



2022 Waterbody Field Report:



South Point Higgins Beach, Beach at Sunset Drive, Thomas Basin Harbor, Rotary Park Pool, Mountain Point Cultural Food, and Herring Cove, Ketchikan, Alaska

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Abstract

The objective of this project, which was conducted by the Southeast Alaska Watershed Coalition (SAWC) and Ketchikan Indian Community (KIC) in partnership with Alaska Department of Environmental Conservation's (ADEC) Beach grant program, was to assess fecal bacteria concentrations at select Ketchikan-area beaches and notify the public when indicator organisms exceed Alaska Water Quality Standards. Additionally, the data were used to ground-truth the Environmental Protection Agency (EPA) Virtual Beach model for the selected beaches. South Point Higgins Beach, Beach at Sunset Drive, Thomas Basin Harbor, Rotary Park Pool, Mountain Point Cultural Food, and Herring Cove were sampled by KIC approximately every other week from June 2 to September 1, 2022 for fecal coliform and enterococci bacteria. This was the sixth year of sampling at Ketchikan's beaches. Only Rotary Park Pool exceeded a primary recreation criterion based on enterococcus, while all beaches except for South Point Higgins exceeded one or more water quality criteria for raw shellfish harvest and consumption based on fecal coliform. All beaches have previously been listed as impaired due to persistent pathogen (fecal coliform and/or enterococcus) pollution. The Virtual Beach model satisfactorily predicted bacteria concentrations (above/below water quality criteria) for all beaches except for Rotary Park Pool, where exceedances were predicted more often than observed. Future monitoring will be needed to measure progress towards meeting water quality criteria after various control measures and actions are implemented by the community and industries.

¹ Southeast Alaska Watershed Coalition, project # ACWA-21-B10 funded by DEC from an EPA pass-through grant.

Basic Waterbody Information

Table 1. Basic Waterbody Information.

Assessment Unit ID	EPA Beacon ID	Assessment Unit Name	Location description	Water Type	Area sampled	Time of year sampled
AK_B_1010204_001	AK909574	South Point Higgins (KB–SP Higgins)	Tongass Narrows-Frontal Clarence Strait (190101020403)	Marine beach	Point sample representing 0.48 miles of beach	Jun 2 – Sep 1
AK_B_1010204_003	AK212340	Beach at Sunset Dr. (KB–Sunset)			Point sample representing 0.30 miles of beach	
AK_B_1010204_005	AK508635	Thomas Basin Harbor (KB–Thomas Basin)			Point sample representing 0.48 miles of beach	
AK_B_1010204_007	AK365539	Rotary Park Pool (KB–RotaryPool)			Point sample representing 0.14 miles of beach	
AK_B_1010208_001	AK346845	Mountain Point Cultural Food (KB–Mtn Pt Cultural Food)	Hassler Lake-Frontal Revillagigedo Channel (190101020801)		Point sample representing 0.21 miles of beach	
AK_B_1010205_001	AK549954	Herring Cove (KB–Herring)	Carroll Inlet-Frontal Revillagigedo Channel (190101020510)		Point sample representing 0.14 miles of beach	

Water Quality Evaluation

Background

The beaches monitored near Ketchikan, AK during the 2022 recreation season include South Point Higgins Beach, beach off Sunset Drive (Sunset), Thomas Basin Harbor, Rotary Park Pool, Mountain Point Cultural Food, and Herring Cove (Table 1, Figure 1). Table 1 provides basic water body information for each monitoring location. The monitoring locations are situated along the coastal recreational areas within several watersheds. They were identified as Tier 1² beaches by ADEC and were high priority for sampling to assess potential fecal contamination. The surrounding and upgradient area uses include boat harbors, residential/commercial/industrial, state recreational sites, neighborhood/local beaches, and shellfish and marine food gathering. Potential bacteria sources include public and private wastewater treatment outfalls, deficiencies in sewer collection systems, septic systems, private watercraft in harbors and at sea, cruise ships and ferries docked and at sea, and pet and wildlife waste (Figure 2). Table 2 identifies the nearby pollution sources for each site.

Fecal bacteria monitoring has occurred at these sites as far back as 2017, and all sites were previously listed as impaired water bodies for pathogens because they failed to meet water quality criteria for primary recreation and/or harvest of raw shellfish for consumption. In previous years, different and/or more sites were sampled; information about these sites and their data can be found in past reports³. An area-wide bacteria management plan was developed in 2021 in response to the persistent water quality exceedances and can also be found on the ADEC website.

