

DEPARTMENT OF ECOLOGY

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TO: Steve Hood, Bellingham Field Office

THROUGH: George Onwumere, Environmental Assessment Program

FROM: Nuri Mathieu, Environmental Assessment Program

**SUBJECT: Drayton Harbor Watershed FC TMDL
QUARTERLY PROGRESS REPORT #2 (April – June, 2008)
PROJECT CODE: 06-021-02**

Introduction

Drayton Harbor is an enclosed estuary located within Water Resource Inventory Area 1 and Whatcom County just south of the Canadian border. The Drayton Harbor Watershed drains approximately 35,372 acres, 90% of which empties into either California or Dakota Creek before entering the harbor. The watershed houses approximately 10,465 people including the city of Blaine and hosts diverse land uses including: (1) commercial and industrial development, (2) low density residential land, (3) commercial dairies and berry farms, (4) non-commercial hobby farms, (5) agriculture, (6) surface mining, and (7) forestland.

Ecology is conducting a TMDL study in this watershed because there is strong evidence of bacterial contamination that is affecting beneficial uses in the area, such as shellfish harvesting and recreation. Several study-area waterbodies are included on Ecology's 303(d) list of impaired waters, including Drayton Harbor, California Creek, Dakota Creek, and a small unnamed creek that drains to Drayton Harbor between the mouth of Dakota Creek and the city of Blaine. The field work for the study began in December 2007 and will continue through December 2008. The goal is to assess the current condition of waterbodies and to identify and quantify factors contributing to these impairments. The Quality Assurance (QA) Project Plan is available online at: <http://www.ecy.wa.gov/biblio/0803105.html>.

This memorandum summarizes the progress for the second quarter of 2008 (April - June) regarding data collection and project communications. Data presented are provisional; data quality has not been checked.

Progress to Date

Communications

- The statement of work and the sole source laboratory justification have been completed for the Blaine Harbor marina's microbial source tracking (MST) study. The Quality Assurance Project Plan is under development and a draft should be completed by the end of July. Sampling is scheduled to begin in late August or early September.

- Notification of fecal coliform results over 200 cfu/100 mL was sent within one week following each sampling event to Ecology’s regional staff, Whatcom County, and other interested parties. These notifications were, and will continue to be, used to help direct follow-up activities within the watershed.

Data Collection

- Fecal coliform samples were collected at 30 sites during five sampling events from April to June 2008. These samples were collected in the Dakota, California, and Cain Creek Watersheds, as well as from several drainages that discharge directly to Drayton Harbor. Flow measurements were collected wherever possible.
- Four new sites were added in the second quarter (Table 3). Three in the upper South Fork Dakota Creek Watershed (1-SFD-2.2, 1-TribDak-S1, 1-TribDak-2) and one in the lower California Creek Watershed (1-TribCal-0).
- The second shoreline and marina sampling survey was conducted on 5/27/08, the day after Memorial Day weekend. Bacteria samples were collected at 33 sites along the Drayton Harbor shoreline and at 16 sites within the Blaine Harbor and Semiahmoo marinas.

Table 1 presents the fecal coliform data collected during the first quarter of 2008.

Bacteria Results and Comparison to Washington Water Quality Standards

- Results were reviewed for all samples collected in the first quarter (December 2007 – March 2008). Preliminary data in tables and figures were compared to Washington State Water Quality Standards for primary contact recreation (WAC-173-201A) which state:
 - *Fecal coliform organism levels must not exceed a geometric mean value of 100 colonies /100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 200 colonies /100 mL.*
 - For 1-Cain-0.1 and 1-Cain-SD1, the FC levels must not exceed a geometric mean of 50 colonies/100mL and 100 colonies/100mL for 10 percent of the samples.
 - The salinity of the water at the sampling location at the mouths of Dakota and California Creeks indicate the applicable standards are the marine standards. The mouths of Dakota and California Creeks will be expected to meet the marine water quality standards where FC levels must not exceed a geometric mean of 14 colonies/100mL and 43 colonies/100mL for 10 percent of the samples.
- Geometric means and log-transformed 90th percentile statistics were calculated for all sites. The log-transformed 90th percentile has been identified as representative of the *not more than 10 percent of all samples* criteria, provided the data fits a log-normal distribution. **These statistics are preliminary and not representative of final statistics used for analysis of the project. For the purpose of the quarterly reports, they are meant to help prioritize areas for follow-up actions and to identify sites and waterbody segments that *may* exceed water quality standards.** For the final data

analysis, results will be statistically analyzed both for an entire year and by season after data collection has been completed. Figures 1-7 show box plots for each station.

- 26 out of 30 sites exceeded water quality standards. Of those 26 sites, all exceeded the 90th percentile criterion and 12 sites exceeded the geometric mean criterion.
- A large decrease in FC concentrations was observed at the tidally-influenced sites on Dakota and California Creeks between the wet and dry seasons (Figure 8). FC concentrations at these stations were below their respective water quality standards during the dry weather months (April to June).
- Conversely, FC concentrations increased during the dry season at the majority of the mainstem (outside the tidal influence) and tributary sites throughout both the Dakota and California systems. Figure 9 illustrates an example of this trend on the California Creek mainstem above the tidal influence.
- Marine water quality appears to worsen in the wet weather months, negatively impacting commercial shellfish harvesting and primary contact recreation during these months in the harbor; while fresh surface water quality deteriorates during the dry season, creating a more widespread and increased public health risk to recreational users in the Dakota and California Creek Watersheds. These trends are also evident in the historical data collected by the Department of Health and Northwest Indian College reviewed in the QA Project Plan.
- High FC concentrations continued in the Cain Creek sub-basin. Baseline concentrations (represented by the geometric means) were similar in both the wet and dry season; while 90th percentiles dropped during the dry season, which is most likely due to a decrease in stormwater runoff (Figure 8). The large increase in FC counts continued between 1-Cain-1.3 and 1-Cain-0.4.

