2023 Waterbody Field Report
Mission Beach, Buskin Beach, Frye Point (Women's Bay), and Lighthouse Beach (Old Harbor)
Kodiak Island, Alaska

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Abstract

The objective of the study was to assess bacteria concentrations at recreational beaches on Kodiak Island, AK both on and off of the Kodiak Road System through the Alaska Department of Environmental Conservation (ADEC) Beach Grant Program. Mission Beach was sampled by Kodiak Area Native Association, Buskin Beach and Frye Point (Women's Bay) were sampled by Sun'aq Tribe of Kodiak, and Lighthouse Beach (Old Harbor) was sampled by Alutiiq Tribe of Old Harbor. Nine samples were collected from May - September for fecal coliform and enterococci bacteria. This was the first year of sampling and no samples exceeded the recreational criteria for the 2023 season for enterococci bacteria; however, Lighthouse beach did exceed the 10% criteria threshold for fecal coliform (harvesting for raw consumption). One sample for DNA source testing using Microbial Source Tracking was conducted at each location. Only Lighthouse Beach in Old Harbor saw quantifiable levels of bird fecal bacteria. There were no quantifiable levels of fecal bacteria of human or dog at any of the beaches.

This project is overseen by Kodiak Area Native Association (KANA) in partnership with the Sun'aq Tribe of Kodiak, and the Alutiiq Tribe of Old Harbor. Monitoring the potential fecal coliform and enterococci bacteria that may pose a risk to recreational beaches and traditional food source aligns with our mission to improve the quality of life of the people that we serve as these may pose to the health and wellness of our people. KANA applied for these funds based on the priorities and the interests of the partnering Tribes.

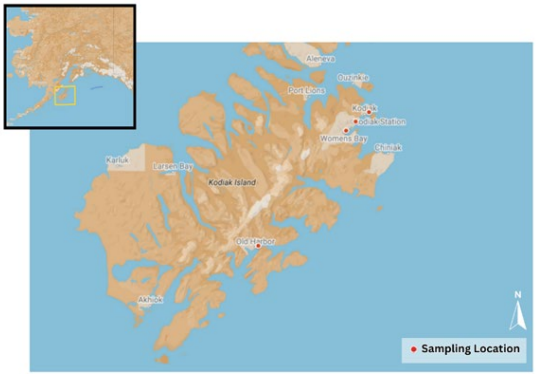

Figure 1. Map of sampling locations on Kodiak Island.

[1] Kodiak Area Native Association, project #ACWA-23-11 funded by ADEC from an EPA pass-through grant

Basic Waterbody Information

Table 1. Basic Waterbody Information

Assessment Unit ID	AK_M_2070115_007			AK_M_2070118_000
EPA ID	AK986984	AK394314	AK493433	AK813073
Assessment Unit Name	Mission Beach	Buskin Beach	Frye Point (Women's Bay)	Lighthouse Beach
Location description	Located in Shahafka Cove, approx. 1.3 miles northeast of downtown Kodiak.	North of the Buskin River mouth, approx. 5 miles southwest of downtown Kodiak.	North of Frye Point in Women's Bay, approx. 9.5 miles southwest of downtown Kodiak.	North side of Sitkalidak Passage approx. 1.3 miles east of the Old Harbor Boat Harbor.
Hydrologic unit code	19020701			
Water Type	Marine Beach			
Area sampled	Point sample representing 0.42 miles of coastline.	Point sample representing 0.38 miles of coastline.	Point sample representing 0.33 miles of coastline.	Point sample representing 1.03 miles of coastline.
Time of year sampled	May 30 – September 7, 2023			

Water Quality Evaluation

Background

Mission Beach, Buskin Beach and Frye Point are all recreational beaches located in the City of Kodiak on Kodiak Island, located in the Gulf of Alaska approximately 250 air miles south of Anchorage (Figure 1). Lighthouse Beach is a recreational beach located in the rural community of Old Harbor, on the south side of Kodiak Island (Figure 1). These beaches are popular for fishing, camping, shellfish harvesting and general recreation.

