Lower Skagit River
Fecal Coliform
Total Maximum Daily Load

Water Quality Implementation Plan

June 2007
Publication No. 07-10-056

Printed on recycled paper

(this page intentionally left blank)

Lower Skagit River
Fecal Coliform
Total Maximum Daily Load

Water Quality Implementation Plan

Sally Lawrence
Washington State Department of Ecology
Northwest Regional Office
Water Quality Program
Bellevue, Washington 98008-5452

June 2007

Publication No. 07-10-056

Printed on recycled paper

This document can be viewed or downloaded from the internet at
http://www.ecy.wa.gov/biblio/0710056.html

Title page photo: Hansen Creek at Minkler Road

For additional copies of this publication, please contact:

Department of Ecology Northwest Regional Office
Water Quality Program
3190 – 160th Avenue SE
Bellevue, WA 98008-5452
Phone: (425) 649-7105

Refer to Publication Number 07-10-056

Table of Contents

List of Figures

List of Tables

Acknowledgements

Many organizations and individuals have contributed to this plan to improve water quality in the Lower Skagit Watershed. Most important to future improvements in water quality are citizens of Skagit County, too numerous to cite individually, who are working to improve their land and water resources.

Thanks also to the staff of local and state government agencies and organizations:

Rick Haley, Skagit County Public Works, for his knowledge of the water bodies, understanding of the data, timely statistical assistance, and general support of the TMDL

Ann Bylin and Betsy Stevenson, Skagit County Planning and Development Services

Steve Olsen, for his creativity in designing incentives for homeowners to get their onsite septic systems inspected; and Corinne Story, Skagit County Health Department

Margaret Fleek, City of Burlington

Rick Blair, City of Sedro-Woolley

Chris Hagedorn and Bill Fullner, City of Mount Vernon

Kristi Carpenter, John Schuh and Carolyn Kelly, Skagit Conservation District

Jon-Paul Shannahan, Upper Skagit Tribe

Larry Wasserman, Skagit River Systems Cooperative

Greg Combs and Bob Woolrich, Washington Department of Health

Cara McKinnon, Washington State Department of Agriculture

Hilary Culverwell, Puget Sound Action Team/Puget Sound Partnership

Department of Ecology staff who developed the Technical Report and Submittal Report for the TMDL were Paul Pickett of the Environmental Assessment Program and Jerry Shervey and David Pater of Northwest Regional Office.

To finally bring this TMDL to a full implementation plan, Dave Garland kept the TMDL alive through several staff changes and provided excellent comments and thoughtful reviews. Mike Woodall of Ecology's GIS Technical Services patiently addressed my innumerable requests for map revisions. Shawn McKone was an excellent liaison with Ecology's municipal wastewater program. Paul Pickett was thoroughly engaged and committed to review of this long-delayed report, and appropriately skeptical in his reviews. Joanne Polayes provided the latest accomplishments of several Centennial Grant-funded projects in the lower Skagit watershed. Additional review and helpful comment was provided by Dave Hallock of the Environmental Assessment Program and Elaine Snouwaert, Douglas Palenshus, Sinang Lee and Helen Bresler of the Water Quality Program. Thoughtful comments on the relationship between the Implementation Plan and the Phase II Municipal Stormwater NPDES Permit process were provided by Anne Dettelbach, Ralph Svrjcek, and Steve Hood.

Executive Summary

In 1994, parts of the main stem of the Lower Skagit River, along with several tributaries, did not meet Washington's water quality standards for bacteria. When our lakes, rivers, streams or marine water bodies fail these standards, the Washington State Department of Ecology (Ecology) is required to place such waters on a list of polluted water bodies. The list is called the "303(d) list" because of the section of the U.S. Clean Water Act where it is described. This act is a federal law requiring that water bodies listed as polluted must receive additional analyses, and further requires that a strategic plan be developed for correcting the problems.

This analysis and planning process is called a total maximum daily load assessment or "TMDL" and includes a determination of the total "load" or amount of a pollutant or other impairment condition in the water body that must not be exceeded. When these maximums *are* exceeded, Ecology must act to correct problems. This TMDL work is done under authority of agreements with the U.S. Environmental Protection Agency (EPA). Ecology now publishes the results of such work in documents titled *Water Quality Improvement Plans*. (Note: the initial TMDL work for the Lower Skagit Fecal Coliform was published in 2000 under an earlier naming scheme and was titled: *Lower Skagit River Fecal Coliform Total Maximum Daily Load: Submittal Report.*)

This new document you are reading is the *Lower Skagit River Fecal Coliform Total Maximum Daily Load: Water Quality Implementation Plan* (Implementation Plan). It describes the *specific* actions that will implement the recommendations and requirements listed in the earlier Water Quality Improvement Plan. These actions are to be undertaken by the agencies of local and state governments and local watershed organizations.

Additionally, this implementation plan describes the various program oversight and enforcement roles of the EPA, Ecology, and the Washington Department of Agriculture. The Washington Department of Health (DOH) Office of Shellfish and Water Protection monitors water quality in South Skagit Bay to classify harvest areas for shellfish. DOH alerts commercial growers and watershed organizations about potential changes in harvest status when marine water quality improves or deteriorates.

The geographic area for this implementation plan includes several tributaries and the main stem of the Lower Skagit River from Skiyou Slough east of Sedro-Woolley downstream to the mouths of North and South Forks on South Skagit Bay. The sources of fecal coliform bacteria addressed are: stormwater--which conveys bacteria associated with urban land uses, including pet waste and illicit discharges; failing septic systems; agricultural manure; and effluent from wastewater treatment plants. Treatment plants are regulated by discharge permits administered by Ecology. The implementation plan also addresses ''combined sewer overflows'' (see ***Appendix A: Glossary***) in the city of Mount Vernon and describes progress made to reduce those overflows.

Currently, three Skagit River tributaries addressed in this document *exceed* bacteria standards for water quality during both wet (October to April) and dry (May – September) seasons. These are Hansen and Brickyard creeks and a site in Nookachamps Creek (Knapp Road). However, sites in

Fisher Creek and at Swan Road in Nookachamps Creek exceed standards only in the summer dry season, and Hill Ditch (the lower ditched reach of Carpenter Creek) meets standards in both seasons.

The Skagit River itself met state bacteria standards at all stations monitored in 2004-2006: at River Bend Road in Mount Vernon, at Ecology's long-term monitoring station at the Old Highway 99 Bridge just north of Mount Vernon, and at both the North and South Fork stations monitored by Skagit County. Further, Ecology's long term monitoring station shows a significant decreasing trend in bacteria concentrations from 1982 to the present, and also since the time of the TMDL study in 1994 and1995.

Review of state Department of Health water quality data for South Skagit Bay indicates that bacteria concentrations have declined significantly since 1995 only at one monitoring site which is close to West Pass of the Old Stillaguamish Channel near Stanwood. Other stations, including those closest to the South Fork Skagit River, do not show a significant trend since 1995.

The improvement in point source (wastewater treatment plant) performance since 1995 is well documented: the reduced incidence of combined sewer overflows in Mount Vernon; improvements in the treatment plants; and enlargements of their service areas leading to a reduced number of older onsite septic systems. More difficult to quantify are changes in management of nonpoint sources of bacteria: -- whether there are more or fewer failing onsite septic systems, whether reduced numbers of dairies and improved manure management at some livestock operations is offset by poor manure management at others, whether pet waste management has improved while number of pets has increased. Thus, the involvement of nonpoint sources in the water quality improvements in the mainstem Lower Skagit River is not clear.

These waters are expected to meet bacteria standards by 2015. In order for the tributaries to meet standards, more work on nonpoint sources of bacteria needs to be done. New programs by local municipalities under the Phase II NPDES municipal stormwater permit are expected to play a role in improving water quality in urban areas. Ecology-Northwest Regional Office's renewed commitment to nonpoint investigation (though resource-limited), as well as Ecology's coordination with local authorities and Washington State Department of Agriculture, are expected to help in rural areas.

Between now and 2015, if annual reviews of water quality data and implementation activities described here do not meet expectations, the implementation plan may be revised.

This document was prepared primarily for government organizations and others who are familiar with Ecology's role in administering federal and state regulations in relation to water bodies that have not met designated quality standards. The complex information and language herein may not meet everyone's needs. If you find that this information is not clear or does not provide information that you need, please contact the WRIA 3 TMDL Lead at Ecology's Northwest Regional Office, 425-649-7000.

The Washington State Department of Ecology invites you to join us in accepting responsibility to care for our streams, rivers, lakes and marine waters. Thank you for your interest and efforts on all of our behalf!

(this page intentionally left blank)

Introduction

The goal of the *Lower Skagit River Fecal Coliform Total Maximum Daily Load: Water Quality Implementation Plan* (Implementation Plan) is to reduce bacteria and restore the beneficial uses of swimming and fishing to mainstem reaches and tributaries of the lower Skagit River. It is also designed to ensure that the Skagit River load of bacteria is sufficiently low that it does not increase the concentration of bacteria in South Skagit Bay[1] which has some areas approved for commercial shellfish harvest.

In 1994, parts of the main stem of the Lower Skagit River, along with several tributaries, did not meet Washington's designated water quality standards. When our lakes, rivers, streams or marine water bodies fail these standards, the Washington State Department of Ecology (Ecology) is required to place such waters on a list of polluted water bodies. The list is called the "303(d) list" because of the section of the U.S. Clean Water Act where it is described. This act is a federal law requiring that water bodies listed as polluted must receive additional analyses, and further requires that a strategic plan be developed for correcting the problems.

This analysis and planning process is called a total maximum daily load assessment or "TMDL." A TMDL begins with a study that includes water quality monitoring and analysis. The purpose of the TMDL study is to determine the total 'load' or amount of a pollutant or other impairment condition in the water body that must not be exceeded. When these maximums *are* exceeded, Ecology must act to correct problems. This TMDL work is done under authority of agreements with the U.S. Environmental Protection Agency (EPA). Ecology now publishes the results of such work in documents titled *Water Quality Improvement Plans*. (Note: the initial TMDL work for the Lower Skagit River Watershed Fecal Coliform TMDL included a monitoring study conducted in 1994-1995 and published as an Ecology TMDL study in 1997. The Water Quality Improvement Plan was published in 2000 under an earlier naming scheme as: *Lower Skagit River Fecal Coliform Total Maximum Daily Load: Submittal Report.*

Both the 1997 TMDL study and the 2000 TMDL Water Quality Improvement Plan are available on the Ecology web site at http://www.ecy.wa.gov/programs/wq/tmdl/index.html

This new document you are reading is the *Lower Skagit River Fecal Coliform Total Maximum Daily Load: Water Quality Implementation Plan* (Implementation Plan). It describes the *specific* actions that will implement the recommendations and requirements listed in the earlier Water Quality Improvement Plan. These actions are to be undertaken by the agencies of local and state governments and local watershed organizations. The Implementation Plan also describes the various program oversight and enforcement roles of the EPA, Ecology, and the Washington Department of Agriculture. The Washington Department of Health (DOH) Office of Shellfish and Water Protection monitors water quality in South Skagit Bay to classify harvest areas for shellfish. DOH alerts commercial growers and watershed organizations about potential changes in harvest status when water quality improves or deteriorates.