Project Schedule and Upcoming Tasks

- Data collection at the 34 routine freshwater sites will continue through December 2008.
- One to two additional shoreline surveys will be conducted. The next survey is scheduled as a dry season storm event, which will be targeted in the next quarter (July – September).
- Project staff will also try to capture a dry season storm event for the Dakota and California Creek Watersheds in the next quarter.
- Continuous data loggers will be deployed in late July to collect dissolved oxygen, pH, conductivity, and temperature data at key sites throughout the Dakota and California Creek Watersheds.
- An addendum to the QA Project Plan describing the sample plan for the Blaine marina MST study will be completed within the next quarter. Sampling is scheduled to begin in late August or early September.

Tables and Figures

Table 1. Fecal coliform bacteria data (colonies/100 mL) for Quarter 1 of 2008 (see Table 2 for site descriptions). Replicate sample values were averaged together.

Date	Dak-0.1 MF	Dak-0.1 MPN	Dak-3.1	Dak-6.8	SFDak-0.2	NFDak-0.1	NFDak-2.5
12/11/2007	285						
12/12/2007	84		21	40	16	45	63 J
12/18/2007	56	110	22	31	15	37	130
1/15/2008	250	130	150 J	160	160 J	88	49 J
1/28/2008	43/76*	49	40	66	17	84	36
2/6/2008	450 J	1100	250	270 J	300 J	245 J	200
2/19/2008	18	49	44	28	24	22	36
3/3/2008	12 U	145	88	120	405	34	108
4/30/2008	6	11	35	120	15	220	230
5/12/2008	5	9.3	72	150	160	97	260
5/28/2008	19	79	76	120	51	160	235
6/12/2008	9	33	270	180	100	415	280
6/24/2008	5	13	57	37	81	46	140
Date	TribDak-1	TribDak-2	TribDak-3	TribDak-4	TribDak-5	TribDak-N1	TribDak-N2
12/12/2007	160	68	93	80	9	25	28 J
12/18/2007	250	80	340	100	29	55	44 J
1/15/2008	220	47	150	130	17	43 J	69 J
1/28/2008	445 J	84	130	39	17	125	170
2/6/2008	390	77	66	40	28	92	520 J
2/19/2008	150	27	32	21	19	29	12
3/3/2008	440	260	135	79	82	800	57
4/30/2008	150	46	101	91	9	57	430
5/12/2008	490	32	190	120	86	300	280 J
5/28/2008	54	1000 J	160	425	53	57	650
6/12/2008	350	970	210	945	52	430	300
6/24/2008	9	140	240	110	55	3 U	1300
Date	SFDak-4.0	TribDak-S1	TribDak-S2				
4/30/2008		63					
5/12/2008		1800 J					
5/28/2008	100 J	770	350				
6/12/2008	100 J	85	520 J				
6/24/2008	130	470	320				

Table 1 Continued. . .

Date	Cain-0.1 MF	Cain-0.1 MPN	Cain-SD1	Cain-0.4	Cain-1.3	TribDray-1	Dray-SD4
12/11/2007	260		40	71 J	1 U	8	4
12/18/2007	180 J	540	190	96 J	69	55 J	24
1/15/2008	1200	1700	255	1800 J	15	175	124
1/28/2008	49/26*	110	140	71	8	29	5
2/6/2008	3200 J	1100	435	2100 J	60	41	75 J
2/19/2008	50 J	90	51	17 J	2	48	1
3/3/2008	92	70	420	180	31	61	80
4/30/2008	255 J	110	46	450	15 J	84	7
5/12/2008	147	130	74	620	29	340	35 J
5/28/2008	170		41	66	41	46	150
6/12/2008	200	350	110	240	83	81	260
6/24/2008	370	240	19	31	215	no flow	120
Date	Cal-0.1 MF	Cal-0.1 MPN	Cal-0.8	Cal-3.1	Cal-5.0	Cal-6.2	
12/11/2007	320		3	5	11 J	37 J	
12/18/2007	100	79	29	15	5	29.5 J	
1/15/2008	220	175	130	110	110	140 J	
1/28/2008	240/60*	170	160	22	33	86.5	
2/6/2008	100	180	88	49	48	84 J	
2/19/2008	17	17	46	14	10	11.5 J	
3/3/2008	10	17	13	24	12	16 J	
4/30/2008	2	4.5	15	35	140	86 J	
5/12/2008	36	79	89	180	120	140 J	
5/28/2008	8 J		32	235	100	200 J	
6/12/2008	3	2	56	280	340	140 J	
6/24/2008	14	11	20	240	170	235 J	
Date	Cal-SD1	TribCal-1	TribCal-2	TribCal-3	TribCal-4	TribCal-5	TribCal-0
12/11/2007	2 U	440	610 J	12	14 J	5 J	
12/18/2007	3	20	23	16	49	10	
1/15/2008	3	6	29	160	27 J	32 J	
1/28/2008	1 U	2	59	61	32	26	
2/6/2008	6	5	520	68	65	60	
2/19/2008	1 U	5 J	69	14	32	3	
3/3/2008	1	10	240	2	24	26	
4/30/2008	1 U	74	57	10	200 J	103	7
5/12/2008	1 U	24	320	120	34 J	160	
5/28/2008	63	7	100	3500 J	40 J	210 J	
6/12/2008	28	180	145	92	160 J	120	250
6/24/2008	1 U	no flow	330	130	4600 J	80	54

* High Tide Sample/ Low Tide Sample

U – Analyte was not detected at or above the reported result.