No known monitoring of fecal bacteria has occurred at these beaches previously, so it was of interest to test the beaches identified above as they all have unique potential sources of bacteria, including wastewater treatment plant, stormwater drain outfalls, campgrounds, public

restrooms, small farms, airport, military base, ferry and barge passage, wildlife and pet feces (figures 2-5). A Quality Assurance Project Plan (QAPP) was developed for this project and is available at beaches.alaska.gov .

Figure 2. Mission Beach, Areas of Interest[2]

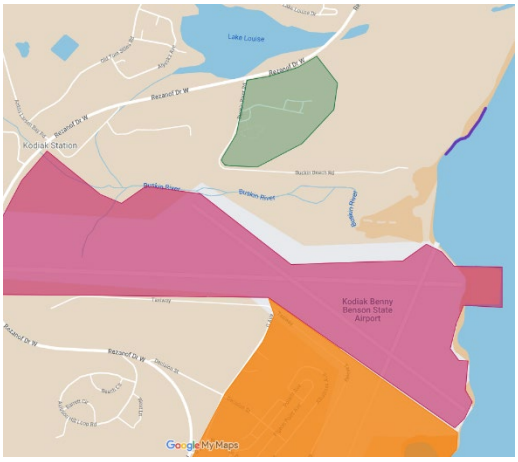

Figure 3. Buskin Beach, Areas of Interest

Figure 4. Frye Point, Areas of Interest

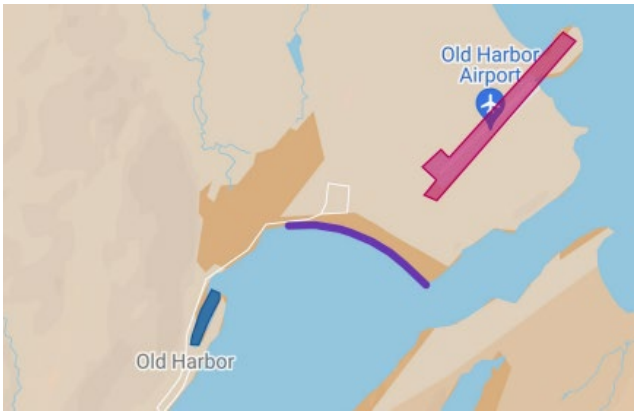

Figure 5. Lighthouse Beach, Areas of Interest

*Please note that the areas shown on the map are an approximation.

[2] Not pictured: Kodiak Wastewater Treatment Plant, located .70 miles northeast of Mission Beach.

Objective

The primary objective of this DEC BEACH Monitoring Program 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)[3].

Quality Assurance Review

Field staff followed procedures for sample collection and transport as outlined in the project's QAPP. The ADEC-approved QAPP is available at beaches.alaska.gov and from ADEC Southeast staff in Juneau, AK. Two samples did not meet the required holding time by the laboratory due to inclement weather, causing delay or cancellations of flights. However, cooler temperatures were within limits and no discrepancies, errors, data qualifiers, or QC failures were identified by the laboratory. Calibration and verification of the Hach Turbidimeter was completed as specified in the QAPP, however verification of the Hanna handhelds was only completed one time during the sampling season. 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 usable[4].

Methods

Nine grab samples were collected at each beach over the course of the sampling season. The sampling plan called for five samples to be collected at each location within a 30-day period to allow for calculation of the geometric mean. Samples were shipped via Alaska Air Cargo (and additionally Island Air for Lighthouse Beach) to the SGS Laboratory in Anchorage for fecal coliform and enterococci analysis. A field replicate was collected at one beach during each sampling event, rotating among sites. Modified EPA Marine Sanitary Surveys were conducted for each beach and sampling date and in situ water quality parameters (temperature, pH, turbidity) were collected using a hand-held Hanna meter and a Hach turbidimeter. Grab samples for Microbial Source Tracking (MST) were collected once at each location and sent to the LuminUltra Laboratory in Linthicum Heights, Maryland.

