

# **Addendum to the 2009 Sanitary Survey Report of Portage Bay**

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WASHINGTON STATE DEPARTMENT OF HEALTH  
OFFICE OF ENVIRONMENTAL HEALTH AND SAFETY

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## **Summary**

This addendum opens the April through June closed period to commercial shellfish harvest in the Conditionally Approved portion of the Portage Bay Growing Area (Figure 1, page 5). The period from October through December remains closed to commercial harvest due to elevated fecal coliform (FC) levels.

The closure period change is in response to an evaluation of regulatory and special samples collected by the Department of Health (the Department) and Lummi Nation's Natural Resources Department in fall 2017 and spring 2018. The evaluation showed improved water quality in the growing area during the April through June period, but no improvement from October through December. Sampling by Whatcom County Public Works and Lummi Natural Resources also indicates a general improving water quality trend in the lower Nooksack River system, the largest source of freshwater to the growing area. Improved water quality is attributable to watershed cleanup activities by multiple partners.

## **Background**

The Nooksack River has the largest water quality impact to the Portage Bay Growing Area. During periods of heavy or sustained rainfall or substantial snowmelt, the Nooksack River flow rate can increase substantially and rapidly. The 2000 Nooksack River Fecal Coliform Total Maximum Daily Load study found that when fecal coliform pollution is present in the river, and the river is flowing at a significant rate (at least 3,000 to 4,000 cfs), and the wind direction is from the east, southeast, or south, with a velocity sufficient to drive the river plume against the shore of the Lummi Peninsula, stations 271, 52, 51, and 50 have lower salinities and higher fecal coliform concentrations. When the wind is from the southwest or west, the river plume will be blown away from the shore, yielding higher salinities and lower fecal coliform concentrations from these sampling stations (Joy, 2000). Contrary to the 2000 TMDL study, wind direction did not appear to be a good indicator of surface salinities during the 2018-19 special sampling events.

The 2015 and 2016 addendums to the 2009 Portage Bay Sanitary Survey Report identified marine stations in the Conditionally Approved portion of Portage Bay with FC levels that exceeded National Shellfish Sanitation Program (NSSP) water quality standards for an Approved classification. Most of the elevated FC samples were collected during late spring and late fall during times of low salinity in the bay. The 2015 addendum closed a portion of Portage Bay to commercial shellfish harvest from April 1 through June 30 and from October 1 through December 31 each year. The 2016 addendum expanded this area for a current total of approximately 800 Conditionally Approved acres.

Although the most recent 30 regulatory samples in 2015 and 2016 showed that Portage Bay stations were not meeting NSSP criteria for an Approved classification, new regulatory data being added to the dataset at that time showed signs of improving water quality, specifically during the springtime (Figure 2, page 6). This was likely the result of pollution identification and correction actions in the Nooksack River watershed. However, most of the regulatory samples in 2015-16 were collected during times of higher salinity (>10 parts per thousand) so it was not known if water quality was also improving during spring low salinity events. As a result, a special study was designed and implemented by the Department and Lummi Natural Resources to specifically target low salinity conditions during fall 2017 and spring 2018.

## **Pollution Identification and Correction (PIC)**

Specific PIC program activities contributing to improved spring water quality trends include:

- Multi-agency ambient and source identification sampling
- Data analysis and online mapping capabilities
- Educational opportunities personalized for specific-interest farmers (e.g. horse, beef cow, sheep, goats, etc.) incorporating peer and guest speakers and informed by social marketing principles
- Technical assistance to agriculture property owners through an expanded staff of farm planners
- Marine Recovery Area designation and related enforcement of septic system operation & maintenance requirements
- Educational opportunities for landowners with septic systems in the Nooksack watershed informed by water quality and social marketing principles that encourage routine evaluations and maintenance
- Financial incentives to rural landowners for best management practice implementation (septic and small farm rebates, small farm cost share)
- Engagement since 2015 with Watershed Improvement Districts (WIDs) and Ag Water Board of Whatcom County
- An enforcement system of both state and local government using regulatory technical assistance and formal enforcement measures for violations of water quality, critical areas, and public health ordinances and laws
- Community outreach materials and interactive displays at local community events to engage landowners in diverse solutions for reducing bacteria sources (e.g. farm animals, septic systems, dogs, urban wildlife)

## **Water Quality**

Table 1, page 7 summarizes fecal coliform results from the most recent 30 marine water samples collected from stations in the Conditionally Approved portion of Portage Bay. Estimated 90<sup>th</sup> percentiles from the 2016 addendum are also listed for comparison. All stations currently meet NSSP water quality standards for an Approved classification. All but one station failed to meet standards in June 2016.