[1] This TMDL does not address other potential sources of bacteria loading to South Skagit Bay, such as Douglas Slough, Big Ditch, and West Pass of Old Stillaguamish Channel at Stanwood.

The geographic area for this Implementation Plan includes several tributaries and the main stem of the Lower Skagit River (Figure 1) from Skiyou Slough east of Sedro-Woolley downstream to the mouths of North and South Forks on South Skagit Bay (Figure 2). The sources of fecal coliform bacteria addressed are: stormwater--which conveys bacteria associated with urban land uses, including pet waste and illicit discharges; failing septic systems; agricultural manure; and effluent from wastewater treatment plants. Treatment plants are regulated by discharge permits administered by Ecology. The Implementation Plan also addresses ''combined sewer overflows'' (***see Appendix A: Glossary***) in the city of Mount Vernon and describes progress made to reduce those overflows.

This Implementation Plan is designed to use existing programs and requirements for local and state government to improve water quality. It recommends some new programs and actions that, if fully carried out and enforced, should result in meeting the Lower Skagit River Fecal Coliform TMDL targets.

This Implementation Plan includes:

- A summary of the federal and state laws requiring TMDLs; characteristics of the watershed; and a summary of the goals established by the TMDL approved by EPA.
- A description of the primary sources of fecal coliform bacteria to the watershed.
- Recent water quality monitoring results that indicate that most parts of the lower Skagit River currently meet standards, while most of the tributaries do not.
- A description of the roles, activities, and schedules of various agencies and watershed groups that will be working to bring the Lower Skagit River watershed into compliance with water quality standards.
- A list of monitoring programs to identify sources and to verify the effectiveness of measures to control pollution, and performance measures and targets for evaluating progress.
- An adaptive management approach that will be applied as cleanup proceeds and a description of available enforcement authority to help ensure success.
- The reasons that Ecology believes the water cleanup plan will succeed, and potential funding sources for future implementation actions.
- An estimated target date of 2015 to achieve success, and a rationale for this date.

Figure 1. Lower Skagit River below Conway

Watershed description

The Skagit is Washington's second largest river, originating in Canada and extending for 162 miles and draining a watershed of 2,730 square miles in Washington State alone. The area covered by the TMDL—the Lower Skagit River and tributaries, and the North and South Forks downstream to their mouths in Skagit Bay—is the lowland portion of the river downstream from Skiyou Slough (east of Sedro-Woolley at River Mile [RM] 25). This 200-square mile area ranges in elevation from the Skagit delta at sea level to a low range of hills adjacent to Mount Vernon and including elevations of 1,000 to 1,500 ft in the Nookachamps and Hansen Creek watersheds.

Flow in the Skagit River is influenced by seasonal rainfall, glacial meltwater and snowmelt which produce peak flows in early summer, the operation of hydroelectric dams in the upper watershed, and by tides in the lower reaches. Tides affect the North and South Forks, the mainstem upstream at Mount Vernon, and the area near the mouth of Nookachamps Creek at RM 18.8.

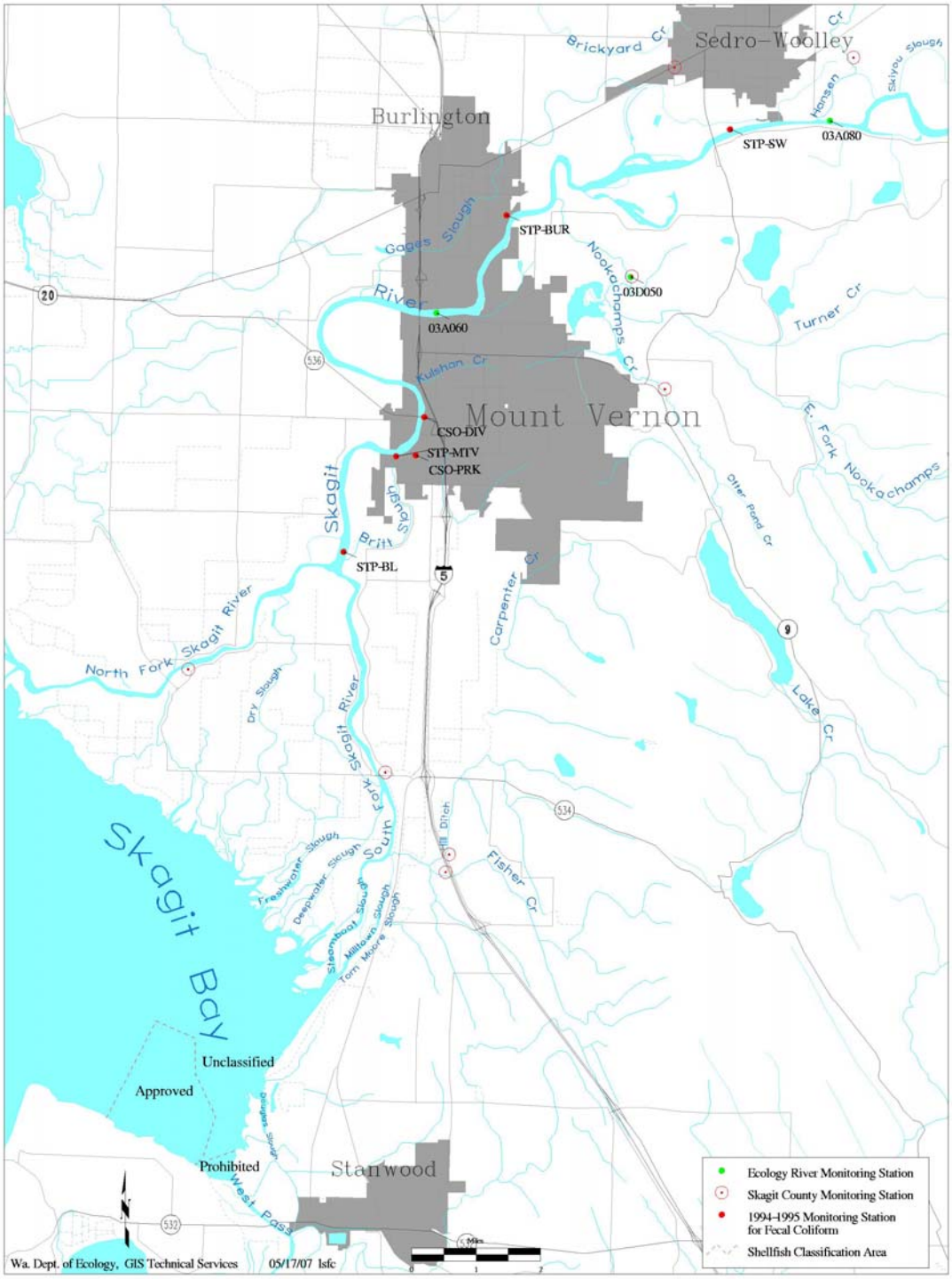


Figure 2. Lower Skagit River TMDL study area

Land uses in the Lower Skagit watershed include dairy, ranching and other forms of agriculture; forestry; small farms and rural residential areas; and rapidly urbanizing areas of Mount Vernon (population 30,000), Burlington (8,120), and Sedro-Woolley (9,000). Much of the lower elevation agricultural area has been diked and drained. During the wet winter season, pump stations discharge water from the drainage districts into the Skagit River. Tide gates prevent high river stages and high-tides from flooding fields under cultivation.

303(d) listings

The water bodies addressed in the Lower Skagit River Fecal Coliform TMDL include reaches of the lower Skagit River and several of its tributaries listed for exceedances of the state water quality standard for bacteria on either the 1996 or the 1998 Section 303(d) list (Table 1).

Table 1. 1996 and 1998 303(d) listings for bacteria in the Lower Skagit River watershed

Water Body Name	Township	Range	Section	Watercourse IIP 303(d) number	Waterbody ID number	1996 303(d) List	1998 303(d) List
CARPENTER CREEK	33N	04E	30	YA61JC	WA-03-1011	X	X
FISHER CREEK	33N	04E	28 & 29	JK73SN	WA-03-1012	X	
GAGES SLOUGH	34N	03E	12	DY42MK	WA-03-1016	X	X
HANSEN CREEK	35N	05E	30	SV53RP	WA-03-1019	X	X
HART SLOUGH/ BRICKYARD CREEK	35N	04E	22, 23& 27	PU87PF	WA-03-1018	X	
NOOKACHAMPS CREEK	34N	04E	3	LZ60MT	WA-03-1017	X	X
SKAGIT RIVER	33N	03E		QG78VP	WA-03-1010	X	X
SKAGIT RIVER	34N	03E		QG78VP	WA-03-1010	X	X
SKAGIT RIVER	34N	04E		QG78VP	WA-03-1010	X	X
SKAGIT RIVER N FORK	33N	03E			WA-03-1015	X	

Load and wasteload allocations

A total maximum daily load study determines the total "load" or amount of a pollutant or other impairment condition in the water body that must not be exceeded. When the source of a pollutant is an industrial or municipal "point source," the TMDL assigns to that source a wasteload allocation, or allowable amount of the pollutant. For nonpoint sources, which include various land management practices that may result in pollution, such as onsite septic systems, pet waste, livestock, roadways and parking lots, the TMDL assigns a "load allocation." The Lower Skagit River TMDL established wasteload allocations (Table 2) for combined sewer overflows from the city of Mount Vernon and for four wastewater treatment plants (WWTP) that discharge to the river. For the treatment plants, the TMDL analysis demonstrated that their existing technology-based permit limits were adequate, so more restrictive wasteload allocations were not assigned to these plants.

