Water Quality Report

Water Year October 2019 – September 2020

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Jefferson County Clean Water District

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Introduction

This reports summarizes the surface water quality of the past water year for the Jefferson County Clean Water District. A "water year" runs from October 1 of the previous year through September 30 of the current year. The emphasis of monitoring is on fecal indicator bacteria, such as *E. coli* and *Enterococcus*, in streams, rivers and pipes that drain to Jefferson County marine shorelines. Polluted water draining to marine waters can impact shellfish beds and water recreation. Fecal indicator bacteria are measures of water quality that indicate whether pathogens that can make people sick are likely to be in water. Since shellfish are filter feeders, they can become contaminated when pollutants that are in the water and can concentrate pathogens in their tissues. Water recreation, as well as commercial and recreational shellfish harvest are important in Jefferson County, and are protected when water is kept clean.

Weather History

Total accumulated precipitation at Chimacum was 19.56 inches, which is below the 1981-2010 climate normal of 28.78 inches. Quilcene rainfall was similarly below average.

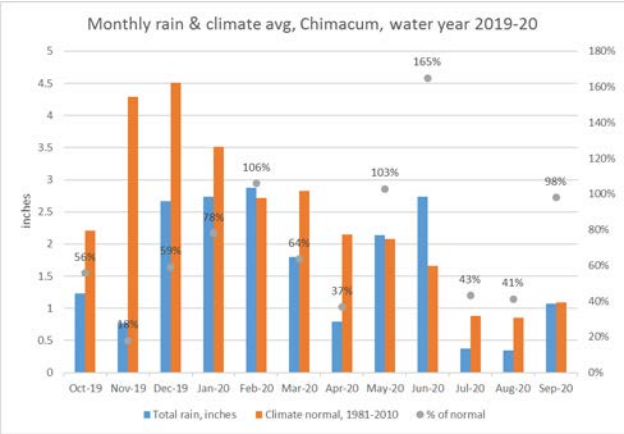

Figure 1, Chimacum rainfall

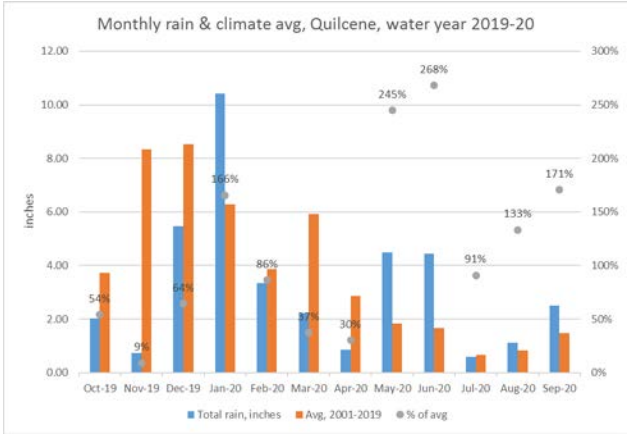

Figure 2, Quilcene rainfall

Stream Flow

Stream flow was below average for much of the year. Minor flood events occurred, but JCPH is not aware of any major events with flood damage to property in eastern Jefferson County during the last water year. Winter flooding of cattle pastures in Center Valley in the Chimacum Creek watershed was

evident from Center Road. On September 23, 2020, 0.48 inches of rainfall in Chimacum and 0.83 inches in Quilcene resulted in high stream flows, turbid water and bacteria high hits at monitoring stations.

