JUNEAU BEACH MONITORING

JULY 1, 2011 – JUNE 30, 2012

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JUNEAU WATERSHED PARTNERSHIP

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INTRODUCTION

Alaska's coastlines provide valuable recreational resources. The beaches around Juneau are not only a gate to major tourist attractions, but are also heavily used - year round - by Juneau residents. Beaches are popular sites for swimming, hiking, camping, dog-walking, fishing, kayaking, boating, and many other activities. Several beaches have been developed to include picnic shelters, campsites, fire rings, and outhouse facilities. They serve as important social, economical, and recreational resources for local residents, and are vital wildlife habitats. Humpback whales migrate to Alaska's coastal waters annually, providing excellent whale watching opportunities. Birdwatchers and other marine life viewers frequent the beaches around Juneau as well.

Many beaches are in close proximity to residential and industrial areas, wastewater treatment facilities, and septic systems. Development and heavy use around beaches can affect water quality. Water contaminated by human or animal waste has the potential to induce illness for people who come in contact with it. Maintaining safe and healthy waters is important for promoting tourism and preserving recreational opportunities.

Wastewater sewage systems, septic tanks, boats, stormwater runoff, domestic animals, and wildlife are common contributors for fecal pollution. It puts people in contact with disease-causing microbes which can cause flu like symptoms including stomach ache and diarrhea, as well as ear, eye, and skin infections.[1] Water quality monitoring on recreational beaches near potential sources of fecal pollution can protect the health of beach users by revealing conditions where risk is elevated.

JUNEAU WATERSHED PARTNERSHIP

Our mission is to promote watershed integrity in the City and Borough of Juneau through education, research and communication while encouraging sustainable use and development.

[1] Alaska Department of Environmental Conservation (2011): BEACH Monitoring Handbook 2011-2012. Available at: http://dec.alaska.gov/water/wqsar/wqs/pdfs/Generic%20Beach%20Handbook%20(Final%2020110630).pdf (07/12/12)

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ABOUT THE BEACH SAMPLING 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. The U.S. Environmental Protection Agency (EPA) administers grant funding to states, tribes and territories under the Act to establish monitoring and public notification programs. The BEACH program has established national water quality monitoring and reporting standards for fecal contamination and notifies the public when microbe levels exceed state and national standards.[2]

The Alaska Department of Environmental Conservation (ADEC) Division of Water (DOW) uses these funds for the Alaska BEACH program. Alaska's BEACH program provides funding to municipalities and watershed organizations to conduct water quality monitoring on high-priority public beaches. BEACH programs have been set up in six Alaskan communities including Juneau. The Juneau BEACH plan was developed in collaboration with the Juneau Watershed Partnership (JWP), the City and Borough of Juneau (CBJ), the US Forest Service (USFS) and Alaska Department of Environmental Conservation (DEC) starting in fiscal year 2011 (FY11).[3] JWP is responsible for the monitoring of three beaches in Juneau.

Two groups of bacteria are measured as indicators of fecal contamination in marine waters, enterococci and fecal coliforms (*Escherichia coli or E. Coli*). These bacteria are found in both human and animal feces. The EPA only stresses the standard for Enterococci, as it survives longer in salt water (0-45 days) and is strongly correlated with gastrointestinal illness. The State of Alaska maintains a standard for fecal coliforms in addition to the EPA's enterococci standard (see Table 1 for water quality standard associated with each parameter).[3]

The three selected beaches are Lena Cove Beach, Auke Recreation Beach and Ann Coleman Street Beach (see Figure 1). The selection was based on information collected from the 2003 Alaska Beach Survey. The survey assessed the types of recreational activities and the level of use during each season for beaches around Juneau. The selected beaches are accessed from the Glacier Highway; therefore are highly used year round.

