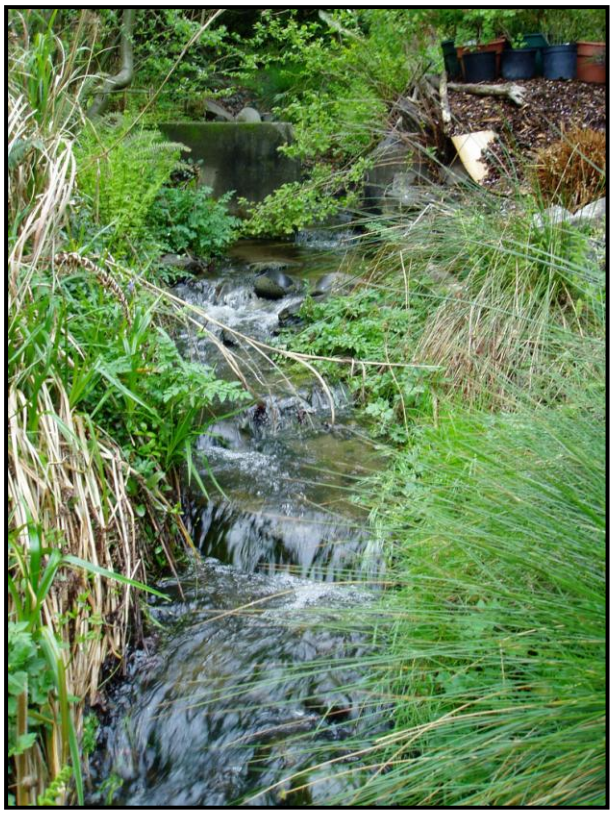
Fauntleroy Creek
Fecal Coliform Bacteria
Total Maximum Daily Load

Water Quality Implementation Plan



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Cover photo: Fauntleroy Creek, taken by Judy Pickens.

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Total Maximum Daily Load

Water Quality Implementation Plan

by
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Executive Summary

The Washington State Department of Ecology (Ecology) has a longstanding interest in improving water quality in urban creeks, such as Fauntleroy Creek. In 2004, Ecology determined Fauntleroy Creek has fecal coliform bacteria levels beyond what the state allows in our freshwaters. The federal Clean Water Act requires a total maximum daily load (TMDL) study for all polluted water bodies. A TMDL study identifies the pollution problems and specifies how much pollution needs to be reduced to achieve clean water. Ecology then works with the local community to develop a detailed plan of actions to control the pollution.

In June 2007, Ecology produced the *Fauntleroy Creek Fecal Coliform Bacteria TMDL: Water Quality Improvement Report* (report). The report documented how much fecal coliform bacteria Fauntleroy Creek can receive without exceeding water quality standards, and established recommended load and wasteload allocations for pollution sources. It also provided a strategy of actions needed to improve the water quality, and described how Ecology involved the community in the decision-making process. The U.S. Environmental Protection Agency (EPA) approved the fecal coliform bacteria TMDL for Fauntleroy Creek in August 2007.

This follow-up document, *Fauntleroy Creek Fecal Coliform Bacteria TMDL: Water Quality Implementation Plan* (plan), is Ecology's more recent effort to address potential fecal coliform bacteria sources to the creek. The city of Seattle and Fauntleroy Watershed Council have been active partners in restoring Fauntleroy Creek for years and assisted in the development of this plan. Our efforts from this point will build upon their accomplishments to help Fauntleroy Creek meet Washington's Water Quality Standards for fecal coliform bacteria and become a clean and healthy stream.

This plan details the specific actions needed to reduce fecal coliform bacteria levels in Fauntleroy Creek. It describes management roles, activities, and schedules for partners. To reduce the current sources of fecal coliform bacteria to the creek while fully supporting all beneficial uses, the plan prescribes actions that involve source tracking activities, riparian re-vegetation projects, public awareness programs, and water quality monitoring efforts. After all actions are accomplished, Ecology expects Fauntleroy Creek to meet the state's Water Quality Standards for recreational use by June 2013.

Using an adaptive management approach, Ecology will track the progress of the plan. Ecology will record completed bacteria source control measures and activities. If the planned activities are shown not to be effective, the actions in plan will be reexamined and modified as part of the adaptive management process.

What is a Total Maximum Daily Load?

Federal Clean Water Act requirements

The Clean Water Act established a process to identify and clean up polluted waters. It requires each state to have its own water quality standards designed to protect, restore, and preserve water quality. Washington State Water Quality Standards (Chapter 173-201a WAC) establish (1) designated uses for state water, such as protection for cold water biota and recreational use, and (2) standards, usually numeric criteria, to achieve those uses.

Every two years, states are required to prepare a list of water bodies – lakes, rivers, streams, or marine waters – that do not meet water quality standards. This list is called the 303(d) list. To develop the list, the Department of Ecology (Ecology) compiles its own water quality data along with data from local, state, and federal governments, tribes, industries, and citizen monitoring groups. All data are reviewed to ensure that they were collected using appropriate scientific methods before the data are used to develop the 303(d) list. The 303(d) list is part of the larger process called the Water Quality Assessment.

The Water Quality Assessment provides a comprehensive list that tells a more complete story about the condition of Washington's water. This list divides water bodies into one of five categories:

Category 1 – Meets standards for parameter(s) for which it has been tested.

Category 2 – Waters of concern.

Category 3 – Waters with no data available.

Category 4 – Polluted waters that do not require a TMDL because:

- 4a. – Has a TMDL approved and it's being implemented.
- 4b. – Has a pollution control program in place that should solve the problem.
- 4c. – Is impaired by a non-pollutant such as low water flow, dams, culverts.

Category 5 – Polluted waters that require a TMDL – the 303(d) list.

TMDL process overview

The Clean Water Act requires each water body on the 303(d) for Category 5 have a total maximum daily load (TMDL). The TMDL begins with a study that describes the pollution problem and then specifies how much that pollutant must be reduced or eliminated to achieve clean water. Ecology shares this information with the local community to set goals for improving the water quality of the water body. The Water Quality Improvement Report documents the findings from the TMDL study, strategy for actions, and describe the work with the community. Once U.S. Environmental Protection Agency (EPA) approves the report, a

Water Quality Implementation Plan must be developed within one year. This plan identifies specific tasks, responsible parties, and timelines for achieving clean water.

What part of the process are we in?

In June 2007, Ecology produced the *Fauntleroy Creek Fecal Coliform Bacteria TMDL: Water Quality Improvement Report* (report) (Ecology, 2007a). EPA approved the fecal coliform bacteria TMDL for Fauntleroy Creek in August 2007. During the 2008 State Water Quality Assessment, Ecology moved Fauntleroy Creek to Category 4a for polluted waters with an approved TMDL currently being implemented (Ecology, 2008). The *Fauntleroy Creek Fecal Coliform Bacteria TMDL: Water Quality Implementation Plan* (plan) details the specific actions needed to improve fecal coliform conditions in Fauntleroy Creek. This plan describes the management roles, activities, and schedules for partners.

Elements required in a TMDL

The goal of this TMDL process is to establish the bacteria loading for Fauntleroy Creek and to work with the local community to restore it to good health. The report includes a written, quantitative assessment of pollutant sources of the water quality problems using the best available information. The study determines the amount of a given pollutant that a water body can receive and still meet state water quality standards (called the 'loading capacity"), and then allocates that load among the various sources.

Identifying the pollutant loading capacity for a water body is an important step in developing a TMDL. EPA defines the loading capacity as "the greatest amount of loading that a water body can receive without violating water quality standards" (EPA, 2001). The loading capacity provides a reference for calculating the amount of pollution reduction needed to bring a water body into compliance with the standards.

The portion of the receiving water's loading capacity assigned to a particular source is a load or wasteload allocation. If the pollutant comes from a discrete (point) source, such as a municipal or industrial facility's discharge pipe, that facility's share of the loading capacity is called a wasteload allocation (WLA). If the pollutant comes from a set of diffuse (nonpoint) sources, such as general urban, residential, or farm runoff, the cumulative share is called a load allocation (LA).

The TMDL study must also consider seasonal variations in water quality and, when appropriate, include a margin of safety that takes into account any lack of knowledge about the causes of the water quality problem or its loading capacity. A reserve capacity for future loads from growth pressures is sometimes included as well. By definition, a TMDL is the sum of the allocations, which must not exceed the loading capacity. The sum of the wasteload and load allocations, the margin of safety (MOS), and any reserve capacity must be equal to or less than the loading capacity.

TMDL (Loading Capacity) = sum of all WLAs + sum of all LAs + MOS

Background: Fauntleroy Creek and its Water Quality Problem

Watershed description

Fauntleroy Creek is an urban creek located four miles south of Alki Point on West Seattle peninsula within Water Resource Inventory Area (WRIA) 09 (Figure 1). Fed perennially by runoff and springs, the creek begins in Fauntleroy Park and flows about one mile through alternating culverts and open reaches before entering Fauntleroy Cove in Puget Sound. In this urban watershed land use consists primarily of single-family homes and local roads, some commercial and public buildings, and a city park with coniferous and deciduous forest which protects the headwaters of Fauntleroy Creek. Washington State Ferries operates a ferry terminal dock off the mouth of Fauntleroy Creek.

Recreational activities that can put people in contact with fecal coliform bacteria in the creek include children playing in the creek or people walking in the water. Fauntleroy Creek appears to have some public use or exposure potential. People can access the creek through the Fauntleroy Park where extensive walking trails exist. In contrast, private property adjacent to much of the lower reach limits public access to nearby residents.

From 1920 to 1979, the city of Seattle installed extensive networks of pipes and drains to divert road and roof runoff into the public stormwater system (Seattle, 2004). As a result of Seattle's stormwater infrastructure, the drainage area into Fauntleroy Creek dramatically decreased to one third of its historical size, to about 149 acres. Ecology defined this present-day Fauntleroy Creek drainage basin as the study area for developing the TMDL (Figure 1). The implementation area extends beyond the study area to the larger historical creek drainage basin so education and public awareness activities can be applied to the larger Fauntleroy community.

Figure 1. Map of present-day drainage basin of Fauntleroy Creek (TMDL Study Area) and historical drainage basin.

Why did Ecology conduct a TMDL in this watershed?

Ecology has a longstanding interest in improving water quality in urban creeks, such as Fauntleroy Creek. In 2004, Ecology determined that Fauntleroy Creek has fecal coliform bacteria levels, as measured as colony forming units (cfu) per 100 mL of water, beyond what the state allows in our freshwaters (Ecology, 2004). As a result, Ecology placed Fauntleroy Creek in Category 5 for polluted waters that require a TMDL (Table 1). Ecology collected two years of recent surface water monitoring data in Fauntleroy Creek for the TMDL study.

Table 1. Fauntleroy Creek's Category 5 303(d) listing on Ecology's 2004 Water Quality Assessment.

Water Body	Parameter	Listing ID	Township	Range	Section
Fauntleroy Creek	Fecal coliform	6656	24N	03E	35

Washington State Water Quality Standards use fecal coliform bacteria to indicate the presence of waste from humans and other warm-blooded animals in freshwaters. These organisms may enter the aquatic environment directly from humans and animals, agricultural and stormwater runoff, and wastewater. Although fecal coliform are usually not pathogenic, they occur in association with disease-causing bacteria and viruses (i.e., pathogens) and thereby serve as indicators of the potential for pathogens in the water.

Water quality standards for fecal coliform bacteria in freshwater are set to protect people who work and play in and on the water from waterborne illnesses. Generally, a high fecal coliform bacteria count indicates a greater likelihood for pathogens to also be present. Fecal coliform bacteria are typically found in higher numbers than pathogens and are easier to analyze in the laboratory.

Ecology assigned Fauntleroy Creek to be protected for "extraordinary primary contact recreation." To protect this use category: "Fecal coliform organism levels must not exceed a geometric mean value of 50 colonies/100 mL, with not more than 10 percent of all samples (or any single sample when less than ten samples exist) obtained for calculating the geometric mean value exceeding 100/colonies mL." [WAC 173-201A-200(2)(b), 2003 ed.]

Long-term data indicate Fauntleroy Creek had extreme peaks of fecal coliform bacteria in the early years of monitoring with general improving conditions since late 1989 (Ecology, 2007a). However, recent data show the creek still does not meet state water quality standards for recreational contact during all seasons, especially during the drier months from May through September when people are more likely to use the creek for recreation (Table 2).