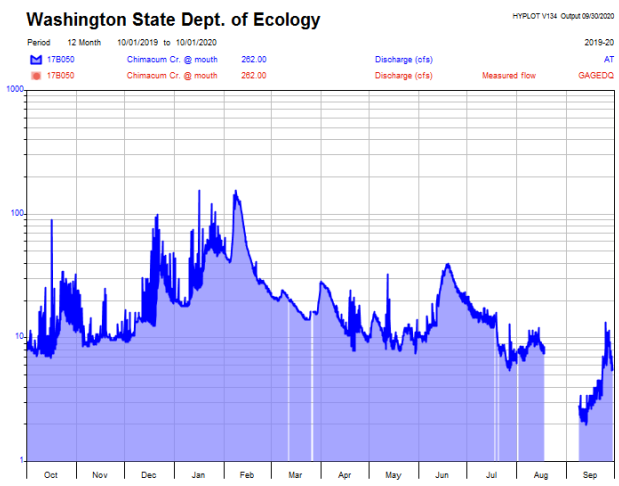

Figure 3, Chimacum Creek flow

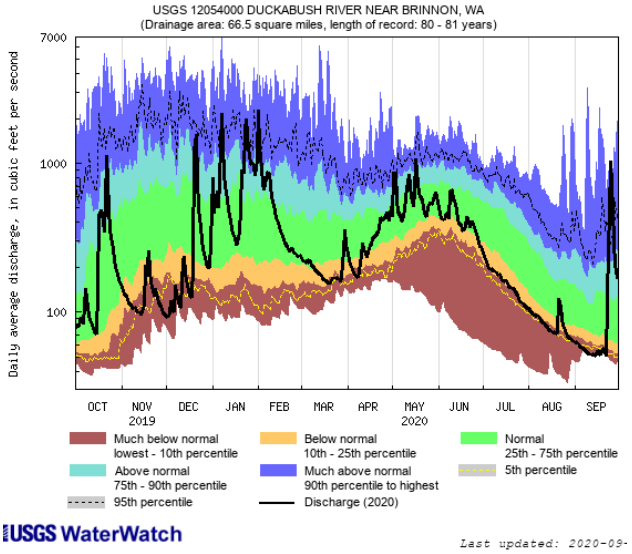

Figure 4, Duckabush River flow

Marine Waters

Regular monitoring of fecal coliform bacteria in marine waters by DOH showed that station 196 in Discovery Bay had improved and was no longer at Threatened status (Swanson, 2019). Hood Canal #3 stations 125 and 136 also improved, but not consistently enough to allow for a restoration of the Duckabush growing area to Approved status. No other shellfish growing areas in the Clean Water District were threatened or downgraded in 2019.

DOH shellfish growing area status and monitoring data is available at the http://www.doh.wa.gov/commercialshellfishmap. Annual Shellfish Area Growing Reports and Early Warning Reports are available at http://www.doh.wa.gov/CommunityandEnvironment/Shellfish/GrowingAreas/AnnualReports.

Oak Bay County Park experienced high bacteria counts in marine water as sampled during the BEACH program in summer 2020. An exceedance of 24,000 *Enterococci* on June 10, 2020, was associated with 13 to 18 mph winds during high tide. During wind events like these, the water becomes turbid and beach wrack (primarily macroalgae) is suspended in the water column. A resample on the 12th of June was 70 *Enterococci*, which was still elevated, but the average remained below the BEACH threshold of 104 *Enterococci* No BEACH warnings were posted. The remainder of the month had low levels of bacteria. Beach closures and data can be found at https://ecology.wa.gov/Water-Shorelines/Water-quality/Saltwater/BEACH-program.

Harmful algae blooms (HABs) are an annual occurrence in Washington marine waters and they can cause illness in people who consume contaminated shellfish. Dinoflagellate blooms were widespread in Jefferson County marine waters in summer 2020, and *Alexandrium* (which can cause Paralytic Shellfish Poisoning) caused biotoxin closures of many local shellfish beds. These closures included Discovery Bay, the Strait of Juan de Fuca, Admiralty Inlet, Port Townsend Bay, Kilisut Harbor, Mystery Bay, Oak Bay, Mats Mats Bay, Port Ludlow, Northern Hood Canal, Squamish Harbor, Dabob Bay and Quilcene Bay. Current closures are shown on the Shellfish Safety Map at www.doh.wa.gov/ShellfishSafety.htm.

Stream Monitoring

Stream stations are primarily located near the mouths of streams discharging to shellfish beds, and are sampled monthly for bacteria. Two projects had stream monitoring for the duration of the 2019-20 water year: Oak Bay – Mats Mats PIC and the Northern Hood Canal PIC projects. Additional streams were monitored at least half of the year in the Discovery Bay and Hood Canal watersheds (Table 1, Stream monitoring stations). Maps for the Oak Bay-Mats Mats and Northern Hood Canal projects are shown in Figure 5.

Table 1, Stream monitoring stations

Location Name	Site ID	Drains to	Project
Salmon Creek	SAL/0.15	Discovery Bay	Strait Priority Areas
Snow Creek	SNO/0.2	Discovery Bay	Strait Priority Areas
Little Goose Creek	LGO/0.02	Oak Bay	Oak Bay – Mats Mats
Oak Bay creek "A"	OBA/0.1	Oak Bay	Oak Bay – Mats Mats
Piddling Creek	PID/0.1	Mats Mats Bay	Oak Bay – Mats Mats
Mats Mats creek "B"	MMB/0.05	Mats Mats Bay	Northern Hood Canal
Cooper Creek	COO/0.04	Paradise Bay (Hood Canal)	Northern Hood Canal
Bywater Bay creek "A"	BBA/0.3	Bywater Bay (Hood Canal)	Northern Hood Canal
Hubbard Creek	HUB/0.0	Squamish Harbor (Hood Canal)	Northern Hood Canal
Shine Creek	SHI/0.2	Squamish Harbor (Hood Canal)	Northern Hood Canal
Thorndyke Creek	THO/1.0	Hood Canal	Northern Hood Canal
Dosewallips River	DOS/0.1	Hood Canal	Central Hood Canal
Pierce Creek	PIE/0.3	Hood Canal	Central Hood Canal
Duckabush River	DUC/0.0	Hood Canal	Central Hood Canal