Table 2, page 8 summarizes the Department's regulatory spring and fall closed periods and open period sampling results from the same date range as the last 30 samples. Spring closed period geometric means were slightly lower than geometric means for the most recent 30-sample dataset and were similar to open period geometric means. Fall closed period geometric means were elevated when compared to the last 30 samples and open period data.

The 2018 spring closed period regulatory and special samples showed mostly low to moderate FC levels at Conditionally Approved stations during times of low salinity and elevated Nooksack River flows, with one exception addressed below (six of the nine 2018 spring sampling events occurred when salinity at Conditionally Approved stations averaged less than 10 parts per thousand (ppt) and Nooksack River flows were greater than 3,000 cubic feet per second). See Table 4, page 9 and Figure 2. The 2017 fall regulatory and special FC data continued to show a pattern of elevated FC, especially during times of low to medium salinity in Portage Bay and elevated Nooksack River flows (Table 5, page 10).

Although several of the 6/19/2018 special samples contained elevated FC, the Department does not consider this event as part of a pattern of poor water quality, but rather a normal part of the variable FC dataset that shows overall improving water quality during the springtime. Open period data from the same Conditionally Approved stations also occasionally include elevated FC values, mostly during summer months.

Geometric means for all Conditionally Approved station regulatory and special FC data in Table 4 ranged from 5.1 FC/100mL at Station 49 to 9.2 FC/100mL at Station 52. When 6/19/18 results were excluded, geometric means were comparable to the last 30-sample open period geometric means, with the exception of Station 52, which had a geometric mean of 8.8 for spring 2018 data compared to 5.2 FC/100mL for the most recent 30 open period samples (Table 3, page 8). The highest FC count for Station 52 during all 2018 spring sampling was 49 FC/100mL. Fall period geometric means continued to be elevated when compared to the last 30-sample dataset, even when the highest FC sampling event (10/19/2017) was omitted from the dataset.