Table 2. Current water quality conditions and target bacteria reductions in Fauntleroy Creek (Ecology, 2007). GMV is the geometric mean value of the sample population. The 90th percentile is the threshold of the upper ten percent of the sample population. Bold indicates exceedance of the state bacteria criteria.

Fauntleroy Creek Near Mouth at Ecology Station 09K070	Water Quality Standard		Current Conditions		Target Percent Reductions*	
	GMV	90th %tile	GMV	90th%tile	GMV	90th%tile
Dry Season (May 1 – Sept. 30)	50	100	**250**	**497**	80%	80%
Wet Season (Oct 1 – April 30)	50	100	**52**	**192**	3.4%	48%
Annual	50	100	**99**	**437**	50%	77%

- Target Percent Reduction = [Current Conditions – Water Quality Standard] ÷ Current Conditions
- GMV = geometric mean value
- %tile = percentile

The TMDL goals

Through the TMDL process, Ecology set fecal coliform bacteria load targets and summarized a strategy for attaining water quality standards for bacteria in Fauntleroy Creek (Ecology, 2007a). The TMDL analysis used Ecology data collected from 2004 to 2006.

The following summarizes the numerical TMDL values for Fauntleroy Creek:

- Since long-term flow data did not exist for Fauntleroy Creek during the TMDL development, Ecology estimated the average annual streamflow in Fauntleroy Creek using Walker Creek as a reference urban stream. Based on the estimated average annual flow and the state's geometric mean standard of 50 cfu/100 mL for fecal coliform bacteria, Ecology estimated Fauntleroy Creek can receive about 179 billion bacteria colonies per year (489 million bacteria colonies per day) and still meet water quality standards. This is the estimated 'loading capacity".

- Using recent data, Ecology estimated how many bacteria colonies currently enter the creek on an annual and daily basis. Between 2004 and 2006, the creek had an average annual bacteria concentration of 99 cfu/100 mL. So it received about 354 billion bacteria colonies per year from all sources, exceeding its estimated total loading capacity. To bring Fauntleroy Creek into compliance with state water quality standards, it will take an 80 percent reduction in current bacteria loadings from all sources to the creek. This is the "target percent reduction" needed to bring Fauntleroy Creek into compliance with state standards.

- The responsibility for reducing fecal coliform bacteria levels is distributed among pollution sources on an annual basis. To reduce current pollutant loadings to the creek while fully supporting all beneficial uses, this TMDL established a wasteload allocation of 69 percent of the total fecal coliform bacteria loading capacity in Fauntleroy Creek to Seattle stormwater point sources, 21 percent to nonpoint sources, and 10 percent for a margin of safety. There are no non-stormwater point sources discharging into Fauntleroy Creek.

The city of Seattle and Fauntleroy Watershed Council have been active partners in restoring Fauntleroy Creek for years, and assisted in the development of the Water Quality Implementation Plan. This plan will build upon their accomplishments to provide steps by which Fauntleroy Creek can meet water quality standards for fecal coliform bacteria.

Ecology and its key partners developed this plan to reduce bacteria loadings to Fauntleroy Creek. This plan details the water quality improvement activities and includes a monitoring plan to assess their effectiveness. As actions are accomplished, Ecology expects Fauntleroy Creek to comply with state water quality standards for recreational contact (for extraordinary primary contact recreation) by June 2013.

Students at KapKa Primary School next to their inverted milk carton pet waste bag dispenser in Fauntleroy Park. Photo: Judy Pickens

Restoring the lower reach of Fauntleroy Creek in the Reach-to-the-Beach Project.
Photo: Judy Pickens

What Will Be Done and Who Will Do It?

Implementation strategy (summary of actions)

During implementation, the overall goal is to achieve state water quality standards for bacteria in Fauntleroy Creek. As defined in this plan, the implementation area is the historical drainage basin to Fauntleroy Creek. Most actions are applicable only to the present-day drainage basin while other actions (i.e., public outreach, watershed stewardship) are applicable to the historical drainage basin. To reduce the current bacteria loadings to the creek while fully supporting all beneficial uses, Ecology encourages the following actions that involve source tracking, riparian re-vegetation projects, increasing public awareness, and water quality monitoring.

- **Increase understanding of the area and land use draining to the implementation area** to help define other actions. Additional information to be gathered may include specific land use and business types within the present day drainage basin.

- **Investigate and repair of possible sewer leaks**, which involves responding immediately and appropriately to sewer leaks by responsible parties.

- **Eliminate identified illicit discharges** to the stormwater drainage system. There are several methods available to detect and eliminate illicit discharges and connections, including outfall surveys, to help identify dry weather flows and pollution sources.

- **Identify specific sources of bacteria** pollution through targeted water quality monitoring. This allows partners to focus Best Management Practice (BMP) resources where they are needed most.

- **Re-vegetate riparian areas to** enhance water quality and habitat and improve stream hydrologic function. Adequately-sized and healthy riparian buffers help filter out a variety of pollutants including fecal coliform bacteria.

- **Outreach to the public** about properly disposing of domestic pet waste, restricting feeding waterfowl, improving yard waste management, and reducing illicit discharges into storm sewers.

- **Provide watershed stewardship opportunities** for citizens to learn about the values and benefits of protecting Fauntleroy Creek from water quality degradation.

- **Monitor the water quality after implementation to** determine whether or not fecal coliform levels in Fauntleroy Creek are decreasing.

Potential pollution sources

In the Fauntleroy Creek watershed, there are several potential sources of fecal coliform bacteria common to urban watersheds. Likely sources include domestic pet waste and wildlife (including avian) waste. Less likely sources are domestic wastewater and sewage. Urban stormwater can carry fecal coliform bacteria from any of these sources into the creek.

Domestic wastewater or sewage

Wastewater from showers, toilets, and sinks is defined as "domestic wastewater." Domestic wastewater can be generated in private residences or commercial businesses. In this watershed, wastewater is conveyed to a King County wastewater treatment facility through a regional sewage conveyance system. A sanitary sewer collection line parallels the creek and borders the Fauntleroy Cove shoreline.

Sewage could potentially enter surface waters under several scenarios: sanitary sewer line breaks, leaks, or illicit cross-connections to stormwater sewers. These can be significant sources of fecal coliform contamination (with concentrations in the tens of thousands of bacteria colonies per 100 mL) and pose great human health risk to people coming in contact with the water.

For sewer systems that rely on gravity to ensure good flow, the favorable natural grade adjacent to a stream makes it a practical place to locate lines at an economical cost. Leaky joints due to shifting earth, line deterioration, or improper installation could lead to leakage to a local stream in these situations.

Sewer system breakdowns or illegal cross-connections are generally corrected as soon as they are detected. In winter of 2006, two pipe failures near Fauntleroy Cove resulted in sewer-line replacement between pump stations in the cove and at Lowman Beach to the north.

Corrective or preventative actions

Investigation and repair of possible sewer leaks involves responding immediately and appropriately to sewer leaks or overflows by responsible parties. Where sewer lines intersect with or run parallel to surface waters, the need for water quality testing upstream and downstream of the lines should be evaluated based on the history of line integrity, age of the line, type of materials, and results of regularly scheduled conveyance integrity inspections. Seattle Public Utilities' inspections generally involve camera inspection as well as life cycle analysis. Sewer lines known or suspected to not conform with Ecology's Criteria for Sewage Works Design (Louthain 1998) should be a priority for inspection.

Sewage system operators should make GIS or hard copy maps (as appropriate) available to staff conducting field work so they may perform more detailed inspections of stream segments where sewer lines are located near a creek.

Domestic pet waste

Microbial source tracing (MST) studies use DNA ribotyping methods to identify sources of fecal coliform bacteria. Such studies consistently show the presence of fecal coliform bacteria from dogs and cats in streams and creeks in urban and suburban Puget Sound streams (Table 3). Due to the limitations of the test method, percentages do not accurately quantify concentrations from each source category but provide a qualitative indication of sources. In an MST study of Thornton Creek, another highly urbanized Seattle watershed, domestic pets (primarily dogs) were found to be contributors of fecal coliform bacteria (Herrera, 2007). Although current methods do not allow for quantification of the fecal coliform bacteria contribution from various sources (e.g., dog, cat, human, avian, wildlife), the consistent presence of pet waste in regional studies indicates that BMPs to control these particular sources should be implemented.

Pet wastes generated at individual homes and public areas, such as parks and playgrounds, may contribute fecal coliform bacteria to Fauntleroy Creek. Dog feces are frequently observed along trails popular with dog walkers in Fauntleroy Park, particularly at the Forrest Court entrance (Pickens, 2006; Richmond, 2008; Dolfay, 2008). Seattle installed "Scoop Law" signage at trail entrances to Fauntleroy Park. In 2003-2004 and 2006-2007, students of KapKa Cooperative Primary School investigated pet waste in the park and created pet waste stations with bag dispensers made from milk jugs and filled with used plastic grocery bags. The recent class found that much of the dog droppings were off of the park trails, suggesting many of the dogs were off leash.

Veterinary offices, animal kennels, and other commercial animal handling facilities generate significant amounts of animal wastes as a byproduct of boarding and other services. If present in the watershed, these businesses must properly manage animal wastes in order for this water cleanup effort to succeed.

Corrective or preventative actions

Public outreach can help address pet waste issues by developing and disseminating educational materials (such as pamphlets, mailers, and signage) to promote proper management of domestic pet waste.

An increased understanding of the area contributing to the present day drainage basin of Fauntleroy Creek, and a better understanding of land uses in the basin, could help define other actions needed to correct fecal coliform bacteria sources. Additional information to gather should include presence and location of specific animal handling businesses. If these types of businesses are present, public outreach should be prepared and distributed to educate businesses about how to prevent fecal waste from entering into surface or stormwater systems.

Table 3. Summary of bacteria sources identified in urban and suburban streams in Puget Sound. Percentages shown are percentage of the total isolates matched to the source (except bottom row). Bottom row indicates the number of bacteria colonies enumerated to determine the percentages in the rows above. Shaded boxes and bold numbers show the top most frequently matched isolates for each study.

Source	**Edgewater Creek** (Mathius, 2003a)	**Glennwood Creek** (Mathius, 2003b)	**Swamp Creek** (Mathius, 2003b)	**Woodland Creek** (TCPH, 2002)	**North Creek Bothell** (Meehan, 2004)	**Thornton Creek** (Herrera, 2007)	**Mill Creek** (King County 2006)	**Springbrook Creek** (King County 2006)	**Hamm Creek** (King County 2006)
Cat/Feline	6.8%	14%	1.6%	1.5%	3%	0.5%	0.6%	2.2%	2.6%
Dog/Canine	**7.4%**	**21%**	**14.3%**	**24.3%**	**15%**	**10.3%**	**17.6%**	**16.9%**	**17.9%**
Opossum/Rabbit	2.7%	2.5%	2.4%	1.5%	1%	1.1%	<1%	<1%	1.3%
Raccoon	**10.8%**	2%	**7.1%**	5.1%	5%	**14.7%**	4.2%	10.4%	11.5%
Beaver/Rodent	2%	9%	0.8%	8.8%	**18%**	**19.3%**	**20%**	**19.1%**	**17.9%**
Muskrat/Skunk							0.0%	0.0%	<1%
Squirrel	1.4%		0.8%			0.4%	0.0%	<1%	0.9%
Deer/Elk				6.6%	<1%		7.3%	2.7%	0.9%
Bear/Bobcat/ Coyote							<1%	0.0%	0.9%
Storm Drain		0.5%							
Human/Sewage	1.4%		2.4%	**14.7%**	12%	3.9%	2.4%	0.0%	2.6%
Horse				3.7%			1.2%	0.0%	<1%
Bovine				3.7%			<1%	0.0%	<1%
Chicken				0.7%					
Avian	**8%**	**28%**	**13.5%**	**11%**	**38%**	**39.8%**	**37.6%**	**35.5%**	**27.8%**
Waterfowl						4.8%	7.3%	4.9%	5.1%
Goose		1.3%	4.8%	2.2%					
Sea gull		0.7%	1.6%	1.5%					
Duck					<1%				
Multi species				6.6%					
Unknown	*60.1%*	*21%*	*50.8%*	*8.1%*	*6%*	*5.3%*	*0.0%*	*7.1%*	*9.0%*
Total percentage	100%	100%	100%	100%	100%	100%	100%	100%	100%
# of isolates	147	196	126	182	349	565	165	183	234

Urban stormwater

Ecology does not consider stormwater a pollutant source in itself, but an efficient conveyor of pollutants from drainage surfaces to local waters. Stormwater starts as rainwater and other precipitation and either infiltrates into the ground or accumulates and flows over impervious surfaces. These areas include rooftops, driveways, sidewalks, parking lots, and roads. Land uses and activities in urban areas, combined with an increase in impervious areas and accumulation of contaminants, typically results in polluted stormwater. Heavy rainfall and runoff wash contaminants off impervious areas into storm drains or directly into streams. During typical storms, pollutants from these areas can reach stream systems quickly.

