

DEPARTMENT OF ECOLOGY
ENVIRONMENTAL ASSESSMENT PROGRAM
Quarterly Report

October 19, 2009

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THROUGH: George Onwumere, Unit Supervisor, Environmental Assessment Program

SUBJECT: Liberty Bay Tributaries Fecal Coliform TMDL Quarterly Report #4
Project Code: 08-023-04

Introduction

Liberty Bay and Johnson, Big Scandia, Little Scandia, Lemolo, Bjorgen, and Barrantes Creeks were listed by the Washington State Department of Ecology (Ecology) for exceeding Washington State fecal coliform (FC) bacteria criteria (Figure 1).

Ecology is required, under section 303(d) of the federal Clean Water Act and U.S. Environmental Protection Agency (EPA) regulations, to develop and implement Total Maximum Daily Loads (TMDLs) for impaired waters.

While the overall goal of the TMDL is to improve water quality in Liberty Bay, this study is focusing on the analysis of the freshwater creek and stormwater FC contributions to the bay. Ecology will be targeting freshwater sources most likely to contribute to marine FC but the TMDL cannot provide an estimate of the resulting change in FC concentrations at marine sampling locations in the bay.

This memorandum is the forth in a series of four quarterly reports that summarizes FC data from August 2008 through October 2009. All data presented are provisional; data quality has not yet been checked.

Progress to Date

The final Liberty Bay TMDL Quality Assurance Project Plan (QAPP) was posted on the web in January 2009. It can be found at <https://fortress.wa.gov/ecy/publications/SummaryPages/0903102.html>.

Data Collection

- Collected 20 to 34 membrane filtered FC samples during each of the 26 surveys completed from August 2008 through September 2009 (Tables 1 and 4). About 20 percent of the samples were replicated for quality assurance purposes.
- Sampled several investigatory sites 4 to 20 times from October 2008 through September 2009 (Tables 2 and 5).
- Sampled all inputs to Liberty Bay during three dry weather sampling surveys in October 2008 and August and October 2009 (Tables 3, 4, and 5).
- Measured streamflow at most sites during bacteria sampling. Streamflows that were not measured in the field are currently being calculated using regression.
- Measured in situ temperature and conductivity at all sites during regular bacteria sampling. Results are not included in this report.
- No rain events were sampled. Most rain events had too little rain, rain that fell when sampling was not possible, or did not have adequate preceding dry periods.
- Attended a tour in Keyport of the Navy Base's stormwater infrastructure in September.

Data Results and Comparison to Washington Surface Water Quality Standards

Ecology reviewed the preliminary FC sample results collected from August 2008 through September 2009 and compared them to Washington State Surface Water Quality Standards (WAC-173-201A). Ecology detected violations of the geometric mean criterion at 10 of the 23 fixed-network sites and violations of the 90th percentile criterion at 22 of the 23 sites (Table 1). Geometric means and 90th percentiles were also calculated for investigatory sites with five samples or more (Table 2).

Project Schedule and Upcoming Tasks

- Regular FC sampling and dry period synoptic sampling in the watershed is complete. Ecology will continue tracking rainfall for storm/rain event sampling.
- The technical analysis has commenced and flow and FC loading analyses are currently being conducted.
- This is the final quarterly report. The final TMDL report should be available in December 2010.

Attachments:

Table 1. Preliminary FC sampling results at fixed-network sites in the Liberty Bay watershed.

Table 2. Preliminary FC sampling results at investigatory sites in the Liberty Bay watershed.

Table 3. Preliminary FC sampling results at dry period synoptic survey sites in the Liberty Bay watershed.

Table 4. Site descriptions for Tables 1 and 3.

Table 5. Site descriptions for Tables 2 and 3.

Figure 1. Map of Liberty Bay watershed with site numbers referencing Table 1.

