



## Whatcom Clean Water Program Quarterly Report July 1 – September 30, 2015

### 1. FECAL COLIFORM BACTERIA SAMPLING & RESULTS

#### LOWER NOOKSACK/PORTAGE BAY WATERSHED

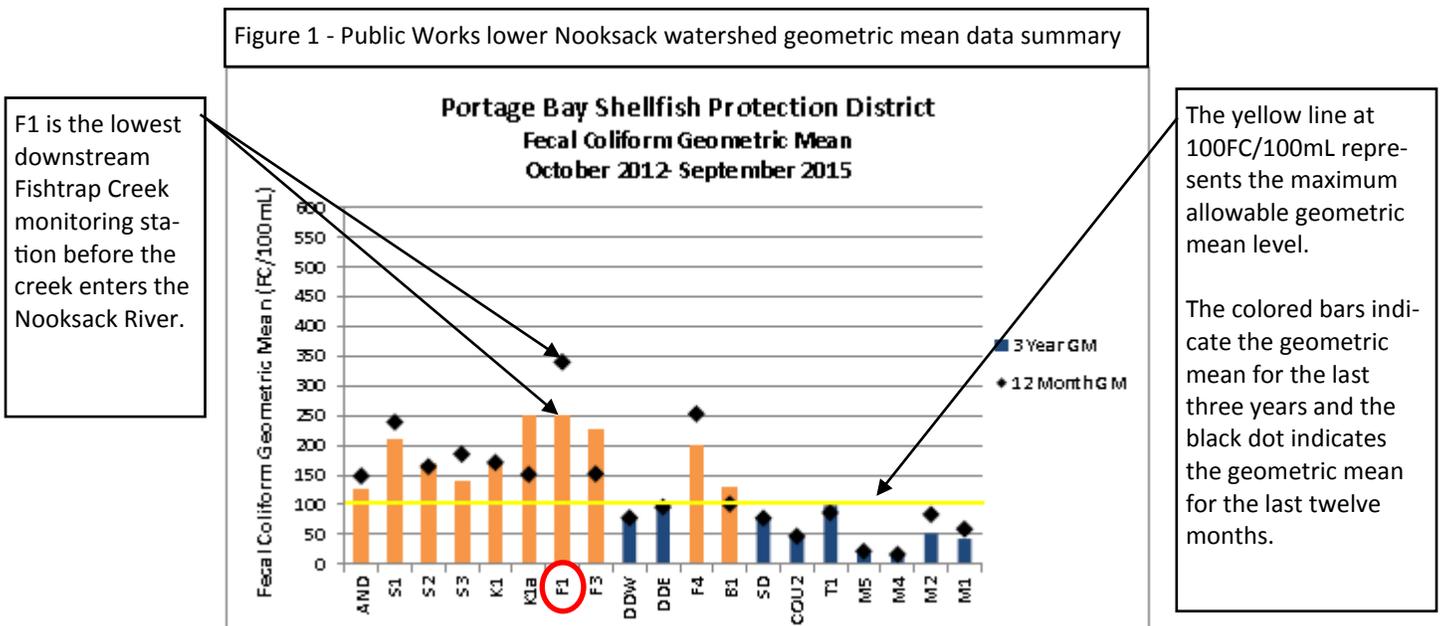
**Monitoring fecal coliform density** - Fecal coliform (FC) bacteria monitoring results are reported in FC per 100 milliliters of sample (FC/100mL) for each sample location.

Whatcom County Public Works (Public Works) conducts routine, twice monthly FC monitoring at fixed location sites in the Nooksack watershed. During one of the two monthly sampling dates, Public Works and other Whatcom Clean Water Program partners coordinate to sample watershed-wide on the same day, usually the day prior to when marine water is sampled in Portage Bay.

Dates for sampling marine water are pre-scheduled by Washington Department of Health, typically one month in advance.

Figure 1 summarizes FC data for Public Works' routine sampling in the Lower Nooksack River watershed during the last three years. The bar chart shows how FC bacteria concentrations in water at the sampling locations compare to the geometric mean criterion of the state water quality standard.<sup>1</sup>

Sampling location descriptions and monthly sampling results for each site summarized in Figure 1 are available from Whatcom County Public Works Natural Resources webpage at <http://www.whatcomcounty.us/1072/Water-Quality>.