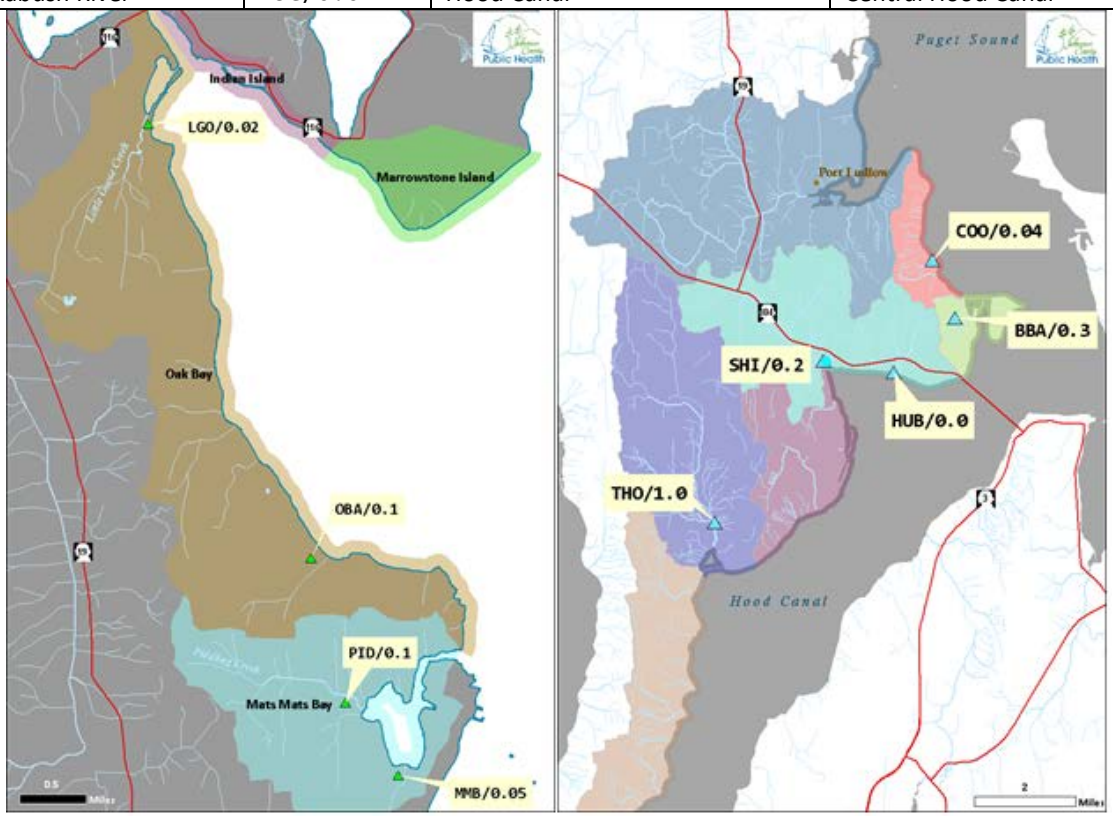

Figure 5, Stream station maps A) Oak Bay – Mats Mats, B) Northern Hood Canal

Stream Bacteria Assessment

Stream data are analyzed by wet season (October through March) and dry season (April through September). Sites are assessed according to Washington State Water Quality Standards (WAC Chapter 173-201A). The seasonal GMV should be less than 100 MPN/100 mL (part 1 of the standard) and no single sample should be greater than the Statistical Threshold Value (STV) of 320 (part 2 of the standard).

All results in this dataset are for *E. coli* bacteria, expressed as most probable number (MPN) per 100 milliliters. Values have been rounded to the nearest whole number. STV is shown as a count of the number of samples greater than the STV. Blank months indicate when JCPH staff did not take a sample.

Table 2, Stream bacteria pass/fail

Stream	Oct	Nov	Dec	Jan	Feb	Mar	GMV	# >STV	Apr	May	Jun	Jul	Aug	Sep	GMV	# >STV
Salmon					1	1	1	0	15	27	36	225	15	39	35	0
Snow					8	2	4	0	2	56	51	82	82	113	40	0
Little Goose	105	9	62	137	12	9	31	0	1	23	32	326	111	2,420	63	2
Oak Bay A	19	1	1	7	40	9	6	0	4	411	8	13	19	649	36	2
Piddling	30	2	1	9	4	9	5	0	1	21	14	71	145	28	21	0
Mats Mats B	5	1	1	5	10	9	4	0	24	127	142	192	98	38	82	0
Cooper	816	82	17	8	15	12	34	1	2	38	179	61	365	68	52	1
Bywater Bay A	111	5	1	12	3	20	8	0	1	20	1,414	53	30	79	39	1
Hubbard	117	11	17	8	3	5	12	0	5	16	16	17	99	210	28	0
Shine	1,414	16	6	6	2	4	14	1	60	64	66	22	55	108	57	0
Thorndyke	16	1	7	8	9	1	5	0	1	70	47	62	66	19	25	0
Dosewallips	42			9	1	1	4	0	2	3	41	6	20	50	11	0
Pierce	66			9	4	10	12	0	1	20	186	1,733	123	99	64	1
Duckabush	34			10	2	2	6	0	1	12	108	14	14	12	12	0