Results

One water quality exceedance was observed at Lighthouse Beach; one fecal coliform sample (56 CFU/100ml) was above the exceedance level (31 CFU/100ml) for the raw consumption of

[3] 18 AAC 70(14)(D) Water Quality Standards amended as of November 13, 2022.

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

seafood (eight samples were collected during the recreation season, therefore one sample accounts for more than 10%). See Table 2 for clarification. The geometric means for Fecal Coliform and Enterococci were well below the exceedance levels at all locations this recreational season (see figures 6 & 7). One sample for DNA source testing using Microbial Source Tracking was conducted at each location. Only Lighthouse Beach in Old Harbor saw quantifiable levels of bird fecal bacteria. There were no quantifiable levels of fecal bacteria of human or dog at any of the beaches (see Table 3).

Sanitary surveys were conducted each week during sampling. Samplers recorded environmental parameters including turbidity, temperature (water and air), pH, precipitation and the number of recreators at each location. Samplers also took a count of the number of birds, dogs, and other various wildlife (dead and alive) each week. The average turbidity at each location was relatively clear, with Frye Point having the highest average turbidity for the season. Lighthouse Beach, on average, recorded the warmest average water temperatures and Mission Beach recorded the coldest average water temperature (see Table 4).

The below tables and figures represent a summary of results from the 2023 sampling season for fecal coliform, enterococci, MST and in situ water quality data. Please see Appendix A and B for a complete table of all bacteria results from the 2023 sampling season.

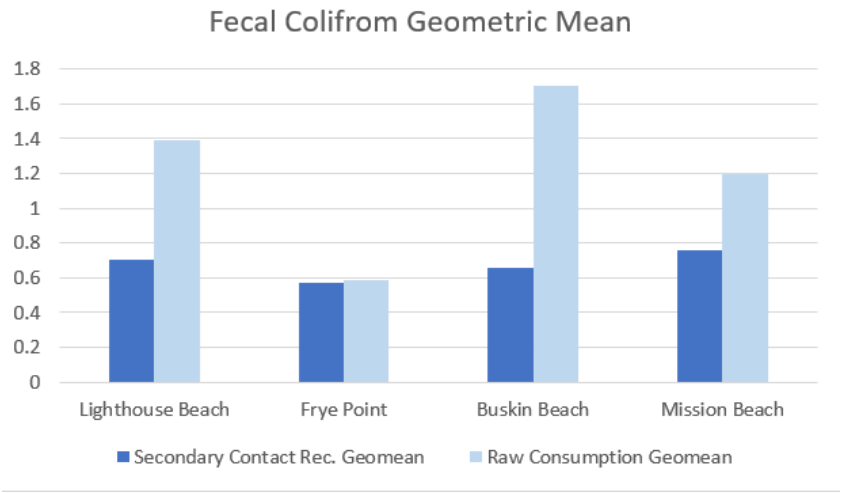

Figure 6. Fecal coliform geometric mean for the 2023 sampling season. The secondary contact exceedance level is 200 CFU/100 mL and the exceedance for raw consumption is 14 CFU/100 mL.

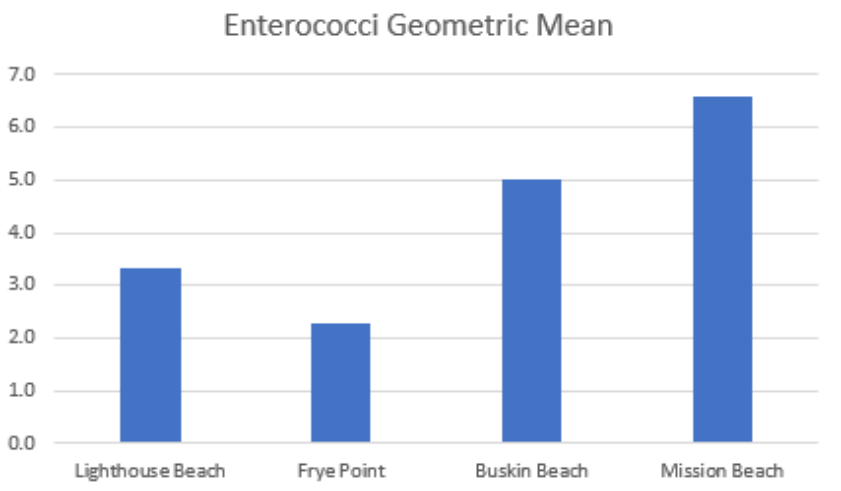

Figure 7. Enterococci geometric mean for the 2023 sampling season. The contact recreation exceedance level is 35 CFU/100 mL.

