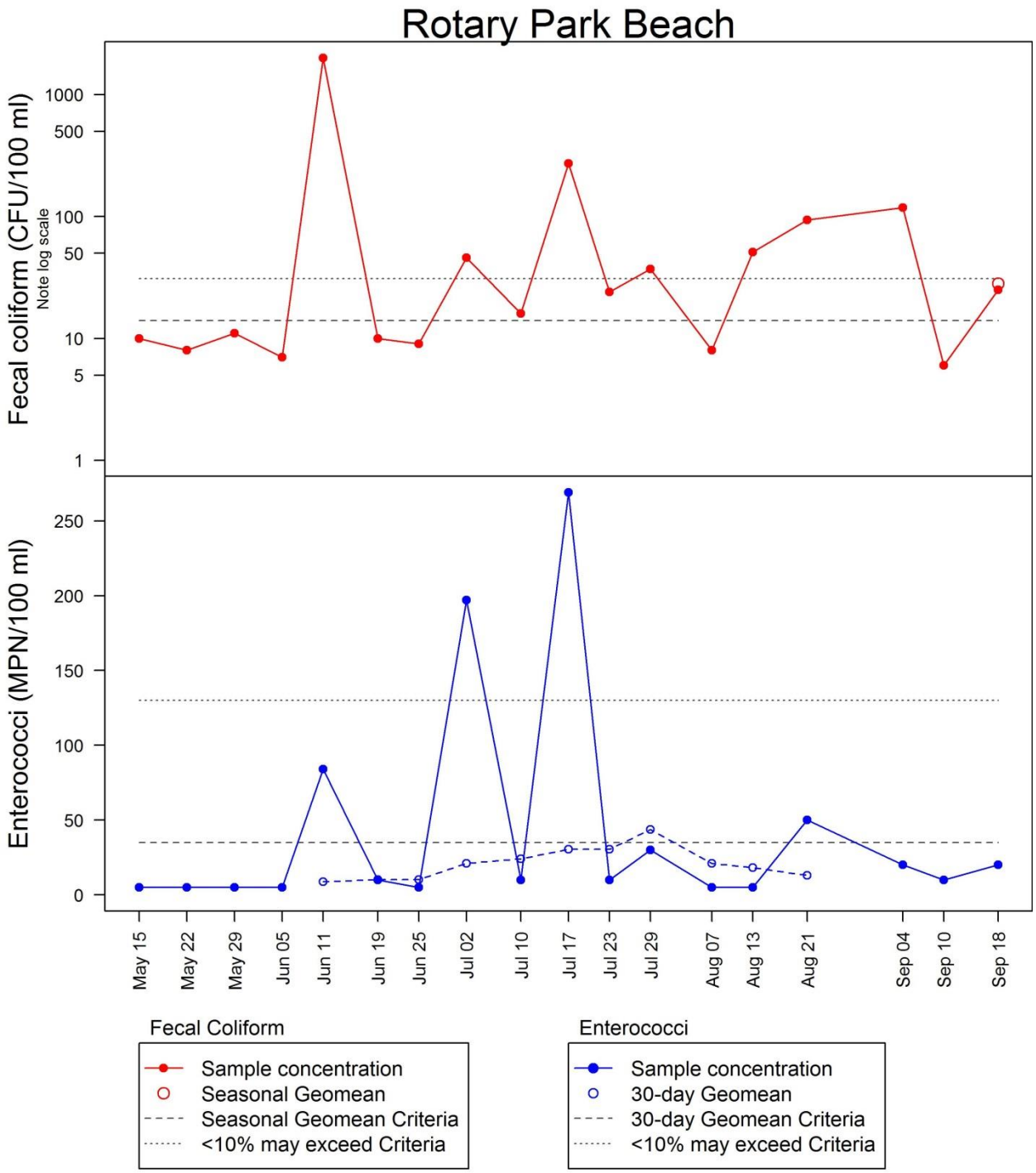

Sunset
Fecal coliform (CFU/100 ml)
200
150
100
50
0
Enterococci (MPN/100 ml)
300
250
200
150
100
50
0
May 15
May 22
May 29
Jun 05
Jun 11
Jun 19
Jun 25
Jul 02
Jul 10
Jul 17
Jul 23
Jul 29
Aug 07
Aug 13
Aug 21
Sep 04
Sep 10
Sep 18
Fecal Coliform
Sample concentration
Seasonal Geomean
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean
30-day Geomean Criteria
<10% may exceed Criteria

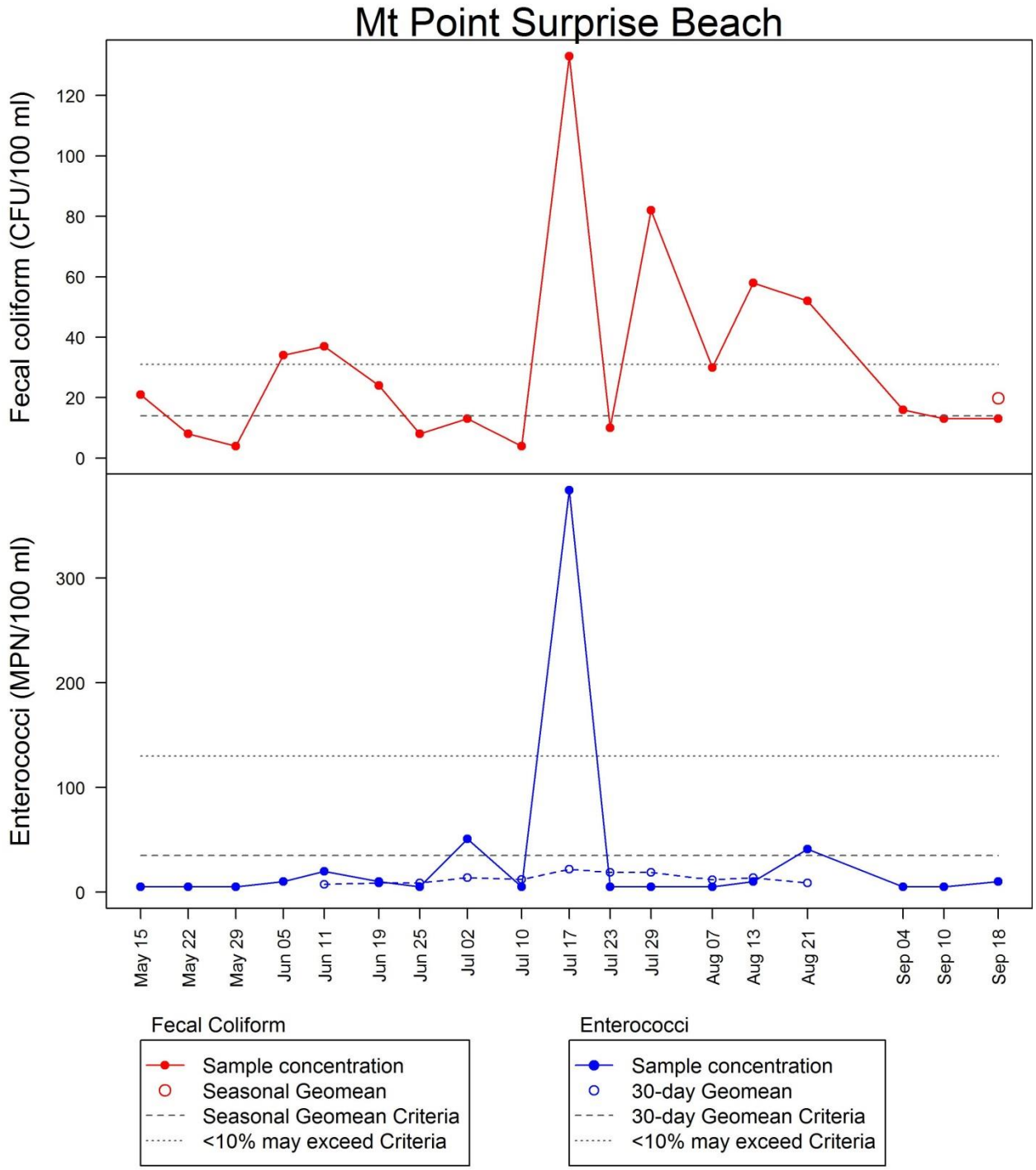

South Refuge Cove
Fecal coliform (CFU/100 ml)
150
100
50
0
Enterococci (MPN/100 ml)
Note log scale
1000
500
100
50
10
5
1
May 15
May 22
May 29
Jun 05
Jun 11
Jun 19
Jun 25
Jul 02
Jul 10
Jul 17
Jul 23
Jul 29
Aug 07
Aug 13
Aug 21
Sep 04
Sep 10
Sep 18
Fecal Coliform
Sample concentration
Seasonal Geomean
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean
30-day Geomean Criteria
<10% may exceed Criteria

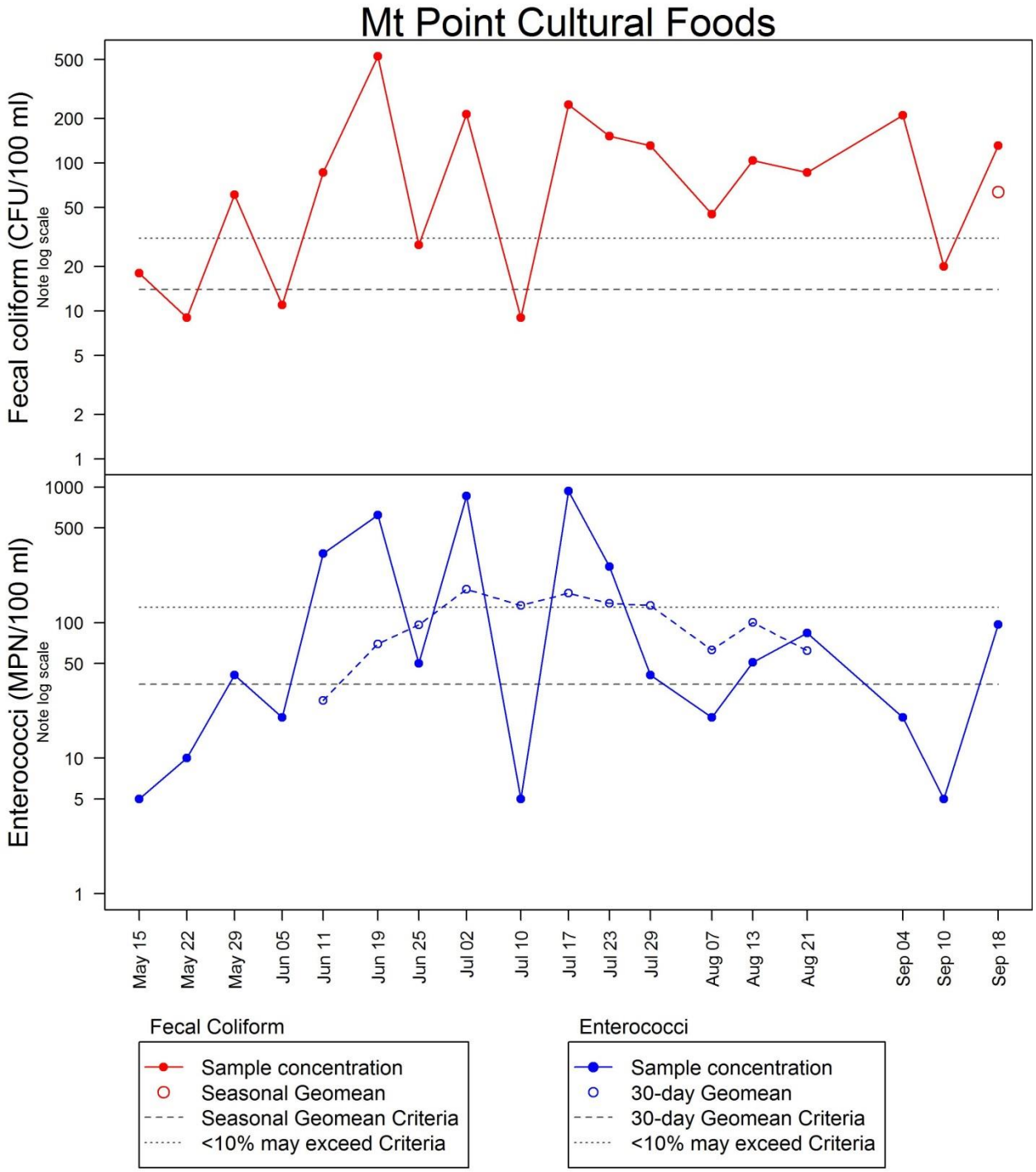

Thomas Basin
Fecal coliform (CFU/100 ml)
400
300
200
100
0
Enterococci (MPN/100 ml)
Note log scale
1000
500
100
50
10
5
1
May 15
May 22
May 29
Jun 05
Jun 11
Jun 19
Jun 25
Jul 02
Jul 10
Jul 17
Jul 23
Jul 29
Aug 07
Aug 13
Aug 21
Sep 04
Sep 10
Sep 18
Fecal Coliform
Sample concentration
Seasonal Geomean
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean
30-day Geomean Criteria
<10% may exceed Criteria

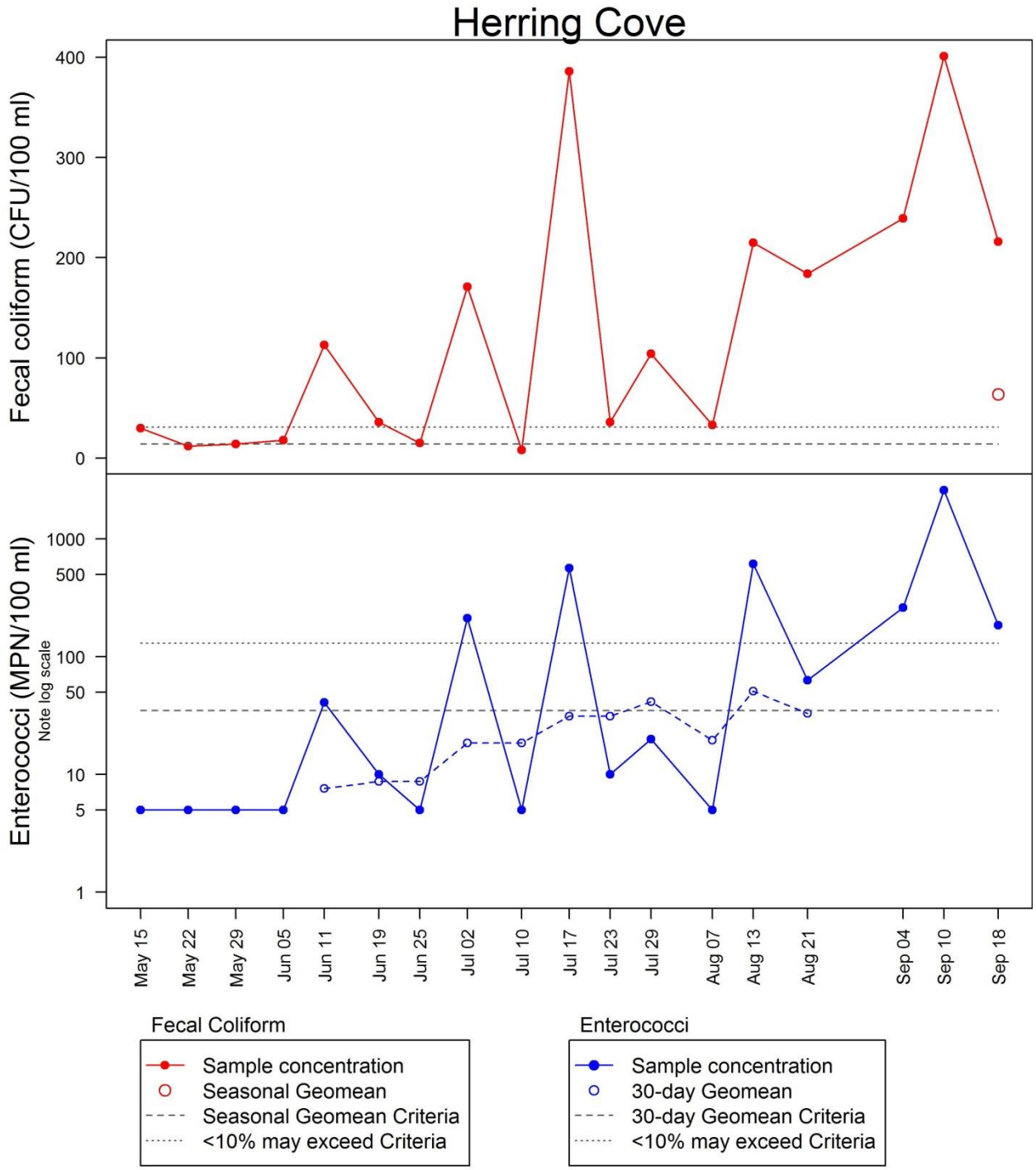

Seaport
Fecal coliform (CFU/100 ml)
150
100
50
0
Enterococci (MPN/100 ml)
150
100
50
0
May 15
May 22
May 29
Jun 05
Jun 11
Jun 19
Jun 25
Jul 02
Jul 10
Jul 17
Jul 23
Jul 29
Aug 07
Aug 13
Aug 21
Sep 04
Sep 10
Sep 18
Fecal Coliform
Sample concentration
Seasonal Geomean
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean
30-day Geomean Criteria
<10% may exceed Criteria