Some stormwater that enters streams is untreated and can contain toxic metals, organic compounds, and bacterial and viral pathogens. Stormwater can carry bacteria from sources such as pet waste and urban wildlife to Fauntleroy Creek. Additionally, urban stormwater can carry excess nutrients from lawns and gardens, and other pollutants associated with activities such as car washing, illicit dumping, and sidewalk cleaning. The specific water quality impact of stormwater on the creek is hard to quantify, partly because of the high variability of pollutant concentrations in stormwater and creek water.

In urban areas around Puget Sound and elsewhere across the country, bacteria concentrations in stormwater range from approximately 1,000 to over 100,000 organisms/100 mL (Chang 1999, Doran et al. 1981, Pitt 1998, Varner 1995). In a recent database compiled by the Center for Watershed Protection, mean fecal coliform concentrations in urban stormwater nationwide were 15,000 cfu/100 mL (Schueler, 1999).

Local data from a stormwater conveyance system discharging to Piper's Creek (a similar watershed to Fauntleroy Creek in that it is located in Seattle, primarily high-density residential, and primarily a ditch or culvert drainage system) showed fecal coliform bacteria concentrations ranging from 200 cfu/100 mL to 27,200 cfu/100 mL with a median value of 1,220 cfu/100 mL (Chapman, 2006).

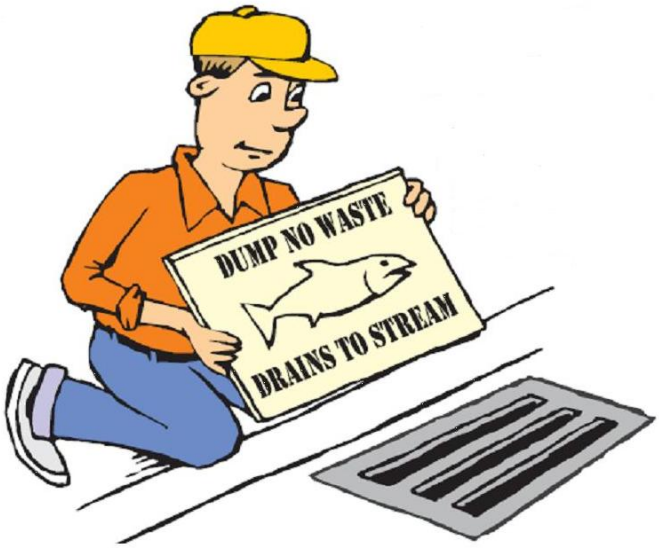
The majority of stormwater captured within the present-day Fauntleroy Creek drainage basin reaches the creek through a system of surface ditches and culverts. The city of Seattle owns and operates a municipal separate storm sewer system (MS4) as defined by federal law. Ecology regulates it through the National Pollutant Discharge Elimination (NPDES) Municipal Phase I Stormwater Management Program (Ecology, 2007b). More information on this program is available at http://www.ecy.wa.gov/programs/wq/stormwater/municipal/.

Corrective or preventative actions for Municipal Stormwater Systems

Ecology's municipal stormwater permits establish the primary activities needed to control pollution from urban stormwater discharged through the MS4s. These include identification and correction of illicit discharges, control of commercial bacteria discharges to the storm sewer, public education, and public involvement. There are several methods available to detect and eliminate illicit discharges and connections including outfall surveys to help identify dry weather flows. Many elements in the NPDES Municipal Stormwater Permit increase the city of Seattle's responsibilities to detect and eliminate possible illicit discharges and connections city-wide in the municipal separate storm sewer system.

Corrective or preventive actions for Private Stormwater Systems

Private stormwater systems are subject to the same pollution sources as publicly owned systems. Within the present-day Fauntleroy Creek basin, there is at least one known private storm sewer system associated with a multi-use residential property. Private storm sewer systems include those on individual residential or commercial properties. Business owners and neighborhood associations are encouraged to examine their land use. They are required to maintain their drainage systems and check them for illicit connections. Educational outreach to private stormwater system owners is recommended to prevent car washing, pet waste, and other discharges from entering Fauntleroy Creek. Grant funding sources are encouraged to support these collaborative efforts.



Wildlife and avian

Wildlife contributes fecal coliform bacteria to surface waters. At typically low levels in undisturbed watersheds this is not considered pollution. In those cases where man-caused alterations of the natural environment have increased wildlife levels and decreased filtration by the landscape, their contributions may be considered a source of pollution. Some practices, such as unkempt dumpster areas, littered parking lots, or grass lawns along shorelines can attract birds and other wildlife and cause excess bacteria loading.

MST studies of fecal coliform bacteria concentrations in streams and creeks in urban Puget Sound consistently show the presence of fecal coliform bacteria from avian and wildlife sources (Table 3). In the MST study in Thornton Creek, another highly urbanized Seattle watershed, avian and wildlife sources were found to be significant contributors of fecal coliform bacteria (Herrera, 2007).

River otters; Northern flying squirrels; mountain beavers; red foxes; and a dozen kinds of birds, including raptors, woodpeckers, owls, wrens, gulls, ducks, and geese have been observed in the Fauntleroy Creek area (FWAP, 2002). These and other warm-blooded animals contribute bacteria loading directly and indirectly to streams.

Corrective or Preventative Actions

When excessive waterfowl are present, exclusionary vegetation, "Do Not Feed the Waterfowl" signage, or other measures should be considered to reduce bacteria inputs. Riparian re-vegetation projects along Fauntleroy Creek should consider promoting riparian vegetation buffers that minimize congregation of birds on streamside properties.

Decaying organic matter

Large stocks of decaying organic matter can be a natural source of fecal coliform bacteria. Klebsiella is a naturally occurring non-pathogenic bacteria genus that is most commonly associated with decaying organic matter, although there are some pathogenic strains. A study of a large wood pile in Seattle's Woodland Park showed elevated fecal coliform bacteria concentrations in runoff from the pile (> 60,000 cfu/mL). Approximately 80 percent of the fecal coliform bacteria in the runoff were Klebsiella, and the remaining 20 percent were E. coli. (Herrera, 2005; Zisette, R., 2007). Klebsiella is not identifiable using the DNA ribotyping methods described previously.

Organizational actions, goals, and schedules

Local government and other organizations have worked together to prepare this Water Quality Implementation Plan. There is no single solution to improving water quality in Fauntleroy Creek. Everyone will need to pitch in to solve the problem. If you want to see how you can help, the best place to start is right in your own backyard. If you want to go further, read about what your local government is already doing and how you can help them work for you. The following government agencies, citizen groups, and tribes have regulatory authority influence, information, resources or other involvement in activities to protect and restore the health of Fauntleroy Creek.

Federal, tribal, state, and county entities

U.S. Environmental Protection Agency

The 1997 Memorandum of Agreement between the Environmental Protection Agency, Region 10 and Ecology requires that EPA and Ecology jointly evaluate the implementation of TMDLs in Washington. These evaluations address whether interim targets are being met, whether implementation measures such as BMPs have been put into effect, and whether NPDES permits are consistent with TMDL wasteload allocations.

EPA provides technical assistance and funding to states and tribes to implement the Clean Water Act (CWA). For example, EPA's CWA Section 319 grants, combined with Ecology's grant and loan funds, are made available to stakeholders through Ecology's annual Water Quality Grant and Loan Process. On occasion, the EPA also gives other grant monies (104(b)(3)) to address storm water pollution problems.

Washington State Department of Ecology

Ecology is given authority by the EPA to implement many aspects of the federal Clean Water Act. These include National Pollution Discharge Elimination System (NPDES) permitting and the Total Maximum Daily Load (TMDL) program. To address the municipal permitting needs of this TMDL, the NWRO has one municipal stormwater engineer and one municipal stormwater specialist who provide technical assistance and auditing activities for the Phase I municipal stormwater permits across the region. Ecology's headquarters also has several staff that can help identify and distribute education and outreach materials to stormwater permit holders.

Ecology has a Water Quality Improvement Lead assigned to the implementation of the Fauntleroy Creek TMDL who will assist the stormwater permit holder and other environmental agencies and groups. The NWRO also has a water quality monitoring specialist who is available to provide assistance in the development of ambient monitoring and source identification monitoring projects. Ecology's Environmental Assessment Program may assist in effectiveness monitoring or other special studies during implementation of the TMDL.

Ecology also helps local governments with funding for water quality facilities and activities through the Centennial Clean Water Fund, 319 Fund, and State Revolving Loan Fund. The full range of Ecology funding opportunities is discussed under the section "Funding Opportunities." Ecology's grant specialists assist local government in the development of stream restoration and water quality improvement projects.

Ecology will be responsible for organizing meetings of the Fauntleroy Creek stakeholders' workgroup no less than annually and will lead additional meetings as requested by the workgroup.

TMDL Actions: Ecology has a wide variety of programs to assist in the implementation of this Plan. The following are key activities that Ecology will conduct in support of this plan:

- Perform bacteria source tracing sampling in the basin, review any data from partners, track trends in bacteria in Fauntleroy Creek, and provide technical assistance.
- Continue to provide current and planned levels of support for overseeing compliance with Seattle's NPDES stormwater programs in relation to this Implementation Plan.
- Assist the Fauntleroy Watershed Council in their efforts to coordinate water-quality related activities within the basin.
- Continue to make grant funding opportunities available to assist in funding stream restoration, pollution identification and correction activities, and early implementation of low impact development.
- Meet or otherwise contact key watershed stakeholders no less than annually to determine and assess the status of TMDL implementation. Ecology will lead additional meetings as requested and resources allow.
- Prepare annual implementation status reports and water quality monitoring report.

Washington State Ferries

The Washington State Ferries (WSF) system has operated the Fauntleroy-Vashon Ferry Terminal since 1951. It was expanded in 1984 and underwent a major refurbishment in 2002. WSF's mission is to provide safe, secure, reliable, and environmentally sound marine transportation for people and goods. WSF currently possesses a comprehensive Safety Management System (SMS) that incorporates policies and procedures for safety, security, emergency preparedness, and environmental protection programs. WSF is in the process of more fully integrating environmental management into their SMS (Olds, 2007).

The Fauntleroy-Vashon Ferry Terminal is prominently located near the Fauntleroy Creek watershed. Views of the restored lower reach of Fauntleroy Creek can be seen from the ferry terminal dock. WSF will be a valuable partner in helping to increase public awareness about improving water quality in Fauntleroy Creek.

TMDL Action: This plan encourages WSF to participate in installing educational signage on the dock of the Fauntleroy Vashon Ferry Terminal to educate the public on the importance of not

feeding waterfowl. In addition, WSF can provide public information on local water quality issues on board their ferries.

Puget Sound Partnership

In 2007 the Washington State Legislature established the Puget Sound Partnership (Patrnership) to lead the recovery of Puget Sound to health by 2020. The Partnership replaced the Puget Sound Action Team in coordinating regional efforts to restore and protect the biological health and diversity of Puget Sound. This includes protecting and enhancing Puget Sound's water and sediment quality, its fish and shellfish, and its wetlands and other habitats.

By December 31, 2008, the Partnership will produce the 2020 Action Agenda that establishes science-based goals to achieve recovery and protection. The 2020 Action Agenda will address habitat protection; toxic contamination; pathogen and nutrient pollution; stormwater runoff; water supply; ecosystem biodiversity; species recovery; and capacity for action.

The Partnership is working with tribal and local governments; community groups; citizens and businesses; and state and federal agencies to develop and carry out the action agenda. Seven geographic action areas were established around the Sound to address and tackle problems specific to those areas. Fauntleroy Creek, of Water Resource Inventory Area 09, is within the South Central Puget Sound Action Area.

The former Puget Sound Action Team provided important leadership in promoting Low Impact Development (LID), an innovative approach to new development and redevelopment to prevent and better manage stormwater runoff.