The wasteload allocation for the Combined Sewer Overflows (CSOs) from the city of Mount Vernon is the requirement to reduce the incidence of CSO discharges to an average of one per year per outfall. CSO reductions are required under Chapter 173-245 of the Washington Administrative Code (WAC): Submission of Plans and Reports for Construction and Operation of Combined Sewer Overflow Reduction Facilities. Like other cities in Washington state that have older storm

and sewer infrastructure, Mount Vernon's sewers were built to allow overflows of untreated sewage along with stormwater during very high rain events. Cities with CSOs are under order by Department of Ecology to replace this older infrastructure with systems that will keep these flows separate and reduce the incidence of CSO events to an average of one per year. Mount Vernon's wastewater NPDES permit requires CSO overflow events to be reduced to an average of one per year per outfall no later than January 15, 2015.

Table 2. Wasteload allocations in the Lower Skagit River Fecal Coliform TMDL[1]

Source	Responsible Agency	Wasteload Allocation
Combined Sewer Overflows	City of Mount Vernon	Combined sewer overflow events reduced to one per year per outfall by 2015[2]
Mount Vernon WWTP	City of Mount Vernon	Meet technology-based permit limits
Sedro-Woolley WWTP	City of Sedro Woolley	Meet technology-based permit limits
Burlington WWTP	City of Burlington	Meet technology-based permit limits
Big Lake WWTP	Skagit County Sewer District No. 2	Meet technology-based permit limits

[1] Source: Ecology 2000

[2] Dept. of Ecology Compliance Order April 11, 1996

The TMDL also established load allocations (Table 3) for several reaches of the Skagit River and for tributaries, pump stations and storm drains that were monitored in 1994 and 1995. Appendix D provides a summary of the monitoring data and load allocations from the TMDL study. The tributaries, pump stations, and storm drains are assigned the freshwater standards for fecal coliform bacteria (100 cfu/100mL geometric mean and 200 cfu/100 mL – 10 percent of samples not to exceed). Two locations in the river are assigned more stringent targets – in the North and South Forks. Modeling for the study showed that if the river water entering the TMDL study area at Skiyou Slough had very low concentrations of bacteria, and if the load and wasteload allocations were met, then the river's load of fecal coliform bacteria discharging to South Skagit Bay would not contribute to exceedances of marine fecal coliform standards.

Table 3. Load allocations in the Lower Skagit River Fecal Coliform TMDL[1]

Water Body	Geometric Mean	10% of Samples May Not Exceed:
Skagit River above Sedro-Woolley	6 cfu/100 mL[2]	80 cfu/100 mL[2]
Hansen Creek	100 cfu/100 mL[3]	200 cfu/100 mL[3]
Northern St Hospital Storm Drain	100 cfu/100 mL[3]	200 cfu/100 mL[3]
Tributary at Riverfront Park	100 cfu/100 mL[3]	200 cfu/100 mL[3]
South Sedro-Woolley Storm Drain	100 cfu/100 mL[3]	200 cfu/100 mL[3]
Brickyard Creek	100 cfu/100 mL[3]	200 cfu/100 mL[3]
Nookachamps Creek	100 cfu/100 mL[3]	200 cfu/100 mL[3]
Gages Slough Pump Station	100 cfu/100 mL[3]	200 cfu/100 mL[3]
Possible Unidentified Source above Kulshan Creek discharge[4]	n/a	n/a
Frontage Rd Pump Station/Kulshan Creek	100 cfu/100 mL[3]	200 cfu/100 mL[3]
Freeway Dr Pump Station	100 cfu/100 mL[3]	200 cfu/100 mL[3]
Westside Pump Station	100 cfu/100 mL[3]	200 cfu/100 mL[3]
Britt Slough Pump Station	100 cfu/100 mL[3]	200 cfu/100 mL[3]
Conway Pump Station	100 cfu/100 mL[3]	200 cfu/100 mL[3]
Fisher Creek	100 cfu/100 mL[3]	200 cfu/100 mL[3]
Carpenter Creek	100 cfu/100 mL[3]	200 cfu/100 mL[3]
Rexville Pump Station	100 cfu/100 mL[3]	200 cfu/100 mL[3]
North Fork Skagit River below Rexville	24 cfu/100 mL[2]	74 cfu/100 mL[2]
South Fork Skagit River below Conway	24 cfu/100 mL[2]	74 cfu/100 mL[2]

[1] Source: Ecology 2000.
[2] Targets set lower than Class AA freshwater quality standard in order that lower Skagit River as a whole does not contribute to exceedances of marine water quality standard in South Skagit Bay.
[3] Class A water quality standard for freshwater.
[4] Unidentified Source above Kulshan Creek: This potential source was hypothesized because of an increase in fecal coliform concentrations between RM 15.8 at Old Highway 99 bridge and RM 12.1, upstream of Kulshan Creek, during two of the surveys. The source may have been short term, or may have been removed since 1995.

Purpose of the implementation plan

The Implementation Plan is a list of actions and programs to be undertaken by organizations in the watershed, and it also recommends resources to ensure that Lower Skagit water bodies will meet water quality standards by 2015. For organizations with NPDES permits administered by Ecology, any requirements developed during implementation of this plan will be incorporated into the next issuance of the permit.

For organizations that do not have Ecology permits, such as non-profits, Tribes, conservation districts, and municipalities, this Implementation Plan makes recommendations for actions and programs that are expected to lead to improved water quality. Ecology TMDL staff will assist these organizations by identifying funding opportunities; by funding some projects relating to fecal coliform reduction; by participating in watershed groups and assisting in outreach; and by providing organizational support for local water quality forums and programs.

Some of the recommendations in this document were identified initially in the Nonpoint Action Plans (400-12 Plans) that were written by local government agencies and watershed organizations in the 1990s. In the lower Skagit watershed, follow-up reviews have been conducted every five years to assess the degree of implementation of the plans for the three high priority watersheds – the Nookachamps, the Samish and Padilla Bay Nonpoint Action Plans (Nookachamps Watershed Management Committee, 1995; Samish Bay Watershed Management Committee, 1995; Padilla Bay/Bayview Watershed Management Committee, 1995). In 2004-2006, recommendations for all three basins were reviewed by an implementation review committee. Its findings are expected to be issued in 2007. It is expected that this review will document the accomplishments that are working to reduce nonpoint pollution and will recommend actions that have not been carried out because of lack of funding or other reasons.

To track the progress of the TMDL, Ecology will assist local organizations in conducting an annual review of the water quality monitoring data and status reports from each organization responsible for achieving reductions in fecal coliform. This annual review, scheduled for January 2008, will cover reports submitted to Ecology by cooperating agencies. Such periodic review will ensure that water quality improvement is occurring and will help the participating agencies and organizations determine whether different types or levels of implementation activities are needed in order for these waters to meet water quality standards in eight years, by 2015. The evidence for a trend of improvements in water quality with respect to bacteria concentrations is provided under the section, Reasonable Assurance.

The annual review will address three types of questions.

- Do the water quality data from ongoing monitoring programs indicate sufficient progress is being made toward meeting water quality standards in 2015?
- Is each cooperating agency fulfilling its commitment to implementation?
- If implementation is occurring as expected but water quality is not improving, what additional activities are needed?

Implementation tracking sheets are provided in Appendix C.

Current Water Quality Conditions and Trends

Because a decade has elapsed since the TMDL study was conducted and recent data are available for this watershed, these were reviewed to determine whether the original goals of the TMDL have been met and whether any of the targets need to be adjusted or pollution reduction activities re-prioritized. This is an initial application of adaptive management to the TMDL process.

The goal of the 1997 TMDL study was to evaluate wet season sources of fecal coliform bacteria to the river and establish TMDL targets for these sources to ensure that the river's wet season contributions of bacteria were not increasing bacteria concentrations in South Skagit Bay. (South Skagit Bay does have bacteria problems, based on classification by state Department of Health Office of Shellfish and Water Protection, however, to address all the pollutant sources would require a larger study that would examine other direct discharges in the Stanwood area.)

Water quality in the Lower Skagit River and its tributaries was monitored for the TMDL in 1994-1995 (Ecology, 1997). The monitoring program was limited to the winter storm season from December through April, with two additional sampling events later that year in September and October. Monthly geometric means for fecal coliform data from the study are provided in Appendix D.

This data review led to the following results and conclusions.

- The mainstem Skagit River is currently meeting state water quality standards for bacteria, and the North Fork meets the stricter TMDL goals. The South Fork meets state standards but needs some improvement to reach the stricter TMDL goals.
- Bacteria concentrations in the mainstem have decreased significantly since 1982, the first year Ecology's long term station was monitored. At this station, bacteria also decreased significantly between 1995, the year of TMDL monitoring, and 2006.
- Bacteria in the larger tributaries (Nookachamps, Fisher, and Hansen Creeks) do not meet standards, whether evaluated on a seasonal basis or annual basis. However, Hill Ditch/Carpenter Creek met standards in the most recent monitoring period;
- Bacteria concentrations in freshwater vary seasonally in this basin, with a peak in the river in fall and in the tributaries in summer;
- Loading in the Skagit River appears to be higher in fall. In 2004 and 2005, the highest loads occurred in October and November and lowest loads in February through April.
- Bacteria concentrations in South Skagit Bay also appear to exhibit some seasonality but the pattern is more complex than in freshwater. In water years 2004-2006, the highest bacteria concentrations at bay stations closest to the Skagit River occurred in mid-summer (July) and were moderately elevated in the November-February period.
- Despite the difference between river and bay in seasonality of concentrations and loads, high concentrations in the river can quickly affect bay concentrations. This was demonstrated in December 1999 when a CSO event in Mount Vernon was followed in less than a day by high bacteria concentrations across most of DOH's monitoring stations in South Skagit Bay.

This section describing current water quality conditions is organized as follows:

- Description of data sources used for analysis
- Data analysis for compliance with standards, seasonality, and long term trends over time
- Data are evaluated for the Lower Skagit River, Lower Skagit River tributaries, and South Skagit Bay
- Results, conclusions, and recommended next steps

Data sources-Ecology, Skagit County, and state Department of Health

Ecology maintains a long term river monitoring station in the Skagit River at Mount Vernon (03A060), monitored monthly for water quality and flow on a continuous basis since 1982. (A second long term station on the Skagit is upriver at Marblemount.) Additional "basin stations" are sampled monthly for a year, usually once every five years. Basin stations in the Lower Skagit are 03A080 (Skagit River above Sedro Woolley), monitored in 2000 and 2005; and 03D050 Nookachamps Creek at Swan Rd, monitored in 1995 and 2000. The data are available on Ecology's website at:
http://www.ecy.wa.gov/programs/eap/fw_riv/rv_main.html

Skagit County Public Works has monitored water quality at 40 river and stream locations since 2003 to assess the effectiveness of Skagit County Code Chapter 14.24.120, Critical Areas Ordinance for Areas of Ongoing Agriculture. The monitoring program is supported in part by a Centennial Clean Water Fund grant. The county provides the data in an annual report (Skagit County, 2007) and on the internet at:
http://www.skagitcounty.net/Common/Asp/Default.asp?d=PublicWorksSurfaceWaterManagement&c=General&p=WQ.htm.