Rotary Park Pool
Fecal coliform (CFU/100 ml)
Note log scale
1000
500
100
50
10
5
1
Enterococci (MPN/100 ml)
Note log scale
1000
500
100
50
10
5
1
May 15
May 22
May 29
Jun 05
Jun 11
Jun 19
Jun 25
Jul 02
Jul 10
Jul 17
Jul 23
Jul 29
Aug 07
Aug 13
Aug 21
Sep 04
Sep 10
Sep 18
Fecal Coliform
Sample concentration
Seasonal Geomean
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean
30-day Geomean Criteria
<10% may exceed Criteria

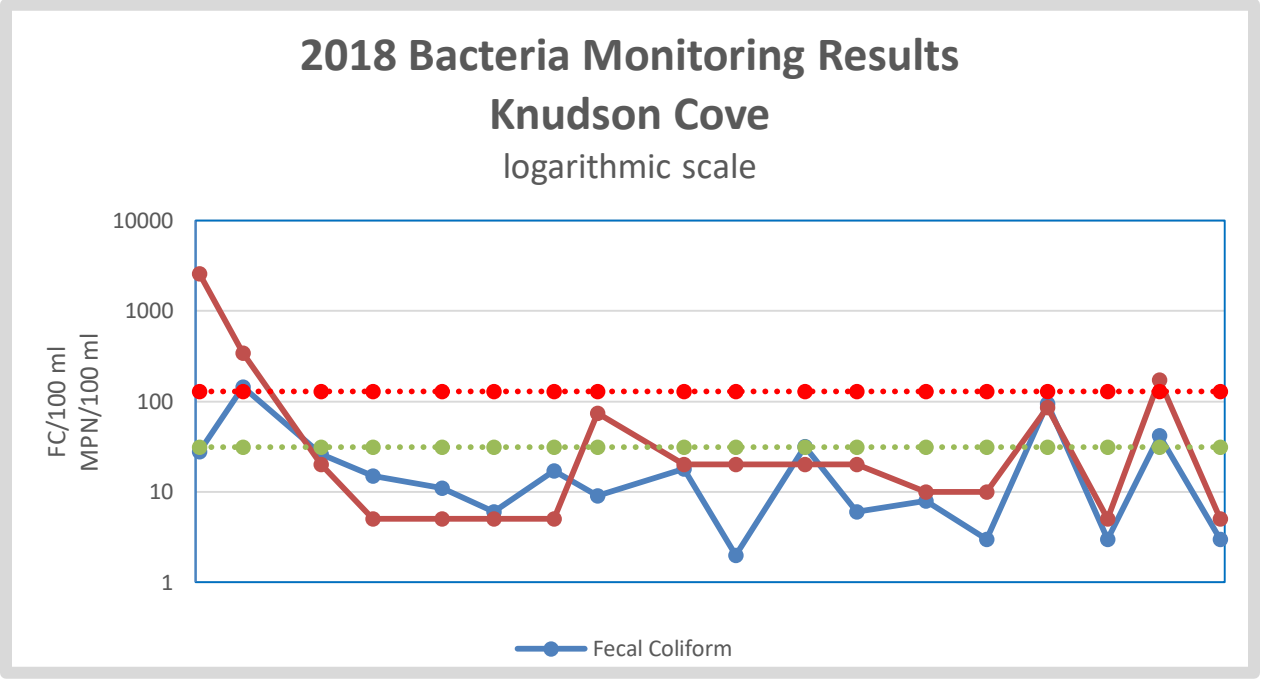

Rotary Park Beach
Fecal coliform (CFU/100 ml)
Note log scale
1000
500
100
50
10
5
1
Enterococci (MPN/100 ml)
250
200
150
100
50
0
May 15
May 22
May 29
Jun 05
Jun 11
Jun 19
Jun 25
Jul 02
Jul 10
Jul 17
Jul 23
Jul 29
Aug 07
Aug 13
Aug 21
Sep 04
Sep 10
Sep 18
Fecal Coliform
Sample concentration
Seasonal Geomean
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean
30-day Geomean Criteria
<10% may exceed Criteria

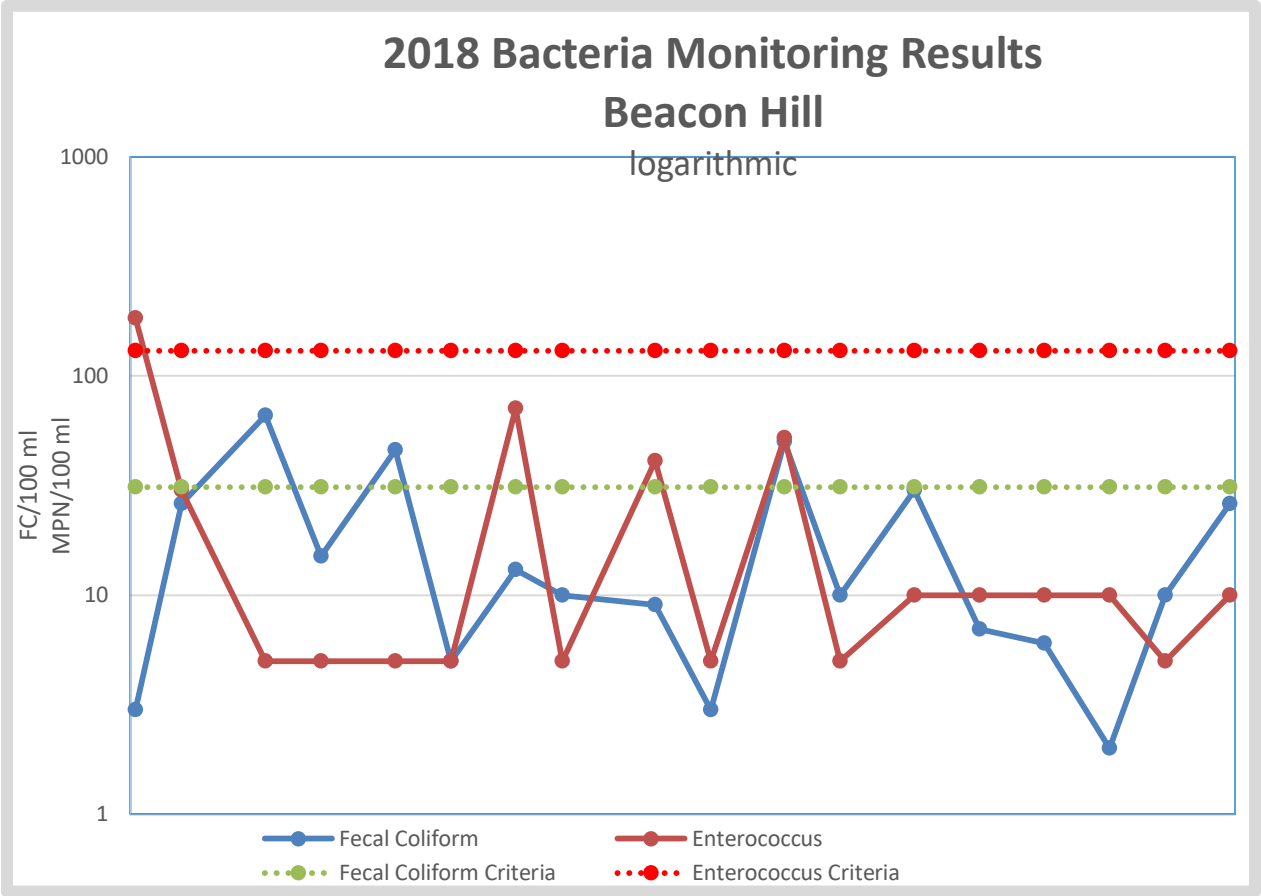

Mt Point Surprise Beach
Fecal coliform (CFU/100 ml)
0
20
40
60
80
100
120
Enterococci (MPN/100 ml)
0
100
200
300
May 15
May 22
May 29
Jun 05
Jun 11
Jun 19
Jun 25
Jul 02
Jul 10
Jul 17
Jul 23
Jul 29
Aug 07
Aug 13
Aug 21
Sep 04
Sep 10
Sep 18
Fecal Coliform
Sample concentration
Seasonal Geomean
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean
30-day Geomean Criteria
<10% may exceed Criteria

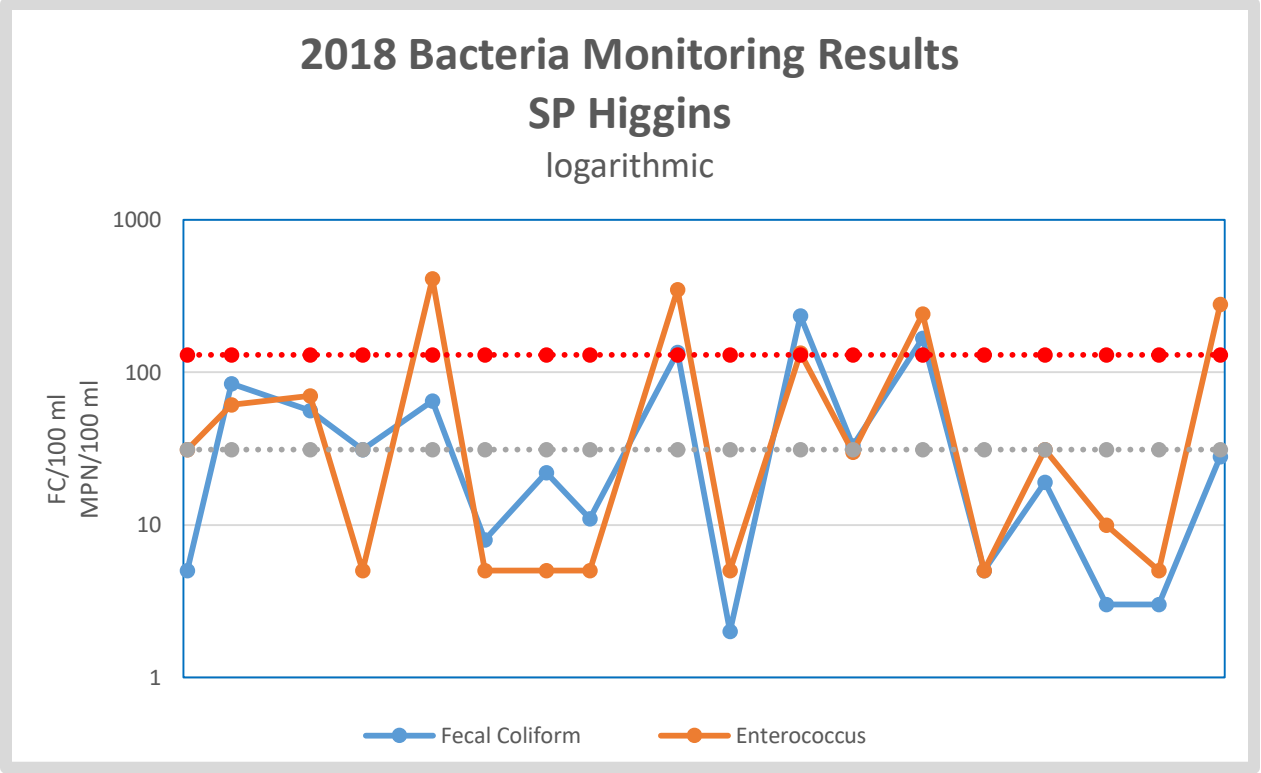

Mt Point Cultural Foods
Fecal coliform (CFU/100 ml)
Note log scale
500
200
100
50
20
10
5
2
1
Enterococci (MPN/100 ml)
Note log scale
1000
500
100
50
10
5
1
May 15
May 22
May 29
Jun 05
Jun 11
Jun 19
Jun 25
Jul 02
Jul 10
Jul 17
Jul 23
Jul 29
Aug 07
Aug 13
Aug 21
Sep 04
Sep 10
Sep 18
Fecal Coliform
Sample concentration
Seasonal Geomean
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean
30-day Geomean Criteria
<10% may exceed Criteria

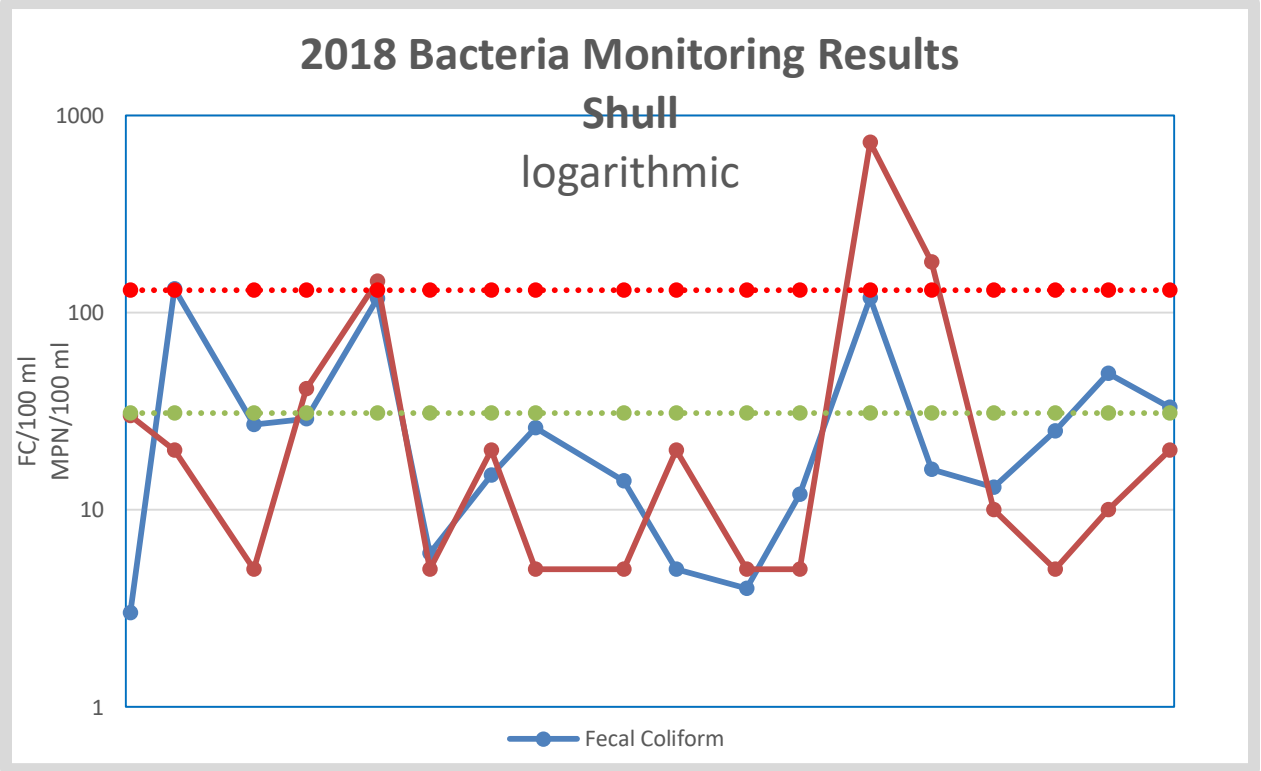

Herring Cove
Fecal coliform (CFU/100 ml)
400
300
200
100
0
Enterococci (MPN/100 ml)
Note log scale
1000
500
100
50
10
5
1
May 15
May 22
May 29
Jun 05
Jun 11
Jun 19
Jun 25
Jul 02
Jul 10
Jul 17
Jul 23
Jul 29
Aug 07
Aug 13
Aug 21
Sep 04
Sep 10
Sep 18
Fecal Coliform
Sample concentration
Seasonal Geomean
Seasonal Geomean Criteria
<10% may exceed Criteria
Enterococci
Sample concentration
30-day Geomean
30-day Geomean Criteria
<10% may exceed Criteria