J – Analyte was positively identified. The associated numerical result is an estimate.

MF = Membrane filter analysis; Standard Methods (SM) 9222D

MPN = Most Probable Number analysis; SM9221E

Table 2. Fecal coliform bacteria sampling sites.

Site ID	Description	Latitude (°N)	Longitude (°W)
<i>Dakota Creek Watershed</i>			
1-TribDak-N2	Trib to NF Dakota Ck ≈300 ft below Delta Line Rd, joins NF Dakota at RM 2.1	48.96554	122.61708
1-NF-Dak-2.5	NF Dakota Creek @ Delta Line Road	48.96971	122.61579
1-TribDak-N1	Trib to NF Dakota Creek at Haynie Rd; joins NF Dakota at RM 2.0	48.97131	122.62618
1-NF-Dak-0.1	NF Dakota Creek @ Custer School Rd	48.95107	122.63790
1-SF-Dak-0.2	SF Dakota Creek @ Custer School Rd	48.95033	122.63792
1-Dak-6.8	Dakota Creek @ Behme Rd	48.95715	122.65964
1-TribDak-5	Trib to Dakota Cr. at Valley View Rd north of McGee St; joins Dakota at RM 2.8	48.96520	122.66007
1-Dak-3.1	Dakota Creek @ Giles Street	48.96272	122.68204
1-TribDak-3	Trib to Dakota Cr. at Rogers Road; joins TribDak-4 and then Dakota at RM 1.7	48.97034	122.69307
1-TribDak-4	Trib to Dakota Cr. at Hoier Road; joins TribDak-3 and then Dakota at RM 1.7	48.97195	122.70018
1-TribDak-2	Trib to Dakota Cr. at Blaine-Lynden Rd nr Harvey Rd; joins Dakota at RM 1.1	48.97911	122.70841
1-TribDak-1	Trib to Dakota Cr. at Blaine-Lynden Rd nr Odell St; joins Dakota at RM 0.9	48.97915	122.71960
1-Dak-0.1	Dakota Creek @ SR 548/Blaine Rd	48.97231	122.72936
<i>California Creek Watershed</i>			
1-TribCal-4	Trib to California Creek @ Bay road, just west of Bruce Rd.	48.90633	122.64965
1-Cal-6.2	California Creek @ Bruce Rd	48.90928	122.64406
1-TribCal-5	Trib to California Creek @ dead end of Main St. in Custer	48.91725	122.64927
1-Cal-5.0	California Creek @ Valley View Rd	48.92136	122.66039
1-TribCal-3	Trib to California Creek @ Arnie Rd west of Ham Rd	48.92110	122.68400
1-Cal-3.1	California Creek @ Birch Bay-Lynden Rd.	48.93575	122.68878
1-TribCal-2	Trib to California Creek @ Kickerville Rd	48.94953	122.70449
1-TribCal-1	Trib to California Creek @ Fleet Rd	48.94850	122.72206
1-Cal-0.8	California Creek @ SR548/ Blaine Rd.	48.95468	122.72617
1-Cal-0.1	California Creek @ Drayton Harbor Rd.	48.96217	122.73289
1-Cal-SD1	18" concrete culvert discharges to California Creek at the mouth	48.96230	122.73235
<i>Cain Creek Watershed</i>			
1-Cain-1.3	Cain Creek next to Blaine Public Works	48.98768	122.73432
1-Cain-0.4	Cain Creek downstream of beaver dam behind Blaine Trade Center	48.99295	122.74513
1-Cain-0.01	mouth of Cain Creek; 60" culvert off of Marine Dr, just north of boatyard	48.99697	122.75463
1-Cain-SD1	Storm drainage outfall to Semiahmoo Bay, north of the mouth of Cain Creek	48.99712	122.75439
<i>Direct Drainages to Drayton Harbor</i>			
1-TribDray-1	Mouth of trib to Drayton Harbor@ Hall & Dearborn	48.96813	122.73312
1-Dray-SD4	36" culvert on harbor shoreline, due east of Peace Portal Dr and Albert St.	48.98246	122.73935

Table 3. Sites added to the TMDL sampling network during the second quarter.

Site ID	Description	Latitude (°N)	Longitude (°W)
1-TribDak-S2	Trib to SF Dakota Creek @ Sunrise Rd; just north of SF Dakota Creek	48.94463	122.59646
1-TribDak-S1	Trib to SF Dakota Creek @ Delta Line Rd near Loomis Trail Rd	48.94784	122.61629
1-SFDak-2.2	SF Dakota Creek at Sunrise Rd	48.94306	122.59647
1-TribCal-0	Trib to California Creek @ SR 548; next to Dakota Ck. Christian Center	48.95827	122.73005