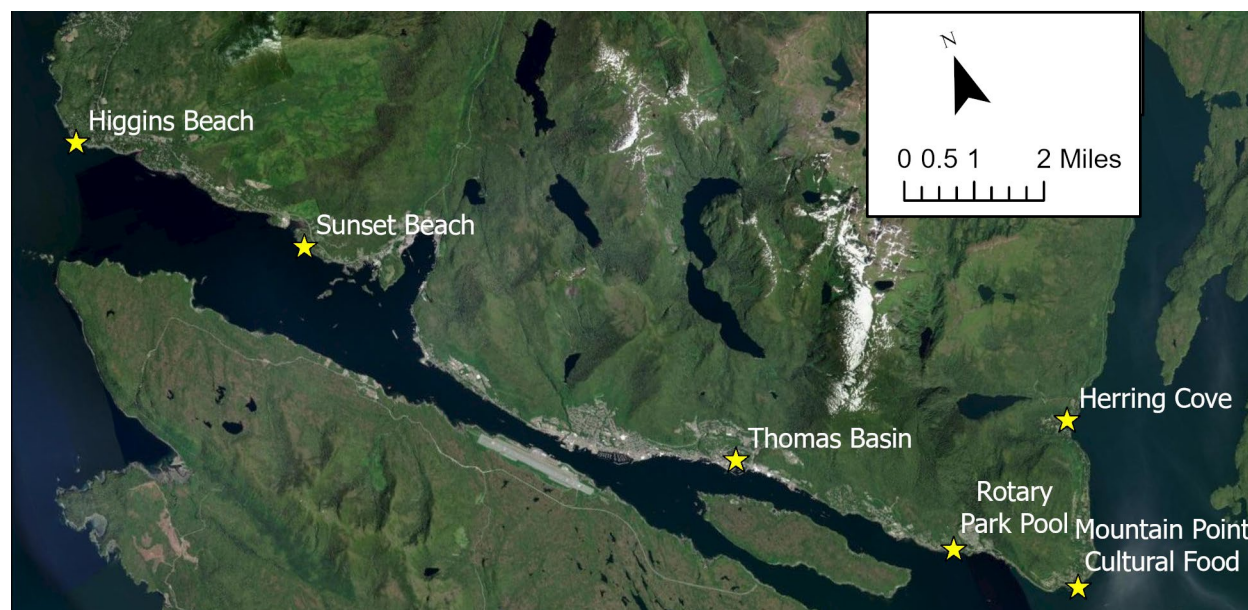


Figure 1. Map of 2022 sampling locations along Ketchikan's coastline.

² The Alaska Beach Program uses a tiered monitoring approach that addresses bacteria testing at recreational marine water beaches based on the nature, extent and frequency of recreational use by the public, the proximity of recreational waters to known point and nonpoint sources of pollution, and the effect of storm events. Tier 1 are the highest priority beaches due to higher risk of bacteria in the marine water and/or high public use of the beach.