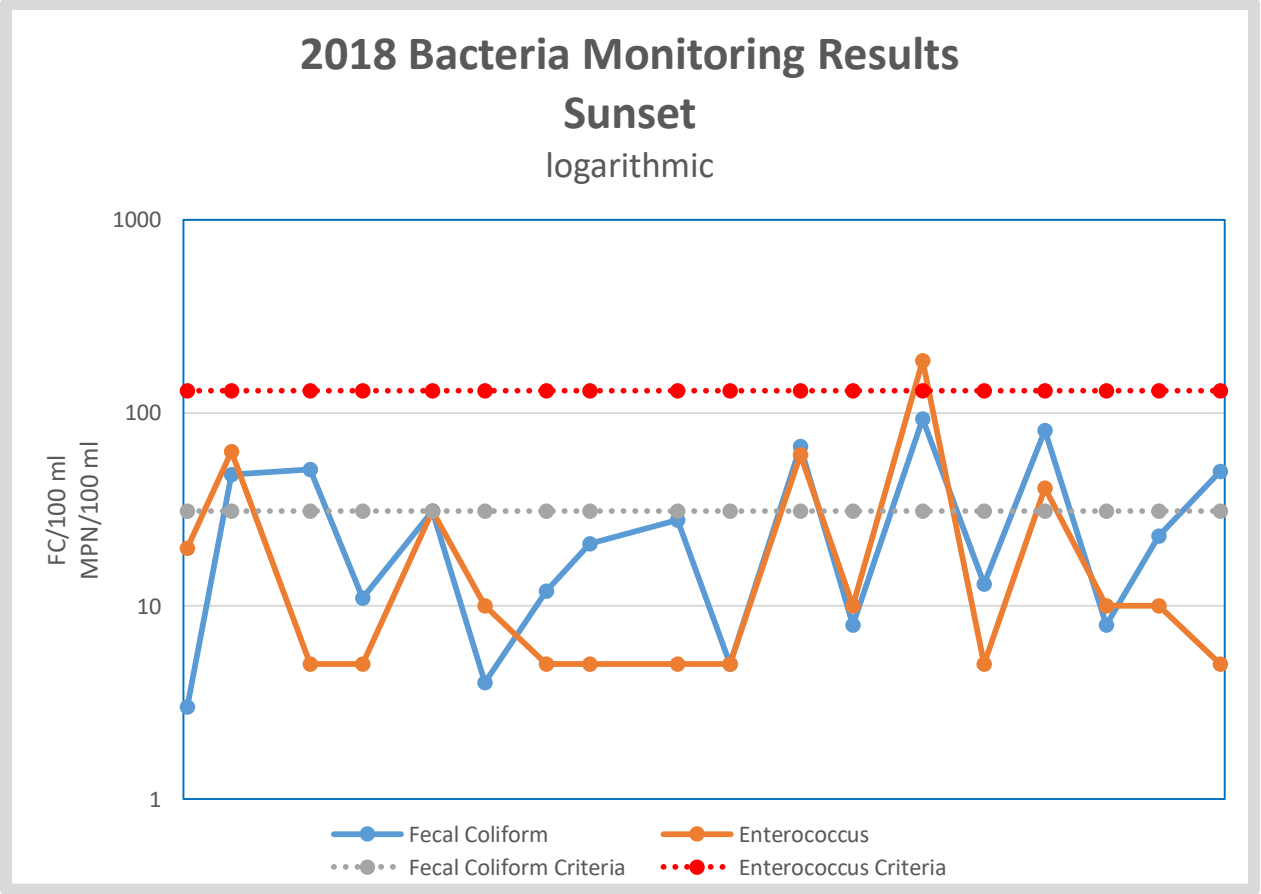
2018

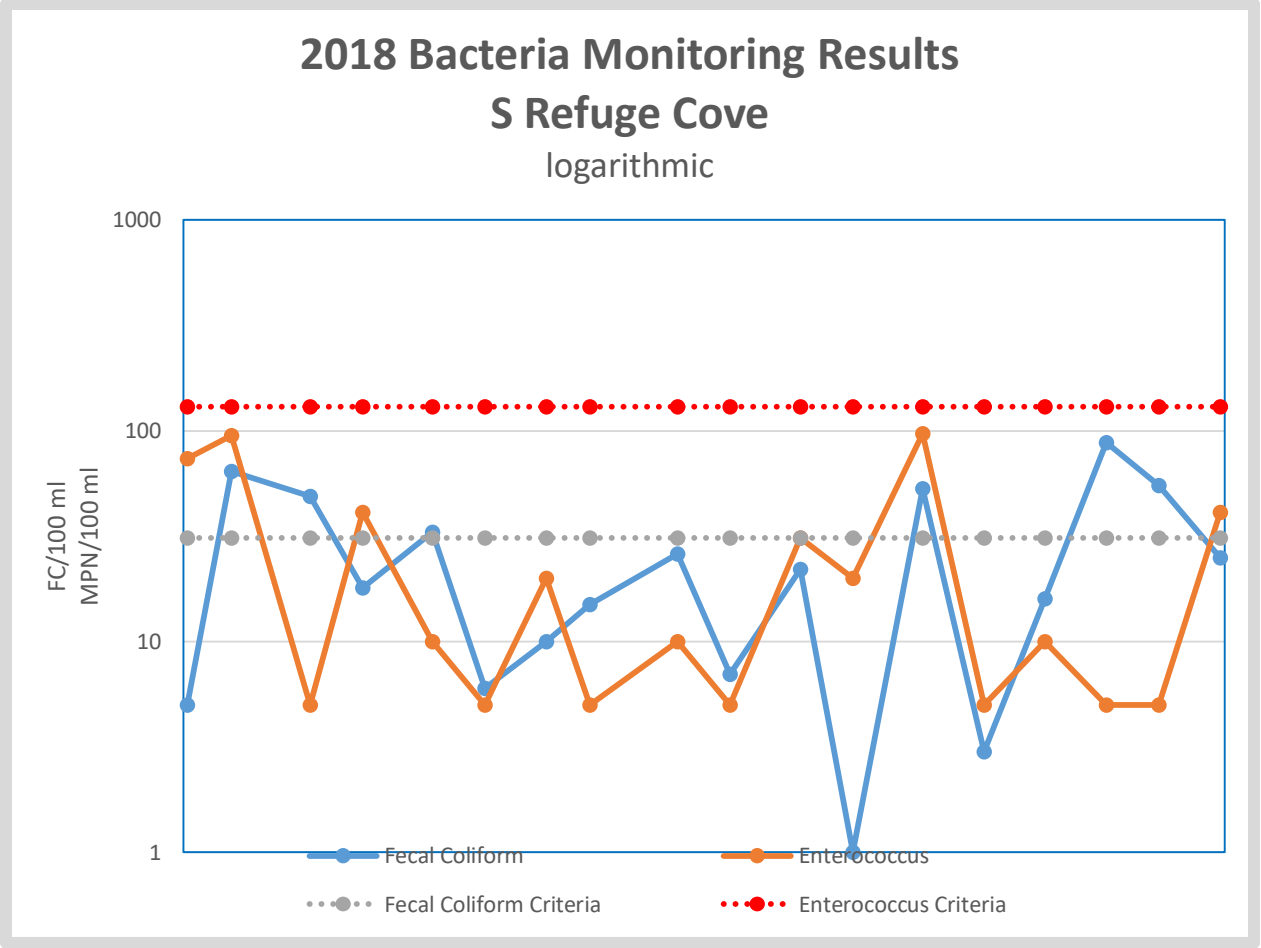

2018 Bacteria Monitoring Results
Knudson Cove
logarithmic scale
10000
1000
100
10
1
FC/100 ml
MPN/100 ml
Fecal Coliform

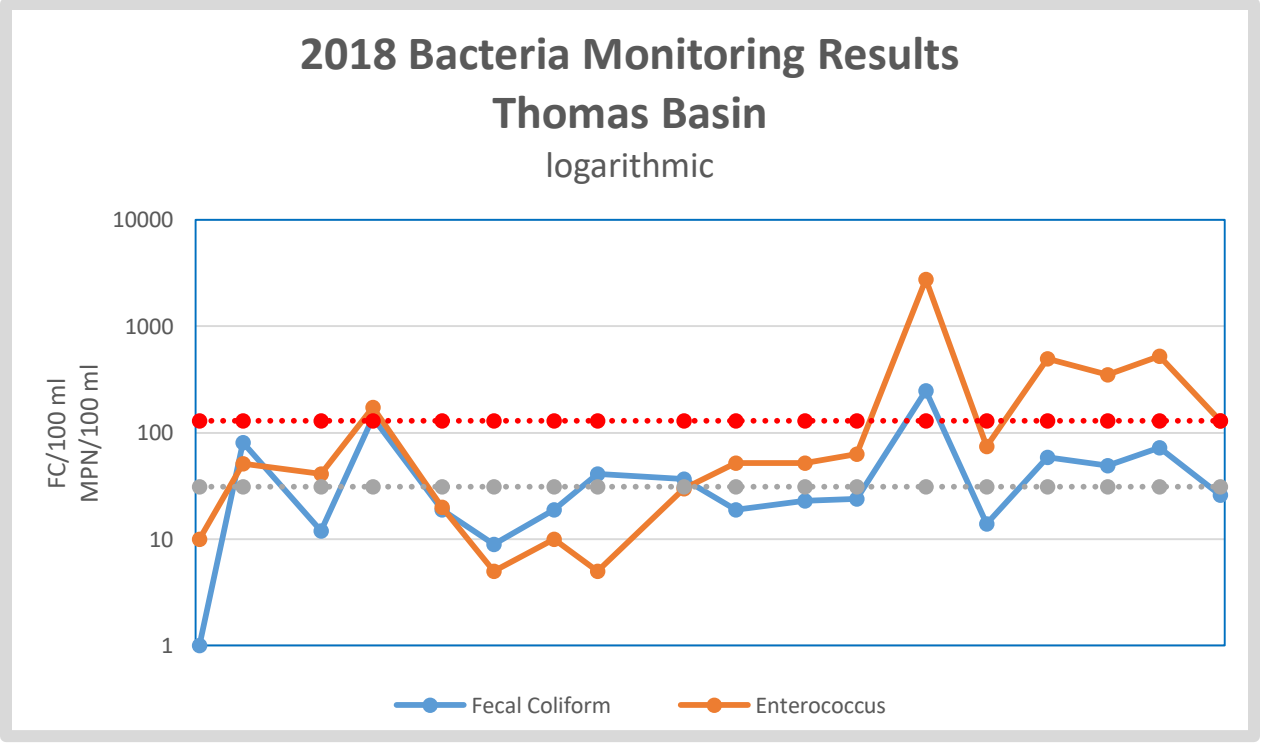

2018 Bacteria Monitoring Results
Beacon Hill
logarithmic
1000
100
10
1
FC/100 ml
MPN/100 ml
Fecal Coliform
Enterococcus
Fecal Coliform Criteria
Enterococcus Criteria

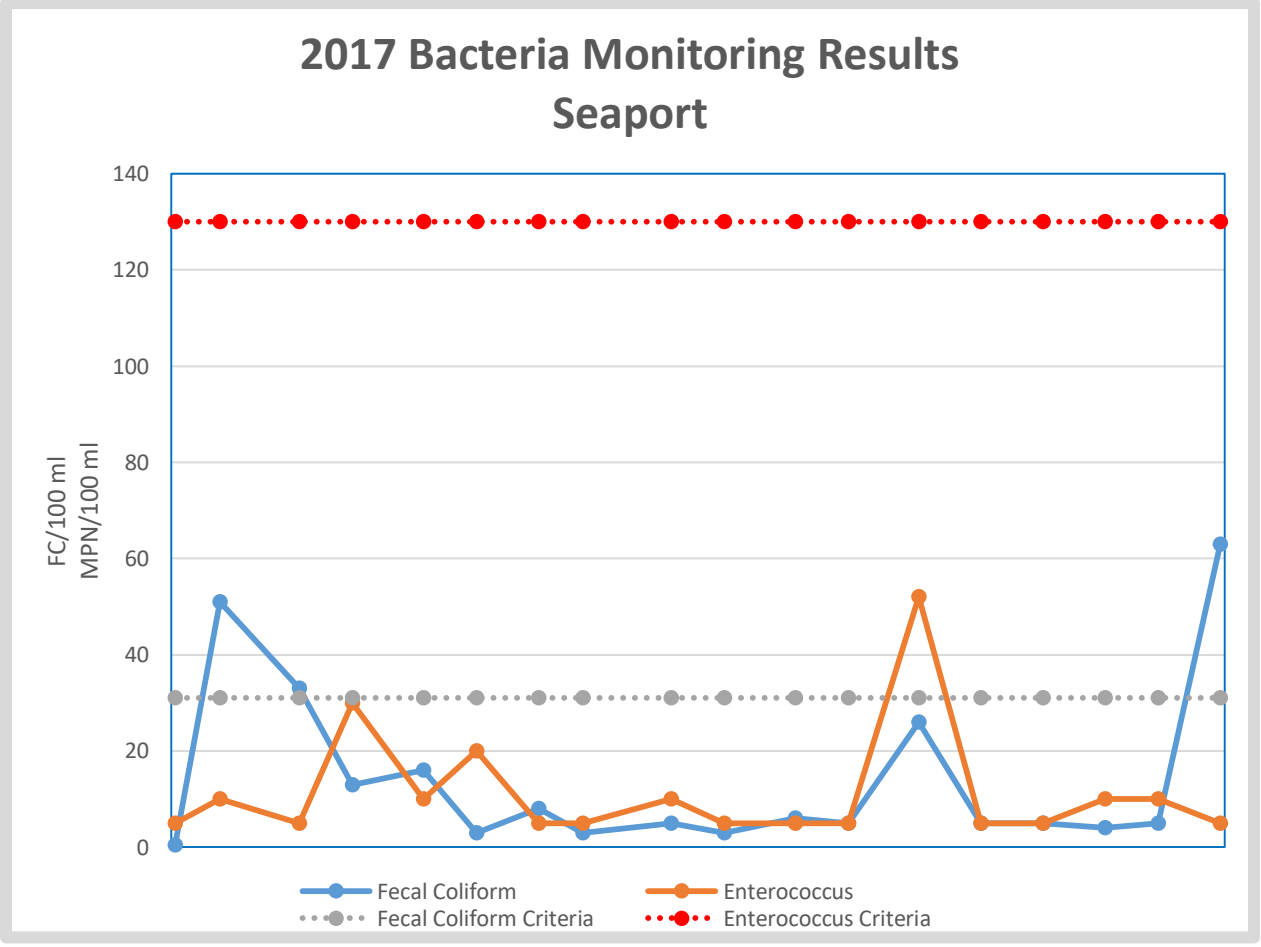

2018 Bacteria Monitoring Results
SP Higgins
logarithmic
1000
100
10
1
FC/100 ml
MPN/100 ml
Fecal Coliform
Enterococcus

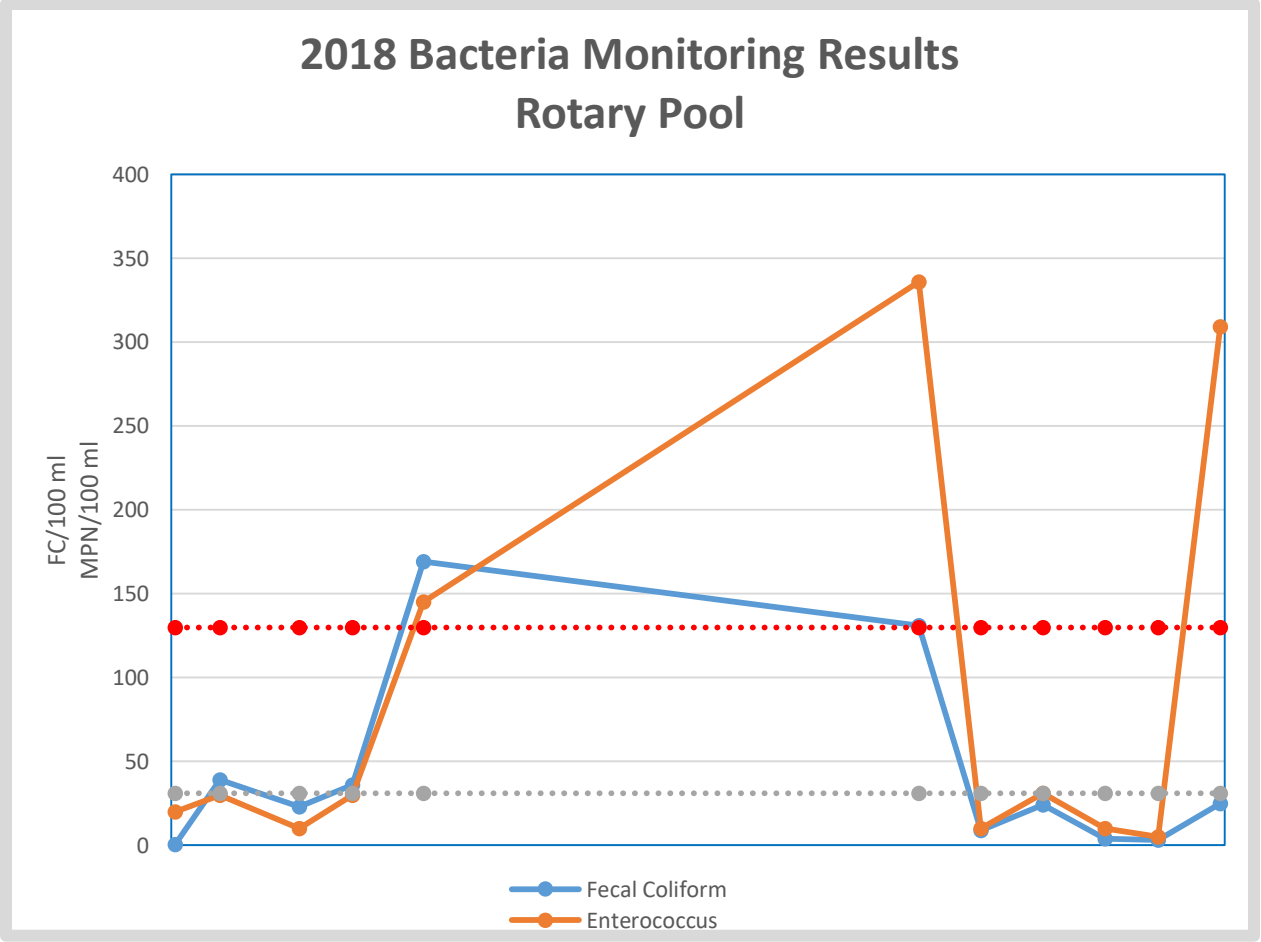

2018 Bacteria Monitoring Results
Shull
logarithmic
1000
100
10
1
FC/100 ml
MPN/100 ml
Fecal Coliform

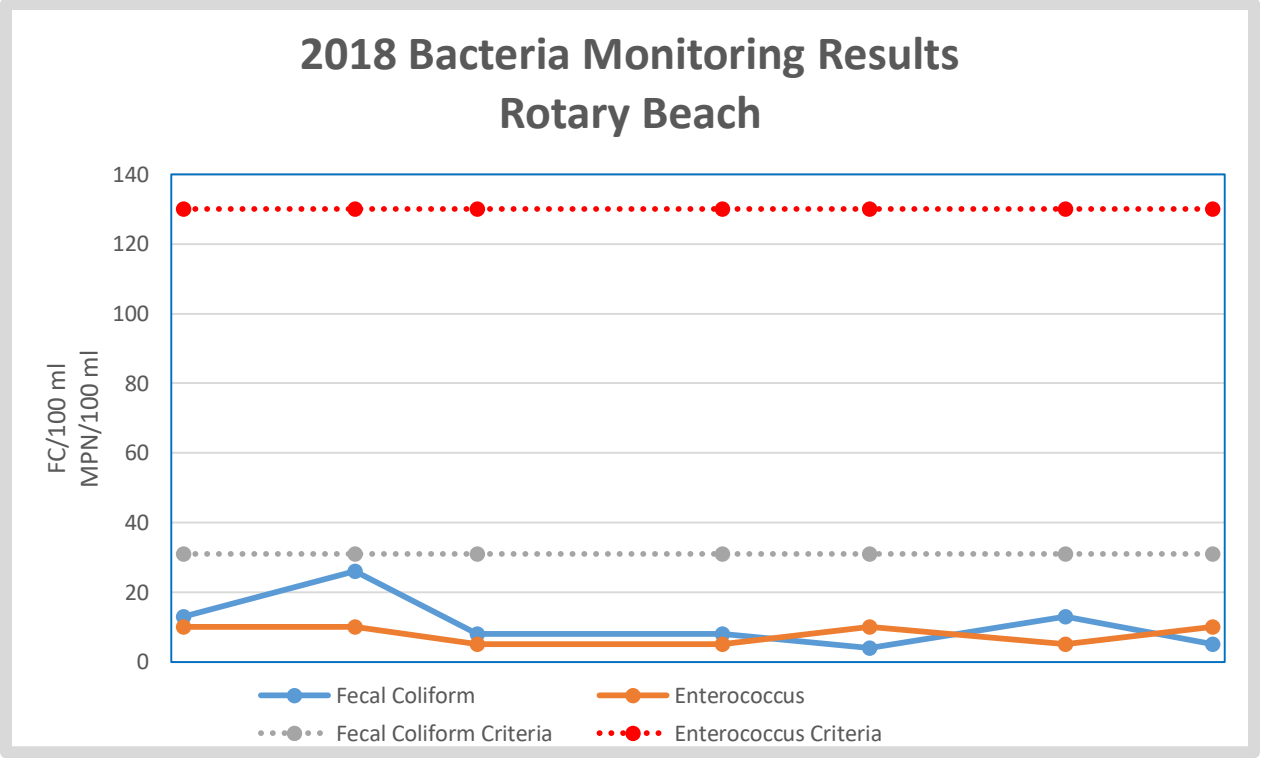

2018 Bacteria Monitoring Results
Sunset
logarithmic
1000
100
10
1
FC/100 ml
MPN/100 ml
Fecal Coliform
Enterococcus
Fecal Coliform Criteria
Enterococcus Criteria