Tables

Table 1. Fecal coliform (colony forming units per 100 mL) at regularly sampled stations (fixed-network sites) in the Liberty Bay watershed. Yellow and orange highlighted values do not meet Washington State surface water quality criteria. Map numbers reference Figure 1. Dashes denote no sample taken. For site descriptions, see Table 4.

Site ID w/ stream mile	Map #	Aug 12	Aug 26	Sept 10	Sept 24	Oct 8	Oct 22	Nov 11	Nov 24	Dec 10	Dec 29	Jan 14	Jan 28	Feb 11	Feb 25	Mar 11	Mar 24	Apr 8	Apr 29	May 6	May 20	Jun 9	Jun 17	July 8	July 22	Aug 12	Sept 1	n	Min	Max	Geo- metric mean	90th percen- tile
Dogfish Creek																																
15-DOG-0.6	1	65	110	43	66	88	32	63	52	21	390	17	19	24	31	12	15	13	11	280	130	250	92	120	84	330	92	26	11	390	56	218
15-SFD-0.0	2	360	120	26	31	84	12	65	9	290	540	31	180	190	280	18	32	11	1000	830	160	54	140	51	130	54	31	26	9	1000	83	447
15-SFD-1.3	3	61	72	170	71	140	46	41	8	330	340	29	66	130	170	3	6	1	140	640	130	110	380	96	69	92	140	26	1	640	68	467
15-EFD-0.0	4	180	80	51	34	220	92	51	4	10	68	5	2	30	15	30	5	18	3	180	140	890	110	180	240	830	150	26	2	890	47	405
15-EFD-1.2	5	60	67	16	29	9	4	3	12	51	130	9	5	51	7	4	10	31	14	170	75	61	61	120	56	300	120	26	3	300	28	151
15-WFD-0.0	6	75	180	110	31	18	18	43	45	23	270	9	14	10	33	10	25	3	44	51	140	74	40	80	120	1300	150	26	3	1300	45	229
15-WFD-0.9	7	57	80	19	28	13	18	37	30	17	170	4	1	4	6	6	8	1	7	35	140	60	510	180	170	62	71	26	1	510	24	188
Johnson Creek																																
15-JOH-0.1	8	8	120	4	140	220	2	11	1	1	87	190	3	15	17	6	2	1	15	120	27	24	53	47	57	74	69	26	1	220	18	165
Big Scandia Creek																																
15-BSC-0.0	9	180	110	14	40	80	40	56	3	31	230	5	17	44	43	13	56	2	23	380	180	240	210	200	170	210	280	26	2	380	55	351
15-BSC-0.1	10	79	110	36	35	88	20	6	2	44	260	9	6	24	56	80	52	2	9	250	250	340	200	88	86	290	300	26	2	340	48	340
15-BSC-1.1	11	35	110	6	10	28	7	11	2	1	55	14	5	12	110	9	5	4	3	340	140	200	400	77	320	500	280	26	1	500	28	300
15-BSC-1.6	12	84	72	32	31	88	7	3	9	1	340	14	40	11	41	24	4	2	4	170	200	74	110	75	150	290	85	26	1	340	31	245
Little Scandia Creek																																
15-LSC-0.1	13	1600	660	410	670	77	140	46	250	55	320	40	110	340	270	3	34	120	92	920	380	160	240	700	2600	770	2500	26	3	2600	224	1545
15-LSC-0.4	14	920	150	260	640	180	160	41	3	6	100	6	99	28	67	4	9	15	40	760	180	120	17	680	220	300	180	26	3	920	73	643
Daniels Creek																																
15-DAN-0.0	15	590	62	540	450	450	100	29	15	23	23	17	10	20	120	18	280	20	9	550	130	110	1200	500	600	480	350	26	9	1200	102	775
15-DAN-0.2	16	420	92	940	200	80	65	10	44	18	51	2	8	1	6	1	5	7	6	62	30	96	670	390	520	550	140	26	1	940	40	556
Perry Creek																																
15-PER-0.1	17	530	550	69	77	80	9	71	3	17	220	23	26	29	74	77	200	20	7	500	200	84	520	310	8000	770	870	26	3	8000	102	996
Sam Snyder Creek																																
15-SAM-0.1	18	-	-	-	-	-	-	20	3	13	54	1	1	22	21	3	6	2	47	32	24	-	-	-	-	-	-	14	1	54	9	54
Lemolo Creek																																
15-LEM-0.1	19	84	77	3	7	18	22	2	6	5	150	21	6	7	5	1	6	14	190	960	800	120	150	280	900	670	23	26	1	960	32	448
Bjorgen Creek																																
15-BJO-0.1	20	3000	140	49	190	140	21	120	6	5	1100	14	6	27	53	6	7	4	17	490	80	280	230	6700	240	220	730	26	4	6700	77	1070
Barrantes Creek																																
15-BAR-0.0	21	450	190	810	190	270	20	110	13	3	90	4	27	8	11	12	1	24	62	240	48	51	170	210	270	-	-	22	1	810	42	392
Unnamed Tributaries to Liberty Bay																																
15-UNN-0.1	22	29	40	-	-	29	15	100	3	4	110	14	1	11	8	4	7	1	7	9	6	83	240	84	230	230	230	24	1	240	20	178
15-UNN-0.0	23	-	-	-	-	-	77	180	63	330	180	10	3	9	39	2	1	1	1	420	150	270	240	180	3300	750	9700	21	1	9700	60	1803