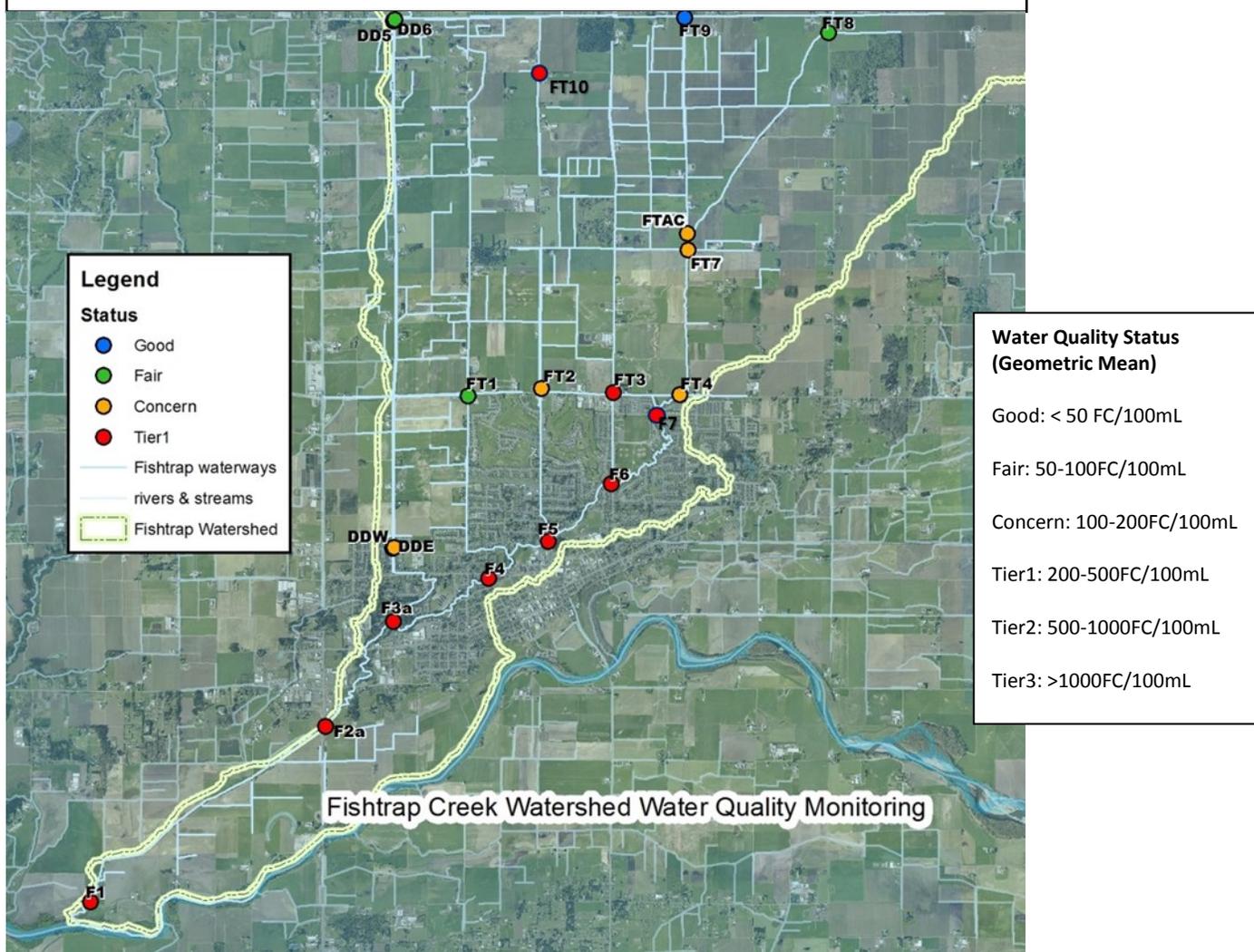


<sup>1</sup> To protect the health of people contacting freshwater for recreation, Washington State's bacteria surface water quality standard has two criteria—a geometric mean criterion and a 90th percentile criterion. Both criteria must be met for water quality to meet standard. In the Lower Nooksack watershed, water quality must meet bacteria criteria established to protect "primary contact recreation" as a use. Freshwater designated uses and criteria are explained further in Washington Administrative Code (WAC) [173-201A-200](http://www.wac.wa.gov/173-201A-200).