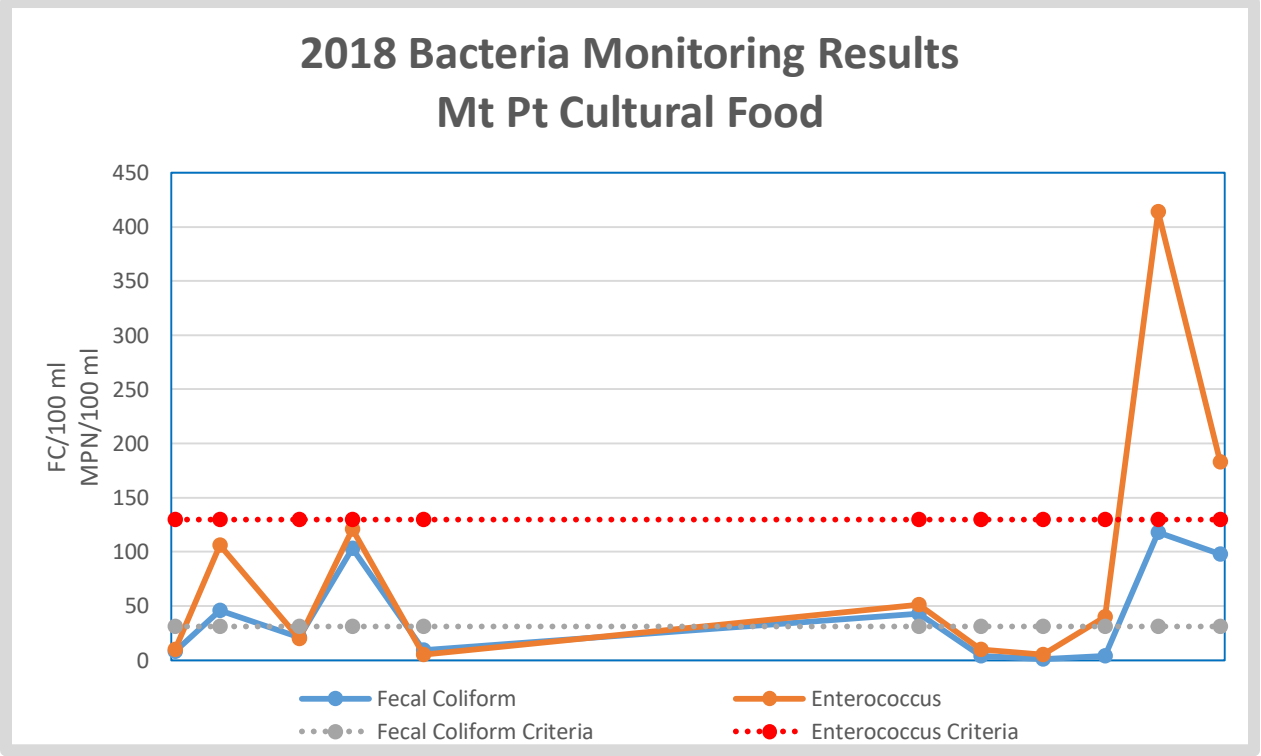

2018 Bacteria Monitoring Results
S Refuge Cove
logarithmic
1000
100
10
1
FC/100 ml
MPN/100 ml
Fecal Coliform
Enterococcus
Fecal Coliform Criteria
Enterococcus Criteria

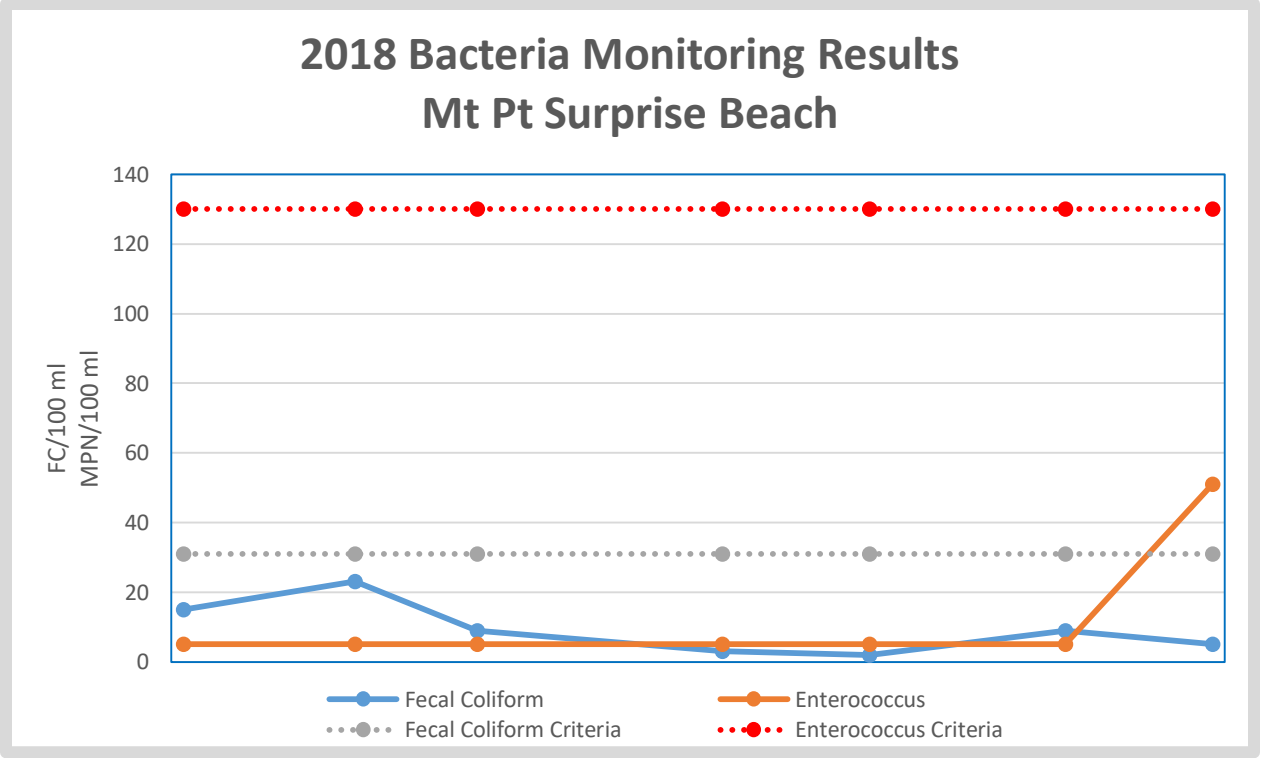

2018 Bacteria Monitoring Results
Thomas Basin
logarithmic
10000
1000
100
10
1
FC/100 ml
MPN/100 ml
Fecal Coliform
Enterococcus

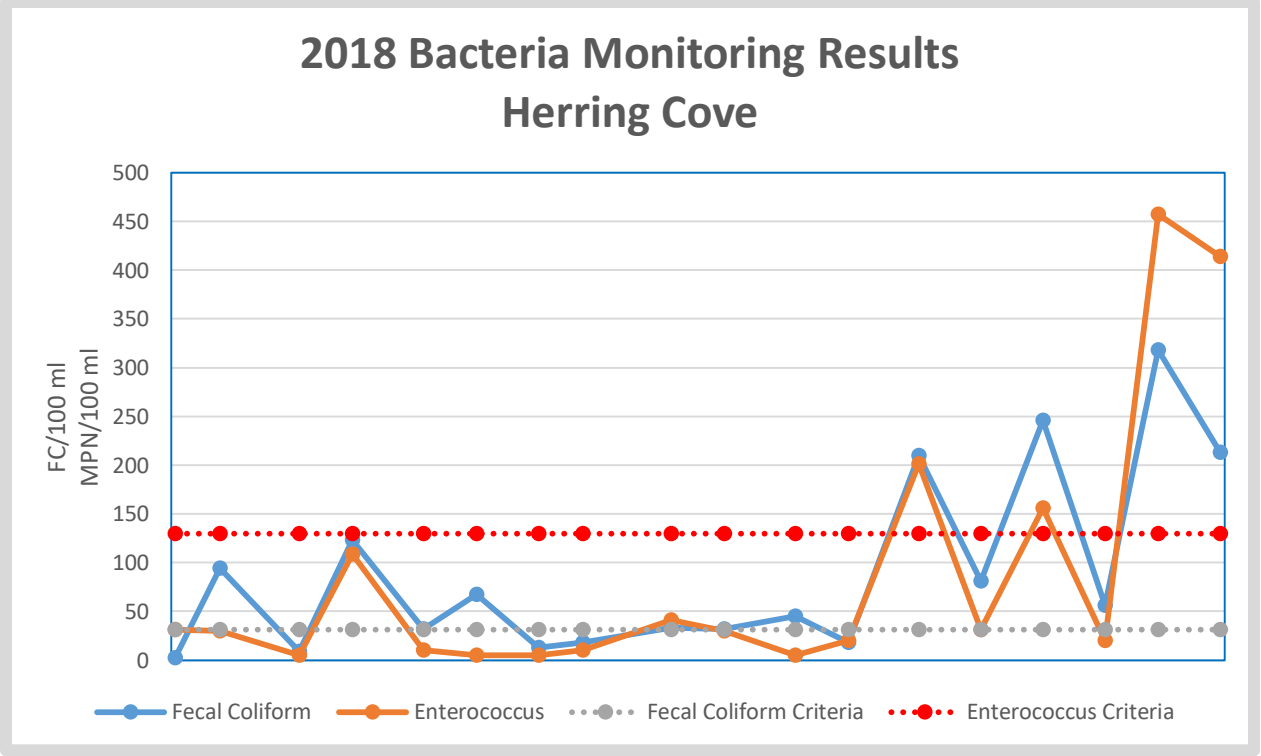

2017 Bacteria Monitoring Results
Seaport
140
120
100
80
60
40
20
0
FC/100 ml
MPN/100 ml
Fecal Coliform
Enterococcus
Fecal Coliform Criteria
Enterococcus Criteria


2018 Bacteria Monitoring Results
Rotary Pool
400
350
300
250
200
150
100
50
0
FC/100 ml
MPN/100 ml
Fecal Coliform
Enterococcus


2018 Bacteria Monitoring Results
Rotary Beach
FC/100 ml
MPN/100 ml
140
120
100
80
60
40
20
0
Fecal Coliform
Enterococcus
Fecal Coliform Criteria
Enterococcus Criteria

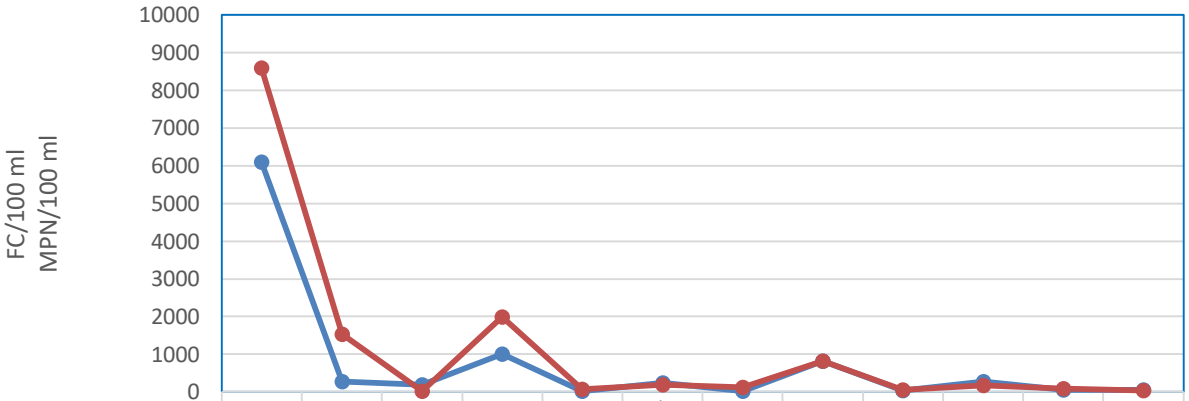

2018 Bacteria Monitoring Results
Mt Pt Cultural Food
FC/100 ml
MPN/100 ml
450
400
350
300
250
200
150
100
50
0
Fecal Coliform
Enterococcus
Fecal Coliform Criteria
Enterococcus Criteria


2018 Bacteria Monitoring Results
Mt Pt Surprise Beach
FC/100 ml
MPN/100 ml
140
120
100
80
60
40
20
0
Fecal Coliform
Enterococcus
Fecal Coliform Criteria
Enterococcus Criteria


2018 Bacteria Monitoring Results
Herring Cove
FC/100 ml
MPN/100 ml
500
450
400
350
300
250
200
150
100
50
0
Fecal Coliform
Enterococcus
Fecal Coliform Criteria
Enterococcus Criteria

Bacteria Monitoring Results 2018
South Kenai Beach

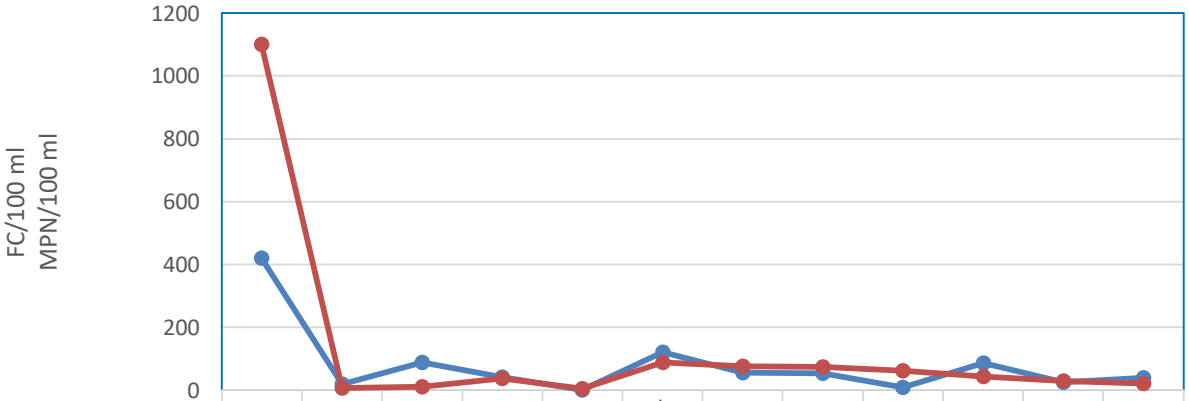
logarithmic



	6/14	6/29	7/3	7/13	7/18	7/25 26	8/2	8/10	8/15	8/24	8/29	9/7
Fecal Coliform	6100	275	200	1010	18	241	22	820	32	280	48	58
Enterococcus	8601	1541	15	1990	67	200	130	816	55	173	84	45