Table 2. Fecal coliform (colony forming units per 100 mL) at investigatory and dry-period survey sites in the Liberty Bay watershed. Yellow and orange highlighted values do not meet Washington State surface water quality criteria. Dashes denote no sample taken. For site descriptions, see Table 5.

Site ID w/ stream mile	Aug 12	Aug 26	Sept 10	Sept 24	Oct 8	Oct 22	Nov 11	Nov 24	Dec 10	Dec 29	Jan 14	Jan 28	Feb 11	Feb 25	Mar 11	Mar 24	Apr 8	Apr 29	May 6	May 20	Jun 9	Jun 17	July 8	July 22	Aug 12	Sept 1	n	Min	Max	Geo- metric mean	90th percen- tile	
Investigatory sites																																
15-PET-0.0	-	-	-	-	-	89	-	-	160	110	8	86	26	190	3	64	22	21	57	59	-	-	-	-	-	-	-	13	3	190	43	199
15-JEA-0.0	-	-	-	-	-	-	150	75	82	1300	3	220	69	1000	1	7	6	34	2900	370	200	49	52	200	530	69	20	1	2900	84	1163	
15-DON-0.0	-	-	-	-	-	-	-	-	-	370	11	1	21	140	8	13	14	12	5200	71	92	840	710	180	700	110	17	1	5200	74	1206	
15-STORM-1	-	-	-	-	-	-	1500	-	-	880	-	-	-	160	-	-	-	-	1300	-	-	-	-	-	-	-	-	4	160	1500	-	-
15-STORM-2	-	-	-	-	-	-	-	-	-	1100	-	-	32	2100	-	-	-	-	-	1600	-	-	-	-	-	-	-	4	32	2100	-	-
15-UN3-0.0	-	-	-	-	-	-	-	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
15-BST-0.0	-	-	-	-	-	-	-	-	760	200	60	11	110	230	88	8	130	100	2900	510	-	-	-	-	-	-	-	12	8	2900	134	1109
15-KE1-0.2	-	-	-	-	-	-	-	-	-	-	23	-	-	51	-	1	-	-	-	380	640	1600	610	930	50	970	10	1	1600	162	3156	
15-KE2-0.3	-	-	-	-	-	-	-	-	-	-	2	-	-	6	-	10	-	-	-	57	55	160	160	970	430	140	10	2	970	60	729	
15-JOHT	-	-	-	-	-	-	-	-	3	150	-	-	-	-	-	-	-	-	1	17	-	-	-	-	-	-	4	1	150	-	-	
15-BOV-0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23	100	31	150	660	200	250	200	900	400	10	23	900	174	799	
15-LMK-0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	45	6000	2900	130	160	-	-	-	-	-	5	45	6000	439	6700	
15-NEL-0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3200	280	590	46	760	870	1700	160	3300	2400	10	46	3300	714	4273	
15-RET-0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	310	520	2300	700	330	54	320	290	1300	770	10	54	2300	461	1698	