TMDL Actions: This plan encourages the Partnership to continue spearheading the development of updated models, written guidance, and other tools that will both educate and assist local governments in implementing LID practices within their jurisdictions. Continued leadership on promoting tools to improve stormwater management is also encouraged.

Muckleshoot Indian Tribe

The ancestors of the present day Muckleshoot Indian Tribe (Tribe) had usual and accustomed fishing places, primarily at locations on the upper Puyallup, Carbon, Stuck, White, Green, Cedar, and Black Rivers, including tributaries. Drainage areas to the Fauntleroy Creek are part of the Green-Duwamish watershed, and thus the Tribe has an interest in the area. The Tribe consists of the descendents of the area's original Coast Salish peoples. The Tribe regards salmon, which were more abundant in area streams, with great reverence. The Muckleshoot Indian Tribe has an active resource protection staff and may assist in stream restoration and water quality improvement efforts.

King County

King County provides regional services throughout both incorporated and un-incorporated areas. Within Seattle, these services include sewage treatment and water quality monitoring. King County has monitored water quality in local lakes, rivers, and streams for over 30 years, and these investigations further King County's interests in maintaining and enhancing regional water quality. King County has also actively monitored the water quality in Fauntleroy Cove since 1997. The Water and Land Resources Division of King County's Department of Natural Resources and Parks is involved in watershed stewardship, stormwater compliance, and water quality monitoring throughout King County.

TMDL Action: Due to the potential for the Fauntleroy Creek TMDL to improve bacteria levels in Fauntleroy Cove, Ecology encourages King County to continue conducting bacteria monitoring in Fauntleroy Cove after the implementation of Fauntleroy Creek TMDL has taken effect.

Cities and towns

City of Seattle

The city of Seattle is very active in watershed protection, stream restoration, and water quality improvement. With the largest population in Washington State, Seattle faces many challenges associated with urban stormwater runoff. Seattle expanded the level of stormwater management beyond flood control and human health risks to embrace actions that aim to improve overall surface water quality and enhance aquatic habitats.

Seattle Public Utilities (SPU) is the designated lead department for managing stormwater, including meeting stormwater regulatory requirements, conducting water quality programs, and managing major drainage-related capital projects. SPU is also the lead city department for development and implementation of the Fauntleroy TMDL implementation plan and is coordinating the input of other city departments, including Seattle Parks and Recreation (Parks), Seattle Department of Transportation, and Seattle Department of Planning and Development.

The city of Seattle partnered with Ecology, King County, and King Conservation District to provide grant funding to the Fauntleroy community for a restoration project on private property along the lowest reach of the creek, to mitigate adverse impacts to the creek environment. The historic use of Fauntleroy Creek as a receiving water body for Seattle's stormwater system caused the impacts. Additionally, the project completed instream and riparian restoration and revegetation along a 200-foot reach at the mouth of Fauntleroy Creek. The restoration addressed excessive stormwater flow damage; may improve water quality as a result of improved riparian vegetation; and may enhance salmonid spawner access from Puget Sound. As an ancillary benefit, the Fauntleroy Ferry Terminal dock will provide public viewing and a venue for school-based streamside education.

TMDL Actions: This plan encourages the city of Seattle to undertake the following actions to reduce bacteria levels in Fauntleroy Creek watershed:

- Continue routine inspections of the integrity of sewer lines through a city-wide program, and respond to sewer problems. Review sanitary sewer inspection records of all pipes within Fauntleroy's present day drainage area, including those that cross or parallel the creek.
- Investigate water quality problems as reported to the Water Quality Hotline (206-684-7587) as part of the city's spills response program.
- Produce an inventory of the animal handling businesses within the present day drainage basin to Fauntleroy Creek based on the registered business database.
- Complete the microbial source tracking (MST) study in Piper's Creek to improve the understanding of fecal coliform bacteria sources in a basin similar to Fauntleroy Creek (highly urbanized Seattle watershed, primarily high density residential, primarily ditch and culvert drainage system).
- Install and maintain pet waste stations, as needed, at the two main entrances of Fauntleroy Park as part of the city's Mutt Mitt Program.
- Continue to work with schools and community groups to heighten the public awareness of water quality issues and watershed stewardship in the implementation area through existing city programs such as Natural Yard Care; Natural Landscaping (professionals); Natural Soil Building; and Storm Drain Stencil Program (Adopt a Storm Drain). These programs could involve activities such as stenciling storm drains; adopting natural lawn care; disconnecting roof storm drains from stormwater pipes; re-vegetating riparian buffers; and creating home rain gardens.

Citizens, Local Businesses, and Volunteer Organizations

Fauntleroy Watershed Council

Guided by the Fauntleroy Watershed Action Plan and in cooperation with agency partners, since 2001 the Fauntleroy Watershed Council provided a venue for citizens and agency staff to advance restoration and stewardship goals for Fauntleroy Park and the Fauntleroy Creek system.

FAUNTLEROY WATERSHED COUNCIL

TMDL Actions: Ecology recognizes the importance of the activities of the Fauntleroy Watershed Council and makes the following recommendations:

- Organize a door-to-door neighborhood campaign in the present-day drainage basin to provide a packet of educational materials that cover various environmental topics, including water quality, invasive plants, and illegal dumping.
- Engage K-12 students in scientific discovery of the watershed through field studies such as investigating pet waste left on trails.

- Work with the city, local businesses, homeowner associations, and other volunteers targeting riparian neighbors with tailored information that emphasizes source controls and creek stewardship.
- Post pet waste health hazard signage along sidewalks frequented by dog walkers and at the entrances to Fauntleroy Park.
- Incorporate water quality news into the council's educational materials (e.g. newsletter, website, and posting sites) that come out of the TMDL effort (e.g., Ecology's annual status report).
- Seek state and local funding opportunities to implement activities that support the TMDL goals.

Local Citizens and Businesses

Local citizens play a critical role in improving the water quality of Fauntleroy Creek. Even those in the present-day drainage basin, who do not live right next to the creek, can impact the quality of water that goes into the storm drainage system from their properties.

Many citizens in the present-day drainage basin can immediately contribute to improving local water quality by doing certain tasks differently, such as properly disposing of pet wastes and preventing illegal discharges into the storm drains. Streamside property owners can take it upon themselves to minimize runoff of nonpoint sources of pollution from their yards, repair leaky side-sewers, and enhance streamside riparian vegetation. Local citizens can also get involved in stream rehabilitation, communicate their interest in the environment to local elected officials, and educate others on how to improve water quality in Fauntleroy Creek.

Ecology plans to work with partners to help educate local businesses on actions they can take to prevent the bacteria pollution their activities may generate. In turn, local businesses can be partners in increasing public awareness on the local water quality issues in Fauntleroy Creek.

TMDL Actions: Local citizens and businesses are key to helping improve water quality of local streams.

- For pet owners, double bag pet waste and place in the garbage. Also, keep dogs leashed when walking on the trails of Fauntleroy Park.

- Report leash and scoop law violations to the Seattle Animal Shelter at (206) 386-PETS (7387).

- Comply with the city of Seattle's Stormwater Code (SMC 22.800) which prohibits illicit discharges from entering into city-owned municipal storm sewer systems or receiving water bodies within Seattle city limits. Illicit discharges include any discharge that is not entirely composed of stormwater. Examples of illicit discharges include, but are not limited to: solid waste; human and animal waste; antifreeze, oil, gasoline, grease, and all other automotive and petroleum products; flammable or explosive materials; metals in excess of naturally occurring amounts, whether in liquid or solid form; chemicals not normally found in uncontaminated water; solvents and degreasers; painting products;

drain cleaners; commercial and household cleaning materials; pesticides; herbicides; fertilizers; acids; alkalis; ink; steam-cleaning waste; laundry waste; soap; detergent; ammonia; chlorine; chlorinated swimming pool or hot tub water; domestic or sanitary sewage; animal carcasses; food and food waste; yard waste; dirt; sand; and gravel (SMC 22.802.012). Some discharges, typically related to groundwater and domestic water discharges, are exempt from this rule and detailed in SMC 22.802.012.

- Report pollution problems in the creek by calling the city of Seattle's Water Quality Complaint Hotline at (206) 684-7587 or Ecology's Environmental Complaints Hotline at 425-649-7000.

Adaptive management

Ecology sets a goal to achieve water quality standards for fecal coliform bacteria in Fauntleroy Creek by 2013. Partners will work together to monitor progress towards these goals, evaluate successes, obstacles, and changing needs, and make adjustments to the cleanup strategy as needed.

The plan will use an adaptive management approach to ensure the progress and overall success of this plan. Opportunities for adaptive management of the plan include conducting special inspections in identified source areas; evaluating effectiveness of best management practices (BMPs); modifying stream sampling frequency or locations; helping develop and fund water quality projects that address fecal coliform pollution; administering local educational initiatives; and other means of conforming management measures to current information on the bacteria problem.

As bacteria source control measures and activities from the plan are successfully completed, those activities will be documented along with expected improvements in water quality. If the planned activities are not effective, the implementation activities as set out in this plan will be reexamined and modified as part of the adaptive management process. If water quality standards are achieved, but wasteload and load allocations are not, the TMDL will be considered satisfied.

As the permitting programs are put into place and BMPs and other implementation activities are completed, evaluation of their success will be assessed by way of ongoing monitoring. Effectiveness monitoring will be done, as available sources allow, following five years of implementation. The results of ambient water quality monitoring will play a key role in determining the effectiveness of the plan. If new fecal coliform sources are found that were not previously identified, they will be corrected through appropriate responsible parties.

See the *Monitoring Plan* section in this report.

Funding Opportunities

Multiple sources of financial assistance for water cleanup activities are available through Ecology's grant and loan programs, local conservation districts, and other sources. Refer to the website (http://www.ecy.wa.gov/programs/wq/funding/indexfunding.html) for a list and descriptions of funding sources.

Ecology administers the Centennial Clean Water Fund, Section 319, State Revolving Fund, and other grant programs that could support activities to help implement TMDLs as well as other water quality and stream restoration projects. Table 4 describes several possible funding sources that may be available to implement activities necessary to correct bacteria problems in Fauntleroy Creek.

Ecology will work with stakeholders to prepare appropriate scopes of work for grant projects, assist with applying for grant opportunities as they arise, and will help grant applicants and other stakeholders in other ways to implement the plan.

Ecology's Coastal Protection Fund contributed to restoring the lower reach of Fauntleroy Creek. Photo: Judy Pickens

Table 4. Possible funding opportunities to support implementation.

Sponsoring Entity	Funding Source	Uses to be Made of Funds
United States Environmental Protection Agency	Environmental Education Grants http://www.epa.gov/enviroed/grants.html	▪ Environmental education projects implemented by nonprofit organizations
Department of Ecology 3190 160th Ave SE Bellevue, 98008 (425) 425-7269	Clean Water Fund, Section 319, and State Revolving Fund http://www.ecy.wa.gov/programs/wq/funding Coastal Protection Fund (CPF) http://www.ecy.wa.gov/programs/sea/sea-grants.htm	▪ Implementation, design, acquisition, construction, and improvement of water pollution control. ▪ Facilities and water pollution control related activities. ▪ Priorities include: implementing TMDL plans, keeping pollution out of streams and aquifers, modernizing aging wastewater treatment facilities, reclaiming and reusing waste water. ▪ CPF is discretionary monies made available to regional Ecology offices to support on-the-ground projects to perform environmental restoration and enhancement.
King County Department of Natural Resources 201 S. Jackson Suite 600 Seattle, 98104 (206) 296-6519	King County Grant Exchange, including six grant programs http://dnr.metrokc.gov/grants/	Projects that protect or improve natural resources; such as water quality, salmon and wildlife habitat, reforestation, water conservation, and related educational efforts.
City of Seattle 700 5th Ave #4900 PO Box 34018 Seattle, 98124	Aquatic Habitat Matching Grants Program	Projects designed to improve habitat in and within the buffer of urban creeks, according to current criteria.

U.S. Environmental Protection Agency Grants

Environmental Education Grants Program sponsored by EPA's Environmental Education Division (EED), Office of Children's Health Protection and Environmental Education, supports environmental education projects that enhance the public's awareness, knowledge, and skills to help people make informed decisions that affect environmental quality. EPA awards grants each year based on funding appropriated by Congress. Annual funding for the program ranges between $2 and $3 million. More than 75 percent of the grants awarded by this program receive less than $15,000.