In Oak Bay – Mats Mats, Little Goose Creek and Oak Bay creek A failed part 2 of the water quality standard in the dry season. Little Goose Creek had been thought to be improving compared with bacteria levels observed in water year 2018-19. But halfway through the dry season of 2020, levels climbed, peaking at over 2,000 *E. coli*. The highest seasonal GMV was 82 at Mats Mats creek "B" in dry season.

JCPH monitors five streams in the Northern Hood Canal PIC project. Cooper Creek failed part 2 in the wet season and dry season. Bywater Bay creek A failed part 2 in the dry season. Shine Creek failed part 2 in the wet season with an October result greater than 1,000 *E. coli*. The highest seasonal geomean in the project was 57 at Shine Creek in the dry season.

Shoreline Monitoring

Marine shorelines in the Clean Water District are monitored by staff walking the shoreline and sampling all freshwater (and some brackish water) rivers, streams, springs, pipes, culverts and lagoon outlets that discharge into marine waters. The goal is to screen for the highest sources of bacterial pollution and identify hot spots needing further investigation. There are 200 miles of shoreline in the District, and not all shorelines are adjacent to shellfish beds or public access sites, so the shoreline has been prioritized by potential for pollution impacts (proximity to shellfish beds or public beaches).

Staff monitored all high priority shorelines in the Oak Bay – Mats Mats project. In addition, staff monitored medium priority shoreline in the entrance to Mats Mats Bay and around Olele Point to the north in wet and dry seasons (see Table 4 and Figure 8).

Table 3, Oak Bay – Mats Mats Shoreline Mileage

Neighborhood	Abbreviation	Wet Season Completed	Dry Season Completed
Oak Bay	OB	7.7	7.7
Indian Island	II	2.6	2.6
Marrowstone Island	MI	2.0	2.0
Mats Mats	MM	3.3	3.3
Total		*15.4*	*15.4*

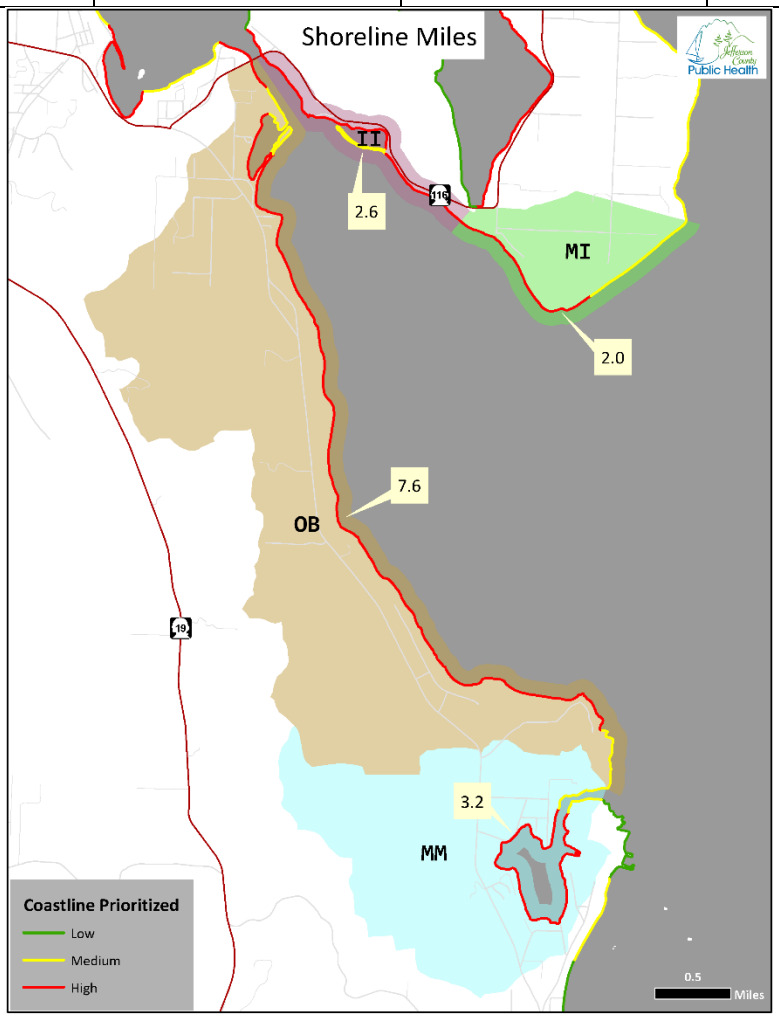

Figure 6, Oak Bay – Mats Mats Shoreline Map

The shoreline in Northern Hood Canal was divided into two sections, North and South. Staff completed monitoring in the southern section in water year 2020 (Table 5 and Figure 9).