Table 3. Fecal coliform (colony forming units per 100 mL) at dry period synoptic survey sites in the Liberty Bay watershed. Yellow highlighted values do not meet Washington State surface water quality criterion. Dashes denote no sample taken. For site descriptions, see Tables 4 and 5.

Site ID w/ stream mile	Oct 29, 2008	Aug 19, 2009	Oct 12, 2009
"Dry storm" sampling survey			
15-LEM-0.0	47	-	190
15-LEM-0.1	-	62	-
15-BJO-0.0	260	-	180
15-BJO-0.1	-	470	-
15-BAR-0.0	43	-	-
15-DOG-0.0	40	190	44
15-DOG-T	2	-	20
15-JOH-0.0	9	480	31
15-BSC-0.0	51	100	100
15-LSC-0.0	5600	-	360
15-LSC-0.1	-	970	-
15-PER-0.0	100	-	360
15-PER-0.1	-	290	-
15-DAN-0.0	220	340	1100
15-UN1-0.0	470	-	200
15-UNN-0.1	-	120	15
15-UNN-0.0	26	340	-
15-UN3-0.0	71	-	-
15-UN4-0.0	2	-	-
15-JEA-0.0	8	46	33
15-BOV-0.0	-	2500	250
15-NEL-0.0	-	620	1800
15-DON-0.0	-	100	20
15-RET-0.0	-	1700	830
15-KE1-0.2	-	-	310
15-KE2-0.3	-	-	9

Table 4. Site descriptions for Table 1.

Site ID w/ stream mile	Map #	Site description
Dogfish Creek		
15-DOG-0.6	1	Mainstem behind dental office on Bond Rd., downstream of HWY 305 crossing
15-SFD-0.0	2	South fork at Bond Rd. and 1st Ave., 50 ft. downstream of culvert
15-SFD-1.3	3	South fork at 8th Ave. and Iverson, upstream side of culvert
15-EFD-0.0	4	East fork at Little Valley Rd., downstream side of culvert
15-EFD-1.2	5	East fork off Bond Rd. at Pugh Rd., upstream side of culvert
15-WFD-0.0	6	West fork at Little Valley Rd., downstream side of culvert
15-WFD-0.9	7	West fork at first Big Valley Rd. crossing near Living Waters Farm, up of culvert
Johnson Creek		
15-JOH-0.1	8	Mainstem south of Norfin Ln., 200ft. downstream of tributary
Big Scandia Creek		
15-BSC-0.0	9	Mainstem at mouth near the end of Scandia Ct. at private property. Trail to ck.
15-BSC-0.1	10	Mainstem at Scandia Rd, upstream side of bridge
15-BSC-1.1	11	Mainstem at HWY 308 between Viking Way and Cox Ave., downstream of culvert
15-BSC-1.6	12	Mainstem at HWY 308 just west of Cox Ave., upstream side of culvert
Little Scandia Creek		
15-LSC-0.1	13	Mainstem at Scandia Rd. behind church, upstream side of culvert
15-LSC-0.4	14	Mainstem at Blomster Way, upstream side of culvert
Daniels Creek		
15-DAN-0.0	15	Mainstem off HWY 308, near residence at 14510, upstream side of culvert
15-DAN-0.2	16	Mainstem at Virginia Loop Rd., approximately 30ft. below culvert
Perry Creek		
15-PER-0.1	17	Mainstem at 90 deg. right turn in Thorpe Rd. upstream side of culvert
Sam Snyder Creek		
15-SAM-0.1	18	Mainstem at Lemolo Shore Dr., downstream side of culvert (dry during dry season)
Lemolo Creek		
15-LEM-0.1	19	Mainstem at Lemolo Shore Dr. east of Delate Rd. Access from first private drive east of creek, 75 ft. upstream of culvert
Bjorgen Creek		
15-BJO-0.1	20	Mainstem at Lemolo Shore Dr. by market, downstream side of culvert
Barrantes Creek		
15-BAR-0.0	21	Mainstem at Lemolo Shore Dr. downstream of culvert. Sample at low tide
Unnamed Tributaries to Liberty Bay		
15-UNN-0.1	22	Trib. east of Daniels Ck. at Hwy 308 near "Support Our Troops" sign. 30ft. upstream of culvert
15-UNN-0.0	23	Trib. flowing into bay right next to Daniels Ck. mouth. Sample at low tide.