Bacteria Monitoring Results 2018
North Kenai Beach

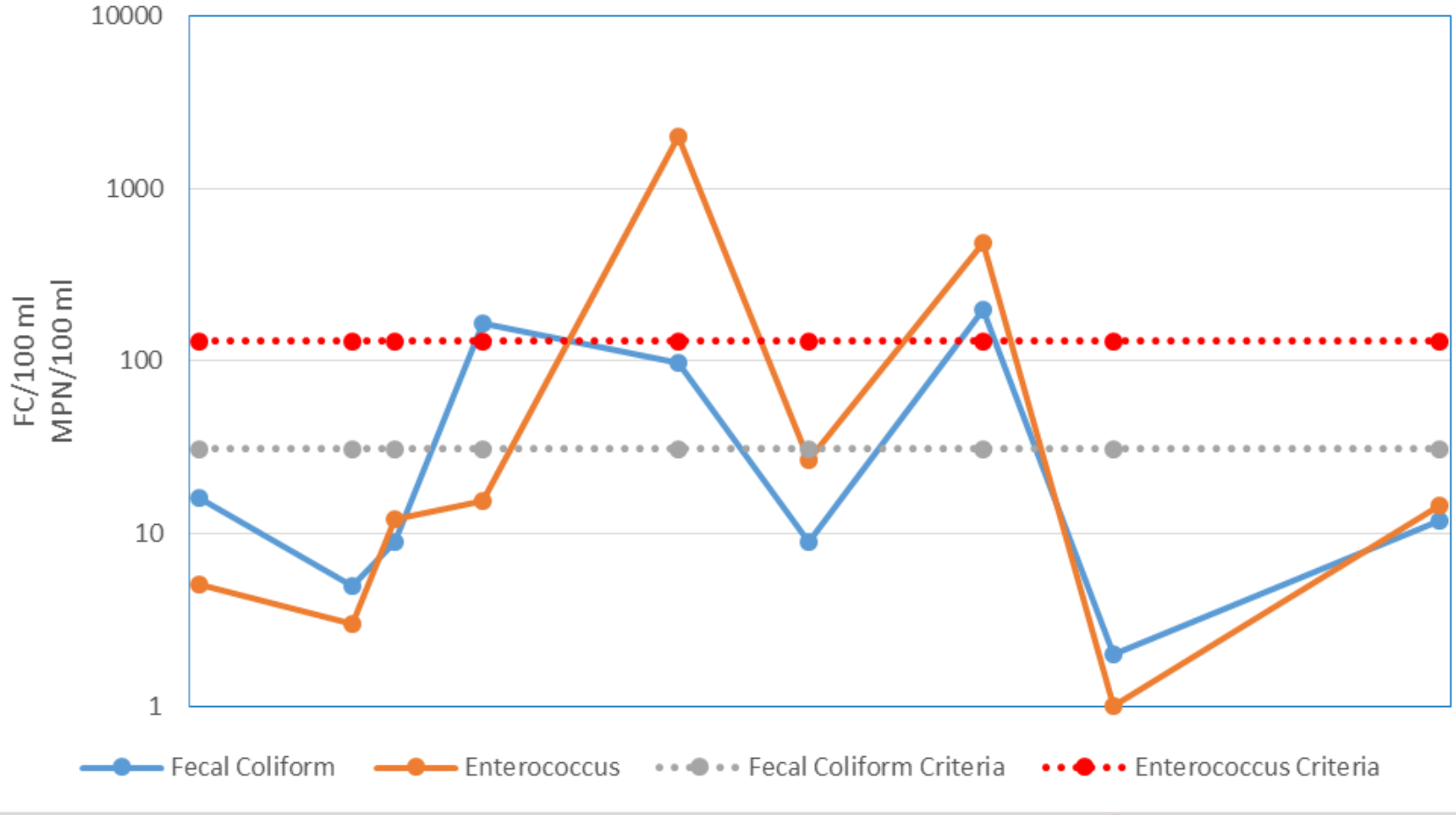
logarithmic



	6/14	6/29	7/3	7/13	7/18	7/25 26	8/2	8/10	8/15	8/24	8/29	9/7
Fecal Coliform	420	18	88	42	0.5	121	56	54	8	86	25	40
Enterococcus	1100	6	11	38	5	89	75	73	61	44	29	21

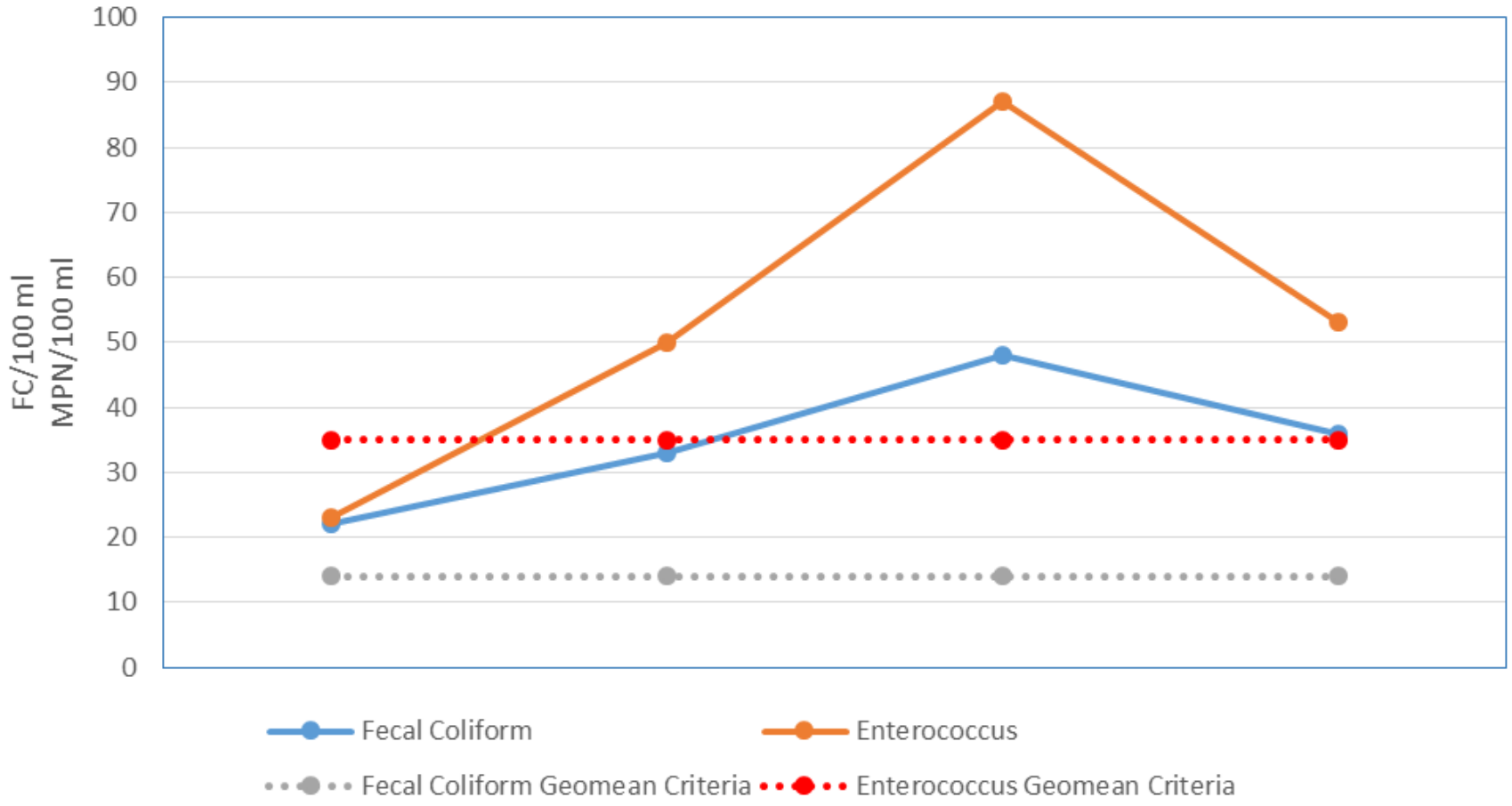
2017 Bacteria Monitoring Results - Knudson Cove

logarithmic scale



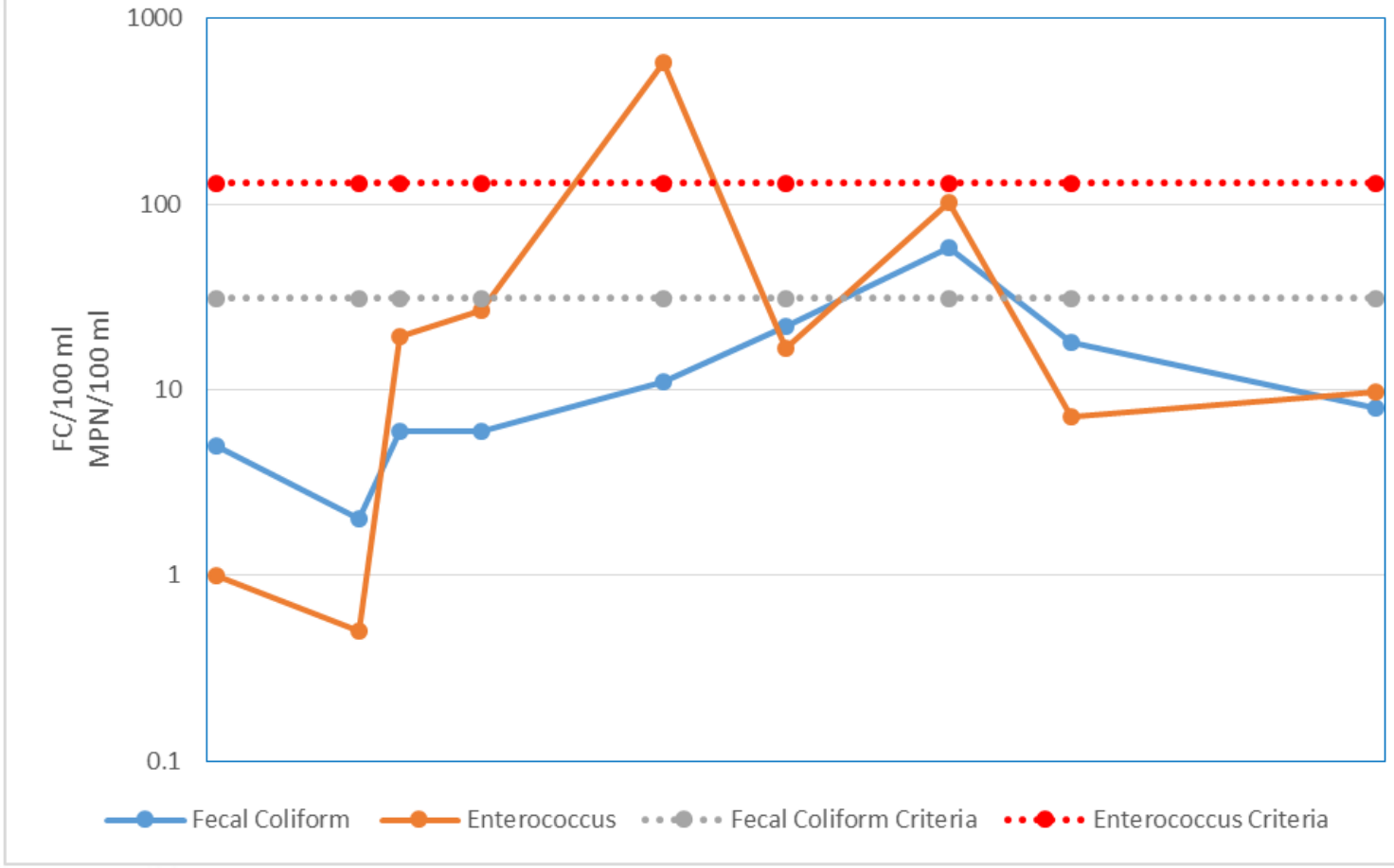
	7/18	7/25	7/27	7/31	8/9	8/15	8/23	8/29	9/13
Fecal Coliform	16	5	9	167	98	9	200	2	12
Enterococcus	5.1	3	12.2	15.6	1986.3	26.9	488.4	1	14.5

2017 Geomean Bacteria Monitoring Results
Knudson Cove

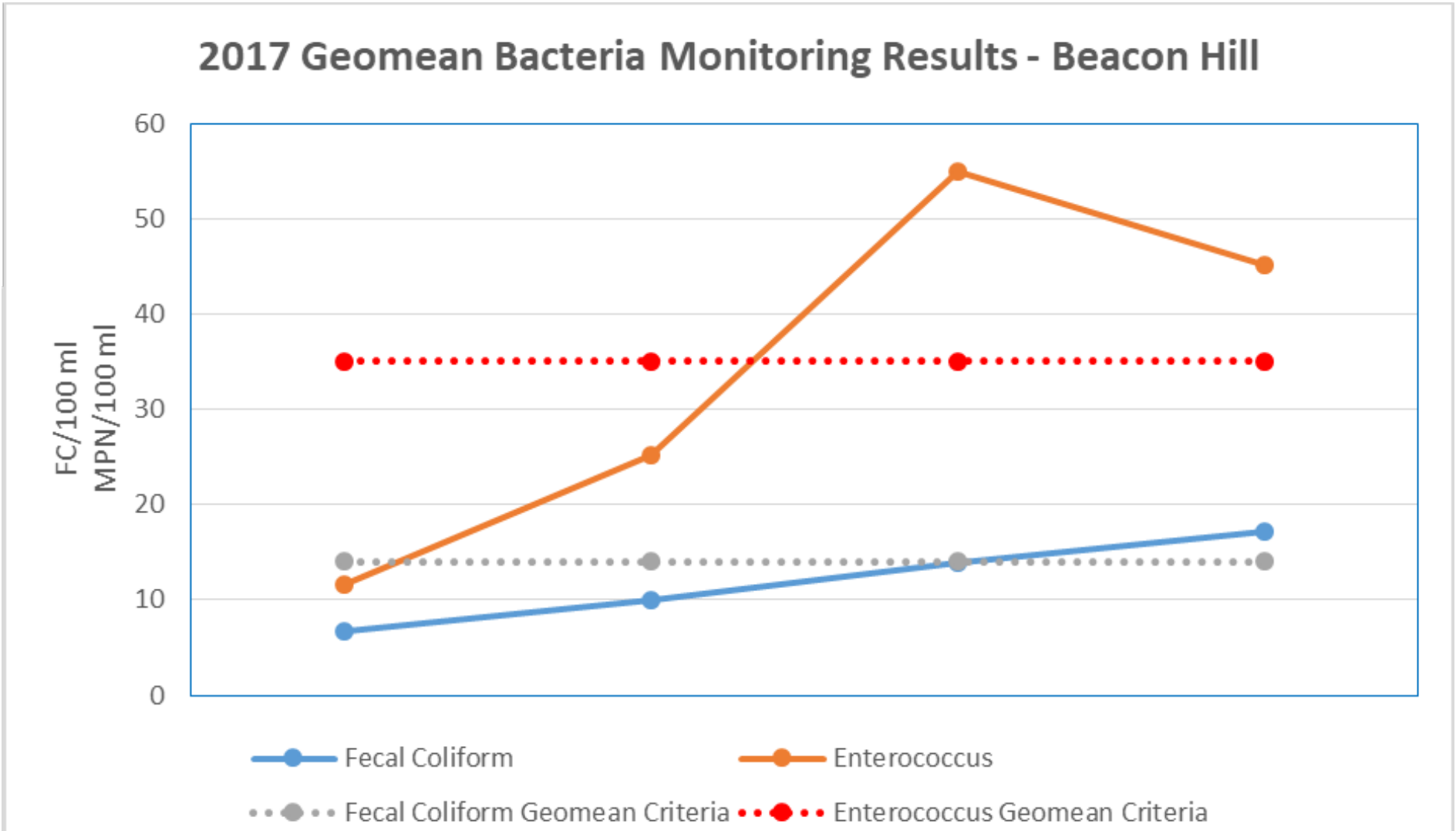


	Jul 18 to Aug 16	Jul 24 to Aug 22	Jul 26 - Aug 24	Jul 31 to Aug 29
Fecal Coliform	22	33	48	36
Enterococcus	23	50	87	53

2017 Bacteria Monitoring Results - Beacon Hill



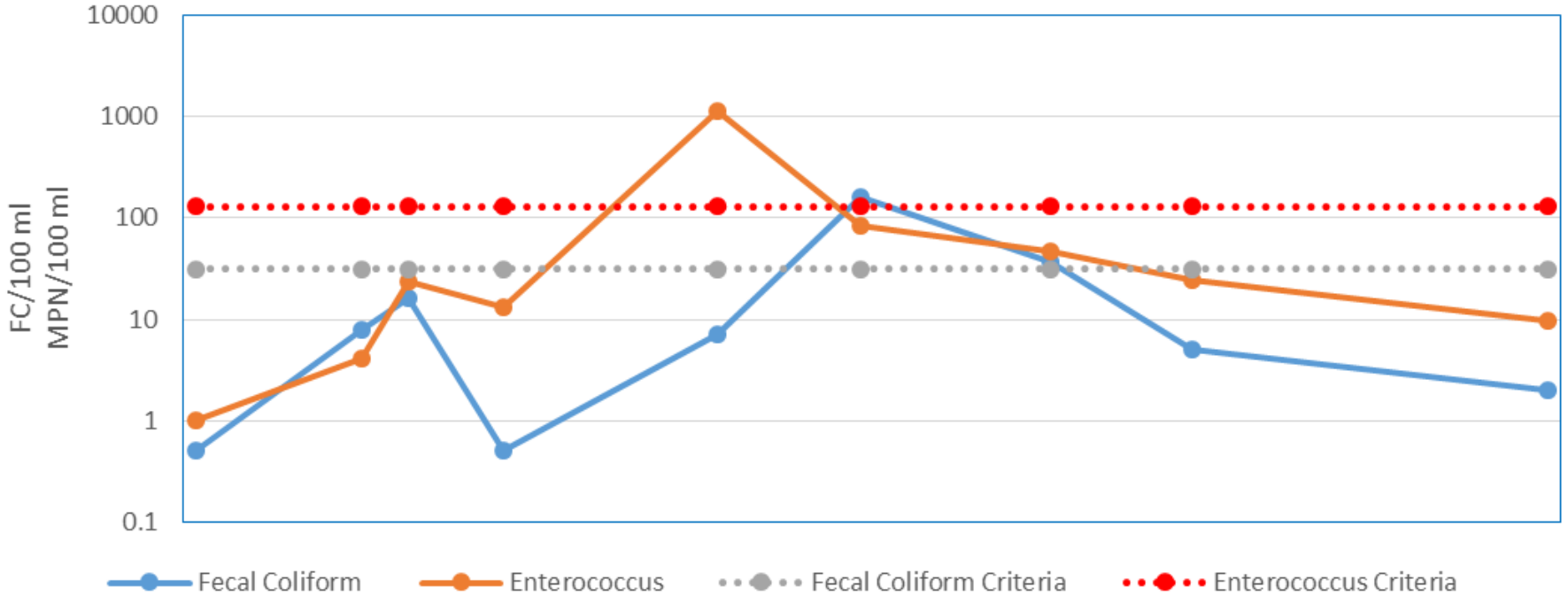
	7/18	7/25	7/27	7/31	8/9	8/15	8/23	8/29	9/13
Fecal Coliform	5	2	6	6	11	22	58	18	8
Enterococcus	1	0.5	19.3	26.6	579.4	16.6	101.7	7.2	9.7