Table 4, Northern Hood Canal Shoreline Mileage

Neighborhood	Abbreviation	Wet Season Completed	Dry Season Completed
Thorndyke	TH	2.88	2.88
Toandos East	TE	8.78	8.78
Coyle	CO	5.85	5.85
Total		*17.51*	*17.51*

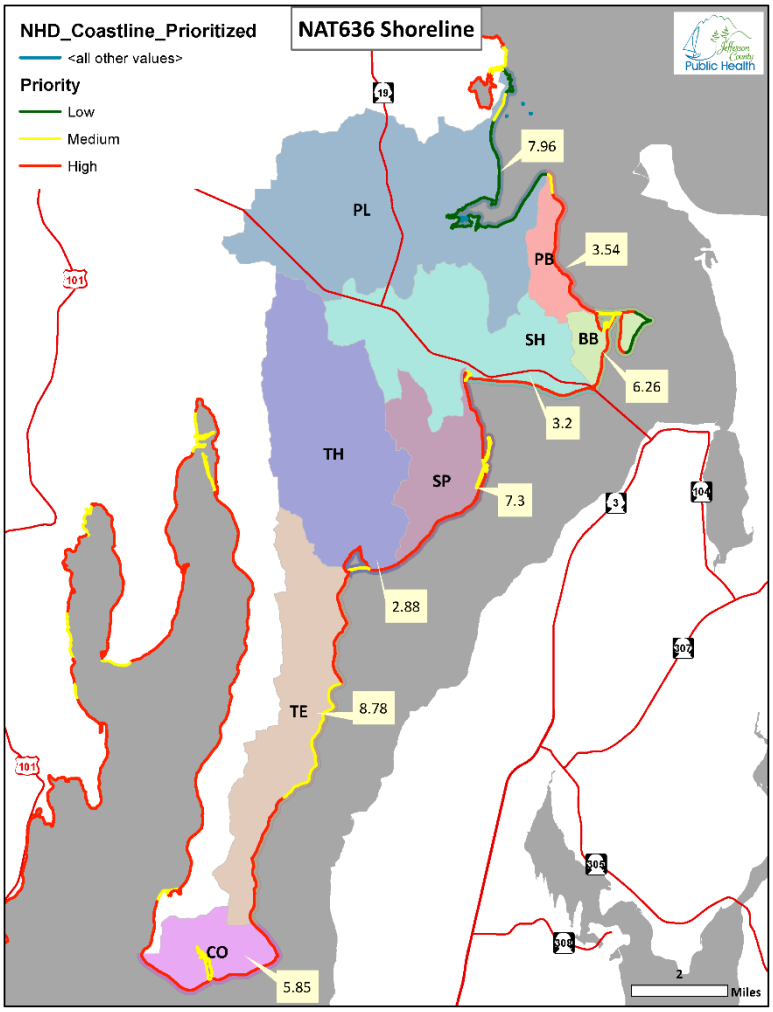

Figure 7, Northern Hood Canal Shoreline Map

Staff monitored high priority shorelines once in the wet season and once in the dry season. Any results greater than the resample threshold (*E. coli* greater than 100 or *Enterococcus* greater than 30) are called high hits. High hit sites are resampled twice within 30 days and the GMV is calculated from all of the results from that site. Sites with GMVs higher than the STV (320 *E. coli* or 110 *Enterococcus*) are designated as hot spots (Table 3, Hot Spot Prioritization Criteria). Sites with single samples ten times greater than the resampling threshold may also be designated hot spots even if the geomean is lower than the STV, if conditions warrant. The hot spots with the highest GMVs are investigated first, with lower priority sites investigated as time and budget allow. The amount of flow at a site is also taken into consideration; sites with limited flow contribute much less bacterial loading to the marine environment and are less of a concern compared with streams with a greater flow volume.

Table 5, Hot Spot Prioritization Criteria

Parameter	High Priority	Medium Priority	No Problem
E. coli	>320 GMV, or single sample >1,000	100 to 320 GMV	<100 GMV, or site dry
Enterococcus	>110 GMV, or single sample >300	30 to 110 GMV	<30 GMV

While regular stream monitoring stations are assessed as to whether or not they meet state water quality standards, shoreline stations are not. However, by definition, hot spots fail the bacteria standard, and some high hit sites do as well. Stream monitoring can also identify hot spot level pollution, and the same prioritization process is used for high hits found during stream monitoring.