Table 5. Site descriptions for Tables 2 and 3.

Site ID w/ stream mile	Site description
"Dry storm" synoptic sampling survey	
15-LEM-0.0	Lemolo Creek mouth
15-BJO-0.0	Bjorgen Creek mouth
15-BAR-0.0	Barrantes Creek mouth
15-DOG-0.0	Dofish Creek mouth
15-DOG-T	Trib. flowing through Fish Park to Dogfish Ck. just above mouth
15-JOH-0.0	Johnson Creek mouth
15-BSC-0.0	Big Scandia Creek mouth
15-LSC-0.0	Little Scandia Creek mouth
15-PER-0.0	Perry Creek mouth
15-DAN-0.0	Daniels Creek mouth
15-UN1-0.0	15-UNN-0.1 mouth
15-UNN-0.0	Trib. flowing into bay south of and next to Daniels Ck. mouth.
15-UN3-0.0	Small, unnamed stream flowing into Dogfish Bay, east of station 15-UNN-0.1
15-UN4-0.0	Small stream flowing through Fish Park into Dogfish Creek near mouth, below 15-DOG-0.6
15-JEA-0.0	Small, unnamed stream flowing into the bay near American Legion Park (Poulsbo outfall PSW31)
Investigatory sites	
15-PET-0.0	Trib. east of Perry Ck. at Thorpe Rd. Sample at low tide above culvert. Dry during dry season
15-JEA-0.0	Small, unnamed stream flowing into the bay near American Legion Park. Poulsbo outfall ID is PSW31
15-DON-0.0	"Donna Jean's Creek" at Poulsbo Yacht Club
15-STORM-1	Storm drain at the south end of American Legion Park. Below the Gran Kirk, Martha and Mary, and Front St. Poulsbo outfall PSW30.
15-STORM-2	next storm drain north of STORM-1 (metal culvert)
15-UN3-0.0	Small, unnamed stream flowing into Dogfish Bay, east of station 15-UNN-0.1
15-BST-0.0	Small unnamed seasonal stream flowing into Liberty Bay ~300 feet east of Big Scandia Creek.
15-KE1-0.2	Small, unnamed ck. near Keyport Creek (1st trib. at Brownsville Hwy)
15-KE2-0.3	Keyport Creek (2nd trib. at Brownsville Hwy)
15-JOH-T	Trib. to Johnson Creek above 15-JOH-0.1
15-BOV-0.0	Trib to Liberty Bay between Bovela St. and Bay St.
15-LMK-0.0	Small, intermittent stream off Virginia Lp. Rd. NE at private prop.
15-NEL-0.0	Nelson Park bioswale at beach
15-RET-0.0	Small, unnamed ck. flowing through assisted living facility property off Viking Way in Poulsbo, near Bovela St. Sample at beach.