Figure 1 illustrates that five sub-basins that drain to the Nooksack River – Anderson Creek (AND), Scott Ditch (S1, S2, S3), Kamm Creek (K1, K1a), Fishtrap Creek (F1, F3, F4), and Bertrand Creek (B1) - fail to meet the FC geometric mean water quality standard. Land use in these watersheds is predominantly agriculture and rural residential. The Canadian portion of the Bertrand sub-basin includes the town of Aldergrove. The Fishtrap Creek sub-basin includes the City of Lynden.

*Fishtrap Creek* - Fishtrap Creek originates in Canada and flows through farm land and the City of Lynden before entering the Nooksack River just downstream of sampling site F1. The Double Ditch system flows south from Canada along both sides of Double Ditch Road and contributes flow to Fishtrap Creek just downstream of sampling site F3a. In Canada, Double Ditch is known as Pepin Creek. See Figure 2 for watershed map with sampling locations.

Figure 2 - Fishtrap Creek watershed focus area water quality sampling location map



The Fishtrap Creek sub-watershed was identified as a focus area for Whatcom County's bacteria pollution identification and correction (PIC) program in early 2015. Fishtrap was prioritized as a focus area because:

- Long term data for the downstream monitoring station (F1) shows that FC concentrations are too high to meet the state water quality standard
- Bacteria levels have increased in the past twelve months (see Figure 1)

The PIC program focuses on finding and fixing human-influenced, preventable sources of FC bacteria pollution by monitoring water quality, prioritizing areas in need of pollution reduction, and working with area residents to identify and fix pollution sources. In agricultural and rural residential land use areas, PIC efforts prioritize finding and fixing pollution related to livestock manure and failing on-site sewage systems (OSS). When a PIC focus area includes a developed area with a sanitary sewer system such as the City of Lynden, pollution impacts from urban stormwater runoff are also considered. Possible FC pollution source investigation could include sanitary sewer cross connections or leaks, improper pet waste disposal, and failing OSS<sup>2</sup>.

Since March 2015 at approximately twenty monitoring sites, Whatcom County Public Works has sampled weekly throughout the Fishtrap watershed. Sampling locations were chosen in cooperation with the North Lynden Watershed Improvement District (WID). In response to elevated bacteria counts, WID leaders coordinate private follow up sampling within WID borders. Public Works, the City of Lynden and Whatcom Conservation District (WCD) also conduct follow up sampling.

See Figure 2 for map of Fishtrap Creek watershed sampling locations and Appendix 1 and Appendix 2 for monitoring results. During late June through mid-September, FT1, FT2, FT3, FT9 and FT10 sampling locations did not have enough water flow to sample.

Results show that as Fishtrap Creek entered the U.S. at FT8, the water was meeting the geometric mean part of the bacteria water quality standard. FC concentrations increased as Fishtrap Creek flowed through agricultural land past Pangborn Road and Badger Road . FC concentrations increased and continued to stay elevated as the creek flowed through the City of Lynden and gathered flow from Double Ditch. In general, the contributing watershed area upstream from F1 is much larger than the contributing areas of stormwater systems within the City of Lynden, particularly during the dry summer months when stormwater discharges from within the City would be small to non-existent.



At Fishtrap Creek Exploration Day, Whatcom Conservation District staff taught community members about water quality and FC sampling, let participants use monitoring equipment, and recruited volunteers. - photo courtesy of WCD

The City of Lynden has a municipal separate storm sewer system (known as an MS4) that includes underground pipes, roads with drainage systems, gutters, catch basins, man-made channels and stormdrains. As the operator of a small MS4, the City of Lynden was required to be covered by a National Pollutant Discharge Elimination System (NPDES) general permit in August 2012. The permit is administered by Washington Department of Ecology and requires the City to address how it will prevent pollution. According to a timeline established in the permit, the City is in the process of developing parts of its comprehensive stormwater management program.

Sampling of stormwater pipe outfalls in the city limits where flow enters Fishtrap Creek is coordinated with routine monitoring in Fishtrap Creek done by Whatcom County staff. City of Lynden consultants are sampling for FC and for ammonia in stormlines and upstream stormwater catch basins. The City will use data to identify sources and prioritize local source control visits as required by the permit. The permit also requires the City to have in place by February 2016 an ordinance prohibiting illicit discharges into its stormwater system.