	Jul 18 to Aug 16	Jul 24 to Aug 22	Jul 26 - Aug 24	Jul 31 to Aug 29
Fecal Coliform	7	10	14	17
Enterococcus	12	25	55	45

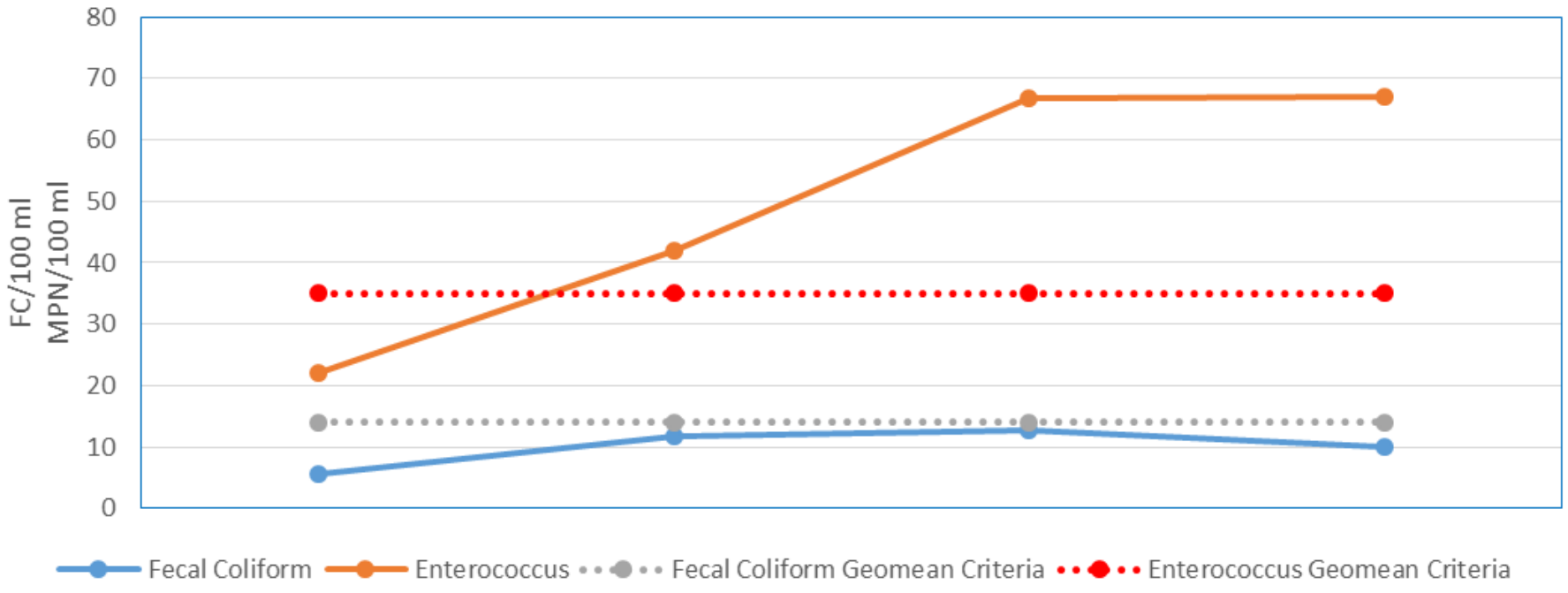
2017 Bacteria Monitoring Results - SP Higgins

logarithmic



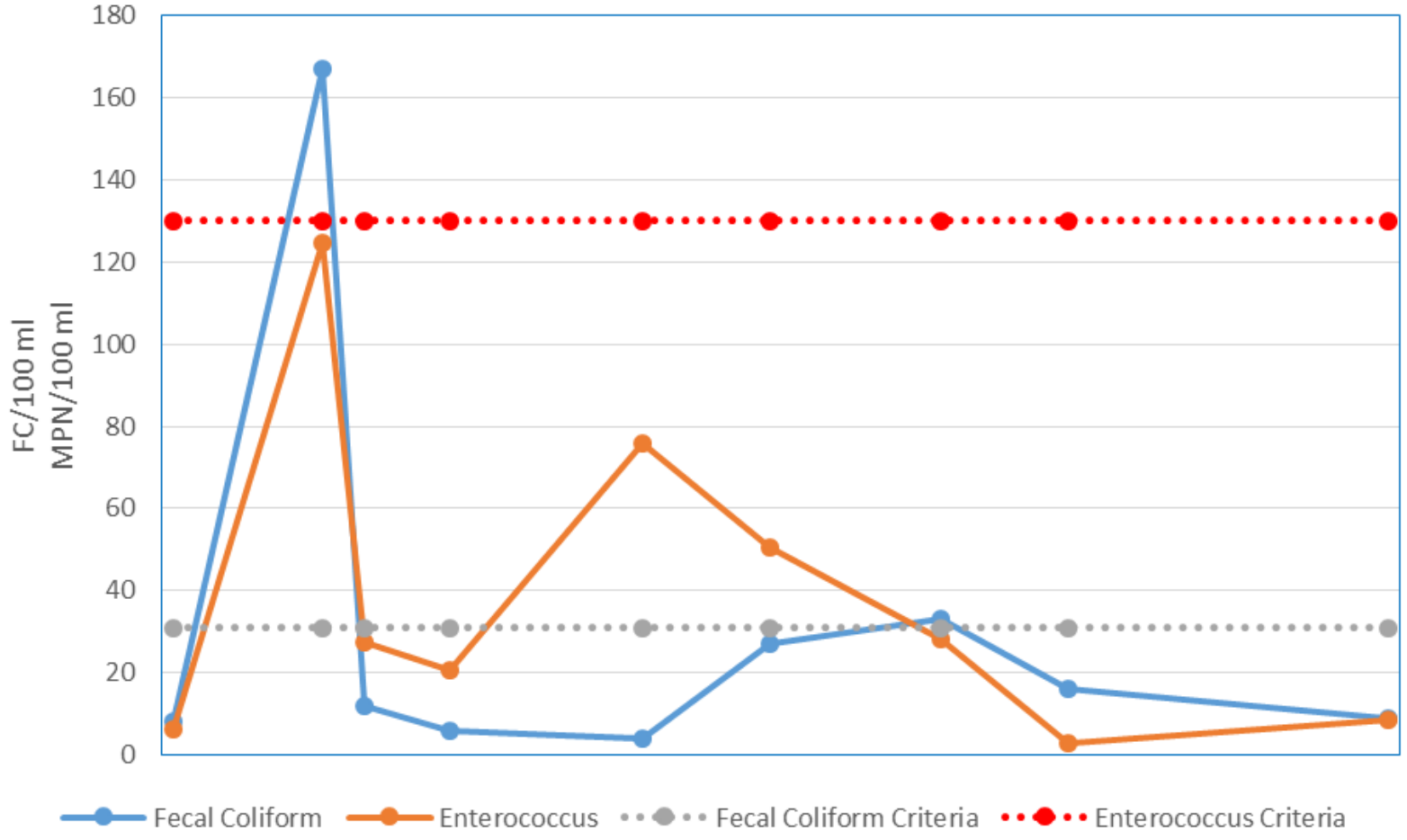
	7/18	7/25	7/27	7/31	8/9	8/15	8/23	8/29	9/13
Fecal Coliform	0.5	8	16	0.5	7	161	37	5	2
Enterococcus	1	4.1	23.8	13.1	1119.9	82.3	46.2	24.3	9.5

2017 Geomean Bacteria Monitoring Results
SP Higgins



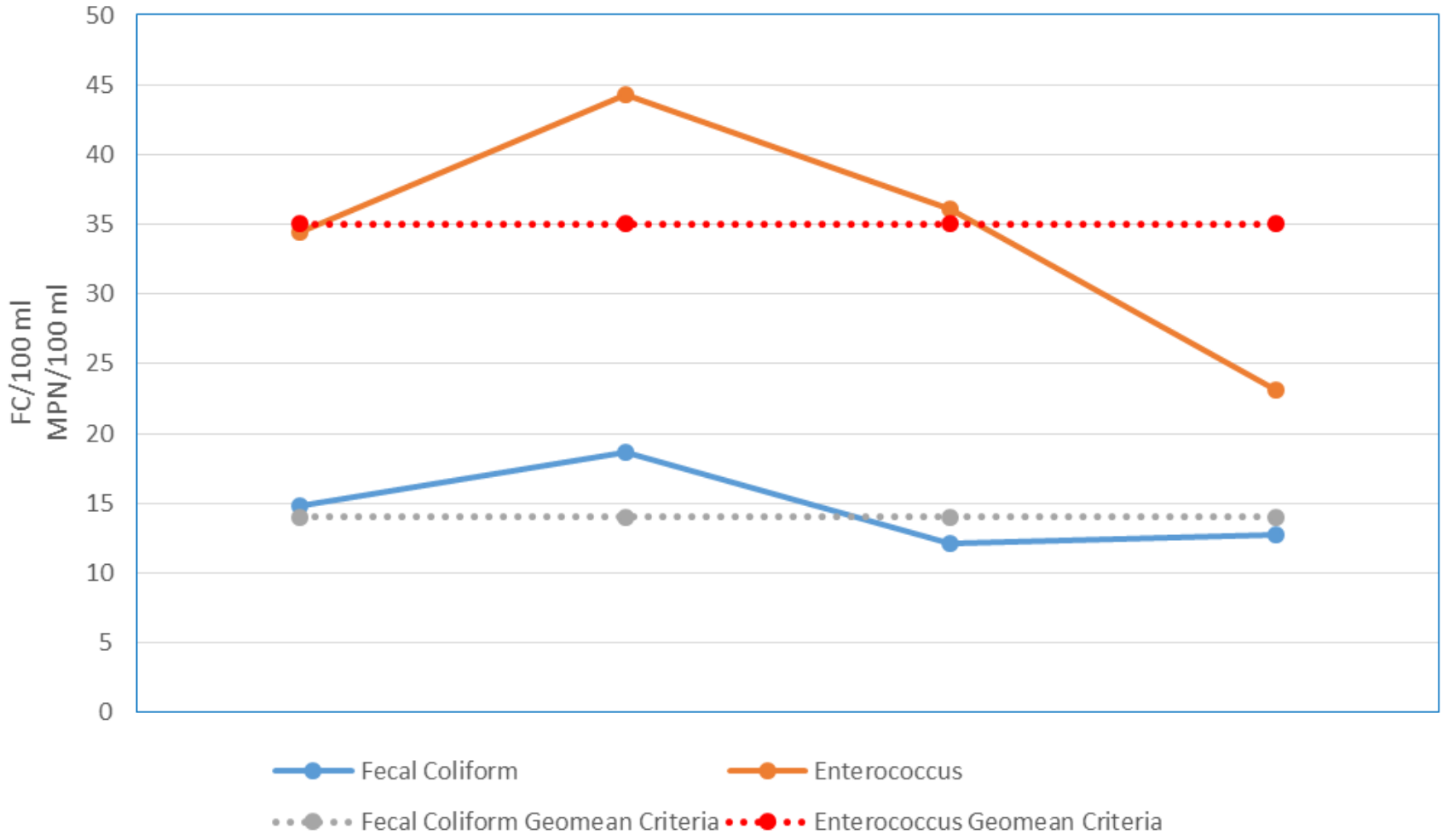
	Jul 18 to Aug 16	Jul 24 to Aug 22	Jul 26 - Aug 24	Jul 31 to Aug 29
Fecal Coliform	6	12	13	10
Enterococcus	22	42	67	67

2017 Bacteria Monitoring Results - Shull



	7/18	7/25	7/27	7/31	8/9	8/15	8/23	8/29	9/13
Fecal Coliform	8	167	12	6	4	27	33	16	9
Enterococcus	6.2	124.6	27.5	20.6	75.9	50.4	28.1	3	8.4

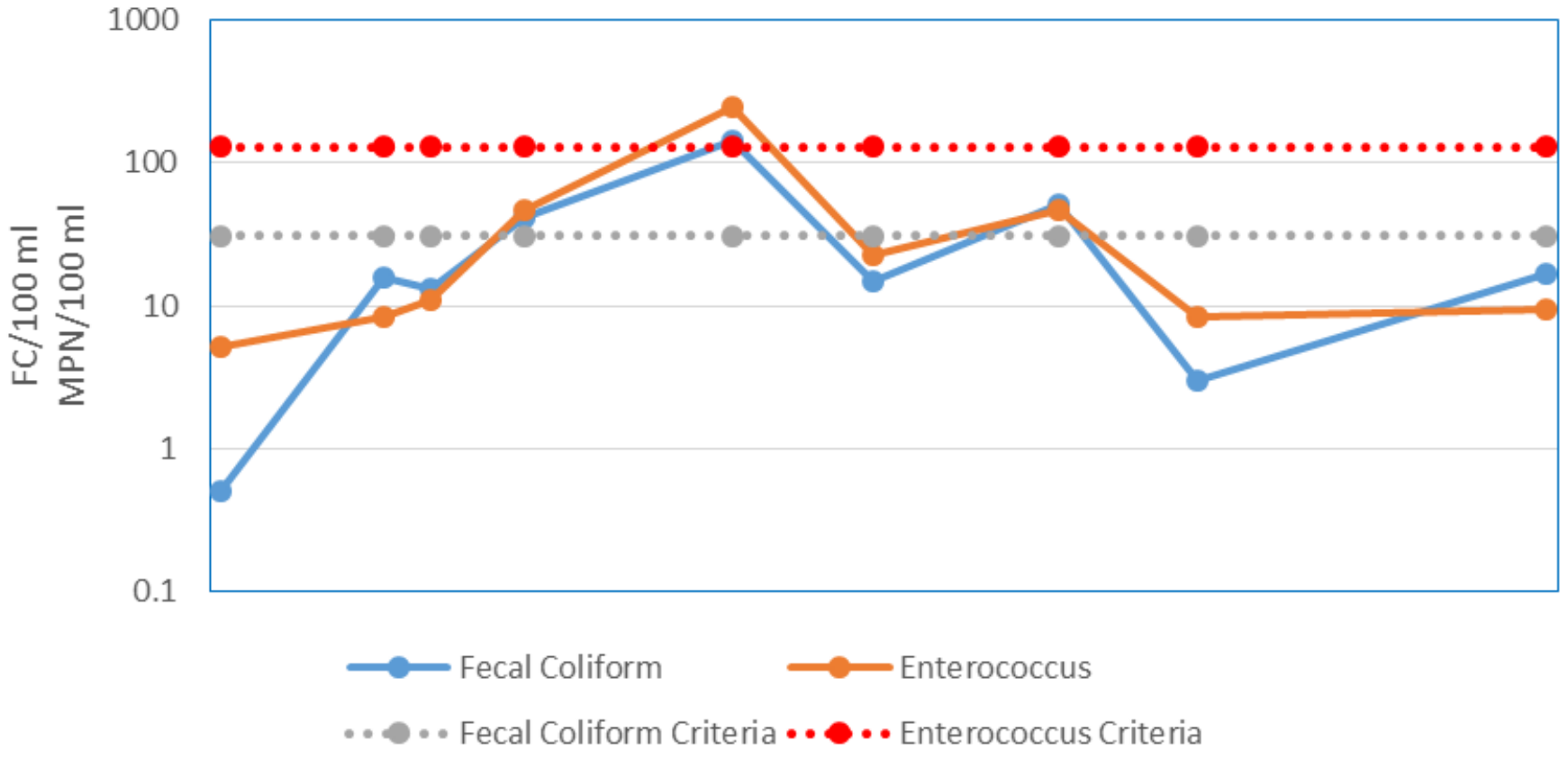
2017 Geomean Bacteria Monitoring Results - Shull



	Jul 18 to Aug 16	Jul 24 to Aug 22	Jul 26 - Aug 24	Jul 31 to Aug 29
Fecal Coliform	15	19	12	13
Enterococcus	34	44	36	23