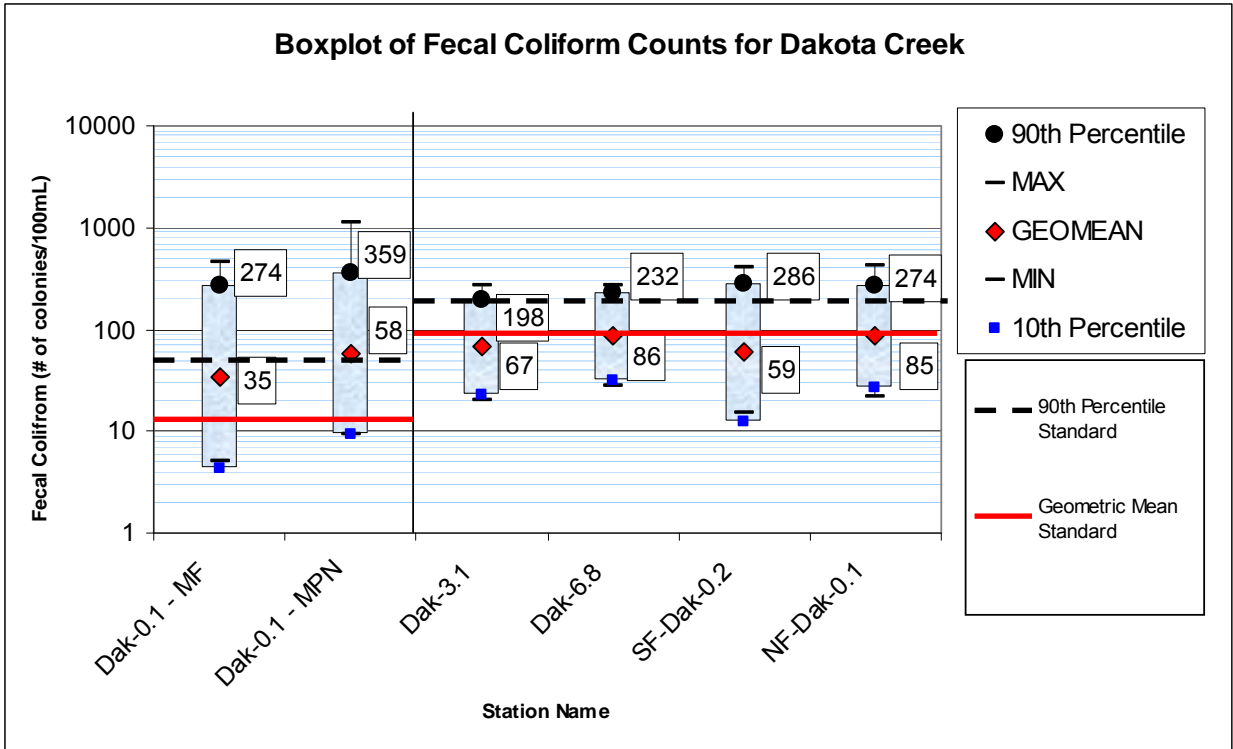


Figure 1. Illustrates the geometric mean and 90th percentile for Dakota Creek stations and their relation to corresponding state standards.

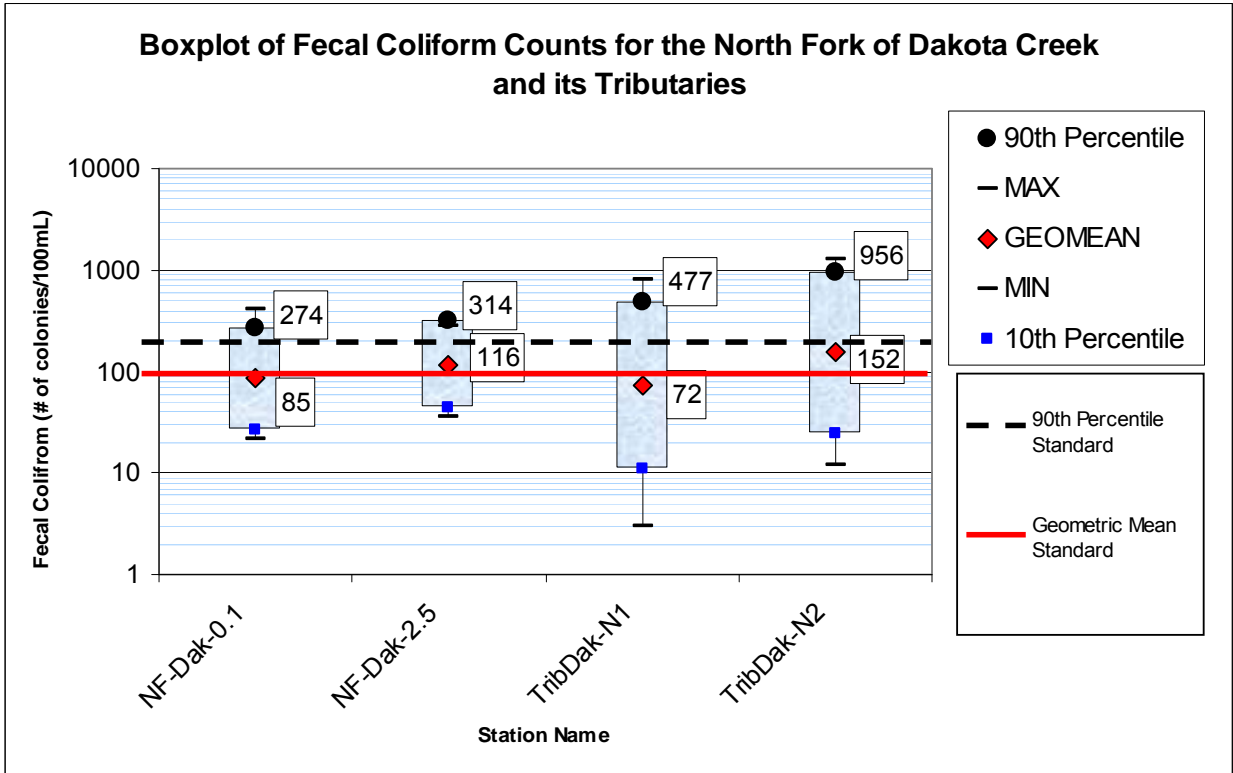


Figure 2. Illustrates the geometric mean and 90th percentile for stations on the North Fork of Dakota Creek and its tributaries and their relation to corresponding state standards.