<sup>2</sup> Approximately 200 residences in the City of Lynden have on-site sewage systems.

For the Double Ditch system, not enough data exists yet to statistically support whether or not water quality was better or worse upstream when it entered the U.S. than downstream when it reached Pine Street. FC concentrations increased as water flowed from DDE to F3a. The City of Lynden will follow up with investigation to identify and correct the pollution source.

Washington Department of Agriculture, Dairy Nutrient Management Program (DNMP) staff sample FC density in water in Bertrand, Fishtrap, Kamm, and Scott sub-watershed focus areas. DNMP staff sample water in locations based on where dairy facilities and dairy manure application fields are located. Staff provide dairy producers and custom manure pumping companies with maps identifying sample locations. When preliminary sample data becomes available, DNMP staff share the data with producers via email as a tool to help producers relate sample results with recent practices. In September, DNMP staff sent letters to producers in all watersheds to provide an update on fecal coliform pollution reduction efforts.

*U.S.-Canadian border* - DNMP and Washington Department of Ecology (Ecology) staff sample water at sites along the U.S.-Canadian (US-CA) border to measure FC concentrations flowing into Whatcom County from Canada through the cross-border Bertrand Creek and Fishtrap Creek systems. Periodic high counts of fecal coliform bacteria have been measured at border sampling sites, both in the Fishtrap watershed via Double Ditch and in the mainstem of Bertrand Creek as it crosses the border.



WSDA inspector collects a fecal coliform sample near the US/Canadian border.

When elevated fecal coliform levels are detected at US-CA border sampling locations, DNMP staff share the water quality information with EPA and with the B.C. Ministry of the Environment. WSDA reports all border data quarterly to the B.C. Ministry of the Environment.

Providing robust data at border sites is important in characterizing where pollution is coming from. Washington Department of Health is working to enable monthly FC sampling at four sites on the Canadian side of the Bertrand Creek watershed during 2016 to characterize bacteria levels before the water flows into the U.S.

*Bertrand watershed* - Throughout the U.S. side of the Bertrand watershed, DNMP staff conduct surveillance and sampling, but focus mainly on the Jackman Ditch area where there is a high concentration of dairies. The area in the Jackman drainage north of H Street continues to show fecal coliform pollution.

During this reporting period, DNMP staff sampled once in late September in the Jackman drainage and in the Kamm watershed on the west side of Northwood at Mormon ditch. The Kamm watershed site result was low (14 FC/10mL), while the Jackman Ditch results on the same day ranged from 220 FC/100mL at H Street on the east side of Jackman Road to 420 FC/100mL downstream at the Jackman Road bridge. The Canadian border sample result was 52 FC/100mL.

Ecology staff sampled for FC upstream at the US-CA border and downstream at Rathbone Road in Bertrand Creek four times during the reporting period. Each sampling event resulted in the upstream border location having a higher FC count than the downstream station. Upstream border sampling results from July – September ranged from 450 to 782 FC/100mL. Downstream sampling results ranged from 80 to 260 FC/100mL.

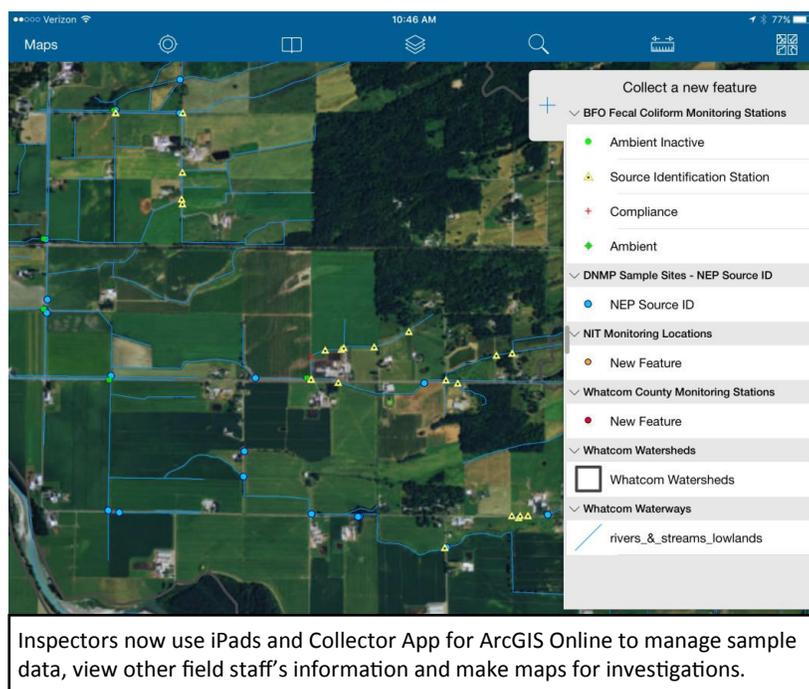
*Kamm watershed* - Kamm Creek is a small stream and ditch system in the lower Nooksack watershed that is