Bracket samples may be taken upstream of a hot spot to help narrow and define the area that is contributing to the pollution. This is not possible at sites where the drainage is small and there is no access point upstream. Larger streams may have more than one bracket sampling location if there are several tributaries.

Hot Spots

Little Goose Creek

Little Goose Creek continues to be a bacteria hot spot and has been monitored under the Oak Bay – Mats Mats project (Figure 8, Little Goose Creek map). A septic repair next to the creek was completed in 2019 and bacteria levels dropped in spring 2020. JCPH continued to sample the mouth of the creek to confirm if bacteria levels remained low through dry season 2020. The August GMV at LGO/0.2 was 143 *E. coli*. In September, however, bacteria levels climbed to over 2,000 GMV (Table 6, Little Goose Creek geomeans). The September results may represent a new pollution source, as upstream station OB101 had a high hit. On the other hand, heavy rain on September 23 resulted in high stream flows and turbid water, and sites county-wide experienced high bacteria levels that day.

Table 6, Little Goose Creek geomeans

Date	LGO/0.2	OB101
8/4/2020	185	
8/14/2020	111	
8/25/2020		108
GMV	**143**	
9/8/2020	2,420	
9/23/2020	>2,420	>2,420
9/24/2020	1,733	
GMV	**2,165**	

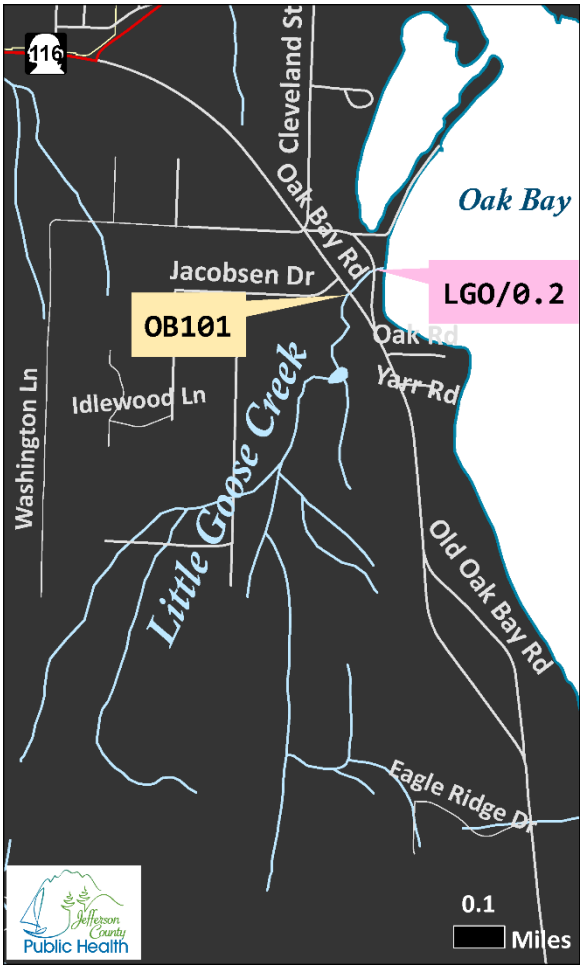

Figure 8, Little Goose Creek map

Autosampler

An autosampler was deployed at LGO/0.2 to take water samples every two hours through a 24-hour period (Figure 8, Little Goose Creek autosampler results). A pattern of high bacteria in the middle of the night was present in both the wet season and the dry season. JCPH believes this is an indication that human wastewater is discharging into the creek, perhaps from a septic system unable to handle the hydraulic load or from a direct discharge. This also

indicates that regular daytime sampling is likely undercounting the true bacterial loading to Oak Bay.