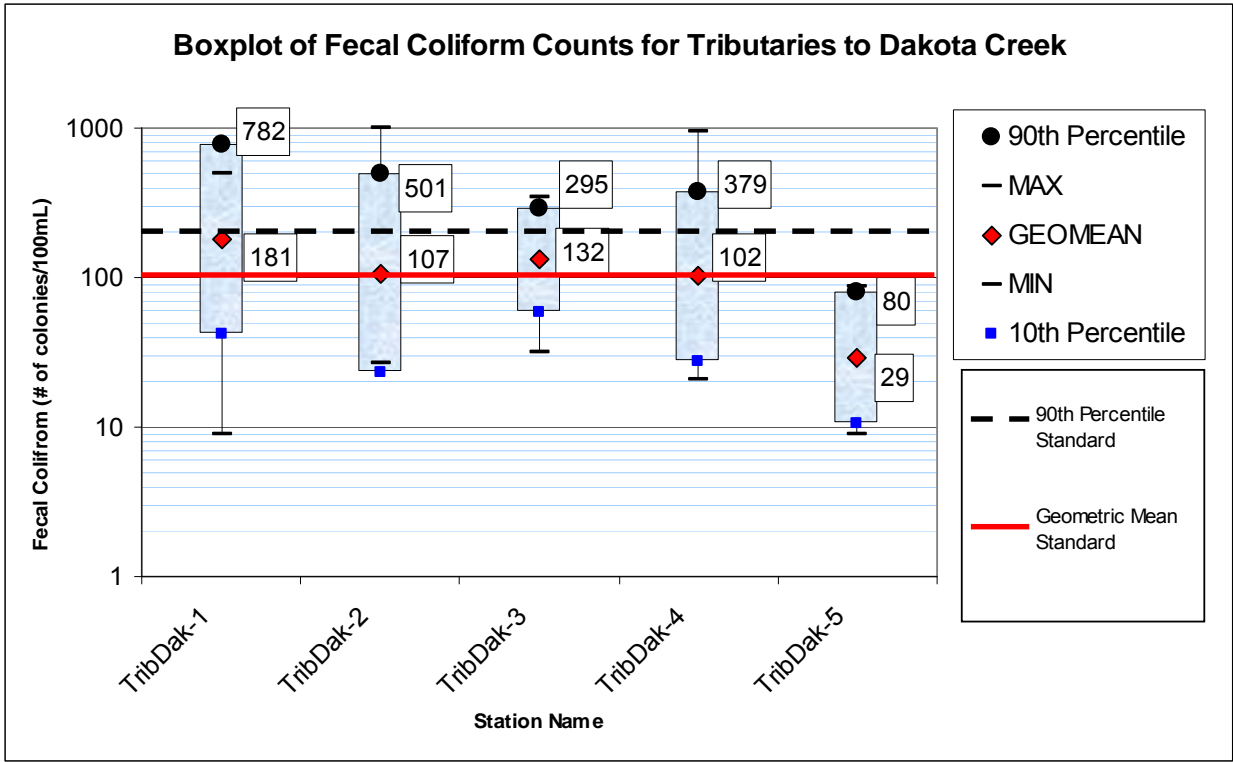


Figure 3. Illustrates the geometric mean and 90th percentile for tributaries to Dakota Creek and their relation to corresponding state standards.

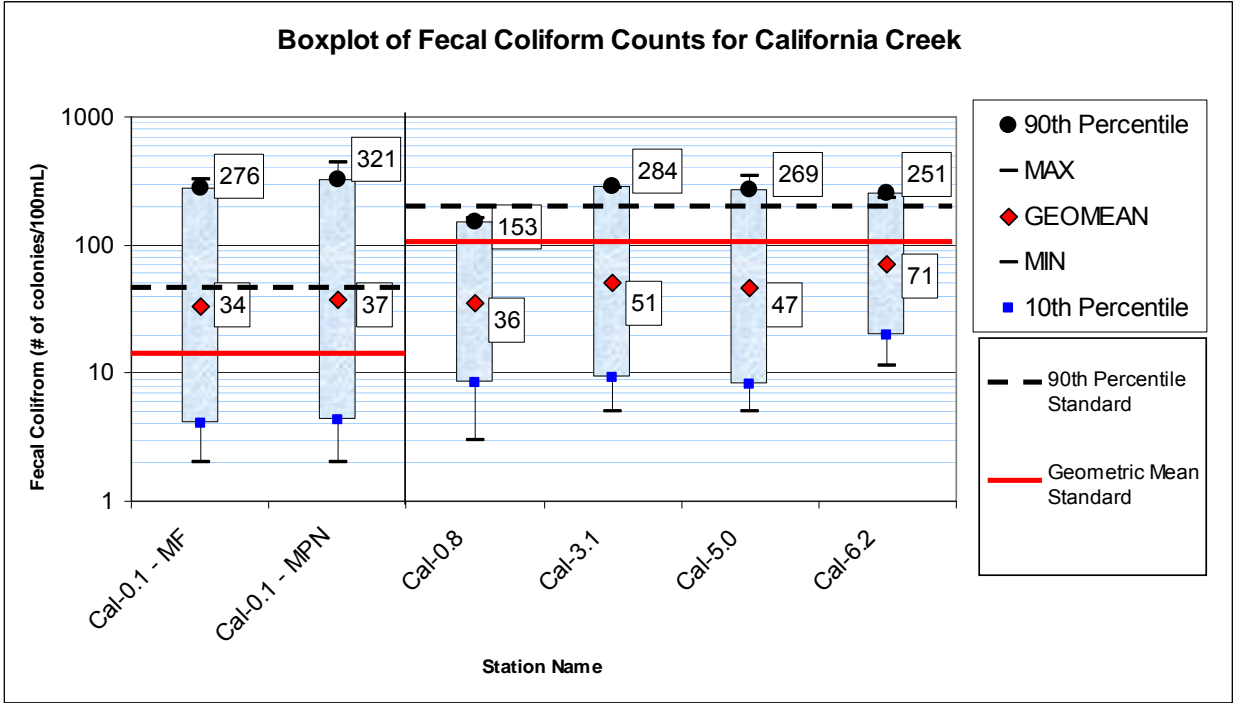


Figure 4. Illustrates the geometric mean and 90th percentile for California Creek stations and their relation to corresponding state standards.

