

Mats Mats Bay Water Quality Report

Water Year 2009-10

ECOLOGY GRANT G0900067

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Project Background

The Mats Mats Bay Water Quality Improvement Project is a program of the Jefferson County Water Quality Department intended to improve surface water quality in the Mats Mats Bay area. Commercial shellfish operations are threatened with a possible downgrade due to increasing levels of fecal coliform bacteria as measured by the Washington State Department of Health (DOH). Fecal coliform bacteria are from feces and indicate potential risk to human health from exposure to pathogens. Sources of fecal coliform typically include livestock and poultry manure, inadequately-treated human sewage, pet waste and wildlife. Health risks include exposure to pathogens from recreational activities such as swimming and from consumption of shellfish.

This report covers the water year (WY) 2009-10 or October 1, 2009 through September 30, 2010. This time period is further broken down into a wet season and dry season, here defined as wet: October 1 through March 31 and dry: April 1 through September 30.

Project Area

The project area is the 1,500-acre watershed of Mats Mats Bay. Contained in the basin are the marine waters of the bay, freshwater streams including Piddling Creek that drain into the bay and upland slopes that would drain surface runoff to the bay (Figure 1, Sampling Stations Map). Approximately 164 residences are located in the project area, primarily single-family homes, all on septic systems. One commercial shellfish growing operation is located in the bay. 17 to 25 moored boats are typically present on private buoys. Average annual precipitation is approximately 19 inches. Precipitation records are available nearby in Port Ludlow at the Community Collaborative Rain Hail and Snow (CoCoRaHS) network station WA-JF-2.

Water Quality Standards

Washington State sets standards for surface water for different parameters per Washington Administrative Code (WAC). For fecal coliform, there are separate standards for freshwater and marine water. Different levels of protection are granted to water bodies based on their designated uses and value as habitat. Mats Mats Bay receives a high level of protection as an Extraordinary Quality Marine Area. Streams flowing into the bay are designated for use as extraordinary primary contact recreation, and also receive the highest level of protection. Therefore for fecal coliform standards the following levels must be met:

Table 1, Washington State Water Quality Standards

Waterbody	Geometric mean	90 th Percentile
Freshwater fecal coliform	< 50 FC/100mL	< 100 FC/100mL
Marine water fecal coliform	< 14 FC/100mL	< 43 FC/100mL

Fecal coliform standards have two parts: a geometric mean threshold and a 90th percentile threshold. Geometric means (geomeans) are calculated on three or more samples and must be no greater than 50 fecal coliforms per 100 milliliters in freshwater or 14 FC/100mL in marine water. No more than ten percent of samples (or any sample when less than ten samples have been taken) can be greater than the 90th percentile threshold.

Shoreline Sampling

Jefferson County staff samples streams, seeps and outfalls flowing into the Mats Mats shoreline. The samples are taken twice per year, once in wet season and once in dry season, and analyzed for the fecal coliform by membrane filtration. Locations that have been sampled to date are identified by a number and have been mapped (Figure 1). Shoreline sampling provides screening to evaluate potential inputs of pollution to the bay. Any locations that exceed 100 fc/100mL are resampled. If three or more samples exceed the water quality standards investigation into possible sources begins. This can involve further sampling upstream, investigation of potential animal sources and inspection of septic systems in the form of "sanitary surveys". Precipitation records are consulted to identify significant rain events previous to sampling. Repeat sampling is performed during the same wet season or dry season, unless flow ceases on small seeps and streams and there is nothing to resample. Results are provided in Table 2, Shoreline Freshwater Fecal Coliform.

Initial sampling in 2010 found low levels of fecal coliform except at one station (116). Geomean values and 90th percentiles were not calculated in Table 2 for water year 2009-10 were not calculated as not enough samples had been taken. Follow-up sampling at 116 was completed as soon as possible but carried over into the following wet season of water year 2010-11. Two subsequent samples at Station 116 Station led to a one-month geomean of 115.5, still a high priority site. 116 was found to be the outfall for a stormwater detention pond off of Mats View Road. Sanitary surveys were completed on all nearby residences and no problems with septic systems were noted. Fecal sources are suspected to be pet waste from roadside ditches and waterfowl or other wildlife.

Marine Sampling

Marine sampling is done every other month by Jefferson County staff to augment DOH data collected in the alternating months. Nine established DOH sampling stations are distributed throughout the bay (Figure 1) and are used by DOH and County staff. These sites are accessed by boat and located by gps receiver and landmarks. They have been sampled by DOH for many years. County sampling began in October 2009. Increased levels of fecal coliform previous to 2009 at Station #10 led to the initial concerns by DOH. Current results are analyzed by water year and provided in Table 3, Marine Fecal Coliform WY 2009-10.

Stations 8 and 9 in the northwestern part of the bay were the only sites to have sample results greater than 43 MPN/100mL. This occurred during wet season. Geomeans were low, but part two of the standard was not met. Subsequent dry season sampling resulted in no sites with elevated fecal coliform levels. Washington State Department of Health sampling results at these same stations during WY 2009-10 were all less than 10 FC/100mL.

Assessment

Sampling during the 2009-10 water year revealed generally good water quality in terms of fecal coliform levels. One area of concern was investigated and results have so far been inconclusive. Additional monitoring will be performed in the 2010-11 water year.