Skagit County uses the most probable number (MPN) method of fecal coliform analysis while Ecology uses membrane filtration (MF). Both methods are considered acceptable measures of fecal coliform bacteria concentration in a sample and results of both methods are expressed as number of colony forming units per 100 mL sample (cfu/100 mL). Ecology has compared fecal coliform data generated by Skagit County's program with Ecology data for the same sites in the Samish watershed during a similar period of time and found the results to be fairly similar but not identical. (Contact Sally Lawrence for this comparison.) MPN results have been reported by others to be often higher than MF, although there was not a consistent difference in the Samish watershed comparison. Current guidance from Ecology's Manchester Laboratory for use of MPN and MF data is that the data should not be compared directly with each other; however, each type can be compared with state water quality standards to determine compliance (N. Jensen, personal communication 2007).

Washington State Department of Health's (DOH's) Shellfish and Water Protection program monitors 17 marine stations in South Skagit Bay monthly for fecal coliform bacteria to determine shellfish harvest classification. DOH uses the MPN method. Fecal coliform data are available from DOH on request.

Fecal coliform results were selected for sites of interest to this TMDL (Table 4). The data were evaluated on a seasonal basis because we determined that fecal coliform concentrations tend to vary seasonally in this basin and the state water quality standards do not permit averaging that would cover periods of exceedances of the standard.

Results – Skagit River, North Fork and South Fork

Compliance with standards. For the period 2004-2006, monitoring at several locations in the Skagit River indicates that bacteria concentrations are in compliance with state standards. This includes Ecology's long term monitoring station near Mount Vernon and the Skagit County station on the North Fork (Table 4). The Skagit County station in the South Fork met state standards but did not meet the stricter load allocation (Geometric Mean of 24 cfu/100 mL and a target value of 74 cfu/100 mL that 10 percent of samples may not exceed), established by the TMDL in 2000.

Table 4. Seasonal compliance with fecal coliform standards at Lower Skagit River stations in 2004-2006. *Bold values in shaded cells exceed the bacteria standard or target established by the TMDL.*

			WET SEASON (Oct – April)			DRY SEASON (May – Sept)		
Site No.	Site Name	Agency	N	GM (cfu/100mL)	% > Target	N	GM (cfu/100mL)	% > Target
03A060	Skagit R near Mount Vernon	Ecology	21	4	0	15	5	0
29	Skagit R at River Bend	Skagit County	24	7	0	20	18	10
45	Skagit R – NF at Moore Rd[a]	Skagit County	29	6	0	22	11	0
46	Skagit R – SF at Fir Island Rd[a]	Skagit County	29	5	0	21	**28**	**19**

[a]The TMDL established load allocations of 24 cfu/100 mL (geometric mean) and 74 cfu/100 mL (10% of samples may not exceed this value) for the two forks of the Skagit River. Shaded cells indicate exceedances of these values.

Water quality at the upriver boundary of the TMDL. In 2000 and 2005, Ecology conducted monthly monitoring for each year at mainstem Station 03A080 on the Skagit River above Sedro-Woolley. This station marks the upriver boundary of the TMDL. If bacteria remain low at this site (< 6 cfu/100 mL geometric mean and 10 percent of samples do not exceed 80 cfu/100 mL), and if the load and wasteload allocations established by the TMDL further downriver are met, then the Lower Skagit River will not contribute to exceedances of marine standards in South Skagit Bay. In both years this upriver site had low levels of fecal coliform bacteria (Table 5).

Table 5. Fecal coliform concentrations for Ecology Station 03A080 above Sedro Woolley

Year	N	GM (cfu/100 mL)	% of samples that exceed 80 cfu/100 mL
2000	11	2.7	0
2005	11	2.3	0

Seasonal patterns. In the most recent period (1998-2005), bacteria concentrations at Station 03A060 increase in late summer leading to a November high for the year (Figure 3), followed by lower concentrations in December – April (possibly a "washout" effect of the storm season). For the earliest seven-year period in this series (1982-1989), the highest month of the year was also November; however, seasonality is not pronounced. For the interim years (1990-1997), seasonality is also not very evident (Figure 4).

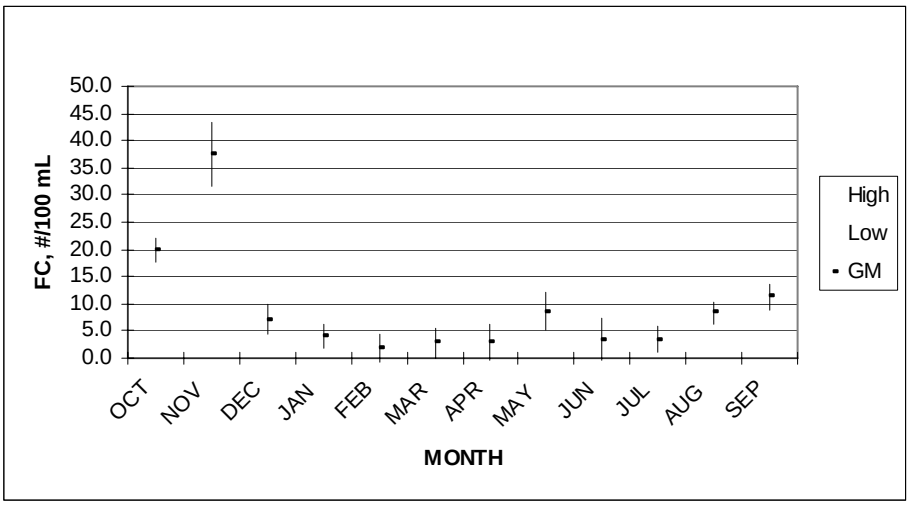


Figure 3. For the most recent seven years, monthly geometric means and standard deviations for bacteria concentrations at Ecology Station 03A060 near Mount Vernon

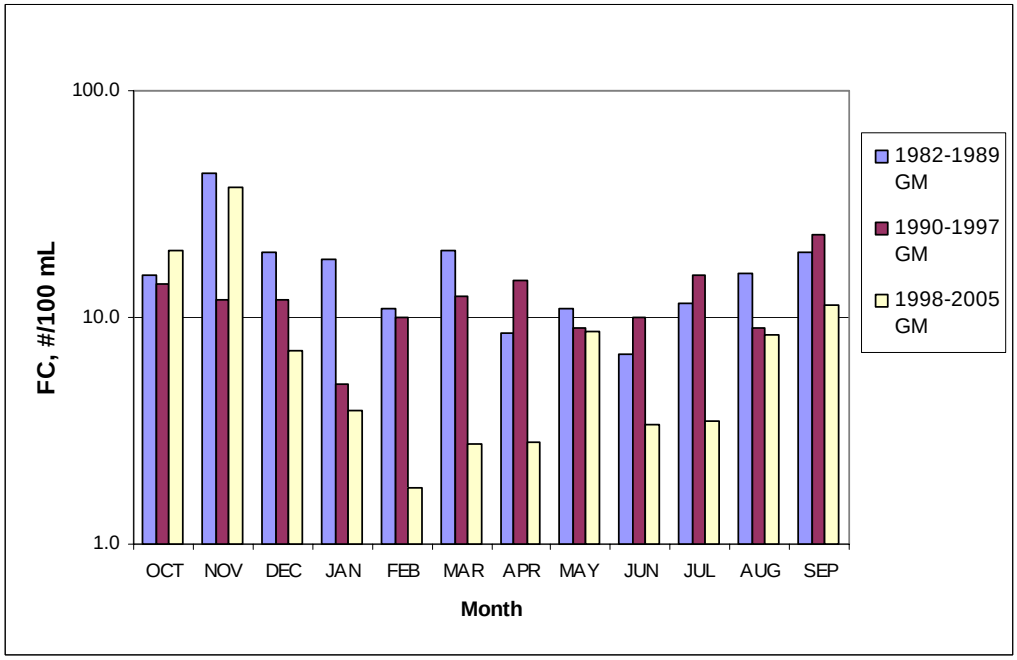


Figure 4. Monthly geometric mean bacteria concentrations for 1982-1989, 1990-1997, and 1998-2005 at Ecology station 03A060 near Mount Vernon

Bacteria at two lower Skagit River stations (at River Bend and in South Fork) monitored by Skagit County occur at higher concentrations in May-October of 2004 and 2005 than in the wet season. The river station concentrations are much lower than concentrations in Hansen and Nookachamps Creeks but mirror the creeks' seasonal pattern (Figure 5).

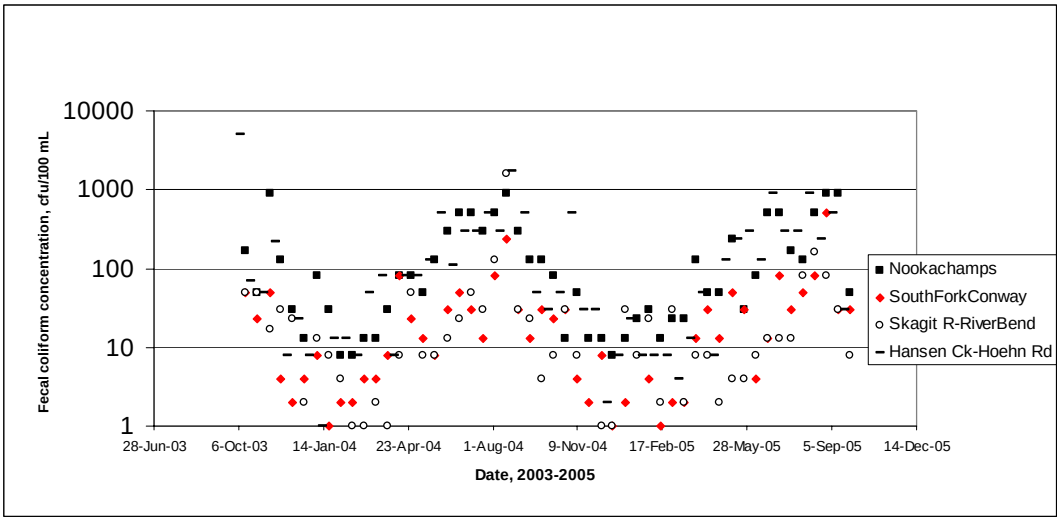


Figure 5. Bacteria concentrations at two river stations (South Fork at Conway and Skagit River at River Bend) and at two tributary stations (Nookachamps Creek at Swan Rd and Hansen Creek at Hoehn Rd) in 2004-2005. Data - Skagit County Monitoring Program, 2007.