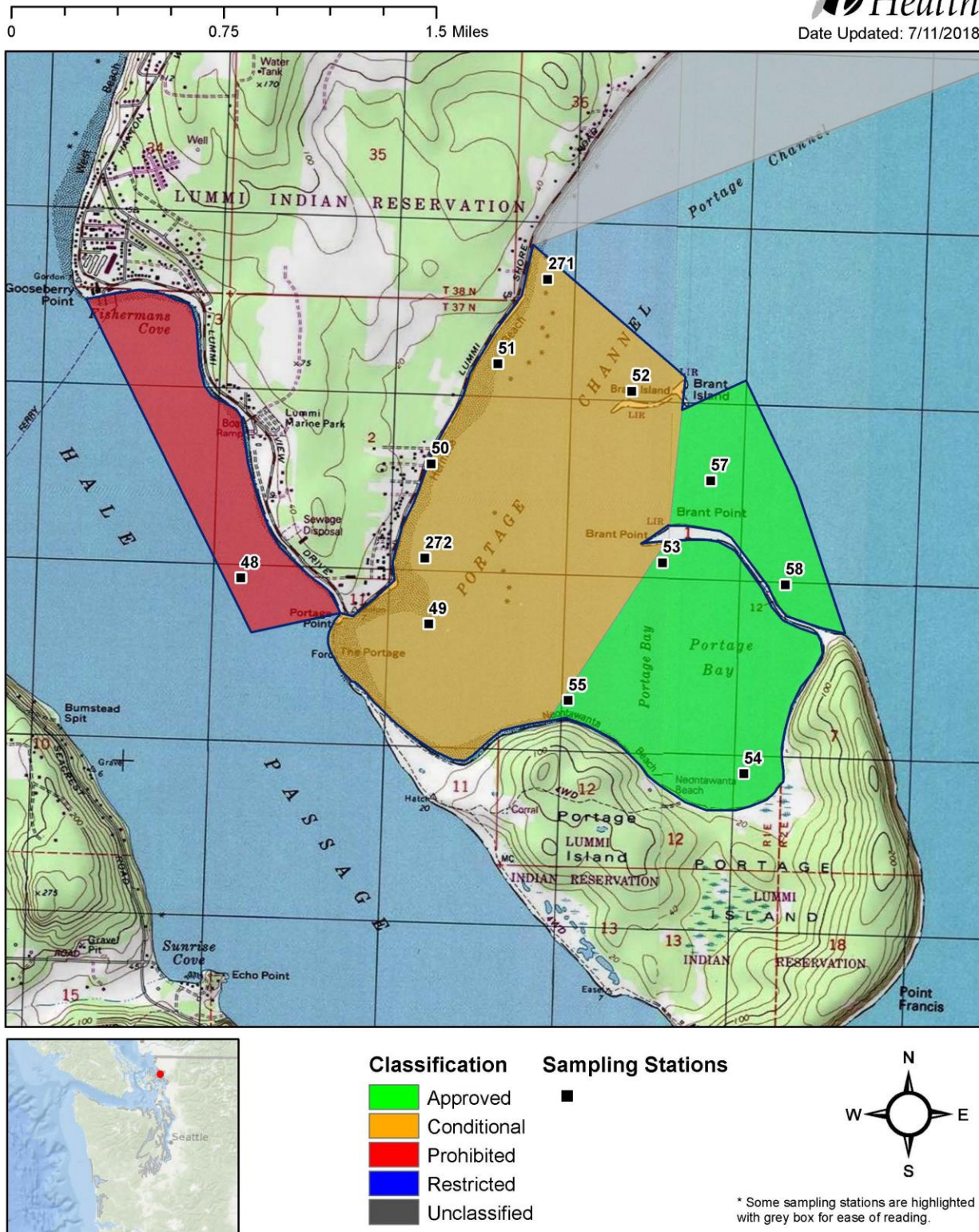
Two fall period sampling events occurred when salinities averaged under 10 ppt and two events occurred when average salinities were 14 and 17.1 ppt (Table 5). All four events occurred during elevated Nooksack River flows. These results, several of which were as high as 350 FC/100mL, indicate that FC levels continue to be elevated beyond NSSP standards on a regular basis in the Conditionally Approved portion of the growing area during the fall closed period.