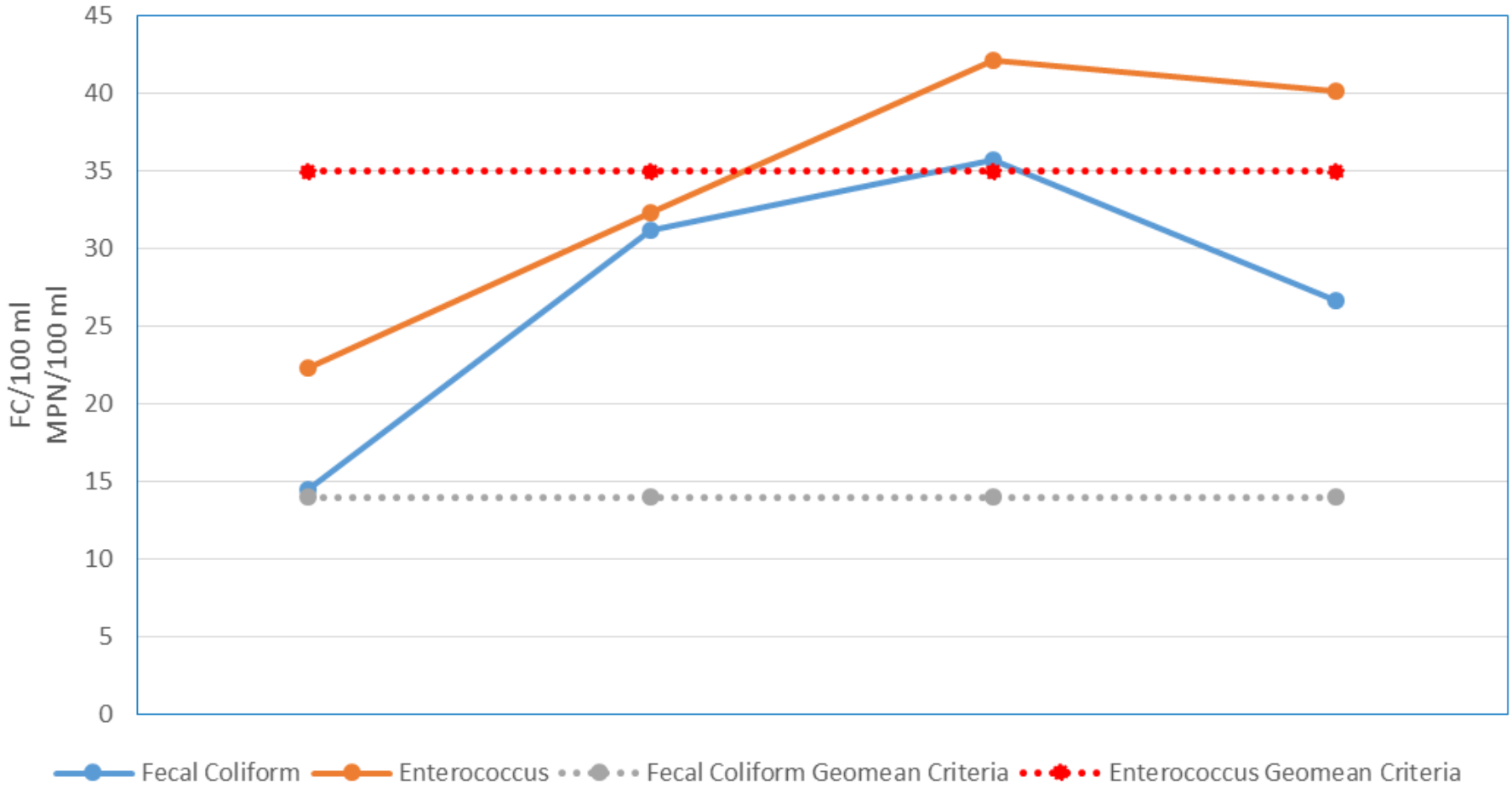
2017 Bacteria Monitoring Results - Sunset

logarithmic



	7/18	7/25	7/27	7/31	8/9	8/15	8/23	8/29	9/13
Fecal Coliform	0.5	16	13	41	142	15	51	3	17
Enterococcus	5.2	8.5	10.9	46.4	248.1	22.5	47.4	8.5	9.5

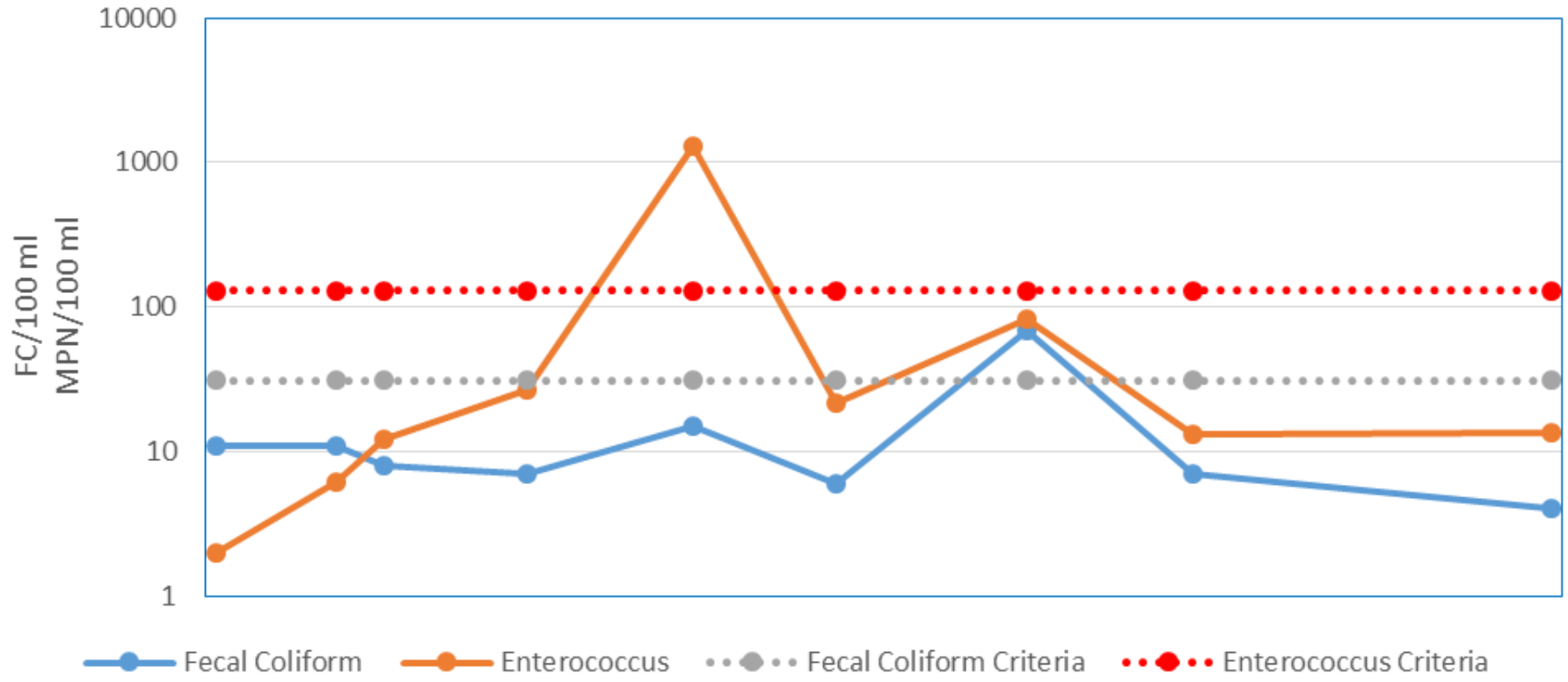
2017 Geomean Bacteria Monitoring Results - Sunset



	Jul 18 to Aug 16	Jul 24 to Aug 22	Jul 26 - Aug 24	Jul 31 to Aug 29
Fecal Coliform	14	31	36	27
Enterococcus	22	32	42	40

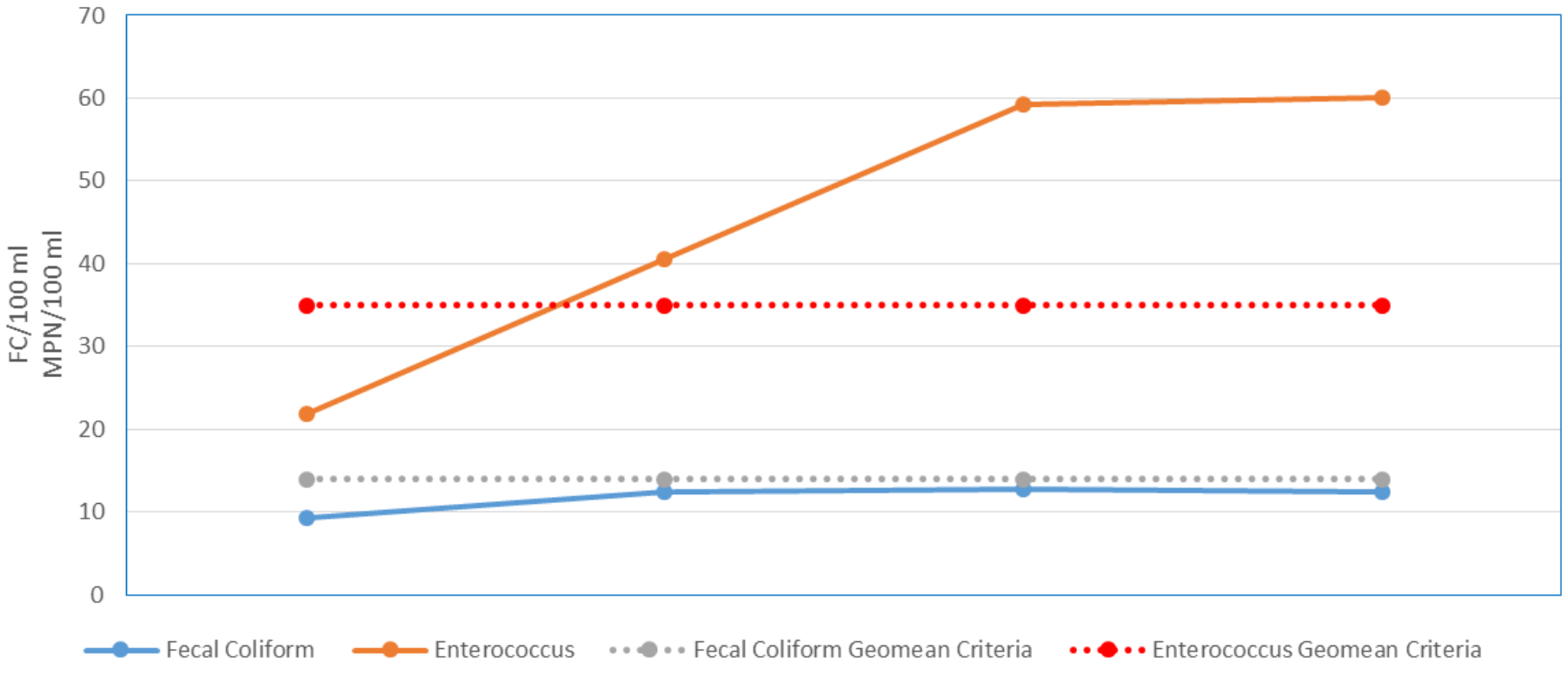
2017 Bacteria Monitoring Results - S Refuge Cove

logarithmic



	7/19	7/24	7/26	8/1	8/8	8/14	8/22	8/29	9/13
Fecal Coliform	11	11	8	7	15	6	69	7	4
Enterococcus	2	6.1	12.1	26.6	1299.7	21.3	81.6	13	13.5

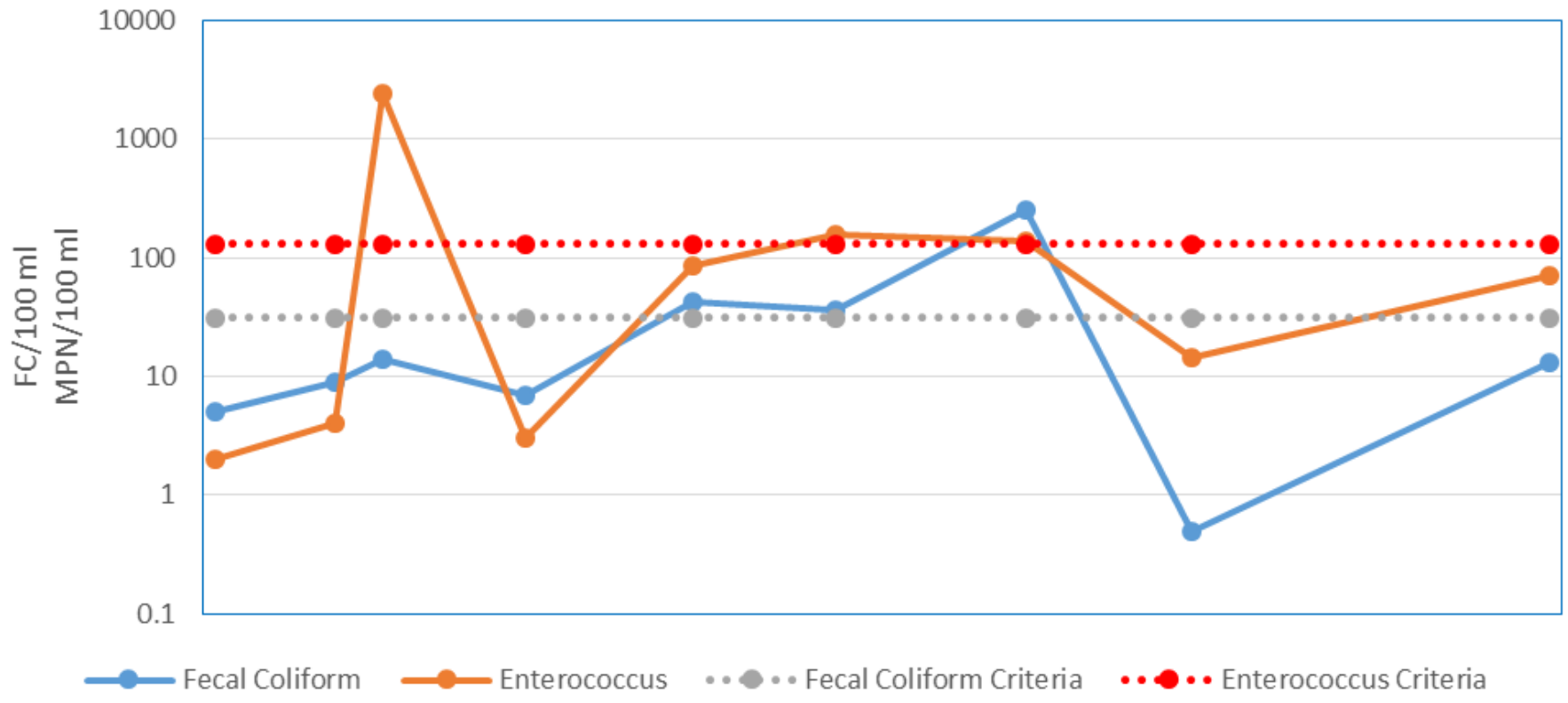
2017 Geomean Bacteria Monitoring Results - S Refuge Cove



	Jul 18 to Aug 16	Jul 24 to Aug 22	Jul 26 - Aug 24	Jul 31 to Aug 29
Fecal Coliform	9	13	13	12
Enterococcus	22	41	59	60