Department of Ecology Grants and Loans Program

Centennial Clean Water Fund (CCWF). A 1986 state statute created the Water Quality Account, which includes the Centennial Clean Water Fund (CCWF). Ecology offers CCWF grants and loans to local governments, tribes, and other public entities for water pollution control projects. During the fiscal year (FY) 2006 funding cycle, Ecology proposed to award $11.1 million from the CCWF. The CCWF is helping to fund the King CD's "Issaquah Creek TMDL Support" project to conduct small farm workshops, farm tours, develop farm plans and create a GIS map of farm plan areas in Issaquah Basin. Application for CCWF, 319 Nonpoint Source Fund, and the state Water Pollution Control Revolving Fund is a combined application process.

Section 319 Nonpoint Source Fund provides grants to local governments, tribes, state agencies, and nonprofit organizations to address nonpoint source pollution and to improve and protect water quality. Nonpoint source pollution includes many diffuse sources, such as stormwater runoff from urban development; agricultural and timber practices; failing septic systems; pet waste; gardening; and other activities. Non-governmental organizations can apply to Ecology for funding through a 319 grant to provide additional implementation assistance.

State Water Pollution Control Revolving Fund Program uses federal funding from the U.S. Environmental Protection Agency and monies appropriated from the state's Water Quality Account to provide low-interest loans to local governments, tribes, and other public entities. The loans are primarily for upgrading or expanding water pollution control facilities, such as public sewage and stormwater plants, and for activities to address estuary management and nonpoint source water quality problems.

Coastal Protection Fund is a sub-account into which water quality penalties, issued under Chapter 90.48 RCW, have been deposited since July 1998. A portion of this fund is made available to regional Ecology offices to support on-the-ground projects to perform environmental restoration and enhancement. Local governments, tribes, and state agencies must propose projects through Ecology staff. Stakeholders with projects that will reduce bacterial pollution are encouraged to contact their local TMDL lead to determine if their project proposal is a good candidate for Coastal Protection funding. Restoration of the lower Fauntleroy Creek was partially funded through the Coastal Protection Fund.

King County Department of Natural Resources Environmental Grants

King County Department of Natural Resources provides numerous grant opportunities to fund projects that protect or improve natural resources such as water quality, salmon and wildlife habitat, reforestation, water conservation, and related educational efforts. Below are just some of the opportunities. For more information, see http://dnr.metrokc.gov/grants/.

Car Wash Kit Grants are for community or charity fundraising events. Nonprofit groups can sell tickets redeemable at environmentally-friendly professional car washes through the Puget Sound Car Wash Association's Charity Car Wash Program (http://www.charitycarwash.org/).

King County Community Salmon Fund awards small-scale grants for salmon habitat protection and restoration projects that are marked by community involvement and watershed health benefits, which are consistent with local salmon recovery plans.

Natural Resource Stewardship Network provides grants and technical assistance to projects that involve communities and youth in improving neighborhood green spaces and forests. Funds for grants are provided by the King County Forestry Program and the King Conservation District.

Splash Water Quality Education Fund provides grants up to $15,000 for educational projects related to water quality. The primary activity of the project must be community education.

Water Works individual grants up to $60,000 are available for projects that protect or improve watersheds, rivers, lakes, wetlands, and tidewater. Projects must provide opportunities for stewardship. There are several funding cycles each year.

Wild Places in City Spaces funds are available under the Urban Reforestation and Habitat Restoration Grants Program. Grants support projects to reforest urban areas, remove invasive non-native plant species, or provide wildlife habitats. Applications are accepted year-round.

City of Seattle Grants Program

Aquatic Habitat Matching Grants Program

Seattle Public Utilities provides matching grants for individuals or groups to help improve Seattle's aquatic and stream side habitat, including streamside revegetation projects. Awards amounts begin at $2,000 per project, with $300,000 in total awards available. Projects require a one-to-one match.

Measuring Progress toward Goals

The TMDL established the bacteria loading capacity for Fauntleroy Creek in order to initiate and guide actions needed to reduce current bacteria loadings (Table 5). To meet standards during the critical dry season, the TMDL estimated it will take an 80 percent reduction in current bacteria loadings from all sources to the creek (Ecology, 2007a). Since best management practices are expected to be the same year round, the Fauntleroy Creek bacteria TMDL applies year round.

The progress of the plan will be measured by (1) assessing the pollution control activities underway or completed and (2) direct measurement of water quality. The goal is for Fauntleroy Creek to consistently meet the Washington State Water Quality Standards for bacteria. Ecology anticipates that if state and local coordination proceed as expected, compliance with the extraordinary primary contact recreation standard for Fauntleroy Creek is anticipated by June 2013.

Table 5. Estimated loadings of fecal coliform bacteria in Fauntleroy Creek (Ecology, 2007).

	Annual Bacteria Loads (cfu/year)	**Maximum Daily Bacteria Loads** (cfu/day)	**Relative Allocations** (%)
ESTIMATED TOTAL CURRENT LOADINGS	354 billion	--	--
ESTIMATED TOTAL LOADING CAPACITY	179 billion	489 million	--
Seattle Stormwater Point Sources (WLA)	124 billion	339 million	69%
Nonpoint Sources (LA)	37.1 billion	102 million	21%
Margin of Safety	17.9 billion	48.9 million	10%

Performance measures and targets

Appendix C includes tables to track the progress of implementation activities for each organization listed in the *Pollution Sources and Organizational Actions, Goals, and Schedules* section of this report.

In order to gauge the progress of this TMDL implementation, Ecology will convene a meeting of municipal and community stakeholders, no less than annually, to share information on the state of water quality in Fauntleroy Creek and to report the status of implementation activities. Water quality data, trends (where applicable), regulatory changes, new and innovative concepts, and funding sources will be discussed to evaluate the overall status of the TMDL. Ecology will solicit input from the workgroup at this time to help direct the adaptive management of this

TMDL. Ecology will track implementation, no less than annually, using the tracking table found in Appendix A of this Water Quality Implementation Plan and maintaining current evaluation of water quality monitoring data.

Ecology will continue to offer grant funding for water quality studies, stream restoration projects, BMP effectiveness evaluations, and for the development and implementation of monitoring programs through its annual Centennial Clean Water Fund.

The action items listed in the tracking table reflect information collected throughout the development of the Fauntleroy Creek Water Quality Improvement Report and Implementation Plan. Some actions are voluntary in nature and others reflect activities that are anticipated to occur as a part of National Pollution Discharge Elimination System (NPDES) permits.

Effectiveness monitoring plan

Effectiveness monitoring of in-stream water quality determines if the water quality standards have been met after the completion of the Water Quality Implementation Plan. Effectiveness monitoring of TMDLs is usually conducted by Ecology's Environmental Assessment Program after about five years of implementation. Effectiveness monitoring does not include monitoring conducted to determine if BMPs are effective at reducing pollution.

An essential part of this water cleanup effort is the monitoring of surface waters and identification of potential pollution sources. Monitoring is needed during all phases of the TMDL to identify polluted areas, contributing sources, and to verify that corrective actions have been, and remain effective in protecting local waters. Three types of water quality monitoring are needed to implement the Fauntleroy Creek Fecal Coliform TMDL Water Quality Implementation Plan:

- Source Detection Monitoring (recommended).
- Special Purpose Studies (recommended).
- TMDL Effectiveness Monitoring (as available resources allow).

Each of these monitoring strategies is discussed below.

1. Source Detection Monitoring

Source detection monitoring is used to pinpoint suspected pollution sources. It allows local governments and private groups to focus BMP implementation resources where they are needed most. Source detection monitoring is used when pollution sources are not obvious and additional data is needed to track down the unknown or suspected causes. Events that typically trigger the need for targeted monitoring include:

- When ambient water quality monitoring has identified exceptionally high bacteria levels on either a consistent or a sporadic basis.

- Where potential sources of fecal coliform bacteria are identified and need to be verified. Examples of potential problem areas include poorly managed animal confinement or recreation areas, drainage from dump areas, failing onsite septic systems, or illicit discharges.

When exceptionally high bacteria levels are observed, additional sampling can help to track the bacteria source down to a discrete geographic area. Ecology and local governments review the data and determine how to proceed to control the source(s).

In 2007, Ecology began collecting samples along Fauntleroy Creek above the mouth to detect for reaches with elevated levels of fecal coliform bacteria. This 'reconnaissance survey' is a form of investigating bacteria sources. Ecology sampled 13 sites along Fauntleroy Creek, including the TMDL compliance point at station MOUTH west of Fauntleroy Way (Figures 2-3). Interim results from the sampling surveys conducted on August 28, 2007 (Figure 2) and December 18, 2007 (Figure 3) did not detect exceptionally high levels of fecal coliform bacteria.

On December 18, 2007, at Station FORTRB off of Forest Ct SW, the fecal coliform bacteria concentration (1800 cfu/100 mL) was higher than other samples collected during the study. However, Ecology cannot conclude if this area consistently has higher concentrations without having collected replicate samples at the station during the sampling event. In addition, there is the concern with possible contamination due to disturbing the sediments, and the inherent variability of fecal coliform concentrations. Ecology continues to conduct additional reconnaissance surveys to identify areas that have elevated levels of fecal coliform bacteria.

Due to the lack of prior flow data on the creek, Ecology installed a staff gauge at station FAUNT east of Fauntleroy Way on August 28, 2007.

Table 6 provides interim, instantaneous streamflow data measured by Ecology at station FAUNT to date. Discharge was calculated by measuring velocities and depths in 20 or more divisions of the stream cross-section using standard Ecology procedures (Ecology, 1993).

Table 6. Interim instantaneous streamflow measurements and staff gage height at station FAUNT.

Date	Discharge (cubic feet per second)	Gage Height (feet)
8/28/2007	0.29	0.66
12/18/2007	0.58	0.74
2/13/2008	0.41	0.69

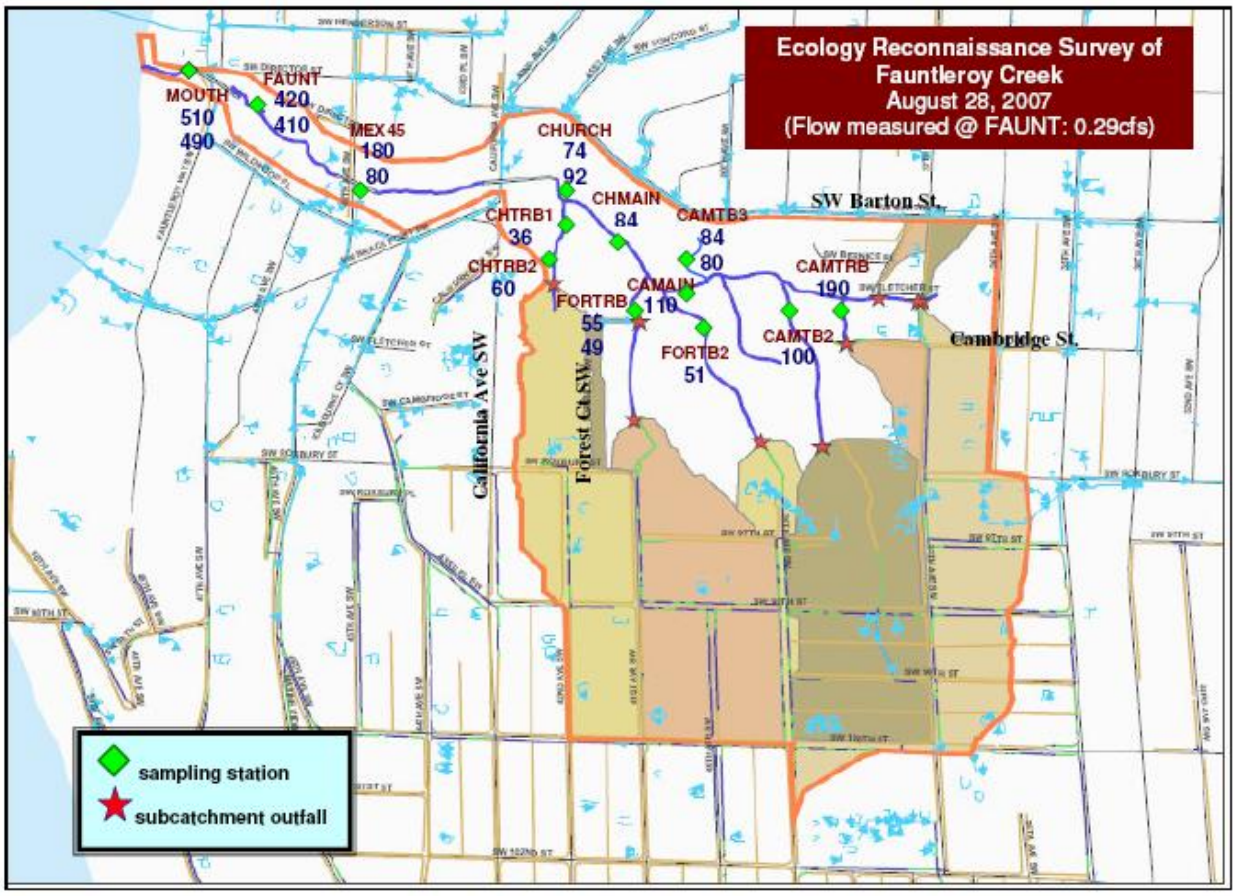


Figure 2. Interim results of fecal coliform concentrations (cfu/100mL) at sampling sites along Fauntleroy Creek from Ecology's source detection sampling conducted on August 28, 2007. Results displayed on city of Seattle's drainage map of the Fauntleroy Creek basin (Seattle, 2007).

