

Mats Mats Bay Water Quality Report

Water Year 2011-12

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) 2010-11 or October 1, 2010 through September 30, 2011. 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	< 50 FC/100mL	< 100 FC/100mL
Marine water	< 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". Investigations are prioritized as High, Medium or Low based on geometric mean values (GMV) of greater than 500 (High), between 200 and 499 (Medium), and 100 to 199 (Low) fc/100mL. Sites have also been given higher priority when any individual sample was greater than 1,000 fc/100mL. 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 analyzed by season and provided in Table 2, Shoreline Freshwater Fecal Coliform.

Stations 105 and 106 along the south shore continued to have high values this year with GMV of 222 and 398 respectively. An onsite sewage system above the area was found to be failing during a sanitary survey and subsequent ditch sampling (Locations 527, 528, and 529) on July 24, 2012 and August 2, 2012 revealed high FC values. Then two of these locations dried up on August 22, 2012 and could not be resampled. The streams at Stations 105 and 106 had low FC values that day. The owner of the failed septic system had the tank pumped and the ponded area of the drainfield dried up. Currently, the owner is in the process of having the system repaired. JCPH will sample these streams again as they have had high bacteria levels and it may then be assumed to have been from the failing system if the subsequent results continue to be low. **Station 108**, flagged for resampling, has been dry this year after one value of 230.

Station 112 on the southwest shore had a GMV of 170 in WY2010-11 and it improved this water year to a GMV of 28. It is assumed that manure from livestock (2 burros) observed above the property may have contributed to the previous higher levels, but the owner of the pasture has not responded to our inquiries.

Station 116 on the west shore had a GMV of 328 in WY 2011-12 and each time, birds and raccoon sign were found. The location is a culvert draining a stormwater retention pond serving the Mats View residential development. Upslope, an investigation of a community septic system found a missing end cap on a sandfilter with lush grass near it, but sampling in a swale below it had low results. The missing end cap may have caused intermittent squirting of effluent onto the ground. JCPH recommended the end cap be repaired and it was in the fall of 2012. Sanitary surveys have not revealed other problems.

Station 121, a flexpipe on the west shore, has been intermittent this year with only one value to go on, of 600. Since then it has been dry or during other sampling events we were unable to access it. The two adjacent property owners have not been willing to participate in sanitary surveys and there are no other potential sampling locations upslope.

Station 127, a stream at the north end of the bay was investigated in WY 2010-11 due to a GMV of 141. Sampling upstream in ditches and streams contributing to it revealed no identifiable source except for wildlife. Two values above 100 were found in the dry season this water year; then the stream and ditches above it dried up. The last high count was from a pool of standing water in the nearly dry



streambed. Sanitary surveys have been completed and no septic sources were found. Wildlife is the most likely source.

Stations 136 and 138 were planned for resampling but the downstream **Station 130** dried up and the chicken coop runoff had been corrected.

Station 321, a seep on the west shore, was flagged to resample but it has been dry or not found in resampling events. **Station 500** had a low FC value in February, 2012. **Station 508** dropped to low values at the end of WY2010-11. **Station 512** had also been flagged for resample, but the septic system of concern had a negative dye test. Downstream at the shore, **Station 112** is continuing to be watched and has intermittent high bacteria levels. During the last two sampling events FC values have been low.

Investigations were conducted upstream of high counts and one onsite sewage system was found to be failing above several stations that had hits. This system is in the process of repair and mitigation actions during repairs involve tank pumping and reducing water usage. **Station 527** down slope has shown dramatic improvement (310 to 60) following the mitigation actions. Another system in the area is in the process of repair. The community sandfilter broken end cap at Mats View Terrace has been repaired.

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 2011-12.

Marine sampling by JCPH resulted in one sample with greater than 43 FC/100mL: Station 1 in dry season (April) was high at 50 FC/100ml causing it to fail to meet the water quality standard. When DOH sampling is taken into account the station met the standard for the year. There was heavy rain that day which may have been a contributing factor causing runoff from animal sources on shore. All wet season results were low. All geomeans remained below 14 FC/100mL. DOH sampling during wet and dry seasons resulted in no samples above 43 FC/100mL. Including DOH data in the calculation of geomeans still resulted in every station meeting part 1 of the fecal coliform standards.

A running count of all samples (JCPH and DOH) throughout the project period (WY 2009 to present) was also analyzed. In this analysis, slightly higher fecal coliform results were found at stations 8 and 9, but were still within standards for extraordinary primary contact recreation.

Agricultural Survey

Since livestock manure management practices influence fecal pollution, JCPH staff wanted to assess and address such sources. Eight parcels were identified as potential non-commercial farms with livestock and were investigated through sanitary surveys (contacting the property owners in person). Only six were confirmed to have animals such as chickens, horses, miniature horses, and burros. When possible, owners were given information on manure best management practices. There were no confirmed manure impacts on water quality this year.