Fecal coliform loading. Monthly loads (Load = Flow x Concentration) for 2004 and 2005 were calculated based on the fecal coliform data for Ecology station 03A060 and median monthly flow data for USGS gage 12200500 in the Skagit at Mount Vernon. (Median monthly flows at the USGS gage were chosen for the monthly load calculations, because flows measured on the same day as bacteria sampling might not necessarily be typical.) In 2004 and 2005, highest flows occurred in October through January and lowest flow in July through September (Figure 6).

Based on the calculations, loads were highest in October and November; lowest in February through April; and moderate in May through September (Figure 7). It may be that fall rains wash off agricultural fields, parking lots and roads resulting in high flow and high overall load of bacteria. Then as winter progresses, wet-season discharge becomes cleaner.

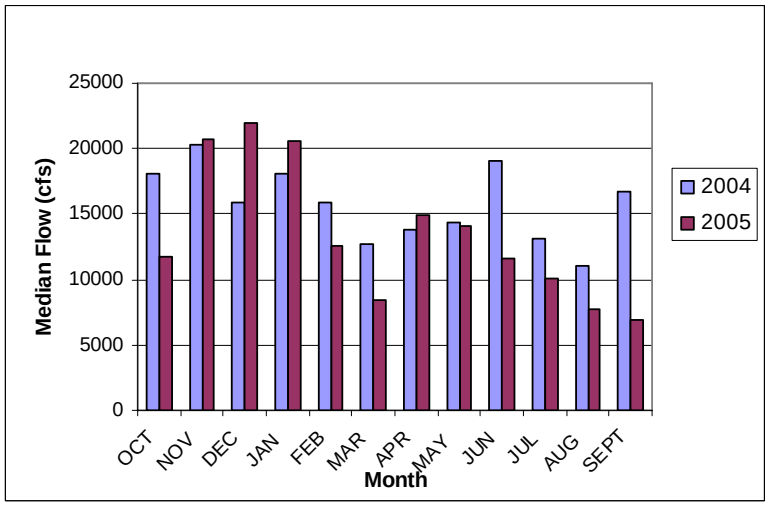


Figure 6. Median monthly flow (cubic feet per second) in Skagit River at USGS station 12200500 at Mount Vernon

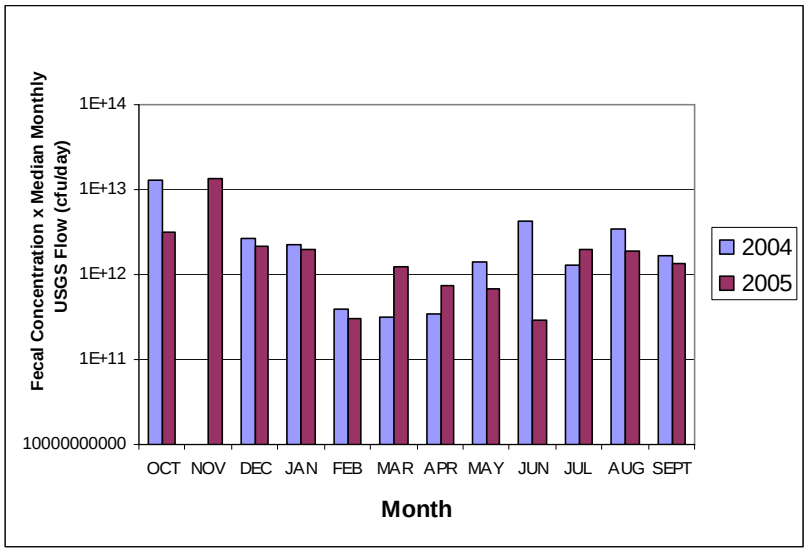


Figure 7. Fecal coliform bacteria load in Skagit River at Mount Vernon, by month, for 2004 and 2005 (Calculations based on bacteria concentrations at Ecology station 03A060, and median monthly flows at USGS Gage 12200500.)

Long term trends. The monthly monitoring record for 1982 through 2006 at Station 03A060 makes possible an analysis of long term trends in bacteria in the river. Visual inspection of annual geometric mean concentrations (Figure 8) suggests a significant decline since 1982. Based on a Seasonal Kendall test for trends using the monthly data, this decline was significant at $p<0.05$ for the entire period (1982-2006); for the period 1985-2006 (excluding the first three years of data showing a significant drop of unknown cause); and for the period following completion of the TMDL (1995-2006).

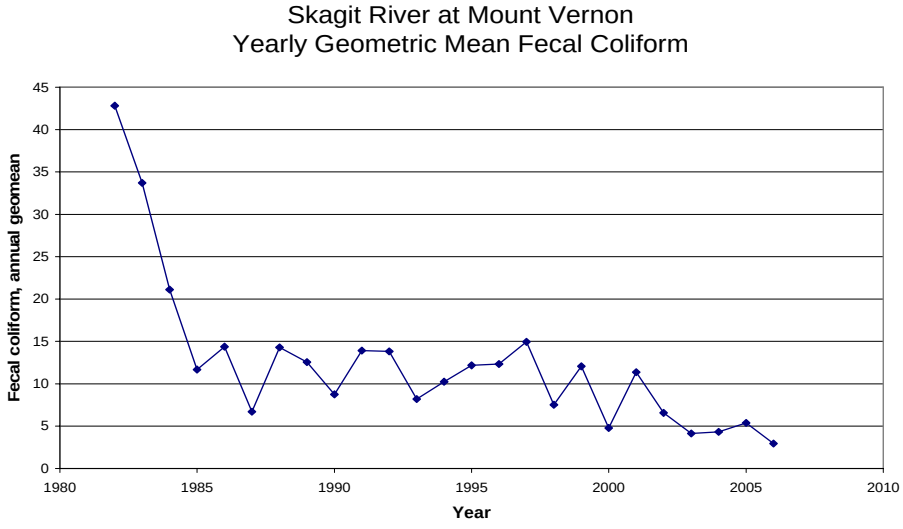


Figure 8. Annual geometric mean bacteria concentrations at Ecology Station 03A060 near Mount Vernon (chart courtesy Skagit County Public Works)

Factors leading to reduced fecal coliform concentrations in the Lower Skagit River

Causes of these significant declines are not known with certainty, but it is likely that many factors are involved. Improvements have been made at all four WWTPs that discharge to the Lower Skagit River. Dates of major upgrades or expansions are provided in Table 6. All the WWTPs that discharge to the river have added sewer lines in urban areas, and such new areas of sewer service could have eliminated some failed septic systems.

The number of dairies in the watershed has declined, and the dairies that remain are required to have farm plans and are subject to inspection by the WSDA nutrient management program. Numbers of other types of livestock may also have declined, although we did not look for data to support this. Because numbers of small non-commercial farms are reported to be increasing (again, no known data are available to support this), it is not known whether overall domestic animal numbers are increasing or decreasing. This is a data gap that may need to be addressed.

Other "nonpoint" factors that could be related to reduced fecal coliform bacteria in the river include greater public awareness of the need to pick up pet waste; repair of failing septic systems; and general improvements in septic systems, such as installation of new types where soils may not be appropriate for conventional gravity systems.

Table 6. Dates of upgrades and expansions of WWTPs in the Lower Skagit River watershed since 1982

Year	Facility	Improvement
1989	Mount Vernon WWTP	Upgrade/expansion
1995	Burlington WWTP	Upgrade
1998	Mount Vernon WWTP	Central CSO regulator installed
1998	Sedro-Woolley WWTP	Upgrade/expansion
2005	Mount Vernon WWTP	Outfall extension/improved mixing

Results – Tributaries to Lower Skagit River

Since 2003, Skagit County has monitored water quality at several locations in the Nookachamps Creek basin, as well as two sites on Hansen Creek and one site each in Fisher Creek and Carpenter Creek-Hill Ditch. Ecology monitored one of the Nookachamps sites (Swan Rd) in 1995 and 2000.

Compliance with standards. Of the tributaries monitored by Skagit County, only Carpenter Creek-Hill Ditch met state bacteria standards in 2004-2006 (Table 7). Two sites (Nookachamps Creek at Swan Rd and Fisher Creek) met standards in the wet season (October to April) but not in the dry season (May to September). All sites had higher fecal coliform concentrations in the dry season.

Seasonal patterns. The summer high concentrations of bacteria in Hansen and Nookachamps Creeks were shown previously in Figure 5. It is likely that other creeks in the watershed follow this pattern. (Summer seasonal peaks in bacteria concentrations have been observed in other smaller creeks in the Puget Sound region [D. Sargeant, Dept of Ecology, personal communication, May 2007].

Table 7. Seasonal compliance with fecal coliform standards in tributaries of the Lower Skagit River in 2004-2006 (Skagit County Monitoring Program)

Bold values in shaded cells exceed the state fecal coliform standard.

			WET SEASON (Oct – April)			DRY SEASON (May – Sept)		
Site No.	Stream Name	Location	N	GM (cfu/100mL)	% > 200 cfu/100mL	N	GM (cfu/100mL)	% > 200 cfu/100mL
12	Nookachamps Creek	Swan Rd.	30	36	3	22	**170**	**45**
15	Nookachamps Creek	Knapp Rd.	30	56	**17**	22	**110**	**27**
20	Hansen Creek	Hoehn Rd.	30	30	**13**	22	**263**	**77**
28	Brickyard Creek	Hwy 20	29	33	**14**	9	**152**	**67**
42	Carpenter Creek/Hill Ditch	Cedardale Rd.	28	13	4	21	46	5
48	Fisher Creek	Franklin Rd.	29	49	7	21	**185**	**43**

Long term trends. For the 2006 Water Year Annual Report, Skagit County reviewed data for Nookachamps, Hansen, Brickyard, Hill Ditch-Carpenter Creek and Fisher Creek for trends over time. No increasing or decreasing trends in fecal coliform concentrations were detected for these creeks for the period (October 2003-September 2006) (Skagit County 2007). It is likely that trends will not be detectable until more years of data are available. Even without sufficient data to detect trends, it is clear from the most recent two years of data that land use practices along the tributaries, which are affected by nonpoint rather than point sources, still need considerable improvement.

Ecology monitored basin station 03D050 in Water Years 1995 and 2000. (This station -- Nookachamps Creek at Swan Rd--is also monitored by Skagit County.) Although the wet season geometric mean fecal coliform declined from 221 in 1995 to 64 in 2000, this difference was not statistically significant, based on a Mann-Whitney nonparametric test. The dry season geometric mean declined from 255 in 1995 to 144 in 2000, but the decline was not significant. Ecology will monitor this station again in 2010. A side-by-side comparison of Ecology and County monitoring results for this station is needed because of the different bacteria analytical methods used (Membrane Filtration and Most Probable Number).