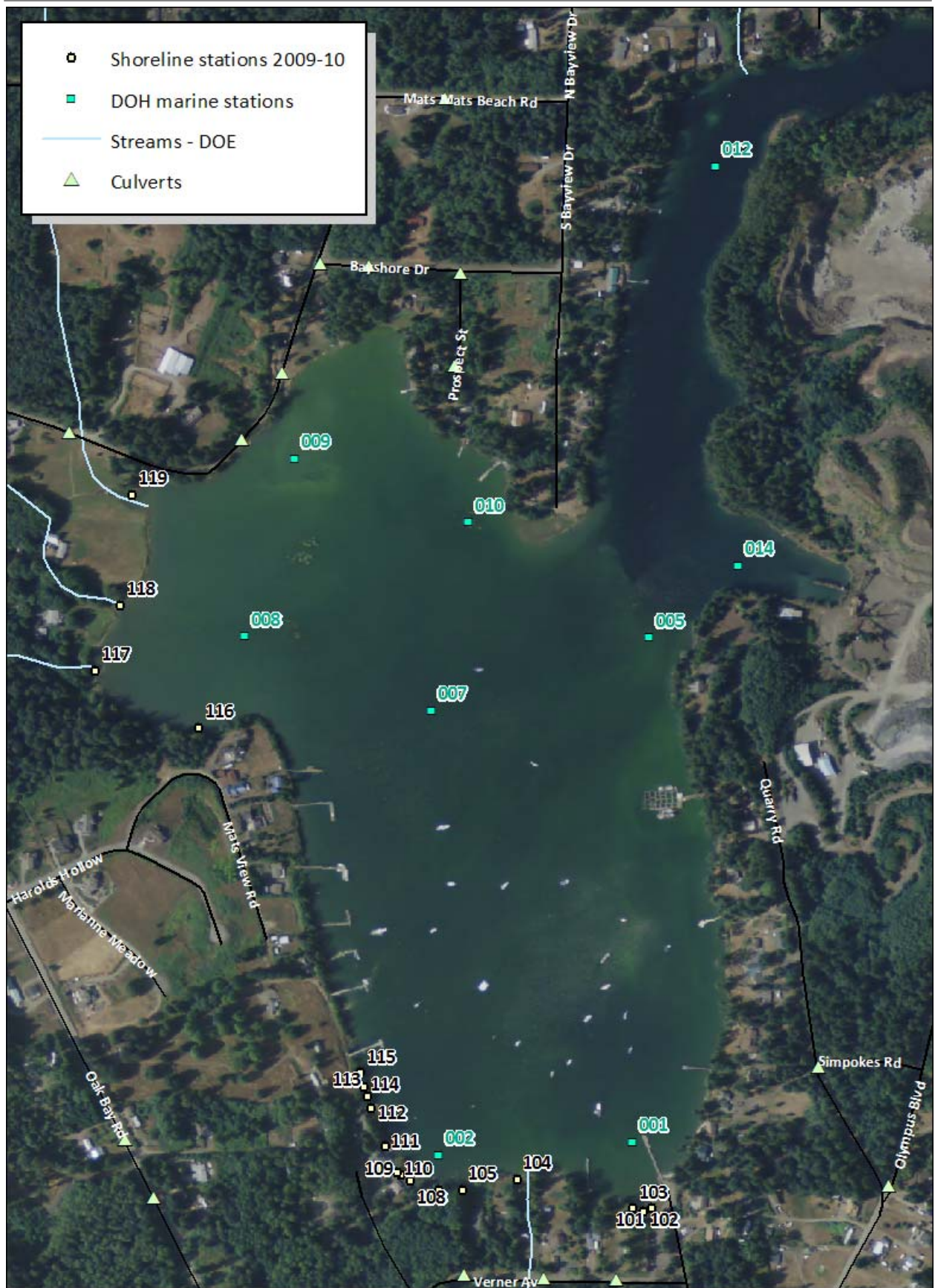


Figure 1, Sampling Stations Map

Table 2, Shoreline Freshwater Fecal Coliform

Station	2/22/2010 (cfu/100mL)	9/27/2010 (cfu/100mL)	Number of Samples	Range (cfu/100mL)	Priority
101	0.5 ¹	20	2	0.5-20	
102	0.5 ¹		1	0.5	
103	4		1	4	
104	25		1	25	
105	0.5 ¹	20	2	0.5-20	
106	4		1	4	
107	10		1	10	
108	10		1	10	
109			0		
110	1		1	1	
111	3		1	3	
112	2		1	2	
113	0.5 ¹		1	0.5	
114	0.5 ¹		1	0.5	
115	0.5 ¹		1	0.5	
116		550	1	550	HIGH ²
117		20	1	20	
118		10	1	10	
119		50	1	50	

Table 3, Marine Fecal Coliform WY 2009-10

Season	Station	Number of Samples	Range (MPN/100mL)	Geomean ³ (MPN/100mL)	90 th Percentile (MPN/100mL)	Meets WQ Standard?
Wet	1	6	1-4	1.4	3.0	YES
Wet	2	5	1-30	2.3	18.8	YES
Wet	5	4	1-4	2.0	4.0	YES
Wet	7	4	1-2	1.7	2.0	YES
Wet	8	5	2-130	10.3	122.0	NO
Wet	9	4	1-80	3.6	56.6	NO
Wet	10	4	1-27	2.7	19.5	YES
Wet	12	4	1-2	1.2	1.7	YES
Wet	14	4	1-2	1.4	2.0	YES
Dry	1	7	1-2	1.1	1.4	YES
Dry	2	5	1-8	1.5	5.2	YES

¹ Substitution of ½ of detection limit for non-detects: "0.5"² Follow-up sampling occurred in WY 2010-11.³ Geometric mean calculated including substitutions of ½ of detection limit for non-detects: "1"

Dry	5	5	1-13	1.7	8.2	YES
Dry	7	5	1-1	1.0	1	YES
Dry	8	5	1-2	1.3	2	YES
Dry	9	6	1-2	1.3	2	YES
Dry	10	6	1-2	1.3	2	YES
Dry	12	5	1-2	1.1	1.6	YES
Dry	14	6	1-8	1.4	4.5	YES