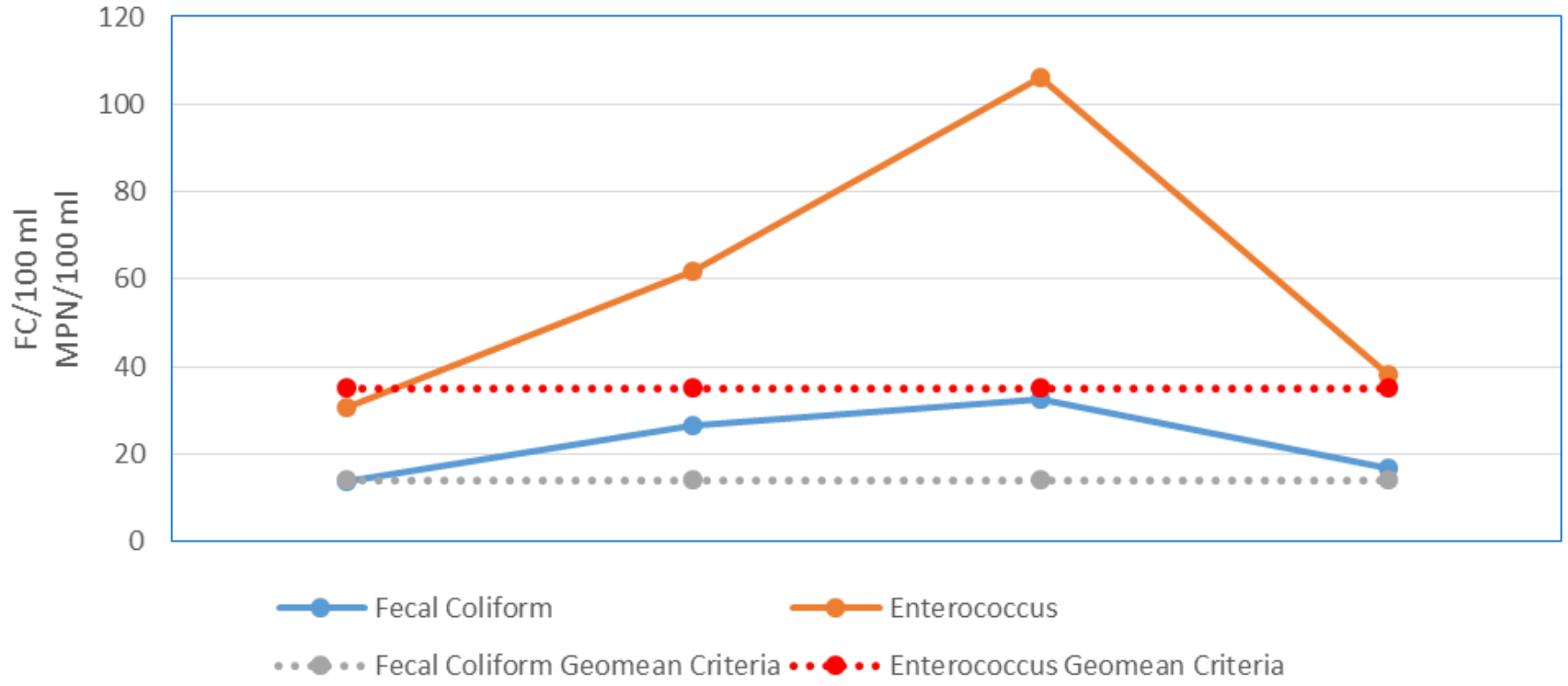
2017 Bacteria Monitoring Results - Thomas Basin

logarithmic



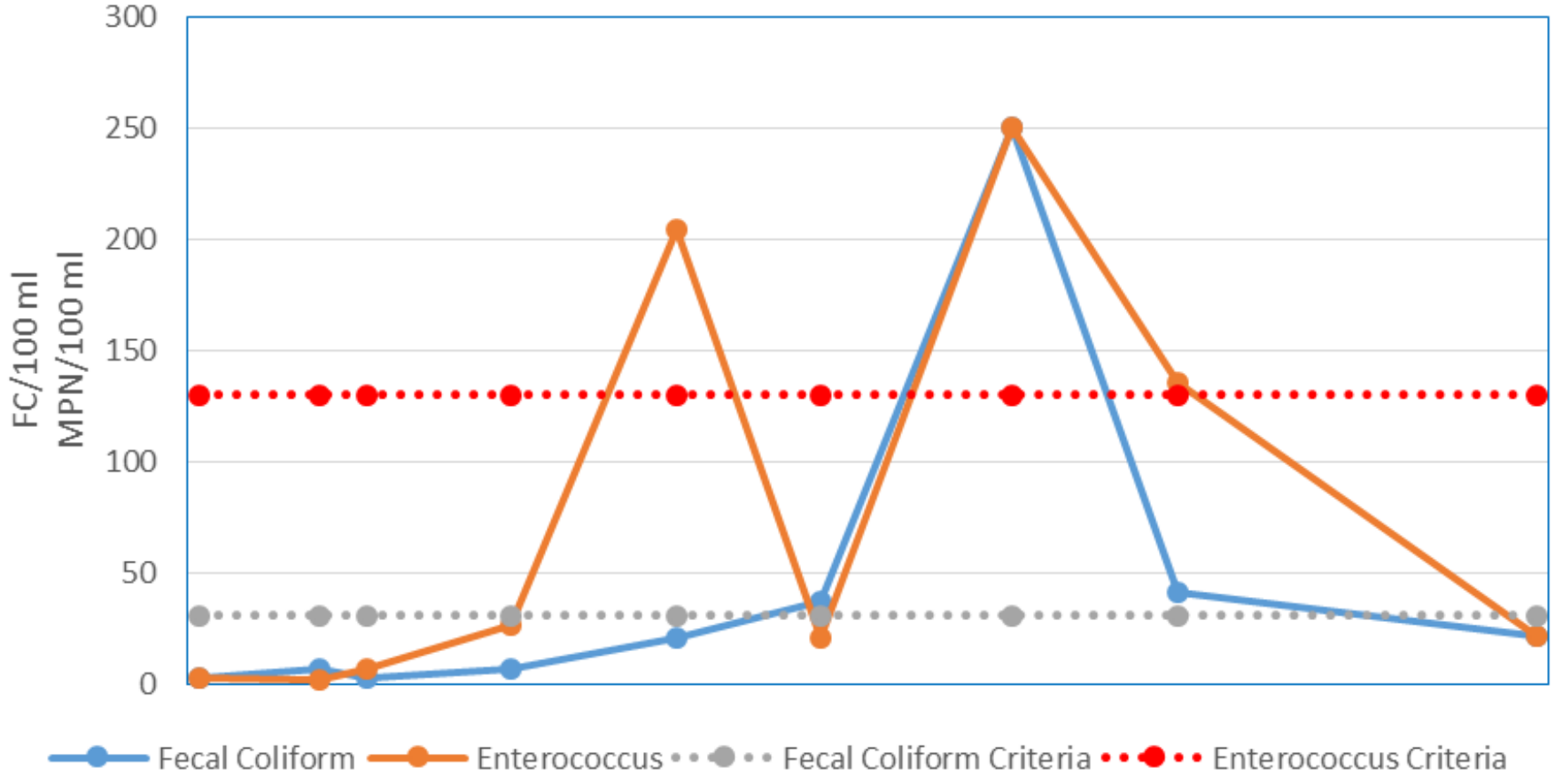
	7/19	7/24	7/26	8/1	8/8	8/14	8/22	8/29	9/13
Fecal Coliform	5	9	14	7	42	36	250	0.5	13
Enterococcus	2	4.1	2419.6	3	86.2	156.5	137.4	14.5	70.3

2017 Geomean Bacteria Monitoring Results - Thomas Basin



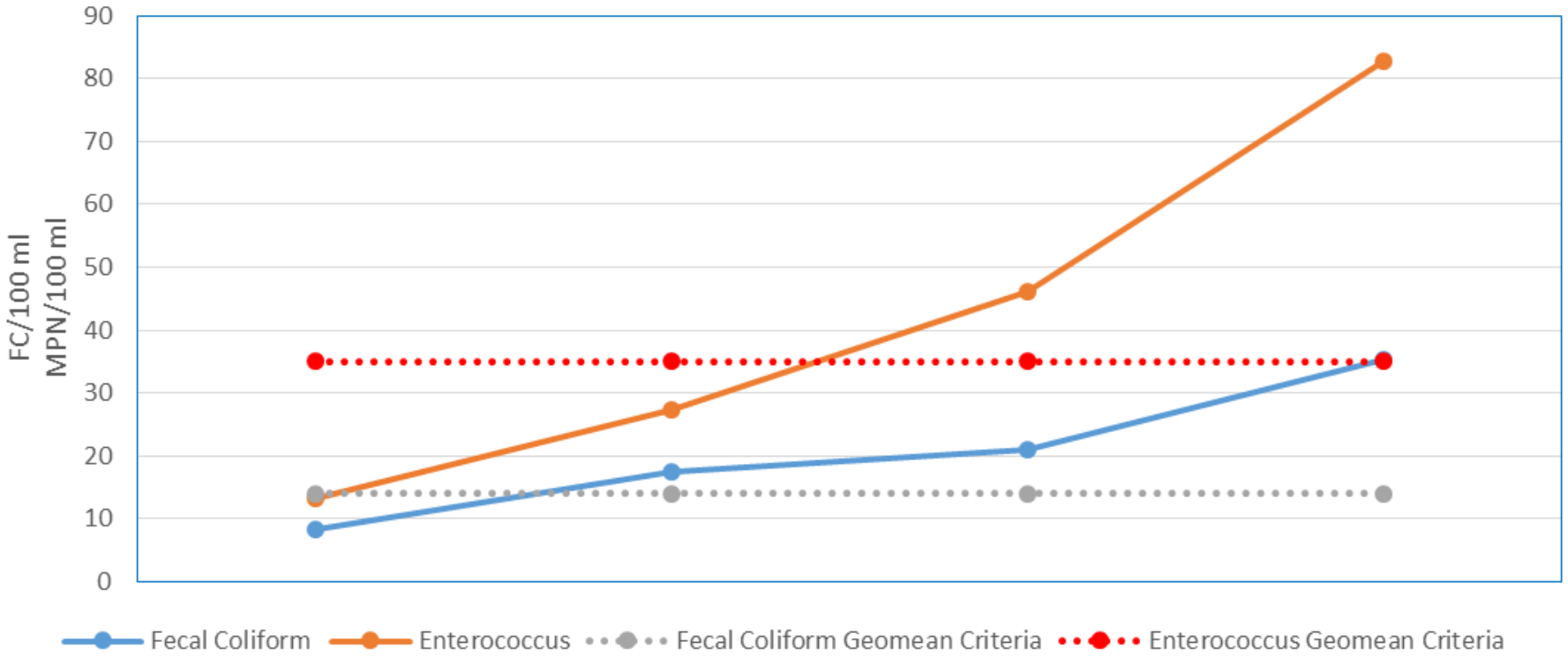
	Jul 18 to Aug 16	Jul 24 to Aug 22	Jul 26 - Aug 24	Jul 31 to Aug 29
Fecal Coliform	14	26	33	17
Enterococcus	30	62	106	38

2017 Bacteria Monitoring Results - Seaport



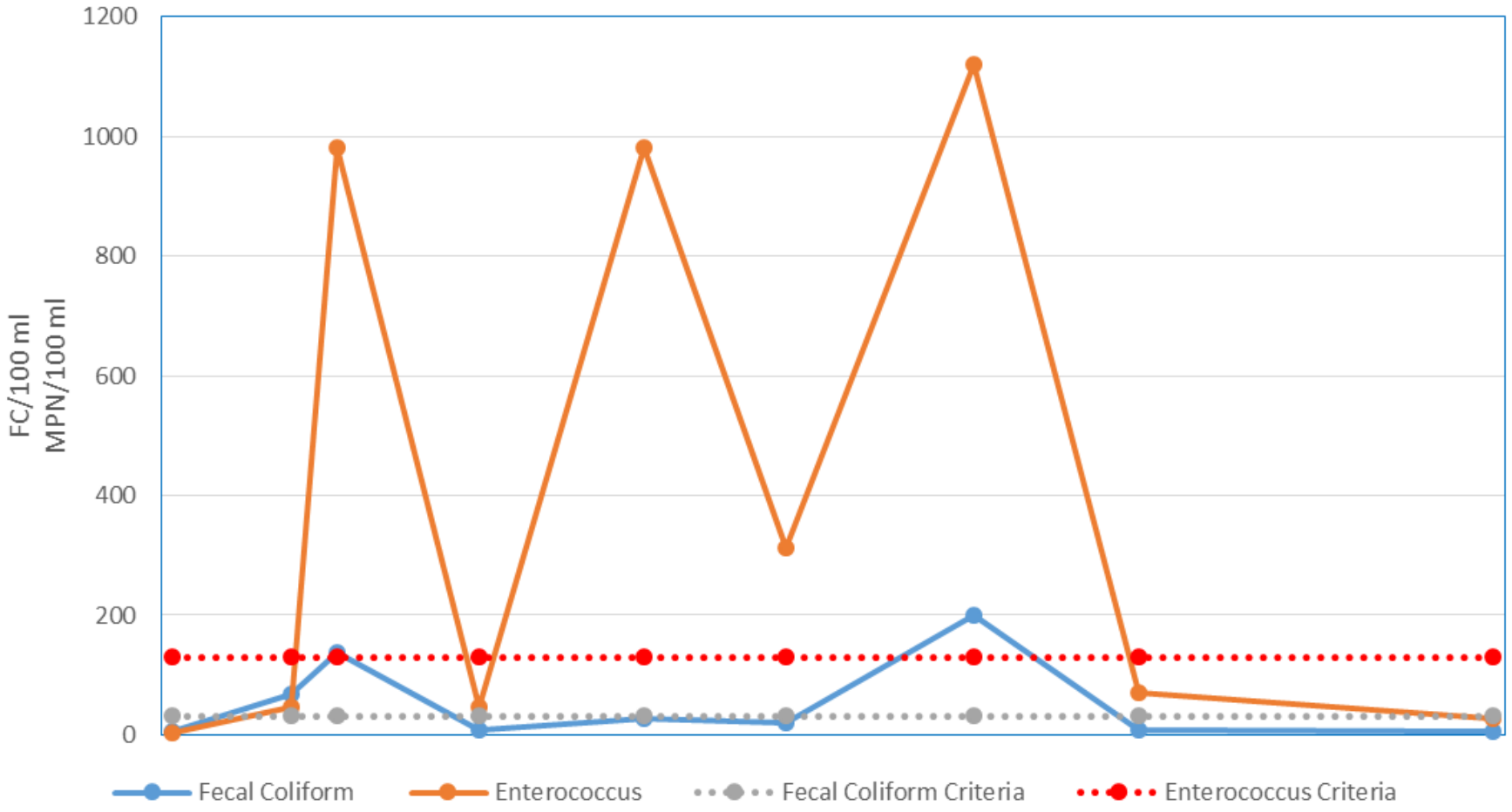
	19-Jul	24-Jul	26-Jul	1-Aug	8-Aug	14-Aug	22-Aug	29-Aug	13-Sep
Fecal Coliform	3	7	3	7	21	37	250	41	22
Enterococcus	3.1	2	7.3	26.6	204.6	21.1	250	135.4	21.3

2017 Geomean Bacteria Monitoring Results - Seaport



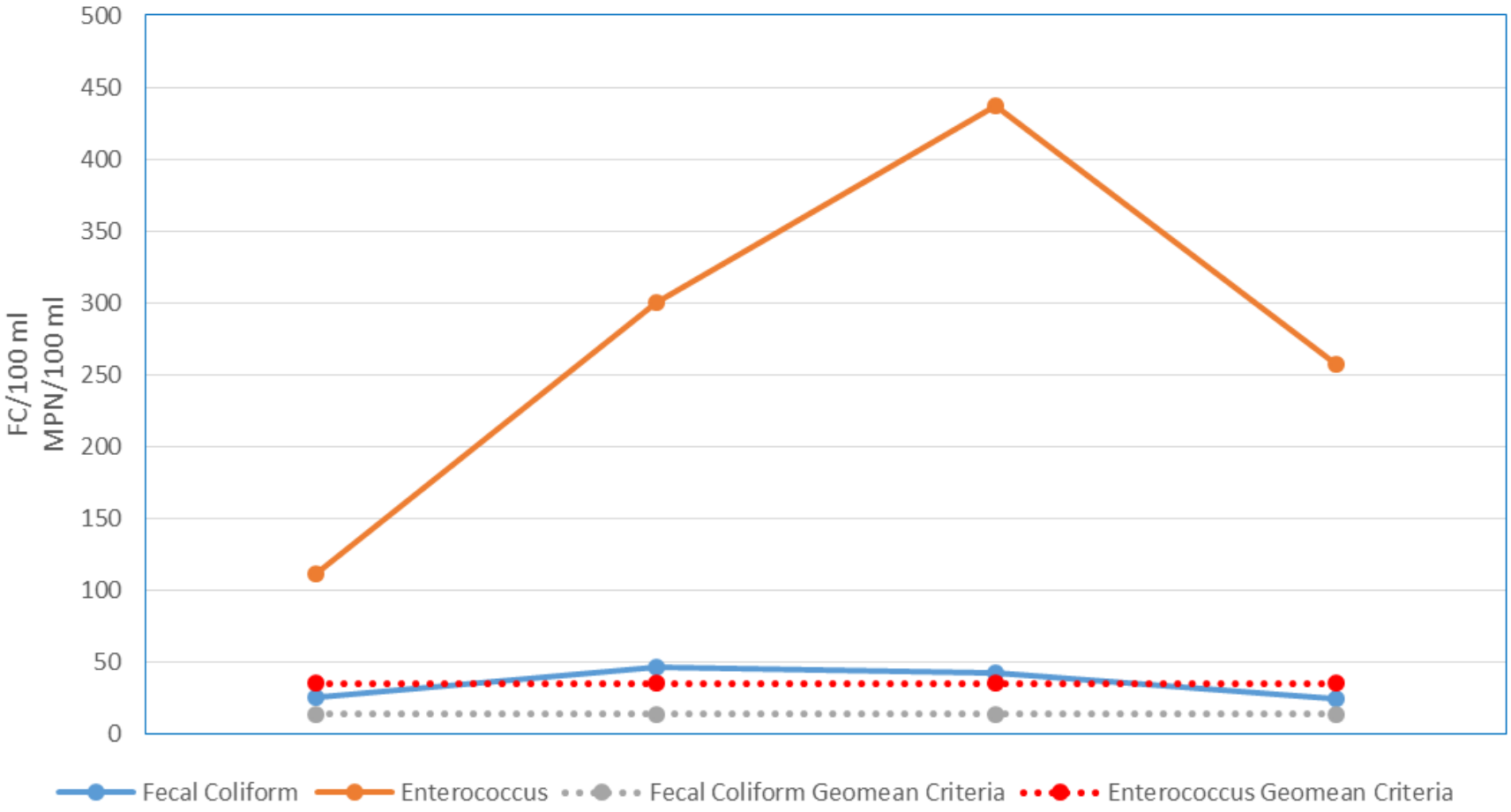
	Jul 18 to Aug 16	Jul 24 to Aug 22	Jul 26 - Aug 24	Jul 31 to Aug 29
Fecal Coliform	8	17	21	35
Enterococcus	13	27	46	83

2017 Bacteria Monitoring Results - Rotary



	19-Jul	24-Jul	26-Jul	1-Aug	8-Aug	14-Aug	22-Aug	29-Aug	13-Sep
Fecal Coliform	6	68	137	9	27	21	200	9	6
Enterococcus	3	45.7	980.4	47.4	980.4	313	1119.9	69.3	26.2

2017 Geomean Bacteria Monitoring Results - Rotary



	Jul 18 to Aug 16	Jul 24 to Aug 22	Jul 26 - Aug 24	Jul 31 to Aug 29
Fecal Coliform	26	46	43	25
Enterococcus	112	300	437	257