Results - South Skagit Bay

Freshwater loading of fecal coliform bacteria to South Skagit Bay (Figure 9) is in theory dominated by the massive discharge of the Skagit River. Other potential bacteria sources to the Bay may be significant but were not part of the scope of this TMDL. These include:

- Big Ditch/Maddox Slough drains farmland along I-5 north of Milltown and discharges through a tidegate to the east side of the Bay.
- Douglas Slough and unnamed ditches drain farmland from the southeast near Pioneer Highway and Stanwood.
- Various sloughs and channels in the Washington Department of Fish and Wildlife (WDFW) Conservation Area to the north and east.

- From the south, West Pass carries part of the discharge of Old Stillaguamish Channel. Old Stillaguamish Channel has a number of 303(d) listings for bacteria, dissolved oxygen and temperature.
- The northeast shore of Camano Island.

The flows and probably the bacteria loads from these sources are orders of magnitude lower than that of the Skagit River. However, reducing bacteria loading from these sources would have a beneficial impact on bacteria concentrations in the Bay. Circulation and tides, which affect dispersion of the freshwater sources, have not been studied.

Summary statistics for fecal coliform bacteria concentration are available for several of these discharges to South Skagit Bay:

- Wiley Slough – GM 56 cfu/100 mL; 12 percent exceeded 200 cfu/100 mL (Skagit County 2007)
- Maddox Slough/Big Ditch – GM 73 cfu/100 mL; 23 percent exceeded 200 cfu/100 mL (Skagit County 2007)
- West Pass, Old Stillaguamish Channel – GM 85 cfu/100 mL; 90th percentile value 1,250 cfu/100 mL (Ecology 2005c)
- Douglas Slough in Stanwood – GM 40 cfu/10 mL; 90th percentile value 620 cfu/100 mL (Ecology 2005c)

Figure 9. South Skagit Bay near Stanwood

Compliance with standards: ***DOH shellfish classification status.*** State Department of Health (DOH) Office of Shellfish and Water Protection conducts monthly monitoring of fecal coliform bacteria at 17 marine stations in South Skagit Bay (Figure 10) to determine shellfish harvest classification. As of summer 2006, there is an Approved Shellfish Harvest area represented by 11 monitoring stations off the northeast shore of Camano Island; a prohibited area to the southeast near the mouth of West Pass, represented by one station; and unclassified areas represented by five stations, one near the northern tip of Camano Island and four toward the mouth of the South Fork Skagit River.

For a marine harvest area to be classified as "approved," one of the requirements is that 30 or more consecutive monthly water quality samples have a cumulative geometric mean bacteria count equal to or less than 14 cfu/100 mL and 90th percentile value no greater than 43 cfu/100 mL.

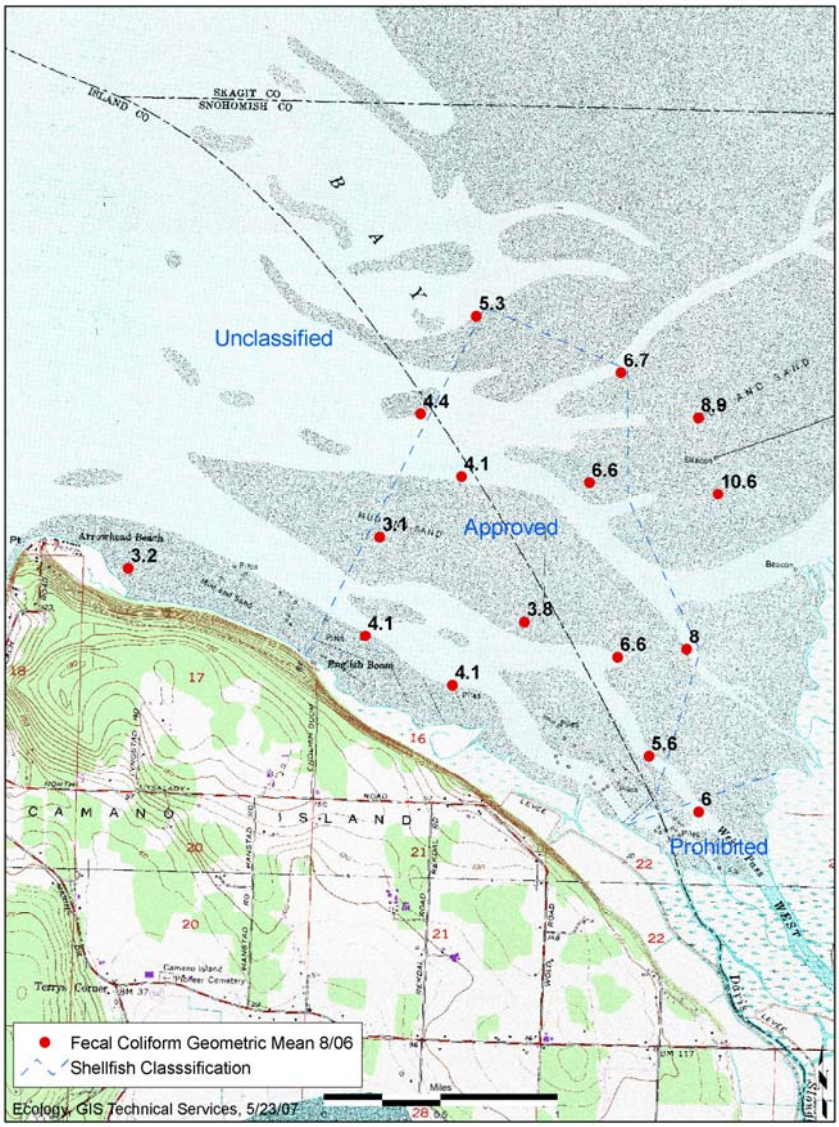


Figure 10. Washington Department of Health classification of South Skagit Bay shellfish growing areas, summer 2006

Seasonal patterns and relationship to Skagit River. DOH monitors South Skagit Bay monthly rather than twice a month, and the range of concentrations is smaller than those in the river, so seasonal patterns are not as evident. Over two years, from October 2003 to December 2005, concentrations at two stations closest to the mouth of the South Fork Skagit River were higher in Nov-Dec 2003; July-August 2004; Dec 2004 – March 2005; and July – October 2005 (Figure 11).

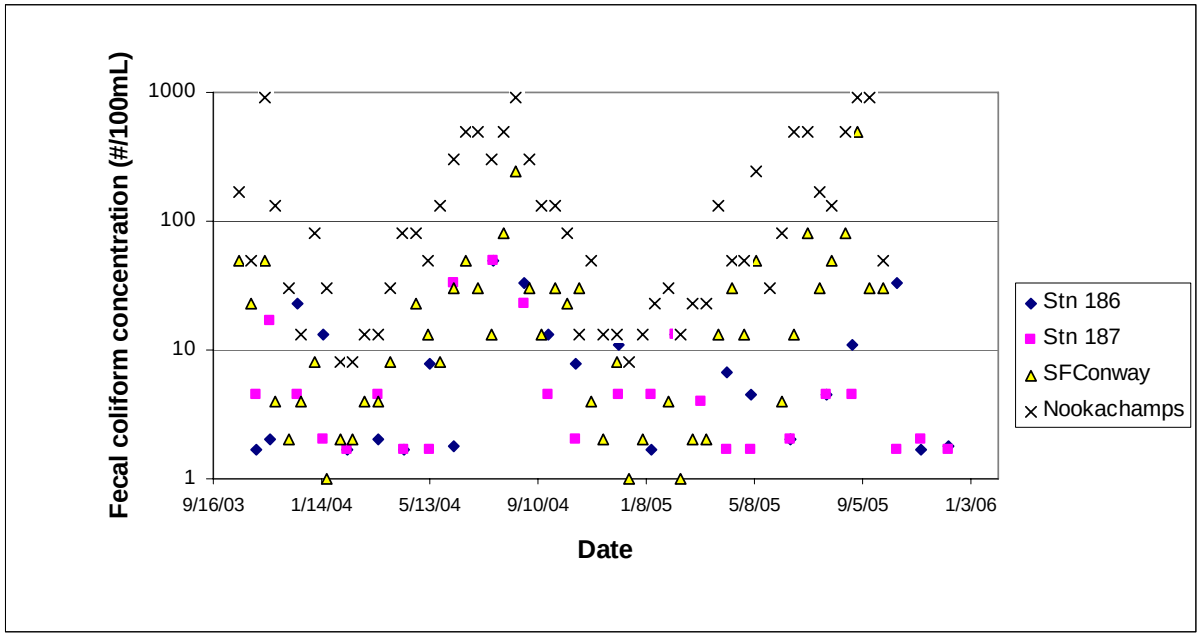


Figure 11. Bacteria concentrations at South Skagit Bay stations 186 and 187 (DOH), and in South Fork Skagit River at Conway and Nookachamps Creek at Swan Rd, 2003-2005 (Skagit County Monitoring Program

Concentrations of bacteria in South Skagit Bay would be expected to vary with concentrations from freshwater sources. Factors that can reduce this correlation include dilution by cleaner marine waters; direct mortality of bacteria at higher salinities; and increased mortality with greater ultraviolet light exposure, particularly as tide ebbs and water depth decreases. Additional factors that affect bacteria numbers in marine waters include resuspension of bacteria archived in sediments and wind effects on the surface layer.

That a high concentration of bacteria in the Skagit would be reflected in the marine waters of South Skagit Bay seems obvious, and this link is supported by data for the following incident. On December 15, 1999, a high precipitation event led to sewage overflows in Mount Vernon from both Park Street and Division Street CSO outfalls, totaling 5.7 million gallons. The overflows started at 8:15 am December 15 and ended at 1 pm December 16 (W. Fullner, City of Mount Vernon, personal communication, May 2007).

On December 16, bacteria concentrations at all South Skagit Bay stations (Figure 12) were from five to 50 times the concentrations typical for these stations, reflecting this slug of untreated sewage carried by the river.