not influenced by flow from Canada. Land use in the basin is predominantly agricultural and rural residential, with most of the eight dairies in the watershed concentrated south of the lower portion of the sub-basin.

DNMP staff note that of the four sub-basins targeted for FC bacteria pollution reduction in the lower Nooksack watershed, the Kamm Creek watershed has had a high level of landowner participation. On one occasion, after seeing FC sample results that DNMP staff shared by email, a producer self-reported as potentially having caused the high FC counts. Another producer who had been contacted for a facility discharge noted that he had found and corrected a pollution source and invited a DNMP inspector to see the fix. These actions support the benefits of clear and consistent communication with landowners at the beginning of a project and how good communication can positively affect participation and corrective action.

Ecology staff conduct FC sampling in the Kamm watershed twice monthly. With dry summer weather, half of the routine sampling locations did not have flow until late September when five of six stations reported high FC counts ranging from 530 FC/100mL to 1437 FC/100mL. The watershed will remain a pollution reduction focus area.

*Improved data collection and management* - DNMP and Ecology staff have been developing ArcGIS Online tools to improve collection, management and sharing of data. The goal of using the online tool is to communicate more efficiently and effectively with partner agencies and stakeholders. By using tablet computers, each agency field inspector can collect and share data and more efficiently to address water quality concerns. The agencies are working to make the tool easily accessible to the public. WCD staff is developing an online map to display routine water quality data.



## DRAYTON HARBOR WATERSHED

### ***Monitoring fecal coliform density***

As part of a county-wide water quality monitoring program, Whatcom County Public Works (Public Works) conducts routine monthly monitoring at fixed location sites in the Drayton Harbor watershed. Routine monitoring identifies areas with patterns of high FC bacteria concentrations and Public Works' prioritizes these areas for pollution reduction through the County's Pollution Identification and Correction (PIC) program.

Focus area monitoring sites typically are sampled weekly, but several monitoring sites had low to no flow during the July through September reporting period:

- Lower Dakota drainage - Ten monitoring sites were sampled weekly when flow was adequate
- Brown Malloy drainage - No monitoring due to lack of flow
- Loomis Trail drainage - Eight monitoring sites were sampled weekly when flow was adequate

The Fox Road drainage was identified as the next PIC program focus area. Public Works and WCD staff conducted a windshield survey of the drainage to identify parcels with potential livestock and to plan outreach.

Routine monitoring stations in both California Creek and Dakota Creek drainages had high concentrations of FC bacteria during Public Works' July and August sampling events. In the Dakota Creek sub-basin, of 27 samples taken during July and August, over half failed to meet water quality criteria maximum (200FC/100mL for a single sample). High results ranged from 210 to 4,900 FC/100mL. Nine of 15 routine samples collected in the California Creek sub-basin failed to meet water quality criteria; results ranged from 400 to 1,873 FC/100mL.

A map of routine sampling sites and monitoring results since January 2013 can be viewed from the Public Works Natural Resources webpage at <http://www.whatcomcounty.us/1072/Water-Quality>.

## 2. PROPERTY OUTREACH, ASSESSMENTS & RESULTS

*Public Works* contacts residents in PIC program focus areas through a series of letters. Letters to residents provide information about neighborhood water quality conditions, how to assess properties for risk of contributing FC pollution to community waterways, and how to access technical and financial assistance if needed.

To specific properties in the areas where the highest fecal coliform concentrations are detected, the contact letters request response from residents. For livestock properties, WCD offers non-regulatory technical assistance to identify risks and to correct livestock-related pollution sources if any are found.