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[2] US Environmental Protection Agency (2012): Basic Information.
Available at: http://water.epa.gov/type/oceb/beaches/beaches_index.cfm/ (07/12/12)

[3] Alaska Department of Environmental Conservation (2011): BEACH Monitoring Handbook 2011-2012.
Available at: http://dec.alaska.gov/water/wqsar/wqs/pdfs/Generic%20Beach%20Handbook%20(Final%2020110630).pdf (07/12/12)

Table 1: State and Federal Standards

Fecal Coliform Water Quality Standard (Alaska Department of Environmental Conservation)	
Single-Sample	200 fecal coliforms per 100 ml
Geometric mean (average) of 5 samples within 30 days	100 fecal coliforms per 100 ml
Enterococci Water Quality Standard (Environmental Protection Agency)	
Single-Sample	276 enterococci per 100 ml
Geometric mean (average) of 5 samples within 30 days	35 enterococci per 100 ml

Figure 1: Juneau BEACH Sampling Sites (based on Google Earth created by JWP)

JUNEAU BEACH MONITORING LOCATIONS

Lena Cove Beach

This U.S. Forest Service Recreational Area is located about 16 miles northwest of Juneau. Recent residential development has increased public usage and the density of septic systems at this beach. Septic drain fields were designed to handle human waste effectively, but there is still potential for development to impact near-shore water quality. The beach is popular for hiking, dog-walking, picnicking, and swimming and is serviced with a picnic area and pit toilets. Picnic Creek runs down the beach, after flowing through a fish passage, attracting wildlife when salmon return annually to the creek to spawn.