2. Special Purpose Studies

In some cases, special purpose monitoring studies may be needed to support the goals of this TMDL. One study currently underway is the Piper's Creek Microbial Source Tracking Study that will be completed in 2010. The purpose of the study is to better understand the sources of bacteria in highly urbanized, primarily residential neighborhoods in Seattle.

Other special studies may involve monitoring stormwater outfalls that discharge into Fauntleroy Park, comparing land use activities in sub-basins draining to the park, and correlating with water quality and focused synoptic sampling studies to discern any diurnal patterns in fecal coliform levels. Ecology will consider advocating, conducting, or funding various special purpose studies as Fauntleroy Creek TMDL implementation progresses.

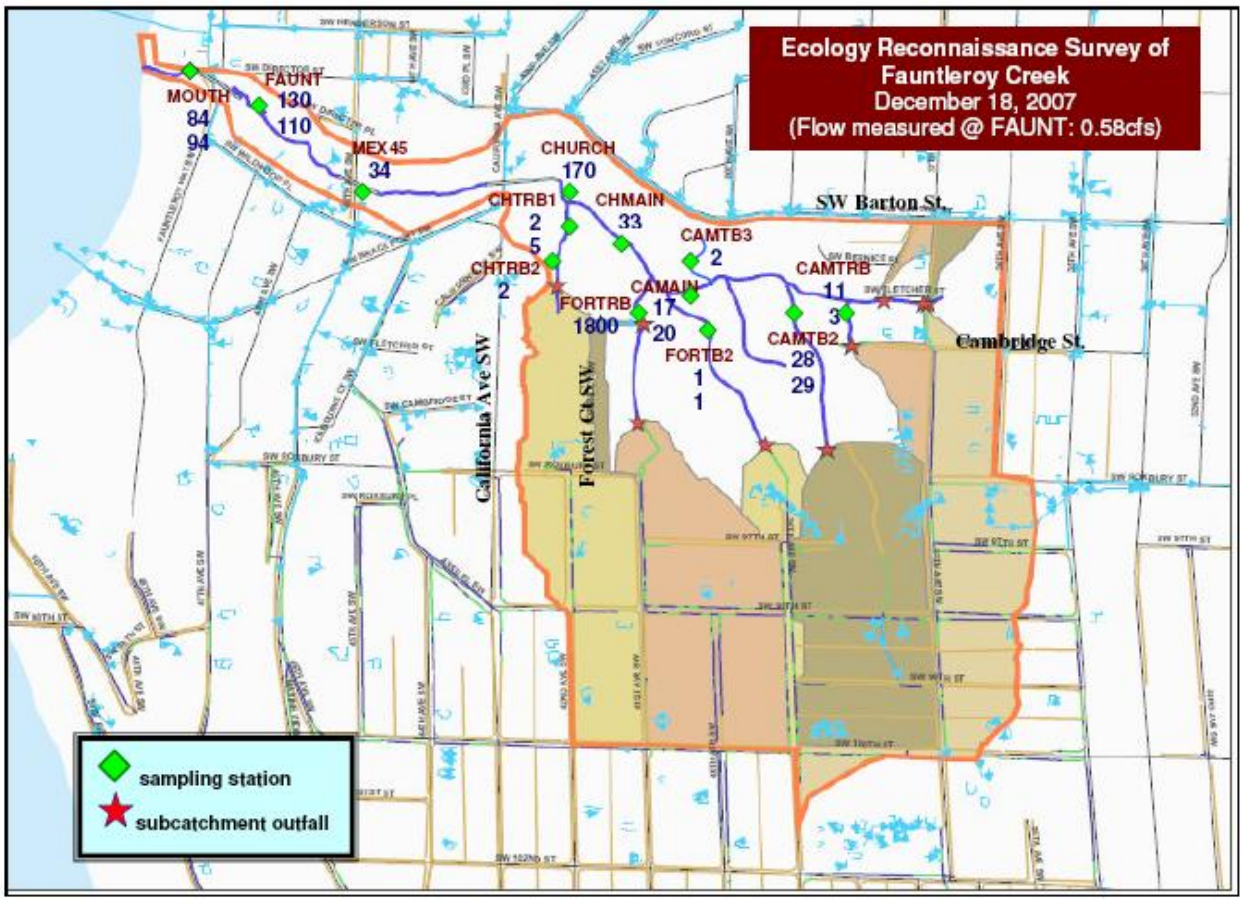


Figure 3. Interim results of fecal coliform concentrations (cfu/100mL) at sampling sites along Fauntleroy Creek from Ecology's source detection sampling conducted on December 18, 2007. Results displayed on city of Seattle's drainage map of the Fauntleroy Creek basin (Seattle, 2007).

3. TMDL Effectiveness Monitoring

TMDL Effectiveness monitoring tells us whether or not bacteria levels are decreasing. Ecology will measure the success of this plan by monitoring water quality in the creeks and their tributaries.

The timing of Ecology's monitoring will depend upon the period after which positive results should be identifiable and the availability of resources. Ecology hopes to accomplish this approximately once every five years. Effectiveness monitoring priorities will be selected by each regional office and verified through the annual scoping process. Ecology will use all available sources of data when effectiveness monitoring begins.

In order to be thorough in accomplishing this task, monitoring personnel in Ecology's Environmental Assessment Program (EAP) will follow a review sequence. For this plan, EAP will contact the regional office TMDL coordinator to determine the status of the TMDL implementation plan and what ongoing monitoring has started as part of implementation activities. On completion of these steps, an examination of the resulting data will be made and a water quality status determination will be announced for the water body in an advisory memorandum followed by a technical report.

Reasonable Assurances of Success

TMDLs (and related action plans) must show "reasonable assurance" of success at reducing pollution problems. When establishing a TMDL, reductions of a particular pollutant are distributed among the pollutant sources (both point and nonpoint sources) in the water body. For Fauntleroy Creek fecal coliform bacteria TMDL, both point and nonpoint sources exist in the present-day creek drainage basin. Education, outreach, technical and financial assistance, permit administration, and enforcement will all be used to meet the goals of the plan are met on schedule.

Ecology believes that the following activities already support this TMDL and add to the assurance that bacteria in Fauntleroy Creek will meet Washington State Water Quality Standards. This assumes that the activities described below are continued and maintained.

There is considerable interest and local involvement toward resolving the water quality problems in Fauntleroy Creek. Numerous organizations and agencies are already engaged in stream restoration and source correction actions that will help resolve the bacteria problem. The following rationale helps provide reasonable assurance that Fauntleroy Creek TMDL goals will be met by 2013:

- Effective on February 16, 2007, the city of Seattle was required to implement their new NPDES Phase I Municipal Stormwater Permit (Ecology, 2007b). Under the city's Stormwater Management Program, as originally approved by Ecology on July 24, 1997, Seattle is implementing programs such as the Drainage System Inspection Program (ensuring proper maintenance of privately owned drainage systems), the Mutt Mitt Program (targeting pet waste), and Urban Creeks & Watershed Stewardship Program (public education).

- The city of Seattle has legal authority to control discharges to Seattle's storm drainage systems. The city of Seattle's Stormwater, Grading and Drainage Control Code (SMC 22.800) prohibits illicit discharges from being introduced into the city's municipal storm sewer system. As part of the city's Stormwater Business Inspection and Complaint Investigation Programs, Environmental Compliance Inspectors inspect Seattle businesses to ensure that stormwater best management practices are being implemented and conduct investigation based on citizen complaints related to stormwater pollution.

- According to Seattle's 2004 Comprehensive Drainage Plan, Seattle Public Utilities (SPU) plans to expand water quality monitoring activities and continue to focus on controlling pollution at the source. Seattle also plans to have an increased focus on improving and protecting habitat conditions along creeks and affected shorelines and fostering awareness and stewardship of natural systems and aquatic habitats through outreach, education, and partnerships.

- Fauntleroy Watershed Council will continue to implement their Fauntleroy Watershed Action Plan (2002) that details activities involved in stewardship and education, vegetation management, upland and in-stream erosion, trails and signage, and maintenance and safety. Ecology regularly reports Fauntleroy TMDL progress to the Council and will continue to receive valuable input and direction from the group.

- With funding from Ecology's Coastal Zone Protection Fund, King County's Community Salmon Fund, and the city of Seattle's Aquatic Habitat Matching Grants, the Fauntleroy Watershed Council and property owners completed installation of a Reach to the Beach Project to enhance the stream and riparian corridor in the lower 200 feet of Fauntleroy Creek. One objective of the project is to improve water quality by eliminating the grass that extends up to the stream bank. This will reduce the feeding areas for shorebirds and keep their waste farther from the water. Furthermore, increasing plantings along the riparian area will help filter stormwater runoff. The project will also make use of the public exposure of the site to maximize general education and awareness of water and habitat stewardship in urban watersheds.

While Ecology is authorized under Chapter 90.48 RCW to impose strict requirements or issue enforcement actions to achieve compliance with state water quality standards, it is the goal of all participants in the Fauntleroy Creek TMDL to achieve clean water through voluntary control actions. Ecology will consider and issue notices of noncompliance, in accordance with the Regulatory Reform Act, in situations where the cause or contribution to the cause of noncompliance with load or wasteload allocations can be established.

Summary of Public Involvement

Beginning in fall 2006, Ecology engaged the public in several ways during the TMDL process to (1) study the fecal coliform bacteria problem in Fauntleroy Creek and (2) develop a plan of action. Ecology staff met with key parties, the city of Seattle and Fauntleroy Watershed Council, to share the study findings and get their input and ideas on how to correct the problem. An Ecology staff regularly updates the members of the Fauntleroy Watershed Council on the TMDL progress during their bimonthly meetings.

As part of the TMDL process, Ecology produced two TMDL documents:

- *Fauntleroy Creek Fecal Coliform Bacteria TMDL/Water Quality Improvement Report* (report) (Ecology, 2007) documents the study findings and the implementation strategy. To get public input on the report, Ecology held a public meeting on May 22, 2007 at the Southwest Branch Public Library in the Fauntleroy Community. A public comment period ran from May 11 to June 11, 2007 to solicit public feedback on the proposed final draft report. The report was approved by EPA in August 2008.

- *Fauntleroy Creek Fecal Coliform Bacteria TMDL/Water Quality Implementation Plan* (plan) details the actions by partners to help address the fecal coliform bacteria problem. Since the approval of the prior report, Ecology worked with key parties to create this detailed plan of action. A public comment period for the proposed final draft plan ran from May 16, 2008 to June 16, 2008. Appendix B records the public notice methods and Ecology's responses to public comments for the plan. The public comment period announcement and focus sheet on fecal coliform bacteria in Fauntleroy Creek are included.

Students at Kapka Primary School present pet waste findings in Fauntleroy Park. Photo: West Seattle Herald

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Appendices

Appendix A. Glossary and Acronyms
Appendix B. Record of Public Participation
Appendix C. Tables of Organizations' Progress

Appendix A. Glossary and Acronyms

303(d) list: Section 303(d) of the federal Clean Water Act requires Washington State to periodically prepare a list of all surface waters in the state for which designated uses of the water– such as for drinking, recreation, aquatic habitat, and industrial use – are impaired by pollutants. These are water quality limited estuaries, lakes, and streams that fall short of state surface water quality standards, and are not expected to improve within the next two years.