³ <https://dec.alaska.gov/water/water-quality/beach-program/past-reports>

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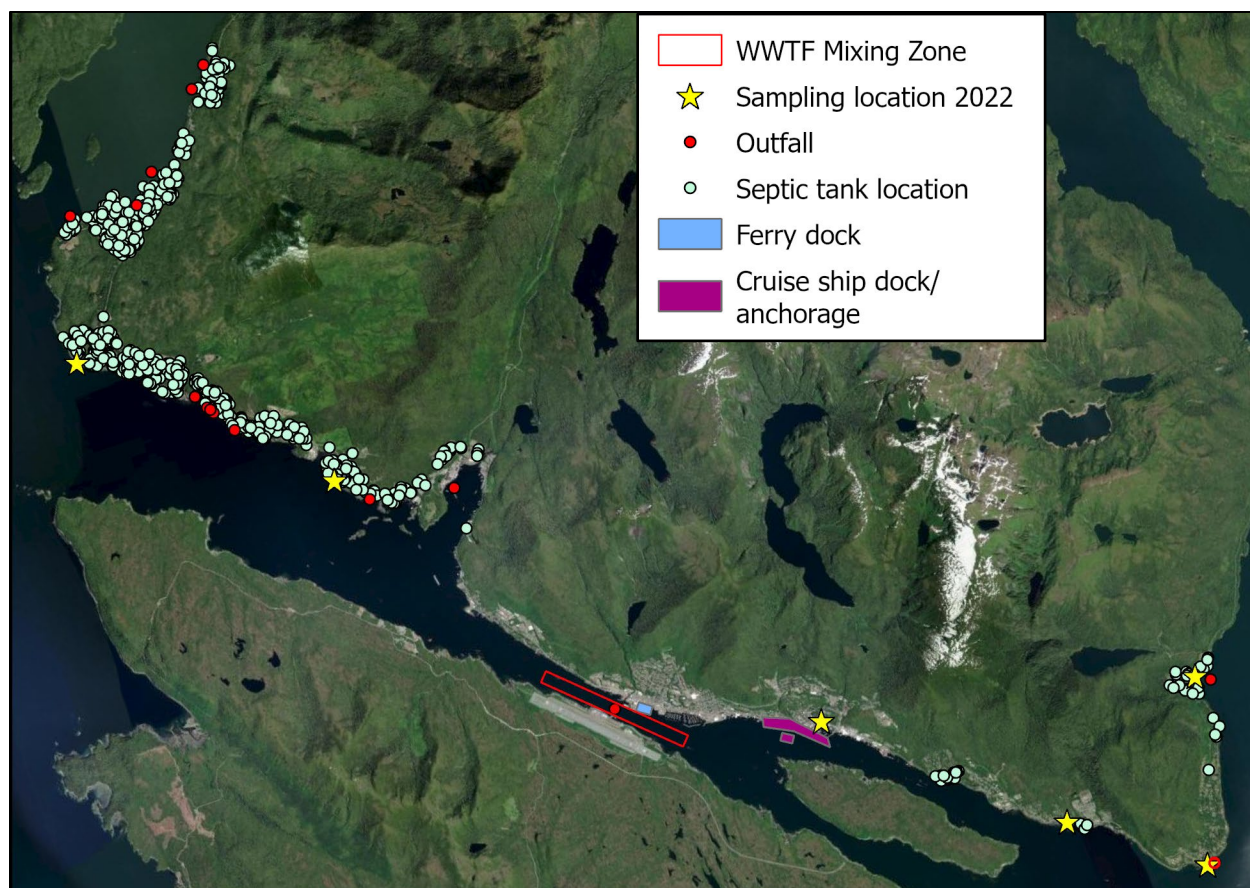


Figure 2. Locations of some potential fecal bacteria sources to Ketchikan area beaches.

Table 2. Potential point and nonpoint sources present in coastal marine waters near monitoring sites. Sources vary by volume and bacteria level.

Potential Source	South Point Higgins	Sunset	Thomas Basin	Rotary Pool	Mt Point Cultural Food	Herring Cove
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			✓		✓	
Boats at boat launches & in harbor areas			✓		✓	

Objective

The primary objective of this project is to protect human health and the environment by sampling the beaches for fecal indicator organisms (fecal coliforms and enterococci bacteria) that signify the presence of fecal contamination. This information will be used to notify the public in the event an exceedance of allowable levels of indicator organisms in accordance with Alaska Water Quality Standards (WQS). A secondary objective of this project is to ground-truth the Virtual Beach model for the selected beaches to assess its potential for providing information about fecal bacteria concentrations and associated health risks in the absence of on-the-ground sampling.

Methods

One grab sample was collected at each beach approximately every other week from June 2 through September 1, 2022, for a total of six samples per beach. A field replicate was collected at one beach during each sampling event, rotating among sites. Samples were delivered to R&M Engineering in Ketchikan, AK for fecal coliform and enterococci analyses. Modified EPA Marine Sanitary Surveys were conducted for each beach and sampling date. A Quality Assurance Project Plan (QAPP) was developed for this project, approved by ADEC, and is available at beaches.alaska.gov and from ADEC Southeast staff in Juneau, AK. ADEC staff modeled enterococci concentration at each sampling event at each beach using the Virtual Beach model and compared the model output to on-the-ground sampling laboratory results. At the end of the season, the model output success rate was used to assess the future utility of Virtual Beach model for each beach.