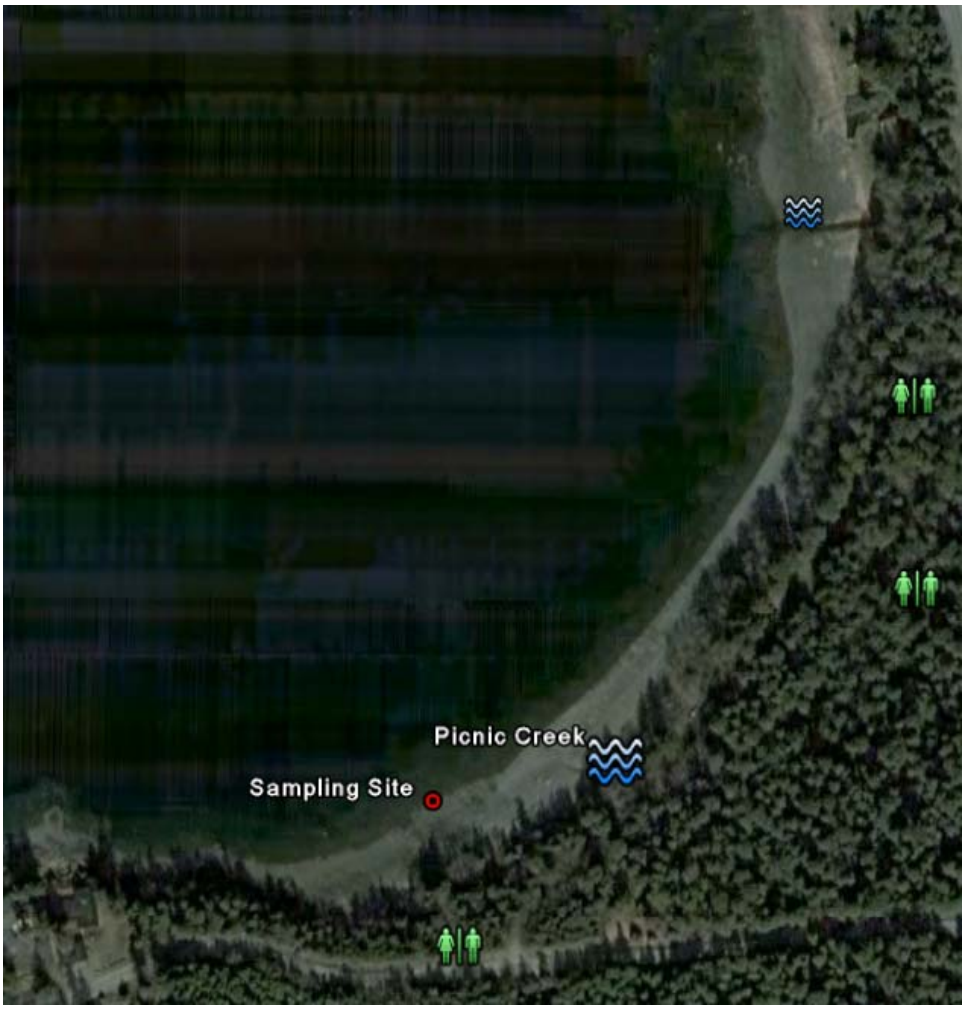

Figure 2: Map of Lena Cove Beach.

The smaller blue water symbol indicates an unnamed creek located at 58.39543 N / 134.74927 W. Picnic creek, shown by the larger water symbol, located at 58.39291 N / 134.75063 W, enters the beach through a fish passage. The sampling site, indicated by the red dot, is located at 58.39286 N / 134.75222 W. There are three pit toilet facilities represented by green restroom symbols at 58.39458 N / 134.74803 W, 58.39458 N / 134.74803 W and 58.38209 N / 134.75200 W from north to south.

Auke Recreation Area Beach

A USFS Recreational Area located 14 miles northwest of Juneau, just past the ferry terminal. Auke Recreation Area is one of the most popular beaches around Juneau and is equipped with several picnic shelters, fire rings, and pit toilet facilities. The beach is adjacent to the Auke Village USFS campground. A residential development serviced by septic systems borders the southern end of the beach. The Auke Bay Wastewater Treatment Facility and Auke Bay Harbor lie 2.5 miles to the west.

Figure 3: Map of Auke Recreation Area Beach.

The small blue water symbols represent outfalls from small culverts funneling freshwater runoff from the hillside to the beach. The larger blue water symbol indicates a creek extending from a large diameter cement culvert. Coordinates for the culverts from west to east are: 58.37812 N / 134.73201 E, 58.37848 N / 134.71812 W, 58.37841 N / 134.71678 W and 58.37836 N / 135.71421 W. The green restroom symbols indicate pit toilet facilities. The pit toilet farthest to the west is located in the campground at 58.37452 N / 134.72922 W. Coordinates for the other toilet facilities from west to east are 58.37751 N / 134.72491 W, 58.37840 N / 134.71623 W, 58.37823 N / 134.71466 W and 58.31776 / 134.71126 W. The sampling site, indicated by the red dot, is located at 58.3780 N / 134.80222 W.

Ann Coleman Street Beach

This beach is located off of Fritz Cove Road, about 12 miles northwest of Juneau. It provides access to the Ann Coleman Wall Underwater Trail, a popular scuba diving route. Anglers often fish from the shore or small boats nearby. The beach is 1.75 miles southeast from the Auke Bay Wastewater Treatment Facility and the Auke Bay Harbor. This location is resulting in relatively heavy small boat traffic.

Figure 4: Map of Ann Coleman Street Beach.

The blue water symbol represents an outfall created by two culverts located on the trail to the beach, located at 58.36181 N / 134.64496 W. The sampling site, indicated by the red dot, is located at 58.36121 N / 134.64777 W.

METHODS

Samples were collected at Lena Cove Beach, Auke Recreational Area Beach and Ann Coleman Beach once per week over a total of 18 weeks. Monitoring was conducted during FY12 for (8) weeks in summer 2011 beginning on July 25 and for (10) weeks in summer 2012 starting on April 24, 2012. Weekly samples were taken to evaluate health risks caused by enterococci and fecal coliforms on three local recreational beaches in the Juneau area. Each sample was collected using the grab method with a 120 ml bottle preserved with sodium thiosulfate. A field blank consisting of sterile water in a sterile sample bottle accompanied the samples during the field collection and transportation process and was tested for either fecal coliforms or enterococci following the replicate sample which was taken from one beach per week on a rotating schedule so that replicates were collected from each beach once every three weeks. The replicate was tested for either enterococci or fecal coliforms on a two week rotation. If a replicate was taken from a particular beach was tested for enterococci, three weeks later it would be tested for fecal coliforms. Temperature blanks accompanied all coolers to ensure that samples remained within acceptable limits.