Figures

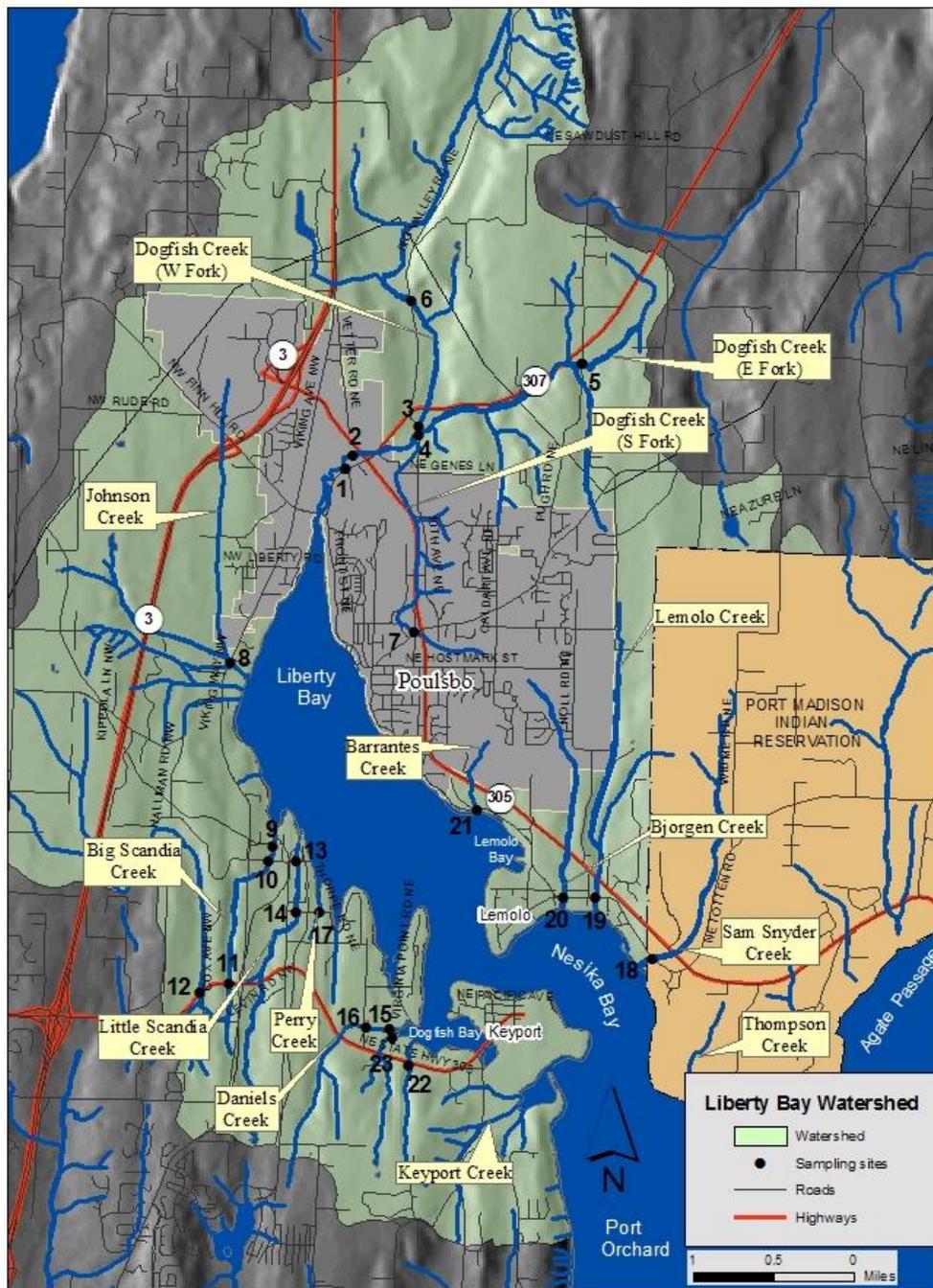


Figure 1. Map of Liberty Bay and Nesika Bay watersheds, including tributaries to Agate Passage and Port Orchard Bay. Numbers reference Table 1.