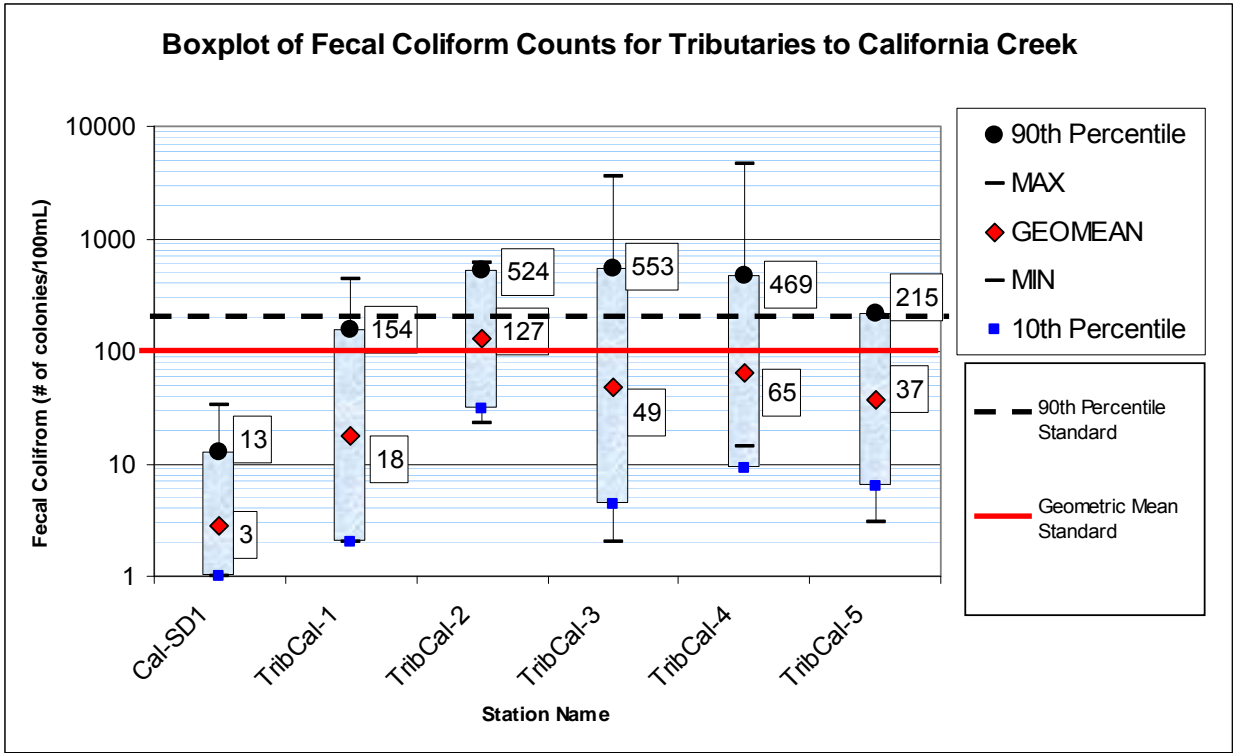


Figure 5. Illustrates the geometric mean and 90th percentile for tributaries to California Creek and their relation to corresponding state standards.