All samples were collected by Juneau Watershed Partnership staff following Alaska BEACH Standard Operating Procedures. 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 to avoid collecting surface scum. During sampling at each location a Beach Field Form was filled out noting recreation on the water and beach usage activities, wildlife, weather, water and air temperature, tidal conditions, and potential sources of pollution.

Admiralty Environmental, a DEC approved water quality laboratory in Juneau, performed analyses of bacterial colonies present in the samples. Admiralty Environmental provided all sampling bottles, materials, and coolers. After collection samples 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. Admiralty Environmental submitted results to JWP by email within 72 hours of receiving the samples and provided a final report within 7 days.

Beach Field Forms were scanned and emailed to Brock Tabor, the DEC contact and project manager. All field data was entered into an MS Excel spreadsheet and supplied to the DEC. Data was then reviewed for quality control and assurance by DEC staff and ultimately uploaded to the state

Alaska Water Quality Monitoring System (AQWMS) database. Data will be shared with the EPA BEACH program and STORET database on an annual basis.

RESULTS

Lena Cove Beach, Auke Recreation Area Beach and Ann Coleman Beach were sampled 18 times for both enterococci and fecal coliform during FY2012 (see Table 2).

Presence of fecal coliform colonies ranged between 2 and 20 FC/100ml at **Lena Cove Beach** throughout sampling events. 63% of the samples showed results of less than 2.0, which is the practical quantification limit (PQL) for fecal coliform. 72% of the samples tested for enterococci returned results above 10 MPN/100ml, the PQL for enterococci. Four samples yielded approximately 10 MPN/100ml and one yielded 20 MPN/100ml at Lena Cove Beach (see Appendix 1, Figure 1).

Results tended to be slightly higher at **Auke Recreation Area Beach**. 42% of the sampling events yielded FC/100ml values less than 2. Values above the PQL ranged from 2 to 48 FC/100ml. The highest enterococci level of the sampling period was taken from Auke Recreation Beach on June 26, 2012 showing 52 MPN/100ml. 63% of the samples tested for enterococci were above the PQL (see Appendix 1, Figure 2).

57% of the samples tested for fecal coliforms at **Ann Coleman Beach** showed less than 2 FC/100ml. When detected, fecal coliform values ranged between 1.7 and 20 FC/100ml. Detected enterococci levels ranged between 10 and 40 MPN/100ml. 68% of the enterococci results were below the PQL at this location (see Appendix 1, Figure 3).

Table 2: Summary of results

Sampling Location	Fecal Coliform					Enterococci				
	Total # of Samples	Max	Max Date	Single Sample Max	# below detection limits	Total # of Samples	Max	Max Date	Single Sample Max	# below detection limits
Lena Cove	18	20	6/26/2012	200	12	18	20	7/25/2011	276	13
Auke Recreation	18	48	8/17/2011	200	8	18	52	6/26/2012	276	12
Ann Coleman	18	20	8/1/2011	200	11	18	40	7/25/2011	276	13

EXCEEDANCE EVENTS

Bacterial levels did not exceed state or federal water quality standards at any of the three sampling locations during the sampling period. Protocols were in place in the event standards were exceeded. These protocols are available in detail in the BEACH Monitoring Handbook[4]. If a single-sample standard were to be exceeded, the DEC project coordinator and city officials would be notified and a re-sampling event would take place. In the event that the re-sample also exceeded water quality standards, public safety notices would be posted at the affected beaches and alerts would be sent out using public media outlets.

PUBLIC OUTREACH

The Juneau Watershed Partnership wrote and published an article about the BEACH monitoring in our "Water Ways" Newsletter in October 2011. Also, JWP submitted a feature article to the Juneau Empire about the Juneau BEACH Monitoring Project. The article was published on October 14, 2011.

ACKNOWLEDGEMENTS

The Juneau Watershed Partnership thanks Brock Tabor (ADEC) for his support and patience during the development and continuation of this program.