Figure 3 summarizes PIC program outreach attempts and resident response. If residents do not respond to contact attempts and a pollution source and/or critical areas ordinance violation is confirmed, Public Works refers the property to the appropriate enforcement agency for follow up. Of the 12 properties Public Works referred to Whatcom County Planning & Development Services (PDS), two referrals resulted in Notices of Violation. The landowners/operators contacted PDS for subsequent site visits and remedial actions to correct pollution sources and critical areas ordinance violations.

Figure 3 - PIC Program non-dairy livestock owner contacts in Drayton Harbor watershed, July-September 2015						
Drainage	Potential Livestock Parcels	1 <sup>st</sup> Letter	2 <sup>nd</sup> Letter	3 <sup>rd</sup> Letter	Referral	Status
Lower Dakota	33	3	4	5	3	48% cooperation <sup>1</sup> or no livestock or in remedial action
Brown Malloy	19	0	2	6	5	42% cooperation or no livestock
Loomis Trail	11	0	0	5	4	64% cooperation or no livestock
Fox Road	9	8	4	0	0	33% cooperation or no livestock
<b>Total</b>	72	11	10	16	12	

<sup>1</sup> Cooperators include landowners who are PIC program participants or who have a farm plan filed with Whatcom County Planning & Development Services, a Conservation Reserve Enhancement Program contract, or a WCD farm plan.

Many residents have chosen to participate in the proactive opportunity for no cost, non-regulatory technical assistance from WCD staff. Through the PIC program during July-September, WCD staff provided technical assistance to eighteen landowners in the Drayton Harbor and Nooksack River watersheds. See Figure 4 for technical assistance summary.

Figure 4 - PIC program non-dairy livestock owner technical assistance, July-September 2015

Watershed	Landowner Contacts	# Technical Assistance	Farm Plans Completed	Best Management Practices (BMPs) planned	BMPs implemented
Drayton	21	14	8 (81.4 acres)	3 access control (17 acres) 3 heavy use areas (5,700 ft <sup>2</sup> ) 1 prescribed grazing (6.2 acres) 2 roof gutters 1 pasture renovation (1.2 acres) 1 critical area planting (0.25 acres)	1 manure storage 1 prescribed grazing (15 acres) 3 access control (9.5 acres) 1 heavy use area (1000 ft <sup>2</sup> ) 1 underground outlet (150 ft)
Nooksack	4	4	2 (5 acres)	1 critical area planting (0.25 acres)	1 access control (0.05 acres) 1 heavy use area (500 ft <sup>2</sup> ) 1 manure storage

*On-site Sewage Systems (OSS)* - Whatcom County's PIC program includes identifying and correcting FC pollution sources from failing septic systems through the OSS operation and maintenance (O&M) program administered by Whatcom County Health Department. The O&M program requires regular evaluations of OSS located in the marine recovery areas of the Drayton Harbor and Nooksack River watersheds.

During the July – September reporting period:

- An O&M specialist found one failing OSS in the Drayton Harbor watershed. The property is now vacant and trying to hook to City of Blaine sanitary sewer system. Whatcom County Health will follow up with the property in November.
- In August, Whatcom County Health sent notifications to approximately 1000 landowners in the North Lynden area (Bertrand, Fishtrap, and Kamm watersheds) notifying landowners of OSS O&M requirements. By the end of September, County Health had received approximately 135 reports of system status. County Health will send reminder letters to landowners to reinforce evaluation requirements.
- An O&M specialist found one failing OSS in the North Lynden area. The landowner is pursuing permission to connect to the City of Lynden sewer system.
- County Health staff offered three workshops to allow 108 homeowners to become certified to evaluate their own OSS. Landowners who attend a workshop are eligible for a rebate to help with the cost of an OSS evaluation by a licensed specialist, septic tank pumping, or installation of O&M equipment.
- Public Works processed seven rebate applications.

*Washington Department of Agriculture, Dairy Nutrient Management Program (DNMP)* conducts routine inspections of dairy facilities. Each licensed dairy facility in Whatcom County receives a pre-scheduled inspection every 22 months. When pollution concerns are identified during routine inspections, DNMP staff follow up on recommended corrective actions. Staff also conducts focused inspections for issues such as lagoon assessments or clean water diversion.

When DNMP staff identify pollution concerns on non-dairy livestock properties during aerial or field surveillance, staff refer the properties to Department of Ecology or to Whatcom County Planning and Development Services (PDS).