Best Management Practices (BMPs): Physical, structural, or operational practices that, when used singularly or in combination, prevent or reduce pollutant discharges.

Clean Water Act (CWA): Federal Act passed in 1972 that contains provisions to restore and maintain the quality of the nation's waters. Section 303(d) of the CWA establishes the TMDL program.

Designated Uses: Those uses specified in Chapter 173-201A WAC (Water Quality Standards for Surface Waters of the state of Washington) for each water body or segment, regardless of whether or not the uses are currently attained.

Diurnal: Of, or pertaining to, a day or each day: daily. (1) Occurring during the daytime only, as different from nocturnal, or (2) Daily; related to actions which are completed in the course of a calendar day, and which typically recur every calendar day (e.g., diurnal temperature rises during the day, and falls during the night).

Existing Uses: Those uses actually attained in fresh and marine waters on or after November 28, 1975, whether or not they are designated uses. Introduced species that are not native to Washington, and put-and-take fisheries comprised of non-self-replicating introduced native species, do not need to receive full support as an existing use.

Extraordinary primary contact: Waters providing extraordinary protection against waterborne disease or that serve as tributaries to extraordinary quality shellfish harvesting areas.

Fecal Coliform (FC): That portion of the coliform group of bacteria which is present in intestinal tracts and feces of warm-blooded animals as detected by the product of acid or gas from lactose in a suitable culture medium within twenty-four hours at 44.5 plus or minus 0.2 degrees Celsius. FC are "indicator" organisms that suggest the possible presence of disease-causing organisms. Concentrations are measured in colony forming units per 100 milliliters of water (cfu/100mL).

Geometric Mean: A mathematical expression of the central tendency (an average) of multiple sample values. A geometric mean, unlike an arithmetic mean, tends to dampen the effect of very high or low values, which might bias the mean if a straight average (arithmetic mean) were calculated. This is helpful when analyzing bacteria concentrations, because levels may vary anywhere from 10 to 10,000 fold over a given period. The calculation is performed by either: 1) taking the nth root of a product of n factors, or 2) taking the antilogarithm of the arithmetic mean of the logarithms of the individual values.

Load Allocation (LA): The portion of a receiving waters' loading capacity attributed to one or more of its existing or future sources of nonpoint pollution or to natural background sources.

Loading Capacity: The greatest amount of a substance that a water body can receive and still meet water quality standards.

Low Impact Development (LID): A stormwater management and land development practice applied at the parcel and subdivision scale that emphasizes conservation and use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely mimic pre-development hydrologic functions.

Margin of Safety (MOS): Required component of TMDLs that accounts for uncertainty about the relationship between pollutant loads and quality of the receiving water body.

Municipal Separate Storm Sewer Systems (MS4): A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, or storm drains): (i) owned or operated by a state, city, town, borough, county, parish, district, association, or other public body having jurisdiction over disposal of wastes, storm water, or other wastes and (ii) designed or used for collecting or conveying stormwater; (iii) which is not a combined sewer; and (iv) which is not part of a publicly owned treatment works (POTW) as defined in the Code of Federal Regulations at 40 CFR 122.2.

National Pollutant Discharge Elimination System (NPDES): National program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements under the Clean Water Act. The NPDES program regulates discharges from wastewater treatment plants, large factories, and other facilities that use, process, and discharge water back into lakes, streams, rivers, bays, and oceans.

Nonpoint Source: Pollution that enters any waters of the state from any dispersed land-based or water-based activities, including but not limited to atmospheric deposition, surface water runoff from agricultural lands, urban areas, or forest lands, subsurface or underground sources, or discharges from boats or marine vessels not otherwise regulated under the National Pollutant Discharge Elimination System Program. Generally, any unconfined and diffuse source of contamination. Legally, any source of water pollution that does not meet the legal definition of "point source" in section 502(14) of the Clean Water Act.

Pathogen: Disease-causing microorganisms such as bacteria, protozoa, viruses.

Phase I Stormwater Permit: The first phase of stormwater regulation required under the federal Clean Water Act. The permit is issued to medium and large municipal separate storm sewer systems (MS4s) and construction sites of five or more acres.

Point Source: Sources of pollution that discharge at a specific location from pipes, outfalls, and conveyance channels to a surface water. Examples of point source discharges include municipal wastewater treatment plants, municipal stormwater systems, industrial waste treatment facilities, and construction sites that clear more than 5 acres of land.

Pollution: Such contamination, or other alteration of the physical, chemical, or biological properties, of any waters of the state, including change in temperature, taste, color, turbidity, or odor of the waters, or such discharge of any liquid, gaseous, solid, radioactive, or other substance into any waters of the state as will or is likely to create a nuisance or render such waters harmful, detrimental, or injurious to the public health, safety, or welfare, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate uses, or to livestock, wild animals, birds, fish, or other aquatic life.

Primary contact recreation: Activities where a person would have direct contact with water to the point of complete submergence including, but not limited to, skin diving, swimming, and water skiing.

Stormwater: The portion of precipitation that does not naturally percolate into the ground or evaporate but instead runs off roads, pavement, and roofs during rainfall or snow melt. Stormwater can also come from hard or saturated grass surfaces such as lawns, pastures, playfields, and from gravel roads and parking lots.

Surface waters of the state: Lakes, rivers, ponds, streams, inland waters, salt waters, wetlands and all other surface waters and watercourses within the jurisdiction of Washington State.

Total Maximum Daily Load (TMDL): A distribution of a substance in a water body designed to protect it from exceeding water quality standards. A TMDL is equal to the sum of all of the following: 1) individual wasteload allocations (WLAs) for point sources, 2) the load allocations (LAs) for nonpoint sources, 3) the contribution of natural sources, and 4) a margin of safety to allow for uncertainty in the wasteload determination. A reserve for future growth is also generally provided.

Wasteload Allocation (WLA): The portion of a receiving water's loading capacity allocated to existing or future point sources of pollution. WLAs constitute one type of water quality-based effluent limitation.

Watershed: A drainage area or basin in which all land and water areas drain or flow toward a central collector such as a stream, river, or lake at a lower elevation.

Appendix B. Record of Public Participation

Introduction

Beginning in fall 2006, Ecology engaged the public in several ways during the TMDL process to (1) study the fecal coliform bacteria problem in Fauntleroy Creek and (2) develop a plan of action. Ecology staff met with key parties, the City of Seattle and Fauntleroy Watershed Council, to share the study findings and get their input and ideas on how to correct the problem. An Ecology staff regularly updates the members of the Fauntleroy Watershed Council on the TMDL progress during their bimonthly meetings.

As part of the TMDL process, Ecology produced two TMDL documents:

- *Fauntleroy Creek Fecal Coliform Bacteria TMDL/Water Quality Improvement Report* (report) (Ecology, 2007) documents the study findings and the implementation strategy. To get public input on the report, Ecology held a public meeting on May 22, 2007 at the Southwest Branch Public Library in the Fauntleroy Community. A public comment period ran from May 11 to June 11, 2007 to solicit public feedback on the proposed final draft report. The report was approved by EPA in August 2008.

- *Fauntleroy Creek Fecal Coliform Bacteria TMDL/Water Quality Implementation Plan* (plan) details the actions by partners to help address the fecal coliform bacteria problem. Since the approval of the prior report, Ecology worked with key parties to create this detailed plan of action. A public comment period for the proposed final draft plan ran from May 16, 2008 to June 16, 2008.

The following summarizes Ecology's responses to public comments on the proposed final draft plan. The public comment period announcement and focus sheet on fecal coliform bacteria in Fauntleroy Creek are included in this appendix.

Summary of comments and responses

Ecology received the following summarized comments during the public comment period for the draft plan. Comments regarding factual inaccuracies, improved wording, or those that clarify policy positions by other government agencies have been directly incorporated into the text of the final plan. All other comments are summarized or paraphrased below.

1. Comment: Please see attached letter below from City of Seattle (dated May 29, 2008).

Response: Ecology recognizes the city of Seattle's commitment to improving water quality in all Seattle streams including Fauntleroy Creek. Ecology acknowledges that meeting water quality standards in urban watersheds can be challenging especially for fecal coliform bacteria. If compliance is not achieved by 2013, Ecology will work with the city of Seattle and other

stakeholders to examine the barriers and explore other reasonable actions needed to reduce the fecal coliform bacteria levels.

City of Seattle
Gregory J. Nickels, Mayor

Seattle Public Utilities
Chuck Clarke, Director

May 29, 2008

Sinang H. Lee
TMDL Lead for Fauntleroy Creek
Washington State Department of Ecology
3190 190th Ave SE
Bellevue, WA 98004-5452

Re: *Draft Fauntleroy Creek Fecal Coliform Total Maximum Daily Load (TMDL)-Water Quality Implementation Plan*

To: Ms. Lee

Thank you for the opportunity to provide comments on the final draft *Fauntleroy Creek Fecal Coliform TMDL – Water Quality Implementation Plan* (May 2008) (Publication # 08-10-041). The City supports Ecology's ongoing work to improve water quality in our regional water bodies, specifically in our urban creeks such as Fauntleroy. The City of Seattle has worked closely with Ecology to develop this draft plan and fully supports the plan's scope and intent to improve water quality.

The City recognizes that the goal of meeting Washington State's bacteria water quality standard in Fauntleroy Creek is an ambitious goal. The City is prepared to meet its commitments as detailed in the plan and to work collaboratively with Ecology, and other parties, to improve water quality in Fauntleroy Creek.

If you have any questions, please contact Andy Rheaume of my staff at (206) 386-4101 or by email at andy.rheaume@seattle.gov.

Sincerely,

Nancy Ahern
Utilities System Management Deputy Director
Seattle Public Utilities

Cc: Trish Ray, Seattle Public Utilities
Darla Inglis, Seattle Public Utilities
Ingrid Wertz, Seattle Public Utilities
Kathy Minsch, Seattle Public Utilities
Theresa Wagner, Seattle City Attorney's Office

Seattle Municipal Tower, 700 5th Ave, Suite 4900, PO Box 34018, Seattle, WA 98124-4018
Tel: (206) 684-5851, TTY/TDD: (206) 233-7241, Fax: (206) 684-4631, Internet Address: http://www.seattle.gov/util/
An equal employment opportunity, affirmative action employer. Accommodations for people with disabilities provided upon request.

2. **Comment:** The primary source of fecal coliform bacteria in Fauntleroy Creek appears to be the ever increasing number of dogs brought to Fauntleroy Park; specifically those that are off leash. This has become very noticeable to me in the last several years since living next to and volunteering in the park. There needs to be enforcement of the scoop and leash laws here. The occasional presence by an enforcement officer who can ticket can help deter dog owners from keeping their dogs off leash in the park. Informational handouts could also be provided to volunteers working in the park to give out to those that they encounter with dogs off leash.

Response: Ecology agrees that dog owners will likely not pick up after their pets when the dogs are off leash and could wander off the park trails. Enforcement of the leash and scoop laws is one measure that can be used to address this issue. Currently, the City of Seattle Animal Shelter has only four officers assigned to enforce animal-related ordinances in all Seattle parks, among other major duties. This limited enforcement capability makes it unrealistic for an enforcement officer to patrol all the city parks for violations of the scoop and leash laws.

Without the presence of enforcement officers in the park, citizens can be the eyes and ears. The public can report leash and scoop law violations to the Seattle Animal Shelter at (206) 386-PETS(7387).

Ecology believes enforcement alone is not the entire solution. The Seattle Animal Shelter promotes the importance of the leash and scoop laws through a combination of enforcement and education in both off-leash parks and on-leash areas. They also take a proactive approach in teaching and encouraging responsible pet ownership. To learn more about them, visit http://www.seattle.gov/animalshelter/strategy.htm.

3. Comment: It appears that not enough money is being generated through pet licenses to properly fund animal control activities therefore another "user fee" could be established in the form of a tax on pet food for pet owners. Just as a gas tax might encourage more appropriate technologies, a tax on the source of fecal coliform (pet waste) seems to be the only way to raise money for mitigation/enforcement/etc., while at the same time holding the pet owning community accountable for better behavior. This may be a more long term solution. Also in the long run, a public awareness campaign that takes many forms can promote proper pet ownership behavior and allow all of us to enjoy our public spaces and still maintain a high environmental standard.