## **Conclusions**

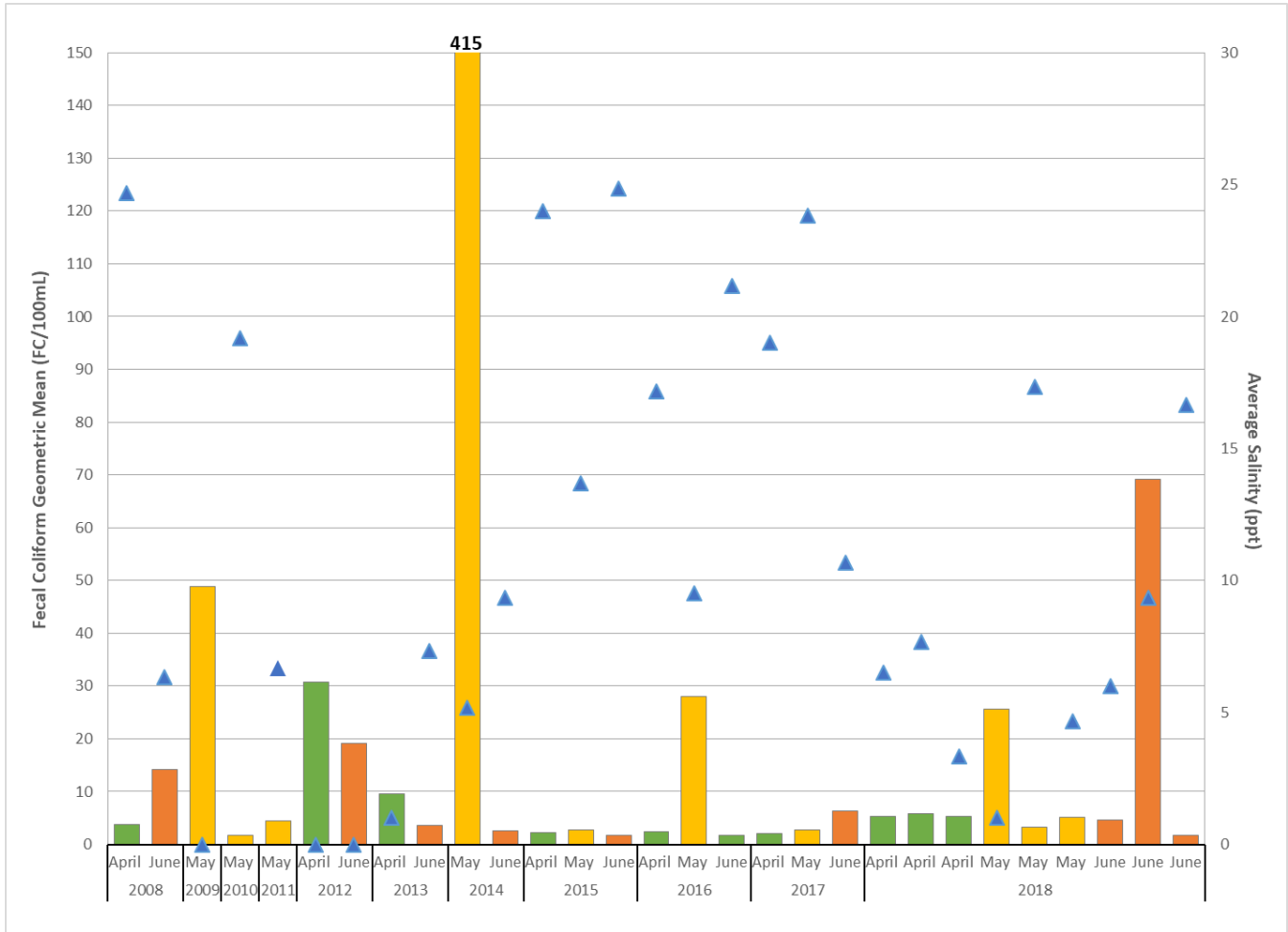
Based on improved marine water quality from April through June at stations 49 - 52 and 271 - 272 and multi-agency cleanup work in the Nooksack River watershed, all of the Conditionally Approved portion of the Portage Bay Growing Area is opened to commercial shellfish harvest from April 1 through June 30 each year. The area remains closed to harvest from October 1 through December 31 each year due to continued poor water quality during these months. Figure 1, page 5 displays classification boundaries for the growing area.

## **Recommendations**

- The Department should continue to evaluate data and conditions during the spring period.



**Figure 1.** Current classifications and marine water quality monitoring sites in the Portage Bay Growing Area.



**Figure 2.** Portage Bay averaged Conditionally Approved station regulatory FC data (April through June) from 2008 – 2018. Lummi Natural Resources special sampling FC data is also included in 2018 data. Bars represent FC and triangles represent averaged salinity.

**Table 1.** Summary statistics for the most recent 30 fecal coliform results from Conditionally Approved stations in the Portage Bay Growing Area. 2016 addendum results are also shown.

## Summary of Marine Water Data (SRS) Growing Area: Portage Bay

Sampling Event Type: Regulatory

Tides Included: ALL

Maximum Number of Samples: 30

Station	Classification	2019 Date Range	2019 data Range (FC/100 mL)	2019 GeoMean (FC/100 mL)	2019 E90th (FC/100 mL)	<b>June 2016</b> E90th (FC/100 mL)	Meets Standard (2019)
49	Conditionally Approved	6/16/2016 - 12/19/2018	1.7 - 49.0	4.3	18.7	46.4	Y
50	Conditionally Approved	6/16/2016 - 12/19/2018	1.7 - 110.0	6.7	36.7	61.5	Y
51	Conditionally Approved	6/16/2016 - 12/19/2018	1.7 - 49.0	4.3	16.1	51.9	Y
52	Conditionally Approved	6/16/2016 - 12/19/2018	1.7 - 130.0	5.6	30.7	54.0	Y
271	Conditionally Approved	6/16/2016 - 12/19/2018	1.7 - 79.0	4.4	21.6	34.3	Y
272	Conditionally Approved	6/16/2016 - 12/19/2018	1.7 - 130.0	4.8	26.6	53.7	Y

The above table shows bacteriological results in relation to NSSP criteria. NSSP standards for approved shellfish growing waters are a fecal coliform geometric mean not greater than 14 organisms/100 mL and an estimated 90th percentile not greater than 43 organisms/100mL.