Table 2. Water Quality Criteria for Enterococci and Fecal Coliform

Sample Site	Pollutant	% of Samples Exceeding Threshold[1]
Mission Beach	Enterococci (MPN/100 mL)	0%
Buskin Beach		0%
Frye Point (Women's Bay)		0%
Lighthouse Beach		0%
Mission Beach	Fecal Coliform (CFU/100 mL)	0%
Buskin Beach		0%
Frye Point (Women's Bay)		0%
Lighthouse Beach		12%[2]

[1] No more than 10% of samples may exceed 130 for enterococci and 31 for fecal coliform per the 18 AAC 70 (14) Bacteria Water Quality Criteria.

[2] 8 samples in total were taken at Lighthouse Beach, therefore the 12% is representative of one sample that was above the exceedance of 31 CFU/100 mL for harvesting and consumption of raw mollusks / aquatic life.

Table 3. Microbial Source Tracking (MST) results

Sample Site	Bacteroidetes	Result Value[1]
Mission Beach	Human	ND
	Dog	ND
	Bird	DNQ
Buskin Beach	Human	ND
	Dog	ND
	Bird	DNQ
Frye Point (Women's Bay)	Human	ND
	Dog	ND
	Bird	DNQ
Lighthouse Beach	Human	ND
	Dog	ND
	Bird	33.02

[1]ND = Not Detected; DNQ = Detected, Not Quantifiable

Table 4. In situ water quality data summary

Sample Site	Parameter	Mean	Median	Range
Mission Beach	Turbidity (NTU)	1.54	1.03	0.64 – 4.59
	pH	7.97	7.98	7.35 – 8.45
	Temperature (°C)	9.40	9.20	7.10 – 10.90
Buskin Beach	Turbidity (NTU)	2.27	1.89	1.20 – 5.33
	pH	8.12	8.01	7.80 – 8.60
	Temperature (°C)	10.46	10.6	8 – 12.6
Frye Point (Women's Bay)	Turbidity (NTU)	3.68	1.86	0.62 – 17.5
	pH	8.05	8.00	7.60 – 8.66
	Temperature (°C)	10.52	10.70	7.8 – 12.90
Lighthouse Beach	Turbidity (NTU)	3.16	2.25	1.17 – 9.77
	pH	9.36	8.24	7.14 – 14.30
	Temperature (°C)	10.67	10.65	7.44 – 14.60