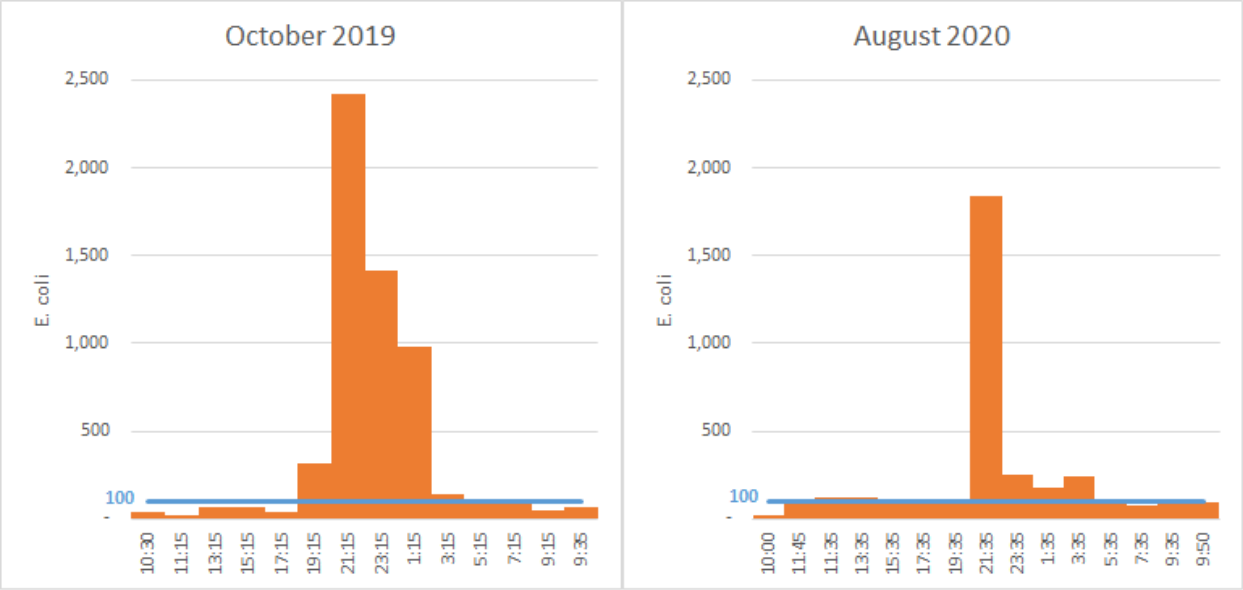

Figure 9, Little Goose Creek autosampler results

Oak Bay 053

Previously identified hot spot OB053, in the Oak Bay – Mats Mats project near North Bay Way, continued to have elevated *E. coli* this year, but below 320 when averaged over the entire dry season. Although the drainage is small, the water courses have all been greatly modified with culverts and ditches and it is difficult to determine the sources of flow. Staff plan to bracket sample at least six different upstream locations. An otter den is nearby. There is at least one septic violation that is pending correction, but no evidence of surfacing sewage to date.

Table 7, Oak Bay 053 geomean

Date	OB053
3/10/2020	134
5/26/2020	160
7/21/2020	109
7/22/2020	203
9/23/2020	906
GMV	**212**

Mats Mats 121

Previously identified hot spot MM121 exceeded 320 *E. coli* in early August, but then went dry. This site is a flexpipe draining to Mats Mats Bay. A planned dye test was postponed due to COVID-19. One septic system correction has been completed.

Table 8, Mats Mats 112 E. coli

Date	MM121
8/4/2020	404
8/19/2020	Dry
9/3/2020	Dry

Mats Mats 132

Previously identified hot spot MM132 at the north shore of the outlet of Mats Mats Bay, was low in bacteria in winter, but then returned to high levels in dry season. Bracket sampling has been inconclusive so far.

Table 9, Mats Mats 132 geomean

Date	MM132
1/8/2020	<10
2/27/2020	10
8/6/2020	613
8/19/2020	2,247
9/3/2020	201
GMV	**652**

Paradise Bay 042

In the Northern Hood Canal project area, previously identified hot spot PB042 continued to have elevated *E. coli* at the most recent dry season sampling, although the May geomean was less than 320. This is a small drainage into Paradise Bay north of the boat ramp that originates in forest land.

Table 10, Paradise Bay 042 geomean

Date	PB042
5/6/2020	63
5/21/2020	839
5/26/2020	404
GMV	**277**

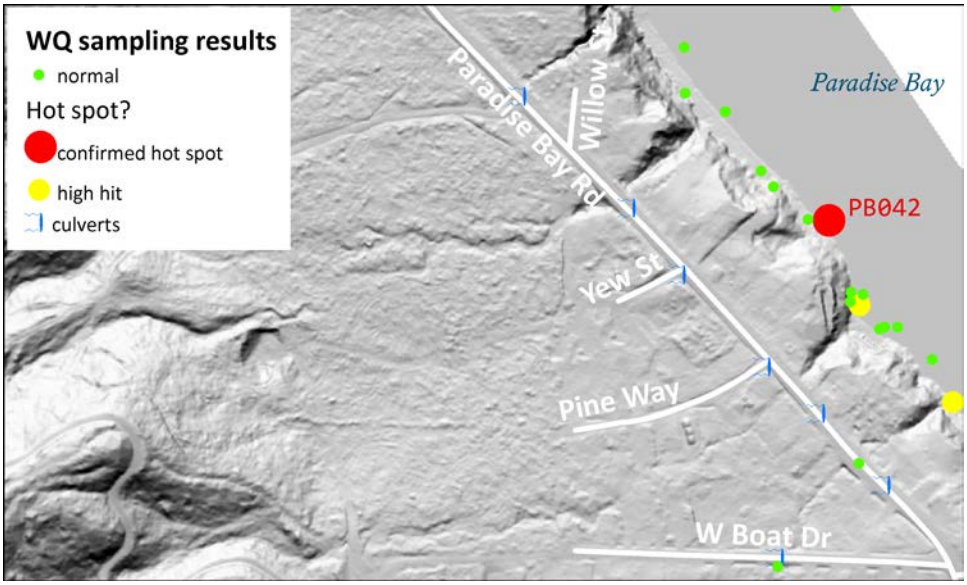

Figure 10, Paradise Bay 042 map

Coyle 002

Coyle 002, a recently confirmed hot spot, is a small stream draining to Hood Canal to the east of the Coyle community.