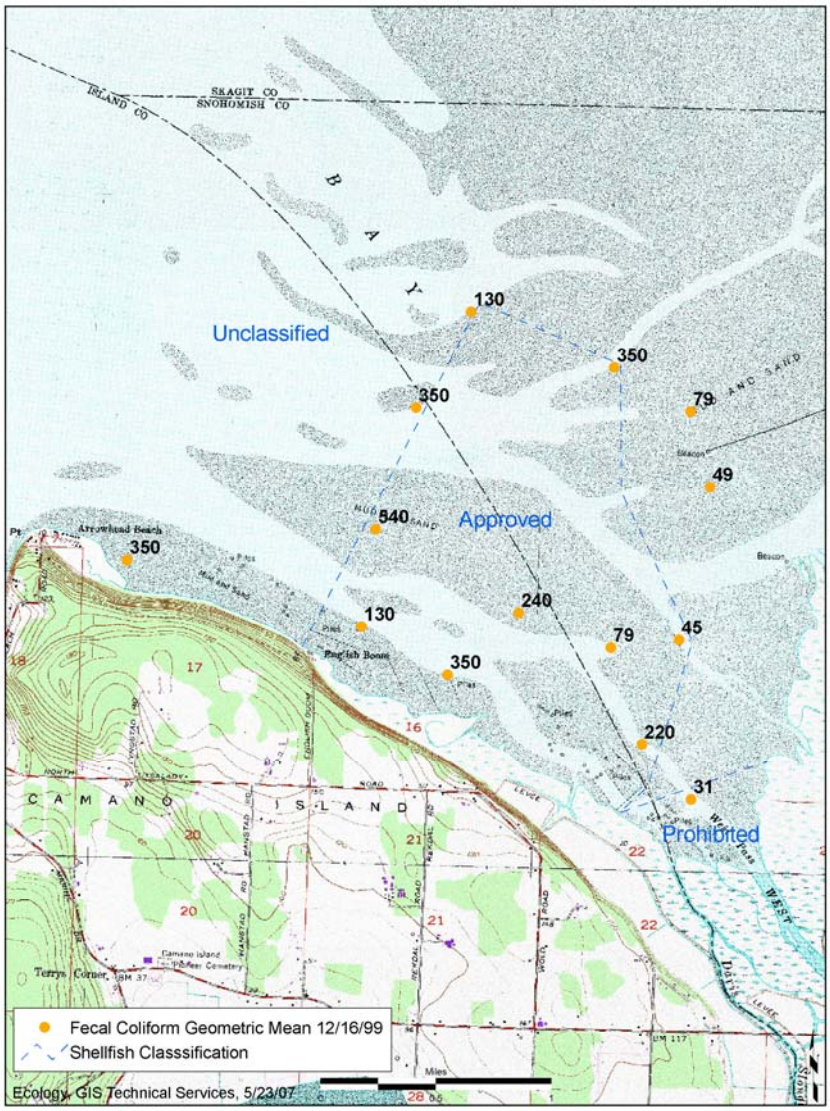


Figure 12. Bacteria concentrations (#/100 mL) in South Skagit Bay following Combined Sewer Overflow event in 1999

DOH revisited six of the South Skagit Bay stations on December 21, five days following the CSO event. Bacteria concentrations were largely but not completely dissipated (Table 8).

Table 8. Fecal coliform concentrations (#/100 mL) in South Skagit Bay following CSO event (DOH data)

Station	Dec. 16, 1999	Dec. 21, 1999
181	240	7.8
182	540	17
183	79	31
184	45	49
185	79	70
191	130	17

Long term trends. DOH bacteria data for eight stations in South Skagit Bay were evaluated for trends using the Seasonal Kendall test. The stations chosen for analysis were:

- Four stations closest to mouth of South Fork Skagit River (185, 186, 187, 192; data start in 1990, 1993, 1993, and 2000, respectively)
- Two stations furthest from mouth of South Fork Skagit River (189, 191; data start in 2000 and 1993, respectively)
- Two stations closest to West Pass (179, 180; data start in 1990)

Of the eight stations, one (Station 179 near West Pass) has declined significantly in fecal coliform concentration since 1990. The others show no significant trends.

Results summary

(1) The mainstem Skagit River is currently meeting state water quality standards for bacteria, and the North Fork meets the stricter TMDL goals. The South Fork meets state standards but needs some improvement to reach the stricter TMDL goals.

(2) Bacteria concentrations in the mainstem have decreased significantly since 1995, the year of TMDL monitoring, and also since 1982.

(3) Bacteria in the larger tributaries (Nookachamps, Fisher, and Hansen Creeks) do not meet standards, whether evaluated on a seasonal basis or annual basis. However, Hill Ditch/Carpenter Creek met standards in the most recent monitoring period.

(4) Bacteria concentrations in freshwater vary seasonally in this basin, with a peak in the river in fall and in tributaries in summer.

(5) Loading in the Skagit River appears to be higher in fall. In 2004 and 2005, the highest loads occurred in October and November and lowest loads in February through April.

(6) Bacteria concentrations in South Skagit Bay also appear to exhibit some seasonality but the pattern is more complex than in freshwater. In water years 2004-2006, the highest bacteria concentrations at stations closest to the Skagit River occurred in mid-summer (July) and were moderately elevated in the November-February period.

Conclusions

Skagit River water quality (with respect to fecal coliform bacteria concentrations) has improved significantly since 1982 and also since 1995, the year of the TMDL study. It has shown these improvements despite the fact that major tributaries continue to exceed water quality standards and despite increasing urbanization in Mount Vernon, Burlington, and Sedro-Woolley. All the factors contributing to this improvement are not known, but improvements in WWTPs, reduced incidence of CSOs in the Mount Vernon area, and fewer dairies and livestock operations along the river may have contributed to the reductions in bacteria concentrations in the mainstem. Whether nonpoint source contributions have been reduced overall is not known.

Bacteria in this watershed show seasonal changes in concentration and loading with a peak in late summer in the tributaries; a peak in fall in the river; and seasonal elevations in July, November and February-March in South Skagit Bay. Despite the difference between river and bay in seasonality of concentrations and loads, high concentrations in the river can quickly affect bay concentrations. This was demonstrated in December 1999 when a CSO event in Mount Vernon was followed in less than a day by elevated bacteria concentrations at all of DOH's monitoring stations in South Skagit Bay. Concentrations of bacteria in the Bay remained elevated for several days.

The results prompt two questions:

(1) Given that water quality has significantly improved at the Skagit River mainstem stations, which are now meeting water quality standards, why has South Skagit Bay water quality not shown measurable improvement except for the station nearest West Pass (Stanwood)?

Two alternative explanations are possible:

- While water quality in the Skagit River has improved significantly as measured by regular monthly monitoring, it still may carry high loads of bacteria during short term storm events. It is not known how long after storm events bacteria concentrations would remain elevated in South Skagit Bay. If these events are of short duration in the water column, then it may be that these loads contribute to sediments of South Skagit Bay. The sediment may act as a reservoir that periodically resupplies the water column with bacteria.
- While water quality in the Skagit River has improved significantly, the other sources around the shore of South Skagit Bay (that were not evaluated in the TMDL) may still be contributing significant loads of bacteria.

(2) Can the apparent high fecal coliform concentrations in the river in the summer months be accounted for by tributary contributions? It would be helpful to perform an updated analysis of tributaries and river loading of bacteria over all seasons.

Recommendations

(1) Tributaries not monitored since the 1994-1995 TMDL study should be monitored to determine compliance with standards. These are Britt Slough and Kulshan Creek.

(2) Ecology should monitor the basin station 03D050 (Nookachamps Creek at Swan Road) in 2010 and 2015. The apparent decline between 1995 and 2000 was not statistically significant, but continued reductions might be significant. Also, Ecology should monitor this station because it is a Skagit County site. Side-by-side monitoring would help in validating the County's program and would provide a useful comparison of results obtained by Most Probable Number (Skagit County) and Membrane Filtration (Ecology) bacteria methods.

(3) The main stem Skagit River at Mount Vernon and South Fork Skagit River at Conway should be monitored during two early fall storm events and two late winter (February-March) storm events to assess storm event loading of bacteria to South Skagit Bay. It is hypothesized that early season storms would carry higher loads of bacteria than late winter storms. Those developing the monitoring plan should consider whether it would be important to learn how long after a storm event bacteria concentrations remain elevated in South Skagit Bay.

(4) An updated bacteria loading analysis of tributaries and river over all seasons should be performed. Of particular interest is whether the bacteria loads carried by tributaries that are monitored add up to the load carried by the river, particularly during seasonal peaks in concentration.

(5) Snohomish County Surface Water Management and the Stillaguamish Clean Water District Citizens Advisory Board should be informed of the questions relating to potential sources of bacteria loading of South Skagit Bay and invited to participate in annual water quality reviews for the Lower Skagit River Fecal Coliform TMDL. Should there be sufficient interest and resources committed by local governments and local organizations, then same day monitoring and flow gaging should be conducted at locations around the bay that may be important contributors of bacteria. Such locations could include West Pass, Douglas Slough, Big Ditch/Maddox Slough, and Wiley Slough.

(6) Department of Health should conduct dry season and wet season shoreline surveys around South Skagit Bay. This effort should be coordinated with local governments if simultaneous monitoring of sloughs, West Pass, and Camano Island shoreline would provide valuable information.

(7) Stormwater Phase II municipalities should place priority on the storm drainage systems that drain directly or indirectly to the Skagit River, Hansen Creek and Nookachamps Creek as they develop their infrastructure mapping, public education and illicit detection programs.

Sources of Fecal Coliform Pollution and the Actions Needed to Improve Water Quality

Bacteria pollution sources in the Lower Skagit watershed include three types of point sources: combined sewer overflows; wastewater treatment plants (WWTPs); and urban stormwater. Urban stormwater was formerly viewed as a nonpoint source of pollution but is increasingly referred to as a point source because it is addressed by regulatory programs, including Ecology's new NPDES municipal stormwater permit program for medium and smaller municipalities (the NPDES Phase II Municipal Stormwater Permit which became effective in January 2007. The nonpoint sources of bacteria addressed in this TMDL are failing on-site septic systems and commercial and non-commercial agriculture.

In this section, these sources of bacterial pollution (Table 9) are described in further detail, followed by descriptions of the actions and programs needed to address them.

Table 9. Potential sources of bacterial pollution to Lower Skagit River and tributaries

Source	Explanation
Combined Sewer Overflows	City of Mount Vernon's sewer infrastructure was built according to standards that allowed discharge of untreated sewage during intense rainfall events. Mount Vernon is reducing these occurrences through a program of infrastructure improvements (see text).
Wastewater Treatment Plants	Under normal operation, these facilities do not contribute to violations of the water quality standards for fecal coliform bacteria.
Stormwater	Contaminated runoff from commercial and industrial areas, urban parking lots, streets, roofs. In residential areas, runoff contaminated with pet wastes. Urbanized areas and Urban Growth Areas of Skagit County, and the cities of Burlington, Mount Vernon and Sedro-Woolley will be covered by Ecology's Phase II NPDES Municipal Stormwater Permit.
Onsite Septic Systems	Many septic systems do not receive recommended operation, monitoring and maintenance (O & M) services, which can lead to incorrect operation or failure. Failing or incorrectly operating systems can result in improperly treated sewage that contaminates groundwater or surface water. Permitted systems are installed and inspected according to State and local codes.
Agriculture – dairy, livestock, crop and noncommercial farms	Runoff and drainage from improper grazing practices or improper application and/or storage of manure.
Wildlife	Considered part of "background" fecal coliform concentration; not pollution.