**Table 2.** Portage Bay Conditionally Approved station regulatory closed and open period data from the same date range as the last 30 samples.

Station	Classification	Number of samples	Date Range	Range (FC/100 mL)	GeoMean (FC/100mL)
<b>Closed period (April through June)</b>					
49	Conditionally Approved	7	6/16/2016 - 6/11/2018	1.7 - 13.0	3.3
50	Conditionally Approved	7	6/16/2016 - 6/11/2018	1.7 - 33.0	5.0
51	Conditionally Approved	7	6/16/2016 - 6/11/2018	2.0 - 13.0	3.7
52	Conditionally Approved	7	6/16/2016 - 6/11/2018	1.7 - 23.0	4.7
271	Conditionally Approved	7	6/16/2016 - 6/11/2018	1.7 - 7.8	2.9
272	Conditionally Approved	7	6/16/2016 - 6/11/2018	1.7 - 7.8	2.8
<b>Closed period (October through December)</b>					
49	Conditionally Approved	8	10/6/2016 - 12/19/2018	1.7 - 49.0	7.6
50	Conditionally Approved	8	10/6/2016 - 12/19/2018	1.7 - 110.0	15.4
51	Conditionally Approved	8	10/6/2016 - 12/19/2018	2.0 - 49.0	9.0
52	Conditionally Approved	8	10/6/2016 - 12/19/2018	1.7 - 130.0	12.5
271	Conditionally Approved	8	10/6/2016 - 12/19/2018	1.7 - 79.0	11.6
272	Conditionally Approved	8	10/6/2016 - 12/19/2018	1.7 - 130.0	9.6
<b>Open Period (January through March and July through September)</b>					
49	Conditionally Approved	15	7/28/2016 - 9/19/2018	1.7 - 49.0	3.6
50	Conditionally Approved	15	7/28/2016 - 9/19/2018	1.7 - 49.0	4.9
51	Conditionally Approved	15	7/28/2016 - 9/19/2018	1.7 - 13.0	3.1
52	Conditionally Approved	15	7/28/2016 - 9/19/2018	1.7 - 49.0	4.0
271	Conditionally Approved	15	7/28/2016 - 9/19/2018	1.7 - 79.0	3.2
272	Conditionally Approved	15	7/28/2016 - 9/19/2018	1.7 - 79.0	4.3

**Table 3.** Portage Bay geometric means from the most recent 30 open period samples compared to geometric means from 2018 regulatory and special sampling (6/19/18 data excluded).

Station Number	Classification	Date Range for Open Period Data	GeoMean (FC/100 mL) Open Period n=30	Date Range for Spring 2018 Data	GeoMean (FC/100 mL) Spring 2018 n=9
49	Conditionally Approved	8/14/13 - 9/19/18	4.5	4/4/18 - 6/27/18	3.1
50	Conditionally Approved	8/14/13 - 9/19/18	5.4	4/4/18 - 6/27/18	6.5
51	Conditionally Approved	8/14/13 - 9/19/18	3.6	4/4/18 - 6/27/18	4.1
52	Conditionally Approved	8/14/13 - 9/19/18	5.2	4/4/18 - 6/27/18	8.8
271	Conditionally Approved	8/14/13 - 9/19/18	4.2	4/4/18 - 6/27/18	3.9
272	Conditionally Approved	8/14/13 - 9/19/18	4.7	4/4/18 - 6/27/18	4.9



**Table 4.** Marine fecal coliform results from WA Department of Health regulatory and Lummi Natural Resources regulatory and special sampling; April through June 2018. Nooksack River samples were collected one day prior to marine sampling except where denoted by an asterisk (\*). Asterisks denote day-of sampling.