Data Quality Review Summary

Field staff followed procedures for sample collection and transport as outlined in the project's QAPP. All laboratory preparation was completed within holding times, the cooler temperatures were within required limits, and no discrepancies, errors, data qualifiers, or QC failures were identified by the laboratory. One duplicate sample per analyte per sample event at one location was collected and analyzed. Relative percent difference (RPD) was calculated for fecal coliform and enterococcus when values met the minimum threshold (5 times the Practical Quantitation Limit (PQL) for fecal coliform and 2 times the PQL for enterococcus). In all cases, the RPD was below the goal of 60%. The QAPP stated completeness goal of 80% was met at 100% and the data is usable⁴.

Results Summary

One or more water quality exceedances were observed at all of the beaches except for South Point Higgins (Table 3). Only Rotary Park Pool exceeded the water quality criteria for primary contact recreation, which is based on enterococcus (in a 30-day period the geometric mean may not exceed 35 CFU/100 ml, and not more than 10% of samples may exceed 130 CFU/100 ml). This exceedance was due to a high enterococci concentration measured during the first sampling event on June 2, and a recreational advisory was issued following this sampling event. Herring Cove, Mountain Point Cultural Foods, Rotary Pool, Sunset Beach, and Thomas Basin Harbor exceeded one or more water quality criteria for raw shellfish harvest and consumption (Table 3), which is

⁴ A completed Quality Assurance Checklist for the 2022 Ketchikan beaches monitoring season is available from ADEC upon request.

based on fecal coliform (the geometric mean of samples may not exceed 14 CFU/100 ml, and not more than 10% of the samples may exceed 31 CFU/100 ml).

Water temperatures ranged from 11.7 to 18.7 degrees Celsius (°C) at different sites across the sampling season (Table 4). The warmest temperatures were observed during the late July and mid-August sampling events, corresponding to the warmest air temperatures. Rotary Park Pool and Mountain Point Cultural Foods were, on average, the warmest locations.

Modified sanitary surveys were conducted each week. Samplers noted the presence of people at the beach or in the water, presence of dogs, kayakers and other boaters, and various wildlife (dead or alive) at the beaches. Little wave action was observed at any of the beaches during sampling times, and the water was generally clear, except at Rotary Park Pool and Sunset beach, where murky water was observed during at least half the sampling events. Weather conditions (air temperature, precipitation, wind) were noted, and water temperatures were collected at each beach. No large precipitation events occurred immediately prior to sampling; June 20 was the only sampling event with more than negligible precipitation during the prior 24 hours (0.66 inches measured at the Ketchikan airport). Complete water quality and sanitary survey data can be obtained from the ADEC Southeast staff in Juneau, AK.

Table 3. Enterococci and fecal coliform sample results summary. Values in bold red indicate an exceedance of a water quality criterion.

Site	Pollutant	Median	Average	Range	% of samples exceeding STV threshold*	Geometric Mean**
Herring	Enterococci (MPN/100 ml)	15	49.0	ND - 128	0	--
Mtn Pt Cultural		15	17.7	ND - 41	0	--
Rotary Pool		25	50.3	ND - 197	16.7	--
SP Higgins		15	18.7	ND - 52	0	--
Sunset		10	8.3	ND - 10	0	--
Thomas Basin		20.5	47.2	ND - 118	0	--
Herring	Fecal coliform (CFU/100 ml)	38	48.7	4 - 137	66.7	31.9
Mtn Pt Cultural		12	18.2	2 - 41	33.3	12.5
Rotary Pool		20.5	25.3	ND - 55	33.3	25.7
SP Higgins		11	11.7	7 - 18	0	11.1
Sunset		9	12.5	4 - 33	16.7	10.0
Thomas Basin		16.5	17.8	6 - 36	16.7	15.4

ND = Not Detected. The detection limit for enterococci was 10 MPN/100 ml. The detection limit for fecal coliform was 1 CFU/100 ml.

*Not more than 10% of samples may exceed the statistical threshold value (STV), which is 130 for enterococcus and 31 for fecal coliform.

**For enterococcus, the criterion applies to the geometric mean of 5 or more samples within 30 days, which could not be calculated due to the sampling schedule. For fecal coliform, the criterion applies to the geometric mean of all samples taken during a year.