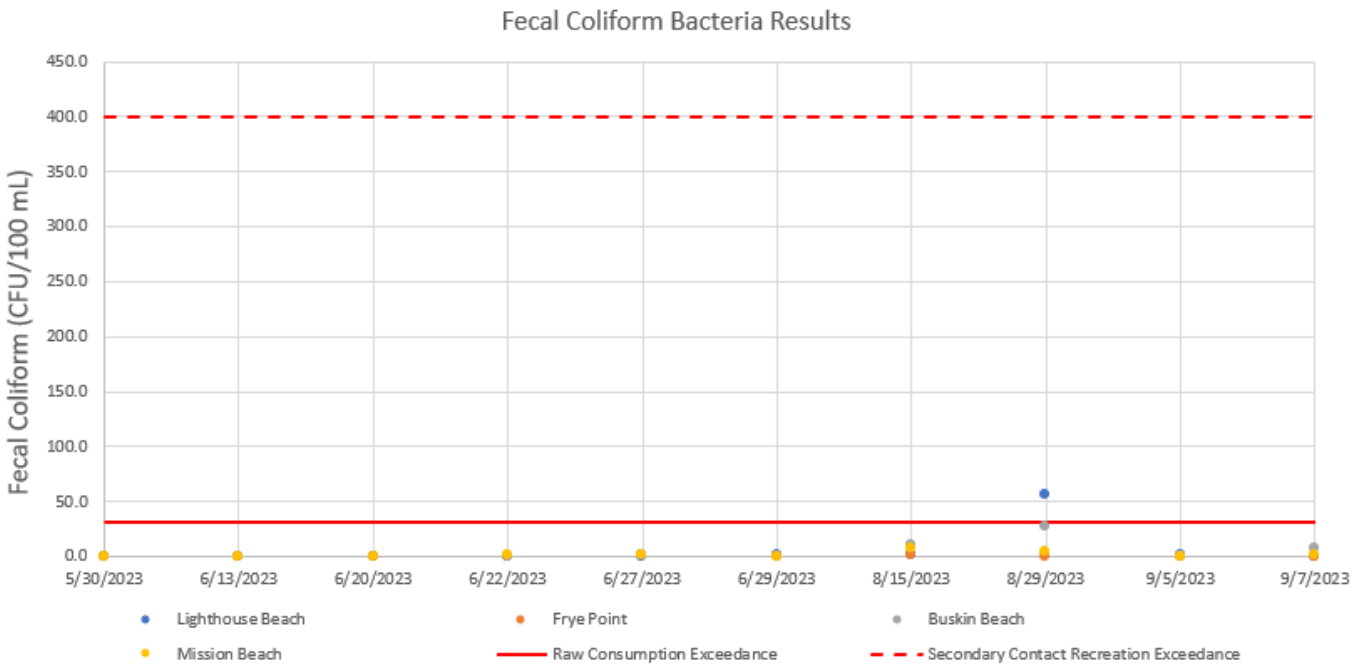

Figure 8. Fecal coliform bacteria result for all four Kodiak Island beaches, relative to water quality criteria.