[4] Alaska Department of Environmental Conservation (2011): BEACH Monitoring Handbook 2011-2012.
Available at: http://dec.alaska.gov/water/wqsar/wqs/pdfs/Generic%20Beach%20Handbook%20(Final%2020110630).pdf (07/12/12)

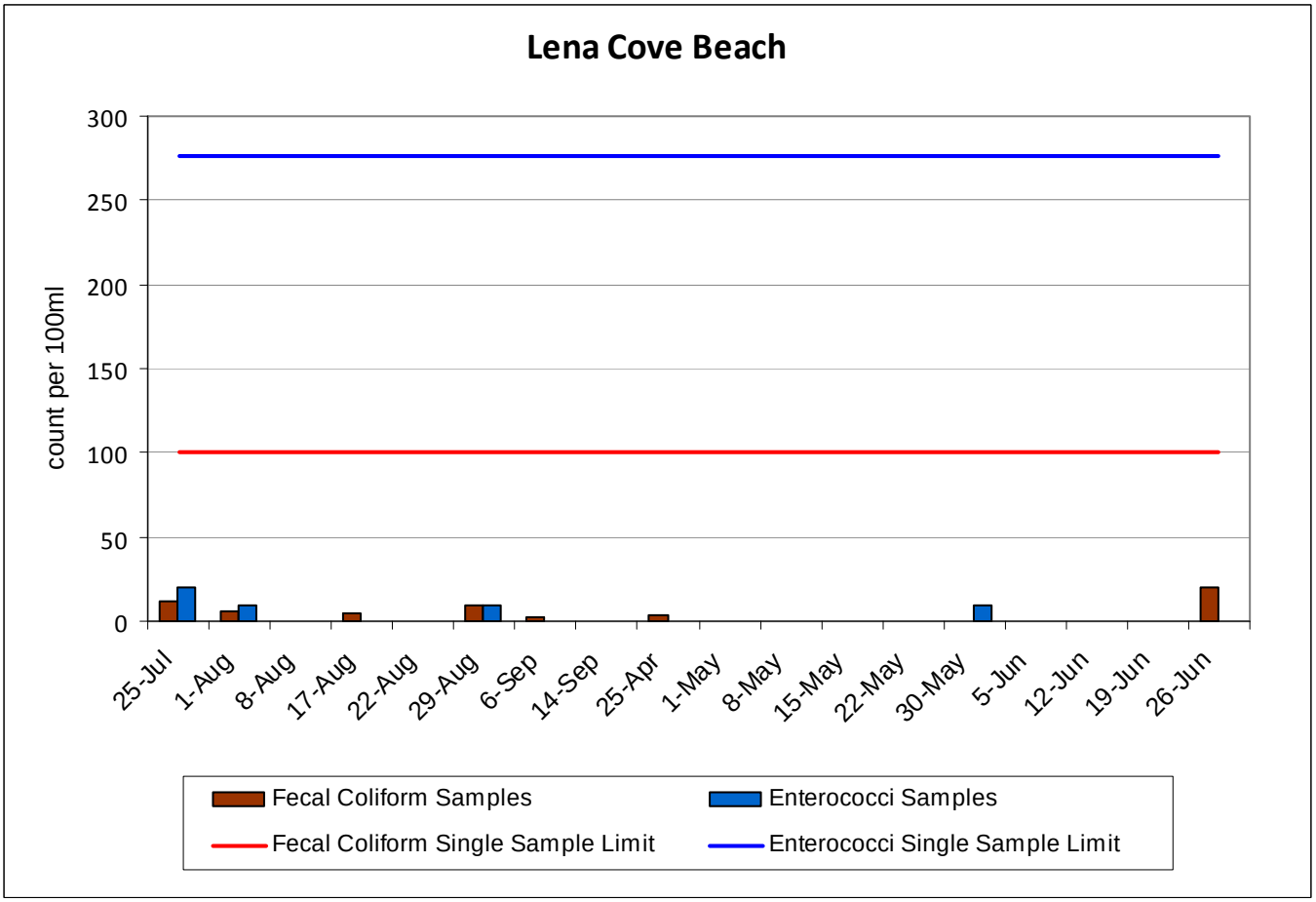

Figure 1: Lena Cove Beach sampling results for fecal coliform and enterococci during FY2012 and the single sample limits for fecal coliforms and enterococci.