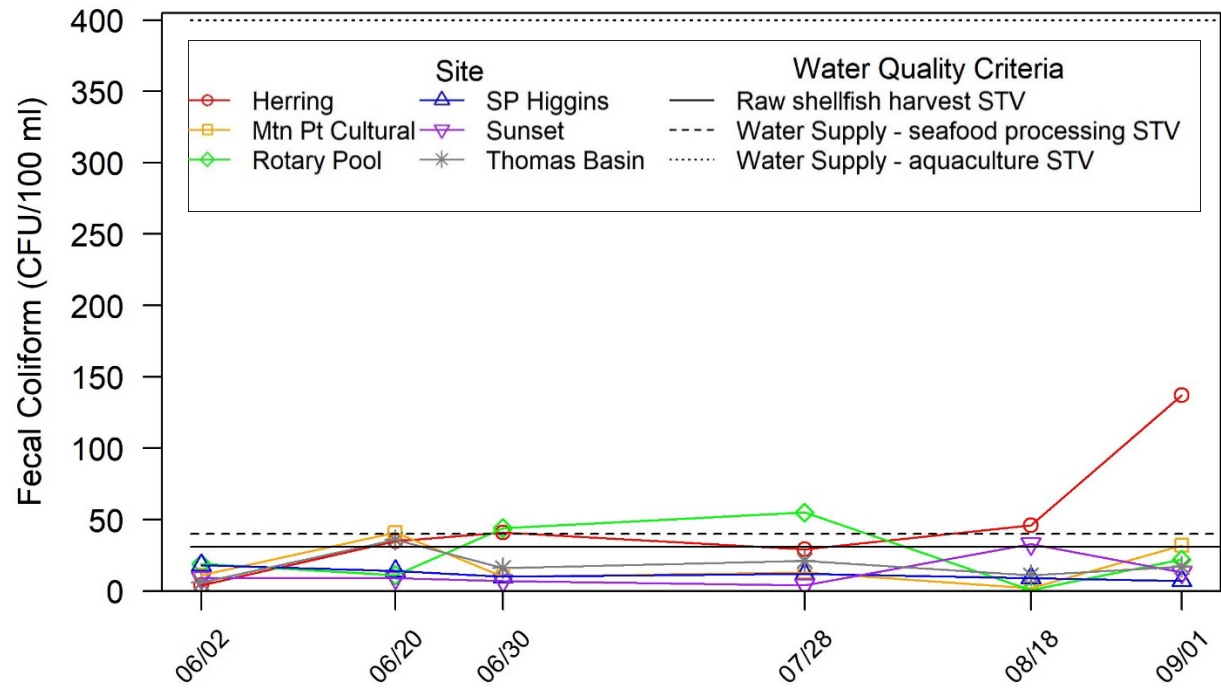


Figure 3. Fecal coliform bacteria results at the six beaches, relative to water quality criteria.