Date	4/4/2018	4/18/2018	4/23/2018	5/8/2018	5/16/2018	5/23/2018	6/11/2018	6/19/2018	6/27/2018	
Sampling type	Special	Special	Regulatory	Special	Special	Regulatory	Regulatory	Special	Special	
Tide	Flood to Ebb	Flood to Ebb	Ebb to Flood	Ebb to Flood	Flood	Flood	Flood to Ebb	Flood	Flood	
Salinity (stns. 49-272) (ppt)	3 to 11	4 to 9	2 to 6	1 to 1	14 to 19	1 to 9	4 to 10	5 to 24	11 to 23	
Average salinity (stns. 49-272) (ppt)	6.5	7.7	3.3	1.0	17.3	4.7	6.0	9.3	16.7	
Nooksack R. at Ferndale (cfs)	2560	6160	3260	6930	7800	5800	3500	4400	3300	
Nooksack R. stage	Bottom	Peak to Falling	Bottom	Rising	Rising	Rising	Falling	Rising	Falling	
24 hour rainfall (in.)	0.34	0	0	0.07	0	0	0.01	0	0	
72 hour rainfall (in.)	0.06	0.65	0.02	0.09	0	0	0.05	0	0.08	
Nooksack @ Ferndale (FC/100mL)	4	82	4*	41	64	16	4*	40	22	
Nooksack @ Slater Rd. (FC/100mL)	5	69	2*	64	48	25	5*	46	27	
Nooksack @ Marine Dr. (FC/100mL)	5/2*	168/7*	NA/17*	63/23*	96/30*	12/40*	NA/10*	50/37*	30/10*	
<b>DOH Marine Sampling Station</b>	<b>Marine Sampling Results (FC/100mL)</b>									<b>Legend</b>
48			1.7			1.7	2			Approved
53			1.7			1.7	1.7			Conditionally Approved
54			1.7			2	1.7			0 to 9
55			1.8			4.5	1.7			10 to 42
57			4.5			2	2			43 to 100
58			7.8			2	1.7			>100
49	4.5	2	1.7	13	2	7.8	1.8	240	1.7	Not Sampled
50	4.5	11	4.5	27	4.5	9.3	7.8	49	1.7	
51	4.5	7.8	4.5	17	2	4.5	2	70	1.7	
52	4.5	13	9.3	49	7.8	4.5	23	13	1.7	
271	7.8	4.5	4.5	14	4.5	1.7	2	79	1.7	
272	6.8	2	2	70	1.7	7.8	7.8	130	1.7	

**Table 5.** Marine fecal coliform results from WA Department of Health regulatory and Lummi Natural Resources regulatory and special sampling; October through December 2017. Nooksack River samples were collected one day prior to marine sampling except where denoted by an asterisk (\*). Asterisks denote day-of sampling.

Date	10/12/2017	10/19/2017	10/25/2017	11/7/2017	11/20/2017	11/29/2017	12/7/2017	12/13/2017	12/21/2017	
Sampling Type	Special	Special	Regulatory	Special	Regulatory	Special	Special	Regulatory	Special	
Tide	Ebb	Flood	Ebb	Ebb	Ebb	Flood	Ebb	Flood	Ebb	
Salinity (stns. 51, 52, 272) (ppt)	23 to 28	2 to 15	25 to 32	25 to 29	13 to 22	1 to 17	4 to 26	10 to 30	11 to 18	
Average salinity (stns. 51, 52, 272) (ppt)	24.4	6.8	26.7	26.4	17.1	7.2	18.7	21.3	14	
Nooksack R. at Ferndale (cfs)	821	10800	3160	1300	3830	6200	3200	2500	5700	
Noosack R. Stage	Bottom	Peaking	Falling	Bottom	Rising	Falling	Falling	Falling	Peaking	
24 hour rainfall (in.)	0.40	0.89	0.03	0.07	0.46	0.00	0.00	0.00	0.00	
72 hour rainfall (in.)	0.48	2.71	0.11	0.24	0.39	0.44	0.00	0.00	1.99	
Nooksack @ Marine Dr. (FC/100mL)	NA/12*	255/330*	33/38*	14/7*	NA/50*	228/60*	4/2*	7/5*	328/64*	
<b>DOH Marine Sampling Station</b>	<b>Marine Sampling Results (FC/100mL)</b>									<b>Legend</b>
48			1.7		4			1.7		Approved
53			4.5		2			1.7		Conditionally Approved
54			4.5		13			1.8		0 to 9
55			2		4.5			4.5		10 to 42
57			4.5		33			1.7		43 to 100
58			1.7		17			2		>100
49	1.7	350	2	1.7	7.8	17	1.7	2	49	Not Sampled
50	2	130	6.8	1.7	4.5	49	1.7	1.7	79	
51	2	130	4.5	4.5	2	350	1.7	2	79	
52	13	240	1.7	1.7	130	13	2	2	49	
271	1.7	350	4.5	2	17	220	2	1.7	170	
272	1.7	110	1.7	1.7	23	13	4.5	2	34	