Enforcement activity for DNMP this quarter included a final settlement for a penalty to a dairy for a manure discharge identified in February 2015. The dairy is located in a drainage known as LLPL ditch that flows directly to the Nooksack River west of Guide Meridian bridge.

Washington Department of Ecology (Ecology) interacted with 17 property owners during the reporting period, including a berry farmer with identified pollution concerns based on field application of manure solids. Five landowners refused to allow Ecology to access their property and will remain properties of concern and surveillance. Inspectors confirmed that three landowners completed five best management practices (BMPs), with two other property owners committing to complete three BMPs.

When Ecology staff identify dairy-related pollution concerns, or concerns about critical areas ordinance violations, staff refer properties to DNMP or to PDS.

From July - September, Ecology:

- Referred four properties to DNMP and two properties to PDS
- Issued three warning letters to landowners in the Bertrand, Scott and Ten Mile watersheds
- Issued an Immediate Action Order to a landowner in the Bertrand watershed
- Issued a Notice of Penalty to a landowner in the Drayton Harbor watershed

### 3. OTHER ACTIVITIES

#### *Outreach, collaboration and coordination*

Several Whatcom Clean Water Program partners led and participated in community outreach events during the third quarter. Events and informational materials provide information about water quality, the PIC program, opportunities to participate in citizen science programs, and what actions individuals can take to contribute to improved water quality.

- The Shuckin' on the Farm and Run with the Chums events coincided with the annual Whatcom Water Weeks celebration during September. Staff from Public Works, WCD, Washington Department of Health, and Lummi Nation participated in the Shuckin' on the Farm event that celebrated shellfish and clean water. Approximately 340 community members participated in these events.
- Public Works staff support ongoing quarterly meetings of the shellfish protection district advisory committee meetings for Drayton Harbor and for Portage Bay.
- Representatives of the thirteen local, state and federal partner agencies that form the [Whatcom Clean Water Program](#) meet every five to six weeks to coordinate FC pollution reduction work. In addition, partners including Whatcom County departments, WCD, and state agency representatives regularly attend and support the shellfish protection advisory committee meetings and ongoing public education efforts.

**Appendix Table 1. Fishtrap Creek watershed bacteria data, mainstem sampling locations  
March—September 2015**

This table reports Whatcom County Public Works' fecal coliform results for focus area sampling since March 2015 at stations in the mainstem of Fishtrap Creek. Results in red exceed 200 FC/100mL. *E. coli* bacteria (results in parentheses) are tested at a subset of stations twice per month.

	River Rd.	Guide Meridian	Main St.	Depot Rd.	Bender Rd.	Aaron	Badger	Pangborn	North-wood
Date	F1	F2a	F4	F5	F6	F7	FT4	FT7	FT8
3/30/15	200	100	220	170	150 <sup>2</sup>	NS	110	100	36
4/6/15 <sup>3</sup>	56	68	92	32	36 <sup>2</sup>	NS	20 (31.3)	24	20
4/13/15	120	180	320	370	88	NS	72	48	32
4/20/15	190	160	400	210	220	NS	40	40	25
4/30/15	270	200	390	200	210	NS	120	46	17
5/4/15	300	300	240	250	60	NS	54	48(38)	20
5/11/15	290	891	230	145	320	NS	135 (133)	76 (76)	50 (33)
5/18/15	390	350	400	440	350	NS	92	360	42
5/27/15	280	520	420	320	300	NS	161	200	64
6/1/15	360	330	240	240	430	773	260 (140)	138 (133)	104 (58)
6/8/15	280	300	320	350	240	200	112 (74)	310 (120)	50 (32)
6/15/15	250	260	280	340	410	420	157	68	74
6/22/15	114	210	270	450	550	380	360 (170)	88 (64)	19 (19)
6/29/15	340	220	92	NS <sup>4</sup>	153	NS	NS <sup>4</sup>	NS <sup>4</sup>	84
7/7/15	360	320	260	144	162	2,900	510	220	106
7/13/15	619	919	5,200	6,200	540	470	400	330	163
7/20/15	682	370	410	250	230	330	360 (190)	240 (110)	550 (250)
7/27/15	710	480	125	570	600	500	510	240	76
8/4/2015	490	440	470	600	480	300	300	460	200
8/10/2015	205	200	166	145	730	220	220	230	132
8/17/2015	400	108	360	300	76	220	220	230	260
8/24/2015	104	82	106	928	240	158	158	500	stagnant
8/31/2015	72	400	6,300	755	6,100	200	210	390	70
9/8/15	200	290	250	300	400	400	330	460	76
9/14/15	520	163	300	116	200	210	280	220	78
9/22/15	500	520	320	200	200	70	220	330	44
9/28/2015	320	320	110	74	78	82	74	60	25

<sup>1</sup> NS- no sample

<sup>2</sup> Samples collected upstream of culvert.