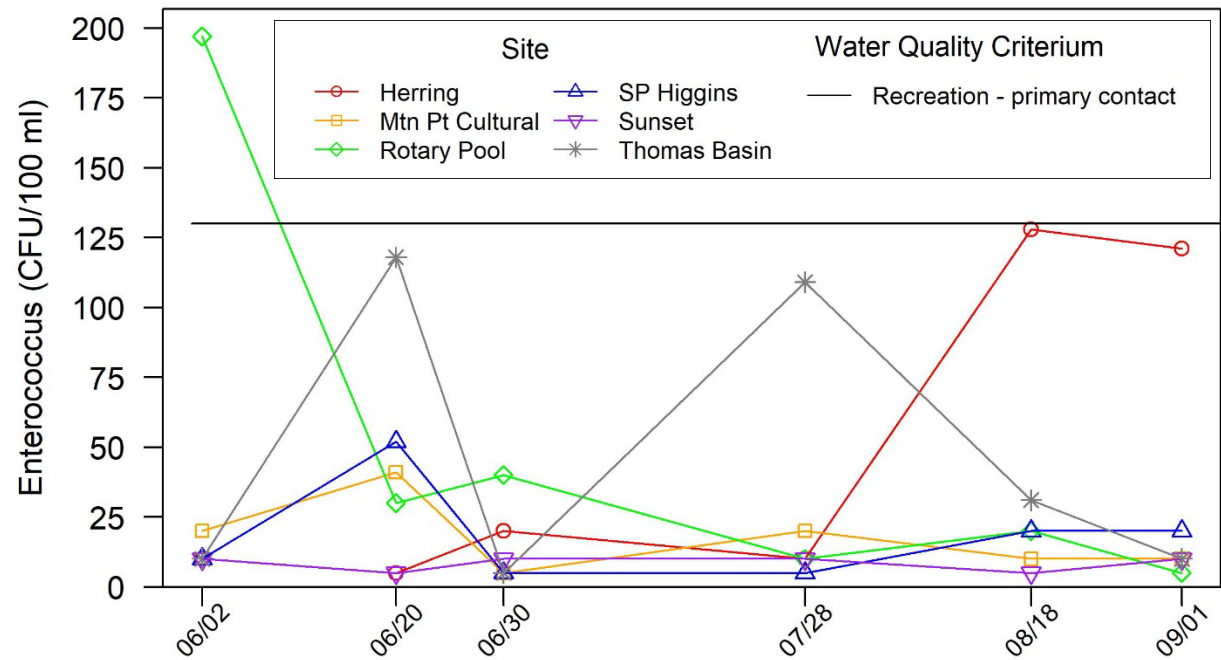


Figure 4. Enterococci bacteria results at the six beaches, relative to water quality criteria.

Table 4. In situ water temperature data summary.
All values are °C.

Sample Site	Range	Average
Herring	12.3 - 15.2	13.5
Mtn Pt Cultural Foods	13.8 - 17.3	15.4
Rotary Pool	13.7 - 18.7	15.7
SP Higgins	11.9 - 16.6	14.4
Sunset	12.6 - 16.7	14.6
Thomas Basin	11.7 - 16.6	13.9

The Virtual Beach model performed relatively well for all the beaches except for Rotary Park Pool, where exceedances were predicted more often than they were observed. The models for each beach are trained with past observed bacteria concentrations and environmental data (e.g., precipitation, water temperature, air temperature). At Rotary Park Pool, changes in these relationships (for example, as a result of new management actions like regularly flushing the pool), or predictive environmental data that does not correlate well to in situ conditions (e.g., water temperature measured at a buoy compared to in the pool) may have contributed to poor model performance at Rotary Park Pool. Complete modeling results are available in an ADEC report that can be found online⁵.

Outreach

During the months leading up to the 2022 recreation season, SAWC staff presented information about past beach data, the area wide bacteria management plan, and upcoming sampling to KIC's Our Way of Life Committee, the Ketchikan City Council and Ketchikan Borough Assembly. During the season, ADEC shared results through a stakeholder email listserv and updated ADEC website results table and interactive map. When water quality criteria were exceeded (only once at Rotary Park Pool) ADEC posted results on Facebook and issued an advisory, and the Borough posted signs at the entrance to the affected area. Following the sampling season, SAWC staff conducted a stakeholder meeting with KIC and City and Borough Public Works staff to discuss results, current actions being taken, and next steps to address bacteria pollution in the Ketchikan area.

Conclusion

This year concluded the sixth season for fecal bacteria monitoring at Ketchikan's recreational beaches. Water quality exceedances in previous years resulted in 13 beaches, including those that were sampled in 2022, being listed as impaired waterbodies due to fecal contamination, with exceedances of the pathogens water quality criteria for primary contact and/or harvest for raw shellfish consumption during multiple years. During 2022, Rotary Park Pool exceeded a primary

⁵ Petitt, J. (2022) Alaska Department of Environmental Conservation Virtual Beach Waterbody Modeling Report Ketchikan and Kenai Beaches, Alaska. Department of Environmental Conservation, Division of Water. Available for download at: file:///C:/Users/SAWC%20User/Downloads/2022_virtual_beach_report.pdf

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contact recreation pathogen water quality criterion, while Herring Cove, Mountain Point Cultural Foods, Rotary Pool, Sunset Beach, and Thomas Basin Harbor all exceeded one or more pathogen water quality criteria for harvest and consumption of raw shellfish. The Virtual Beach model may be an appropriate tool to predict water quality exceedances and alert residents of potential health risks at Ketchikan's beaches, except at Rotary Park Pool.

Recommended Next Steps

Recreators and seafood harvesters continue to use beaches that have been listed as impaired water bodies due to fecal contamination. Although 2022 was the final year of Alaska BEACH Grant Program funding for monitoring, future bacteria monitoring, especially before/during high use times, is recommended, possibly in conjunction with the Virtual Beach model. Local entities such as KIC, the City, or Borough could take on some of this monitoring, modeling, and outreach, particularly regarding safety precautions, to prevent illness and help protect public health. Future monitoring can also provide insights into any water quality improvements that result from ongoing management actions, such as flushing Rotary Pool, finding and repairing sewer system deficiencies, installing restroom facilities, etc. Future targeted outreach to address septic system maintenance, pet waste, and pump-out use in harbors is also warranted.