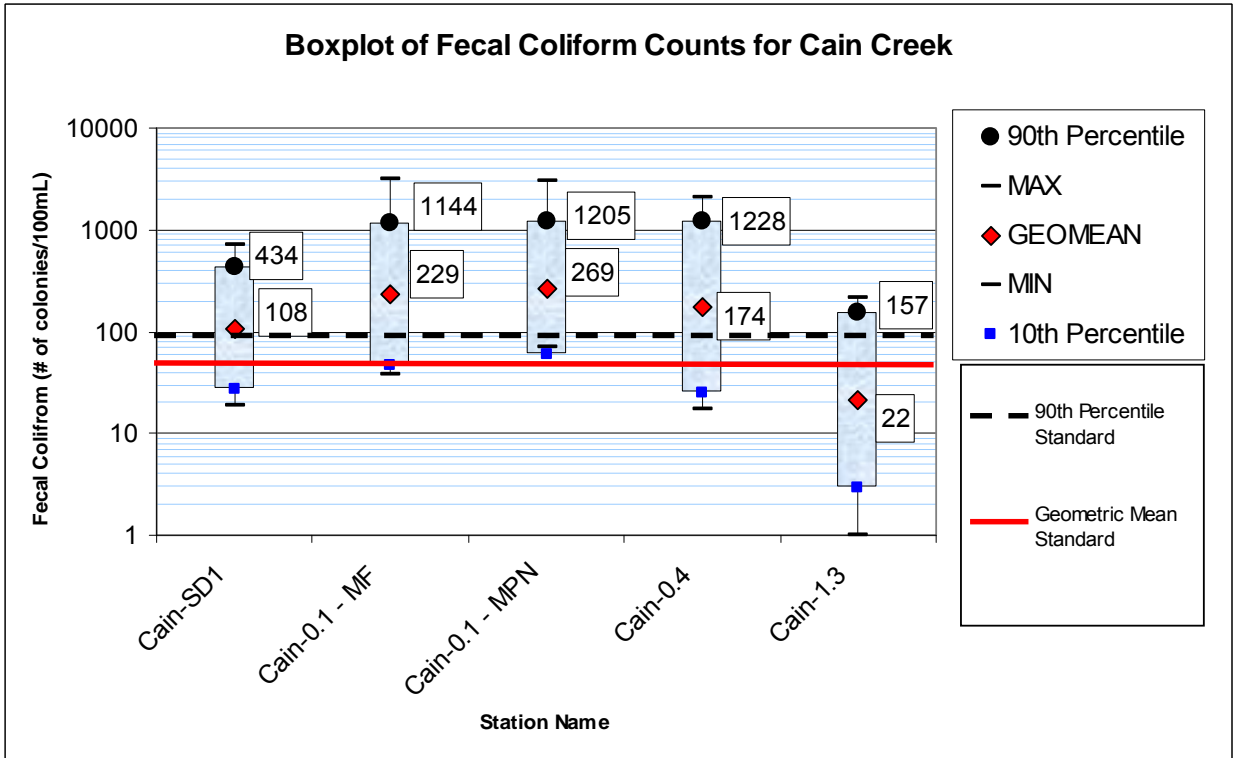


Figure 6. Illustrates the geometric mean and 90th percentile for Cain Creek stations and their relation to corresponding state standards.

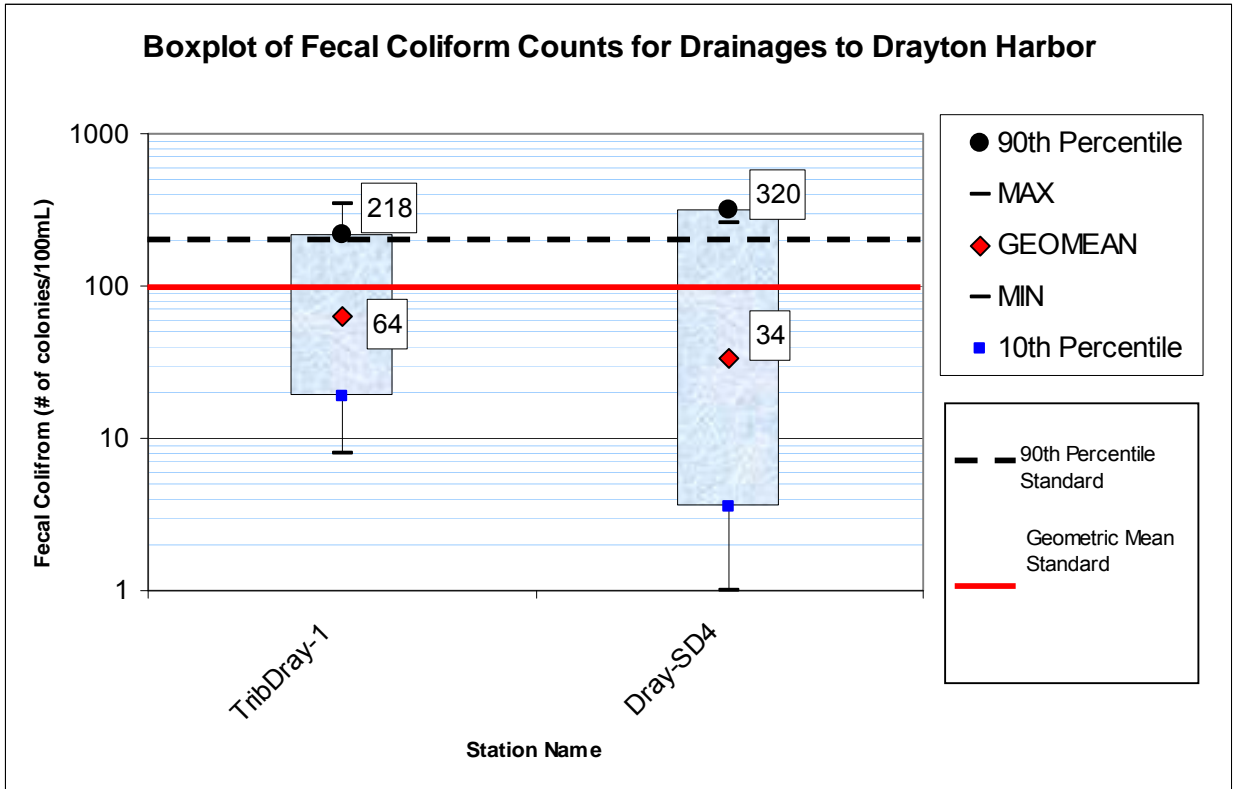


Figure 7. Illustrates the geometric mean and 90th percentile for two direct drainages to Drayton Harbor and their relation to corresponding state standards.