<sup>3</sup> E.coli analyzed using Colilert.

<sup>4</sup> Sample contaminated. No result.

**Appendix Table 2. Fishtrap Creek watershed bacteria data, upstream sampling locations  
March—September 2015**

This table reports Whatcom County Public Works' fecal coliform results for focus area sampling since March 2015 at stations in the upper watershed that eventually flow to the mainstem of Fishtrap Creek. Results in red exceed 200 FC/100mL. *E. coli* bacteria (results in parentheses) are tested at a subset of stations twice per month.

	Double Ditch (DD) at Fishtrap	DD west at Pine	DD east at Pine	DD west at border	DD east at borders	Benson at Badger	Depot at Badger	Depot at Visser	Bender at Badger	East Assink north of Pangborn	East Assink at border
Date	F3a	DDW	DDE	DD5	DD6	FT1	FT2	FT10	FT3	FTAC	FT9
3/30/15	140	100	100	90	84	150	1,700	860	81	170	12
4/6/15 <sup>3</sup>	48	12	32	48 (19.9)	40 (9.8)	80 (54.6)	68 (20.1)	6,600 (>2,419.6)	480 (99.1)	40 (14.6)	16
4/13/15	108	104	72	60	80	28	470	580	390	40	32
4/20/15	360	33	92	38	46	4	300	dry	620	80	13
4/30/15	240	28	76	86	78	32	64	dry	240	200	44
5/4/15	290	NS	NS	62(40)	42 (30)	35	54 (48)	dry	240 (190)	88 (74)	15 (14)
5/11/15	2,400	52	440	82 (36)	64 (42)	32 (22)	310 (250)	dry	380 (200)	260 (160)	trickle
5/18/15	550	70	280	50	42	30	380	dry	330	156	dry
5/27/15	728	350	610	64	340	200	86	dry	655	370	dry
6/1/15	430	220	460	54 (42)	72 (46)	88 (40)	146 (81)	dry	737 (400)	673 (373)	dry
6/8/15	450	360	380	230 (90)	100 (72)	390 (170)	240 (190)	dry	320 (200)	520 (360)	dry
6/15/15	430	145	380	68	42	56	270	dry	dry	460	dry
6/22/15	480	480	dry	80 (50)	76 (50)	430 (270)	44 (36)	dry	dry	142 (115)	dry
6/29/15	700	460	dry	54	200	dry	NS <sup>4</sup>	dry	dry	240	dry
7/7/15	520	240	dry	420	250	dry	560	dry	dry	dry	dry
7/13/15	1,310	580	dry	360	320	dry	49	dry	dry	143	dry
7/20/15	360	dry	dry	360 (170)	270 (140)	dry	dry	dry	dry	dry	dry
7/27/15	1,046	2,000	919	133	200	dry	dry	dry	dry	240	dry
8/4/2015	200	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
8/10/2015	590	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
8/17/2015	240	dry	dry	88	76	dry	dry	dry	dry	dry	dry
8/24/2015	127	dry	dry	54	50	dry	dry	dry	dry	dry	dry
8/31/2015	230	370	dry	682	137	dry	dry	dry	dry	320	dry
9/8/15	400	17	37	80	64	dry	dry	dry	dry	310	dry
9/14/15	350	14	80	52	33	dry	dry	dry	dry	100	Dry
9/22/15	773	27	19	22	27	dry	dry	dry	dry	44	dry
9/28/2015	773	17	5	10	9	19	58	dry	dry	12	dry

<sup>1</sup> NS- no sample

<sup>2</sup> Samples collected upstream of culvert.

<sup>3</sup> E.coli analyzed using Colilert.

<sup>4</sup> Sample contaminated. No result.