Table 11, Coyle 002 geomean

Date	C0002
7/21/2020	318
8/6/2020	3,873
8/18/2020	63
GMV	**427**

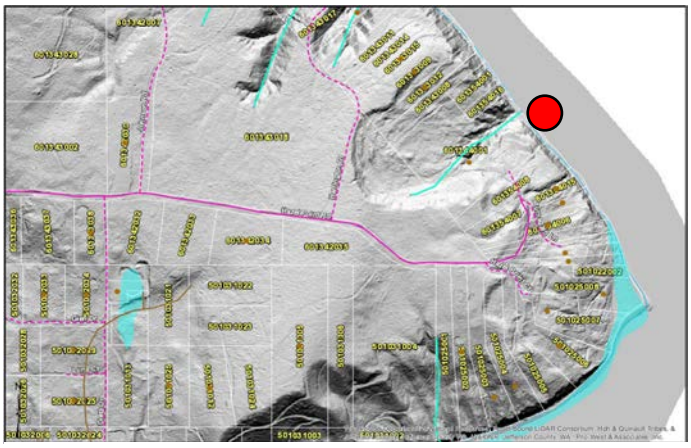

Figure 11, Coyle 002 map

Pierce Creek

Pierce Creek flows into the Duckabush River estuary north of the river, and then to Hood Canal (Figure 12, Pierce Creek map). July sampling at PIE/0.3 on Shorewood Road confirmed it to be a hot spot (Table 11, Pierce Creek geomeans). Upstream bracket sampling at PIE/0.5 indicates that the problem is likely to be at the lower part of the creek. Sampling on September 23 was associated with a heavy rain event that caused high water and turbidity in many local streams.

Table 12, Pierce Creek geomeans

Date	PIE/0.3	PIE/0.4	PIE/0.45	PIE/0.5
7/14/2020	1,733			
7/22/2020	213			
7/28/2020	185			121
GMV	**409**			
8/11/2020	123			
8/19/2020	355			31
GMV	**209**			
9/1/2020	110			
9/9/2020	99			
9/9/2020	86			
9/23/2020	1,300	816	613	275
GMV	**187**			

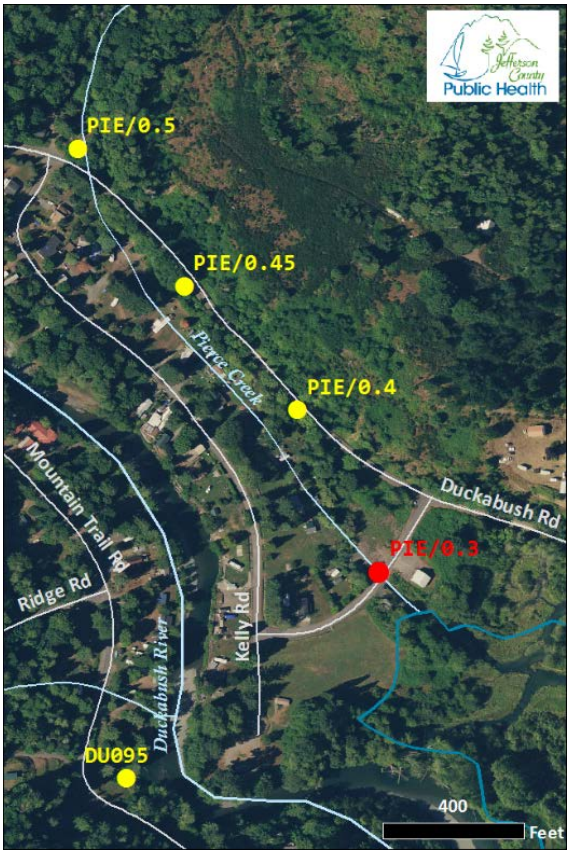

Figure 12, Pierce Creek map

Hot spot investigations

Hot spot investigations at each of these sites are ongoing. Investigations include land use in the area, as well as research of septic permit and maintenance records. No agricultural activities, livestock or pet waste issues have been found at any of these sites to date. Outreach to each area is planned. Staff have mailed fact sheets to residents at Little Goose Creek and Paradise Bay 042, and an update is planned for both areas later this year. Surveys of individual properties and dye tests were limited by COVID-19 precautions starting in March 2020. JCPH has limited in-person site visits to complaint investigations of surfacing sewage, and septic surveys in hot spots with prior notification. Residents are contacted prior to arrival where contact information can be found.