Response: Ecology agrees increasing public awareness, even to the extent of establishing a social norm of properly disposing of pet waste, will enhance water quality and the enjoyment of public spaces. Pet licensing and associated fees and taxes are beyond Ecology's jurisdictional purview.

Outreach and announcements

- Distributed copies of the *Draft Fauntleroy Creek Fecal Coliform Bacteria TMDL/Water Quality Implementation Plan* and public comment period announcement card to members of the Fauntleroy Watershed Council on May 4, 2008.

- Announced the public comment period and posted the draft plan on Ecology's Fauntleroy Creek TMDL Project webpage: http://www.ecy.wa.gov/programs/wq/tmdl/FauntleroyFCtmdlsummary.html.

- Placed copies of the draft plan at the Southwest Branch Public Library (May 16 to June 16, 2008).

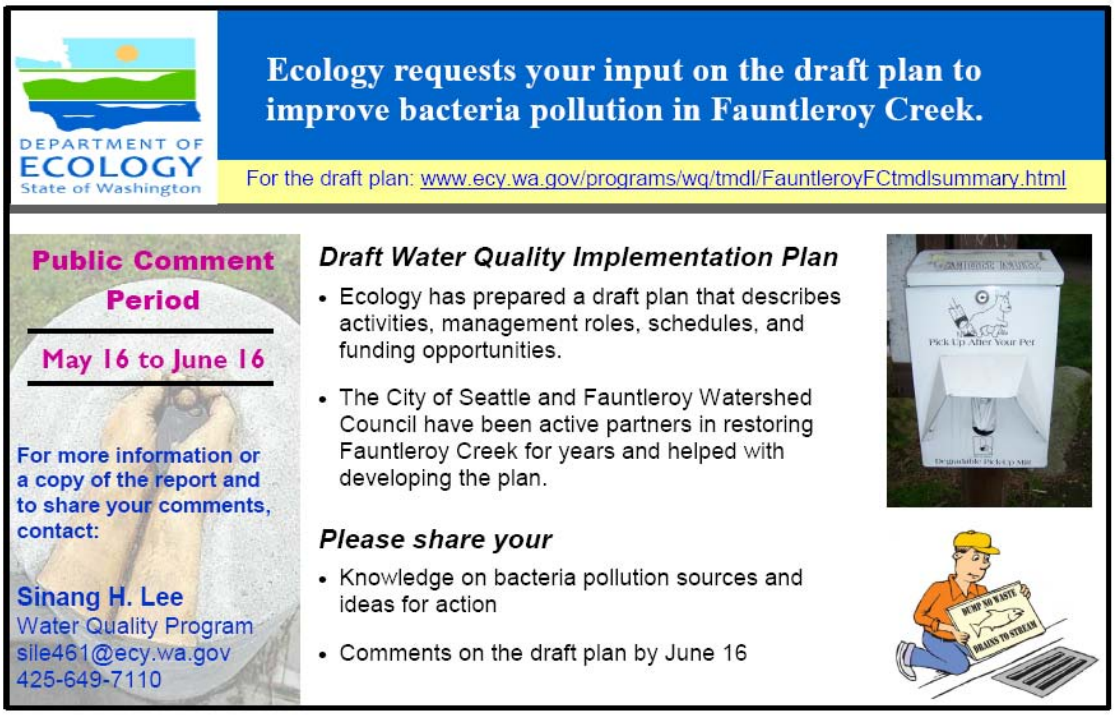
- Mailed copies of the draft plan to key staff of City of Seattle.

- Posted announcement card requesting public comments at the fish-ladder viewpoint and on the Fauntleroy Watershed Council website (www.fauntleroy.net).

- Announced the public comment period through the Fauntleroy Community Association's e-news for May 2008.

Printed outreach materials

- Postcard announcing Ecology's request for public comments on the draft plan.



- Focus sheet on bacteria in Fauntleroy Creek (2 pages), published in May 2007.

Focus on Bacteria in Fauntleroy Creek

from Ecology's Water Quality Program

What's the problem with bacteria in Fauntleroy Creek?

The creek has too much fecal coliform bacteria. Measurements dating back to 1987 have shown continuing declines, but the creek still has bacteria levels beyond what Washington State allows in our freshwaters. We all need to work together to fix this.

Fecal coliform bacteria are a common water quality problem in our state. They belong to a mostly harmless group of bacteria commonly found in large numbers in the feces of people and warm-blooded animals such as pets and wildlife. However, they indicate that more serious disease-causing organisms – called pathogens, may be present in water. Stormwater runoff and other discharges can carry these small organisms into Fauntleroy Creek where they can infect humans through skin contact or ingestion of water.

What is a Water Quality Improvement Report (TMDL)?

When these kinds of water quality problems are found, federal law requires that a Total Maximum Daily Load (TMDL) be developed for water bodies that don't meet state water quality standards. The TMDL process includes an evaluation of the water quality conditions. This information is put into a document that also specifies how much the pollution needs to be reduced to achieve clean water and describes how the state plans to work with citizens, local governments, and organizations to control the pollution and improve conditions in the affected water body. This information is contained in the draft *Fauntleroy Creek Water Quality Improvement Report* (Report).

Ecology has a longstanding interest in improving water quality in urban creeks such as Fauntleroy Creek. After collecting surface water monitoring data for two recent years, Ecology initiated a TMDL for Fauntleroy Creek. The City of Seattle and Fauntleroy Watershed Council have been active partners in restoring Fauntleroy Creek for years and are contributing to this TMDL effort.

Ecology requests your valuable input on the draft Report during the public comment period from May 11 through June 11, 2007. Ecology then intends to issue the final Report in June 2007. A detailed implementation plan will be developed by June 2008.

Public Meeting

Ecology will host a public meeting on recent studies and plans to improve bacteria pollution in Fauntleroy Creek:

May 22, 2007

6:30 – 7:45 p.m.

Southwest Branch Public Library

9013 35th Ave. SW

West Seattle, 98126

Contact Information

Sinang H. Lee
WA Dept. of Ecology
3190 160th Ave. SE
Bellevue, WA 98008

(425) 649-7110
sile461@ecy.wa.gov

Everyone is invited to this meeting to learn about how state and local governments are approaching this problem and what you can do to keep informed or, possibly to be directly involved.

May 2007 07-10-041

Original printed on recycled paper

Where is the pollution coming from?

Urban watersheds are very complex and contain many potential pollutants. This makes it hard for everyone to pinpoint all of the sources that contribute to the problems. In general, the most common potential bacteria sources in urban Puget Sound watersheds include:

- Domestic pets
- Human waste from leaking sanitary sewer lines or from sanitary sewer lines improperly connected to the stormwater drainage system.
- Wildlife, including birds such as gulls and crows, and mammals such as squirrels, rats, and raccoons.

Bacteria from these sources accumulate on yards, driveways, roadside ditches, roads, parking lots, and other locations. Then when it rains or snows, the resulting stormwater runoff can easily enter into the creek.

What can you do?

"Fixing" fecal coliform contamination problems means each of us looking at what we do (or don't do) on our property to prevent pet waste and other bacteria sources from reaching public waters. To be a good steward of your watershed, here are some important things you can do:

- Use proper waste management for dogs and cats. Bag pet waste and put it in the garbage.
- Don't feed ducks and other waterfowl (their wastes contribute to bacteria problems).
- Protect or restore natural vegetation along streams and shorelines. Vegetation slows and filters pollutants from runoff and promotes natural wildlife balance.
- Prevent pollution in stormwater runoff – plant a rain garden, direct downspouts away from paved surfaces, keep storm drains clear of leaves.

Together we can improve water quality in Fauntleroy Creek!

For a copy of the draft Report (Publication No. 07-10-037): http://www.ecy.wa.gov/biblio/0710037.html

Please consider reviewing the draft *Fauntleroy Creek Water Quality Improvement Report*. If you have comments, by June 11, 2007 please write or call:

Sinang H. Lee

Water TMDL Lead for Fauntleroy Creek

3190 190th Ave SE

Bellevue, WA 98004-5452

Phone: (425) 649-7110; or email: sile461@ecy.wa.gov

If you need this publication in an alternate format, please call DouGlas Palenshus at 425-649-7041. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

Appendix C. Tables of Organizations' Progress

Ecology will use the table below to track some of the major activities expected to reduce and control fecal coliform bacteria discharges to Fauntleroy Creek. X indicate expected schedule for implementing action.

Organization	Action	Year						
		2007	2008	2009	2010	2011	2012	2013
Federal, Tribal, State, and County Entities								
Department of Ecology	Convene meeting of the Fauntleroy Creek Implementation Action Team no less than annually			X	X	X	X	X
	Provide Coastal Protection Fund to restore lower reach of Fauntleroy Creek.	X						
	Provide State Revolving Fund (loan) & Centennial Grant funding opportunities	X	X	X	X	X	X	X
	Install staff gage at station near Pickens home for accessibility to continuous gage reading	X						
	Measure stage and flow at least six times within one year at staff gage	X	X					
	Conduct source detection monitoring with bacteria sampling from mouth to the headwaters of Fauntleroy Creek at least twice during the wet season and twice during the dry season	X	X					
	Provide technical assistance for stormwater program and TMDL activities, as requested and resources allow	X	X	X	X	X	X	X
	Measuring the success of this plan through effectiveness monitoring of water quality in the creek and their tributaries approximately once every five years							X
	Prepare annual implementation status reports and effectiveness monitoring report			X	X	X	X	X
	Continue assisting the Fauntleroy Watershed Council in their efforts to coordinate water-quality related activities within the basin	X	X	X	X	X	X	X

Organization	Action	Year						
		2007	2008	2009	2010	2011	2012	2013
Washington State Ferries	Participate in installing a “Do Not Feed Waterfowl” signage on the dock of the Fauntleroy Vashon Ferry Terminal		X	X				
	Provide public information on local water quality issues on board of ferries to encourage watershed stewardship							
Puget Sound Partnership	Develop Low Impact Development Tools							
	Provide technical assistance to local governments in support of water cleanup activities							
King County DNR	Continue conducting bacteria monitoring in Fauntleroy Cove and report data upon request from Ecology	X	X	X	X	X	X	X
Cities and Towns								
City of Seattle	Improve habitat and implement riparian re-vegetation project in lower reach of Fauntleroy Creek	X						
	Check inspection reports of sanitary sewer lines within the present day drainage area of Fauntleroy Creek.		X					
	Investigate water quality problems in the implementation area as reported to Water Quality Complaint Hotline.	X	X	X	X	X	X	X
	Produce an inventory of the animal handling businesses within the present day drainage area based on the business license database		X					
	Complete MST study in Piper’s Creek to increase understanding of fecal sources in urban watersheds like Fauntleroy Creek	X	X	X	X			
	Evaluate need for pet waste stations in Fauntleroy Park, install and maintain stations as needed		X	X	X	X	X	X
	Continue to work with schools and community groups on educational activities through city-wide programs (e.g., storm drain stenciling, LID practices, natural lawn care, rain gardens)	X	X	X	X	X	X	X

Organization	Action	Year						
		2007	2008	2009	2010	2011	2012	2013
Citizens, Local Businesses, and Volunteer Organizations								
Fauntleroy Watershed Council	Disseminate doggy bags or other creative outreach strategies to basin pet owners attending community events such as the Fauntleroy Fall Festival	X	X	X	X	X	X	X
	Conduct pet waste investigation, or "Poop Study", with elementary school students and report findings	X	X					
	Develop and implement door-to-door neighborhood campaign on various environmental topics, including water quality							
	Obtain and post pet waste hazard signage at sites frequented by dog walkers		X					
	Incorporate water quality news and messages into Council's communication materials (as relevant and needed)	X	X	X	X	X	X	X
	Obtain grant funding to implement water quality improvement activities (as relevant and needed)	X	X	X	X	X	X	X
Local Citizens and Businesses	Follow operational BMPs to prevent discharge of animal wastes into surface waters or stormwater systems							
	Report pollution problems in the creek by calling the city of Seattle Water Quality Complaint Hotline (206-684-7587) or Ecology's hotline (425-649-7000)							
	Pick up after pets							
	Comply with city of Seattle Drainage Code on illegal discharges into storm drainage systems							
	Reduce stormwater volumes from private property as appropriate (soil augmentation, rain gardens, absorption swales)							
	Enhance streamside riparian vegetation, request technical assistance if needed from the city and state							
	Educate neighbors on pollution prevention techniques							

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