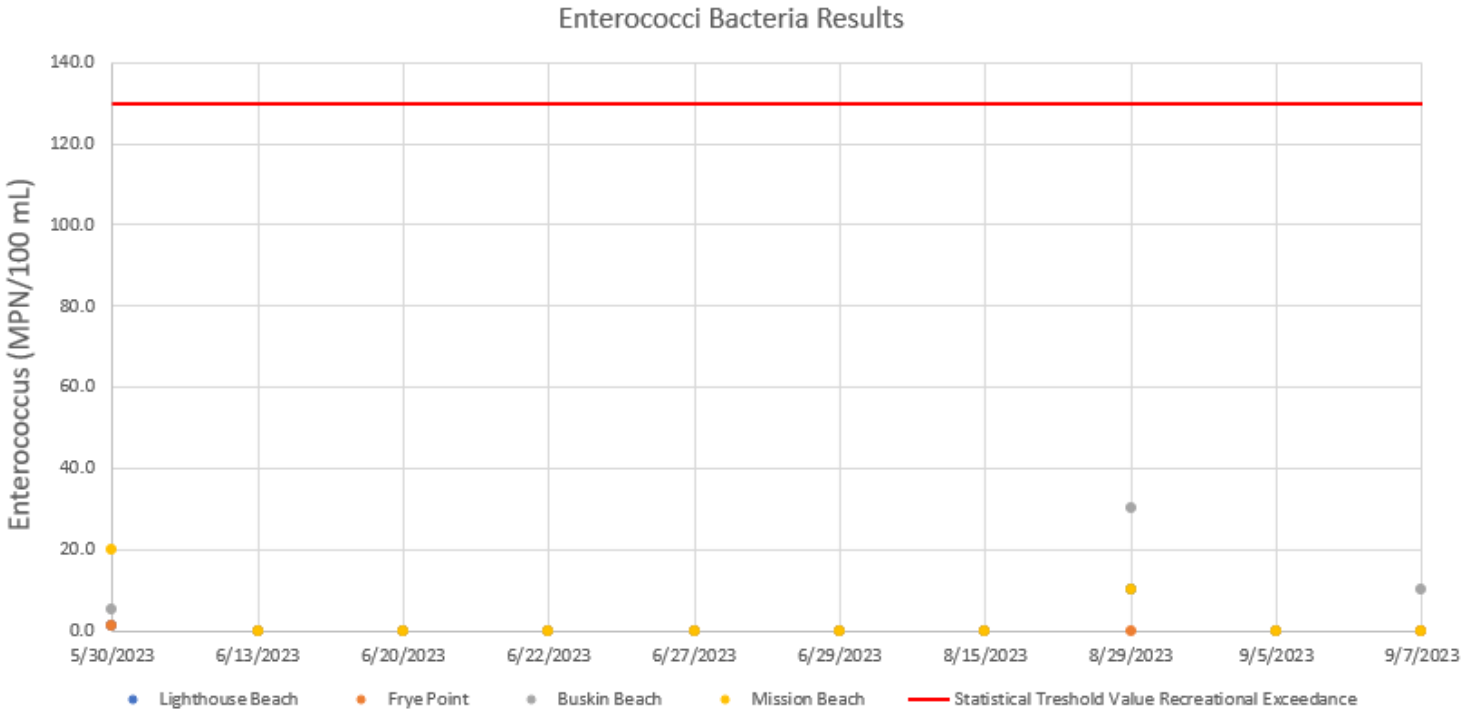

Figure 9. Enterococci bacteria results for all four Kodiak Island beaches, relative to water quality criteria.

Outreach

ADEC developed a communication plan and released a general press release at the beginning of the monitoring season. The Alaska Beach Program website has a specific Kodiak webpage highlighting an interactive map and data table with the most current beach sampling results, FAQs, and supporting project documents. During the season, ADEC shared beach sampling results through a stakeholder email listserv and updated ADEC website results table and interactive map as soon as analytical data was received. Facebook posts and advisory beach signage was prepared for when water quality exceedances occurred, however, no advisories or beach advisory sign postings were necessary during the 2023 recreational season. KANA, Sun'aq Tribe of Kodiak and the Alutiiq Tribe of Old Harbor shared Beach Program information via social media and flyers posted around town prior to the monitoring season and held an outreach event following the recreational season to share the monitoring program results summary, potential bacteria sources, and next steps.

Conclusion

The first year of fecal bacteria sampling at Kodiak Island BEACH locations indicated that bacteria concentrations are low. Lighthouse beach did exceed the 10% criteria threshold for fecal coliform (harvesting for raw consumption). Alaska water quality standards for recreation were met at all other beaches throughout the season. The MST samples indicated no human or dog source of bacteria at any of the locations, and low levels of bacteria from birds at Lighthouse Beach.

Recommended Next Steps

Kodiak Area Native Association, the Sun'aq Tribe of Old Harbor and the Alutiiq Tribe of Old Harbor will be sampling throughout the summer of 2024. An additional year of sampling will help evaluation water quality and will potentially expand the range of weather conditions under which data is collected.

Appendix A. Enterococci bacteria results for all four Kodiak Island beaches.

Sample Date	Mission Beach	Buskin Beach	Frye Point (Women's Bay)	Lighthouse Beach
05/30/2023	20	5	1	1
06/13/2023	0	0	0	0
06/20/2023	0	0	0	0
06/22/2023	0	0	0	No Sample
06/27/2023	0	0	0	No Sample
06/29/2023	No Sample	No Sample	No Sample	0
08/15/2023	0	0	0	0
08/29/2023	10	30	0	10
09/05/2023	0	0	0	0
09/07/2023	0	10	0	0

Appendix B. Fecal coliform bacteria results for all four Kodiak Island beaches, relative to water quality criteria.

Sample Date	Mission Beach	Buskin Beach	Frye Point (Women's Bay)	Lighthouse Beach
05/30/2023	0	0	0	0
06/13/2023	0	0	0	0
06/20/2023	0	0	0	0
06/22/2023	2	0	0	No Sample
06/27/2023	1	2	1	No Sample
06/29/2023	No Sample	No Sample	No Sample	2
08/15/2023	8	10	1	1
08/29/2023	5	28	0	56
09/05/2023	0	0	0	2
09/07/2023	1	7	0	0