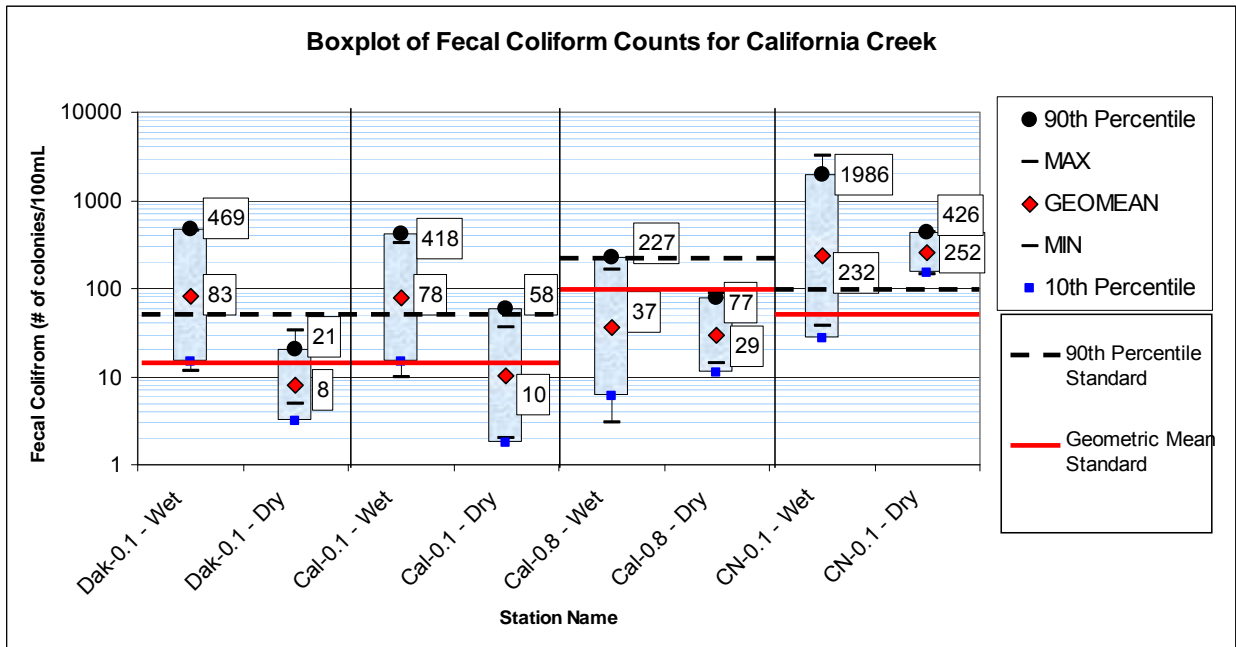


Figure 8. Compares the fecal coliform statistics between the wet (December to March) and dry (April to June) seasons at the four tidally influenced stations.

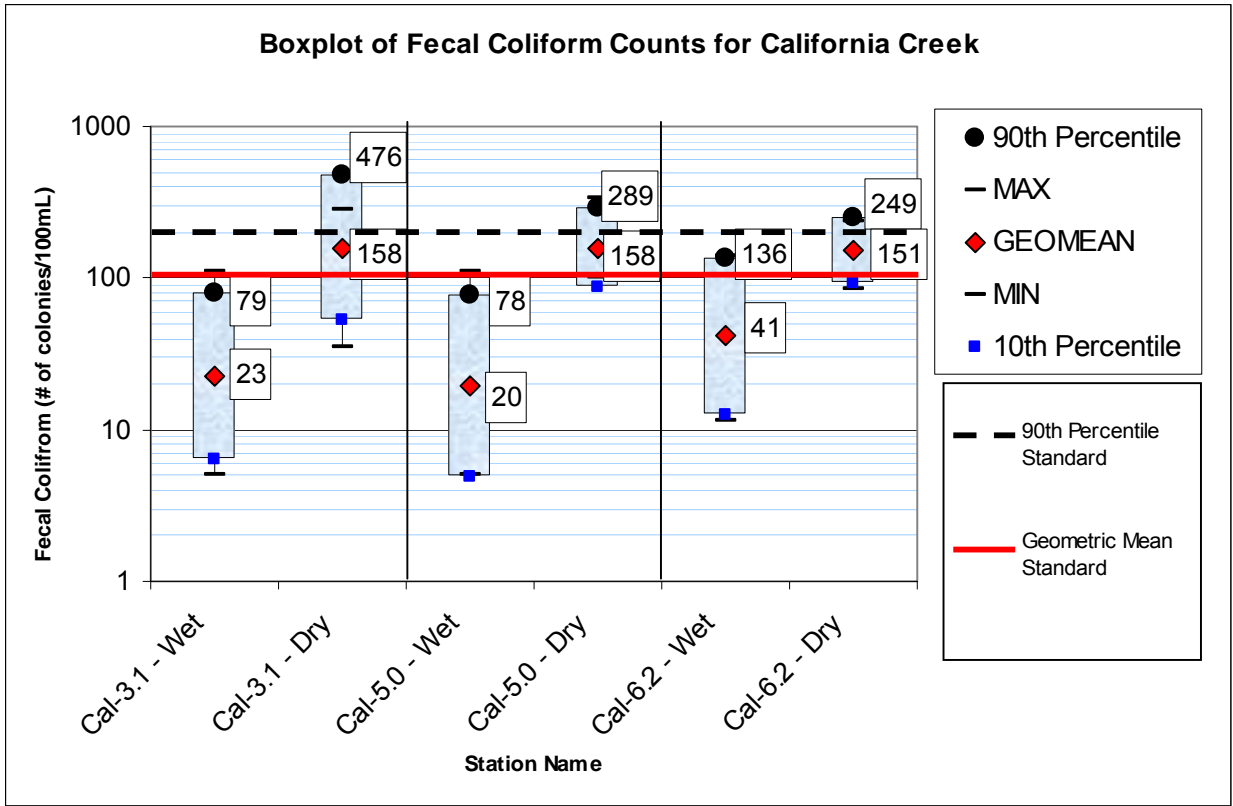


Figure 9. Compares the fecal coliform statistics between the wet (December to March) and dry (April to June) seasons at the three California Creek mainstem stations above the tidal influence.