Moored Boat Survey

During marine sampling events, a count was taken of anchored or buoyed boats in the bay to assess potential sources of pollution and several complaints were received about derelict and/or live-aboard vessels this water year. An investigation has begun to determine if the alleged live aboard vessels are discharging sewage into the bay and if the alleged abandoned boats are at risk of sinking which would potentially pollute the bay. Both Jefferson County Community Development and Washington State Department of Natural Resources are assisting in the investigation.

The moored boat count is fairly stable at around 18, ranging from 16 to 20. Many of the same boats remain at each count and several appear to have had no maintenance as evidenced by plant growth and bird guano on the boats. These correlate with the complainant's descriptions. One live aboard owner was given information about the requirements for marine toilets and using pump out stations.

Assessment

Water year 2011-12 showed declining water quality in shoreline freshwater discharges and essentially stable marine water quality in terms of fecal coliform levels.

Freshwater monitoring was increased to try to identify pollution sources. Upstream sampling locations were tested again and new sampling locations were selected and tested to try to bracket potential sources. Sanitary surveys were also expanded to the whole project area to rule out problems further from the shoreline. Two more OSS repairs are in process as a result and several stations are showing improved water quality down slope of these corrections. Several stations as noted above had dried up this past summer so there is limited data and wet season sampling is needed for those with less than three samples and high FC counts.

A total of four septic systems have been identified as failing or in violation status this year. Three are in the process of repair and one is being mitigated by having the owner live in his RV while a more permanent solution is found. Potential boat pollution sources are under investigation.





Figure 1, Sampling Stations Map



Table 2, Shoreline Freshwater Fecal Coliform

WY 2011-2012						
Station	n	Range	GMV ¹	n samples >100	Meets WQ Standard?	PIC Priority
101	1	10	N/A	0		
105	6	20-710	106.4	3	NO	LOW
106	3	50-2000	397.9	2	NO	HIGH
108	1	230	N/A	1	NO	RESAMPLE
109	1	230	N/A	1	NO	RESAMPLE
110	2	280	N/A	2	NO	RESAMPLE
112	4	10-580	27.6	1	NO	RESAMPLE
116	5	20-2000	328.8	3	NO	HIGH
117	1	50	N/A	0		
118	1	20	N/A	1		
119	3	40-230	82.0	1	NO	LOW
120	2	140-2000	N/A	2	NO	HIGH
121	1	600	N/A	1	NO	RESAMPLE
127	2	170-2000	N/A	2	NO	HIGH
320	1	10	N/A	0		
500	1	10	N/A	0		
503	1	50	N/A	0		
507	2	10	N/A	0		
516	1	10	N/A	0		
521	1	20	N/A	0		
525	1	30	N/A	0		
526	1	840000	N/A	1	NO	HIGH
527	3	60-310	305.0	2	NO	MEDIUM
528	1	330	N/A	1	NO	RESAMPLE
529	2	790-2090	N/A	2	NO	HIGH
530	2	80-200	N/A	1	NO	RESAMPLE
317	1	50	N/A	0		
531	1	10	N/A	0		
532	1	10	N/A	0		
533	1	10	N/A	0		

¹ Geometric mean value calculated including substitutions of ½ of detection limit for non-detects: "0.5" for non-diluted and "5" for 10:1 dilutions.



Table 3, Marine Fecal Coliform WY 2011-2012

Season	Station	n	Range (MPN/100mL)	Geomean ² (MPN/100mL)	n samples > 43	Meets WQ Standard?
Wet	1	3	2-2	2.0	0	YES
Wet	2	2	2-4	2.8	0	YES
Wet	5	2	2-4	2.8	0	YES
Wet	7	3	2-2	2.0	0	YES
Wet	8	2	2-2	2.0	0	YES
Wet	9	2	2-2	2.0	0	YES
Wet	10	2	2-2	2.0	0	YES
Wet	12	2	2-2	2.0	0	YES
Wet	14	2	2-12	4.9	0	YES
Season	Station	n	Range (MPN/100mL)	Geomean ² (MPN/100mL)	n samples > 43	Meets WQ Standard?
Dry	1	4	2-50	8.1	1	NO
Dry	2	5	2-22	3.2	0	YES
Dry	5	4	2-2	2.0	0	YES
Dry	7	4	2-7	2.7	0	YES
Dry	8	4	2-9	2.9	0	YES
Dry	9	5	2-14	3.4	0	YES
Dry	10	4	2-8	2.8	0	YES
Dry	12	5	2-11	2.8	0	YES
Dry	14	4	2-2	2.0	0	YES

² Geometric mean calculated including substitutions of ½ of detection limit for non-detects: "1"
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