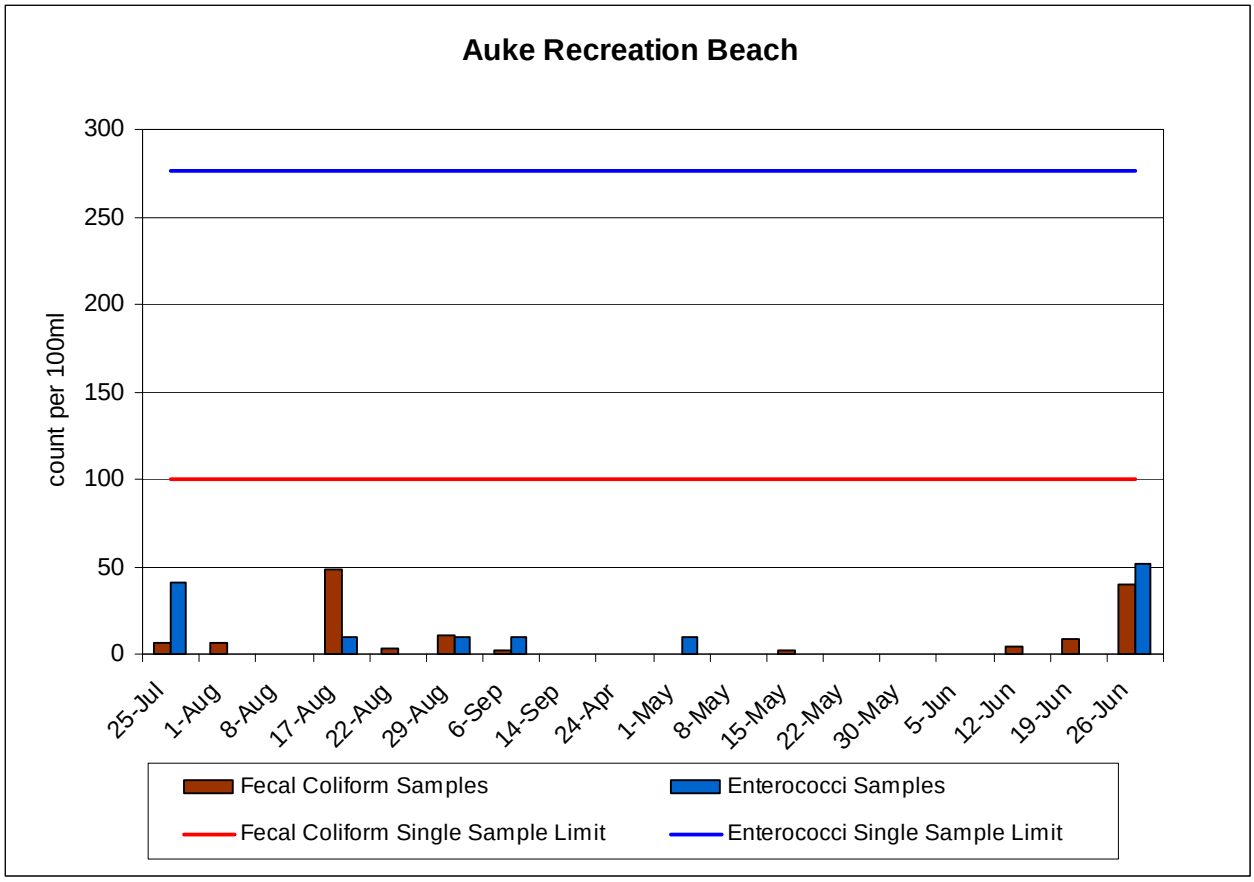

Figure 2: Auke Area Beach sampling results for fecal coliform and enterococci during FY2012 and the single sample limits for fecal coliforms and enterococci.

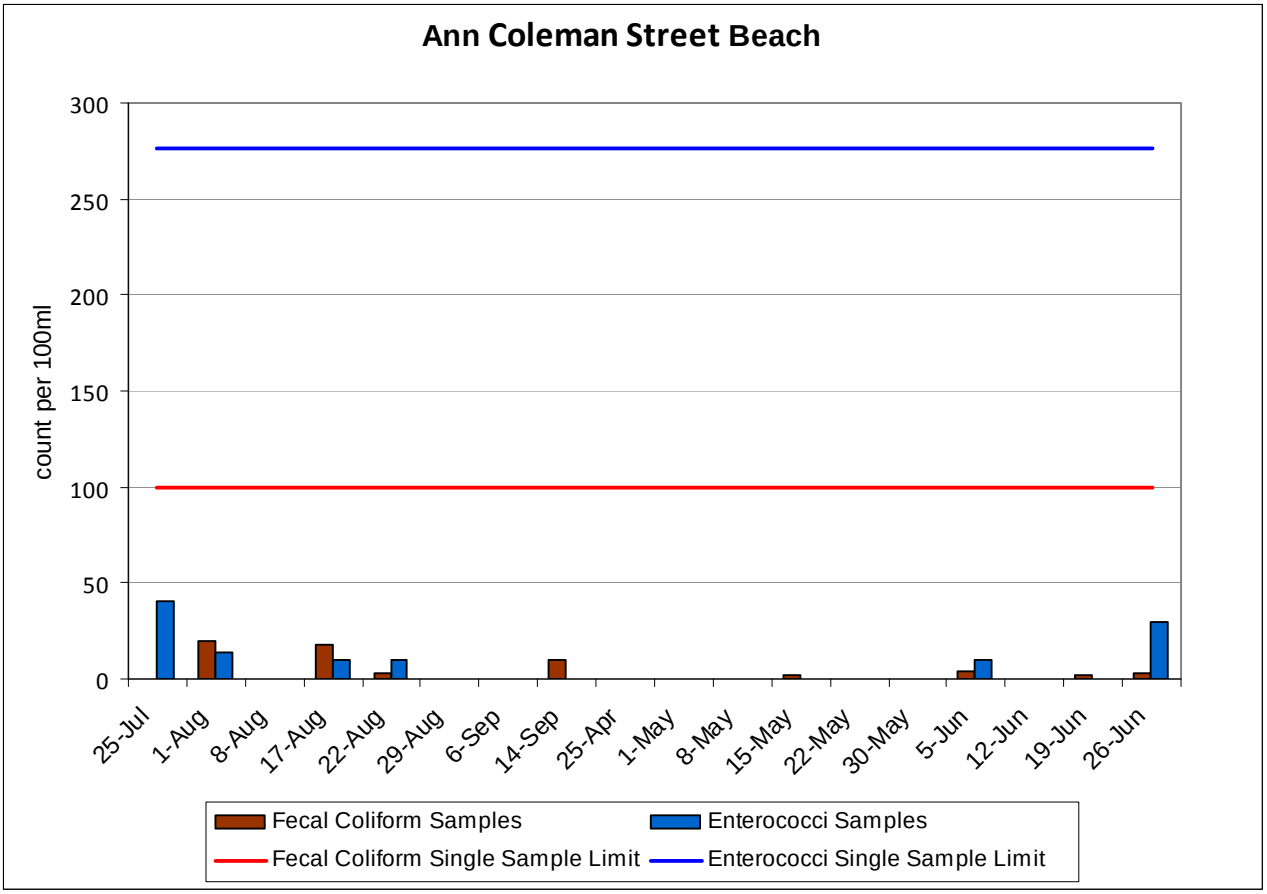

Figure 3: Ann Coleman Beach sampling results for fecal coliform and enterococci during FY2012 and the single sample limits for fecal coliforms and enterococci.