Combined sewer overflow reductions

The city of Mount Vernon is in compliance with a schedule to reduce the incidence of combined sewer overflows (CSOs). Overflows occur during intense rain events when flow in the collection system serving the downtown city core, which was designed to transport combined sanitary sewage and stormwater, is greater than the capacity of the system. When the system capacity is exceeded, a dilute mixture of sanitary sewage and stormwater may be discharged through two different CSO outfalls to the river. Prior to undertaking infrastructure improvements in 1996, the city discharged through its two separate outfalls an annual average of 116 million gallons of untreated sewage combined with stormwater during 130 separate events (photo, Figure 13). Since completing a number of infrastructure and operational changes in 2000, the city's annual average CSO discharge was reduced to approximately 13 million gallons during approximately 9 events (Table 10).

Table 10. CSO event and volume data for city of Mount Vernon
(Source: City of Mount Vernon, Annual CSO Reports to Ecology re: NPDES Permit No. WA-002407-4).

Year	CSO Events (projected no.)	CSO Volume (projected gallons)	CSO Events (actual no.)	CSO Volume (actual gallons)
2005	12	34,000,000	8	7,948,000
2004	12	34,000,000	8	26,647,000
2003	12	34,000,000	13	14,915,000
2002	12	34,000,000	5	3,842,000
2001	12	34,000,000	12	13,239,000

Figure 13. Park Street Combined sewer overflow outfall, Skagit River, Mount Vernon
(photo: Dave Garland)

Under Order on Consent No. 96WQ-N105, the city must fulfill the legal requirements of Chapter 173-245 of the Washington Administrative Code (WAC) to reduce CSO discharge events to an

average of one per year per outfall by no later than January 1, 2015. The collection system has been upgraded with an oversized CSO interceptor and improved pumping systems to increase conveyance and storage capacity of combined sewage flows.

The city is continuing to meet the compliance schedule requirements established in the 1996 consent order. The next phase, which began in spring 2007 and will be completed by mid-2009, will significantly increase the ability of the wastewater treatment plant to treat the high peak flows from intense rain events that currently cause CSO discharges. This will be accomplished by constructing new treatment components with larger flow capacities and converting some existing tanks into storage basins. The city also has preliminary plans in place to construct enhanced primary treatment at the wastewater treatment plant should the expansion project prove to be insufficient to meet the 2015 compliance goals.

Because the correction of CSOs is managed under the Compliance Order and the city's NPDES wastewater permit (regulatory programs separate from TMDLs), this TMDL will not conduct any separate assessment or review of the CSO program.

Wastewater treatment facilities

The four permitted wastewater treatment facilities that discharge treated effluent to the Lower Skagit River are operated by the city of Sedro-Woolley, the city of Burlington, the city of Mount Vernon, and Skagit County Sewer District # 2 (Big Lake) Facility. The TMDL does not require any stricter limits on fecal coliform bacteria than the technology-based permit limits of 2seven00/100 mL (30-day geometric mean fecal coliform concentration) and 400/100 mL (maximum seven-day geometric mean fecal coliform concentration) (see Table 2). When operated properly, these plants do not contribute to exceedances of the water quality standard for fecal coliform bacteria in the river. Under their NPDES permits, these facilities provide monthly discharge monitoring reports which are reviewed by Ecology (photo, Figure 14). As with CSOs, the TMDL will not conduct a separate assessment or review of the wastewater treatment facilities' performance.

Figure 14. Ecology municipal unit staff reviewing monthly Discharge Monitoring Reports from wastewater treatment plants

Urban Stormwater

Stormwater can be a significant source of bacteria, nutrients and toxics to local water bodies. In this document, stormwater is defined very broadly and includes both rainwater that hits the ground and does not infiltrate at that location and other discharges that are collected in stormwater collection systems (pipes or ditches) and conveyed to local surface waters. (See http://www.ecy.wa.gov/programs/wq/stormwater for more information.)

Urban and suburban development is intensifying in some parts of the lower Skagit River watershed, increasing potential impacts of stormwater to the river. Bacteria in stormwater may come from pets, from surfacing wastewater from failing septic systems, from other domestic animals, wildlife, and illicit or inadvertent cross connections with sewer systems. In addition to bacteria, stormwater carries nutrients from animal wastes and lawn fertilizers; and metals, oils and greases from wear on car tires and engine parts. Such activities as car washing and sidewalk cleaning add pollutants as well.

In urban areas around Puget Sound and other parts of the U.S., bacteria concentrations in stormwater range from approximately 1,000 to over 100,000 organisms per 100 mL (Varner, 1995; Pitt, 1998). In a recent study of stormwater as a source of fecal coliform to two marine inlets of Puget Sound (Sinclair and Dyes Inlets near Bremerton), 26 stormwater outfalls from urban and commercial areas discharged bacteria at an overall geometric mean concentration (for several storms) of 947 cfu/100 mL compared with 321 for three outfalls in rural areas and 140 for four outfalls in suburban developments (May et al., 2005).

Urban stormwater reaches the river in the form of runoff from parking lots, streets, and roofs in the three cities and in urbanized parts of the county, and it may reach the river via stormwater infrastructure, including piped outfalls. This category of stormwater is covered by Ecology's Phase II stormwater permit for medium and small municipalities if the municipality is sufficiently large and if the stormwater conveyance system is within a census-urbanized zone or Urban Growth Area of a county. Using these definitions, parts of Skagit County and the cities of Burlington, Mount Vernon, and Sedro-Woolley are subject to coverage under the Phase II permit. All are covered under the new permit which became effective in January 2007. (Ecology's Phase I municipal stormwater permit, issued in 1995, applied to the largest cities and counties in the state, none of them in Skagit County.)

Storm runoff that is conveyed by a private conveyance system directly to surface waters is not covered under the Phase I or II permits. Also, surface runoff that drains directly to a stream or other natural water body without benefit of pipes or ditches is considered nonpoint stormwater runoff, and is not covered under the permits.

The Phase II Municipal Stormwater permit requires permit holders to develop stormwater management programs that include the following elements:

1. Public education and outreach
2. Public participation/involvement
3. Illicit discharge detection and elimination
4. Construction site runoff control

5. Post-construction runoff control
6. Pollution prevention/good housekeeping
7. Implementation of applicable TMDLs
8. Program evaluation and reporting

These elements each have a different, specific timeframe for completion (Table 11). For example, local regulations prohibiting illicit discharge into a municipal storm system need to be in place by August 2009; staff is to be trained to detect illicit discharges by February 2010; and the municipality is required to begin assessment of three high priority water bodies by February 2011. This requirement to assess high priority water bodies provides an opportunity for productive information exchange related to TMDL water quality priorities and municipal stormwater program development, which can take place at the TMDL annual review of water quality.

Table 11. Western Washington Phase II municipal stormwater NPDES permit overview

The timeline below provides and overview of major program components deadlines ("…no later than…") for implementing permit requirements of S5 Stormwater Management Program (SWMP) for cities, towns and counties. Other permit elements are listed on the next page. This is guidance only: please see the permit for additional detail and related requirements.

S5 Program Component	Feb 16, 2007	Feb 2008	Feb 2009	Aug 2009	Feb 2010	Feb 2011	Aug 2011	Feb 2012
A. Stormwater Management Plan	Set up process to track costs, actions and activities. Establish coordination among permittees as possible.		Begin tracking costs.				Program fully implemented	
C.1 Public Education and Outreach			Implement educ. program. Public hotline starts. Begin to measure understanding, adoption.				Distribute IDDE info to target audiences	
C.2 Public Involvement		Program begins. SWMP and annual reports are available to the public and posted on website. Create opportunities for public input.						
C.3 Illicit Discharge Detection and Elimination (IDDE)			Establish public hotline to report spills and illicit discharges.	Adopt IDDE codes & regulations to prohibit non stormwater discharge, establish escalating enforcement. Develop enforcement strategy. IDDE staff training. Recordkeeping	Train all municipal field staff. Prioritize receiving waters for visual inspection.	Storm system map is complete and maps are kept updated. Assess 3 high priority water bodies.	Program fully implemented: field assessment, inspections, pro-cedures, process to ID priority areas. Distribute info on IDDE.	
C.4 Control Runoff from New Development, Redevelopment Construction Sites (generally, disturbing at least 1 acre)	Make NOIs for construction, industrial stormwater permits available. Recordkeeping (inspections, maintenance, enforcement).			Adopt regulations, implement program for runoff control, site plan review, inspection, enforcement, LID. Adopt/implement O&M regulations for post-construction BMPs & facilities. Staff training.				
C.5 Municipal Pollution Prevention, Operation and Maintenance					Adopt and implement SWPPP, inspection & maintenance schedule, procedures. Staff training.			

Notes to Table 11: Other significant elements of the Western Washington Phase II Municipal Stormwater NPDES permit
This is guidance only: see the permit for additional detail and related requirements.

S1 Application for coverage
- Operators of small MS4s designated by Ecology as "significant contributors per S1.B.3 must submit NOIs within 120 days.
- Jurisdictions submitting NOI to Ecology after January 17, 2007 need to conduct public notification.
- Jurisdictions applying as Co-Permittees submit a joint NOI. Co-Permittees can end or amend agreements at any time.

S4.F Response to violations of Water Quality Standards
- Notification and possible corrective actions may occur at any time.

S7 Compliance with Total Maximum Daily Load (TMDL) requirements
- Jurisdictions comply with applicable TMDL requirements listed in Appendix 2 with individual timelines.

S8 Monitoring
- Report on all new stormwater monitoring studies and assessment of BMP appropriateness in each annual report.
- By December 31, 2010 select sites for long-term discharge monitoring and questions/sites for SWMP effectiveness monitoring.
- Beginning March 2011, annual reports include the status of preparing for the future, long-term monitoring program.

S9 Reporting
- Keep all records related to the permit and the SWMP for at least five years.
- Beginning March 31,2008 submit a report for the previous calendar year using annual report forms in Appendix 3.
- Notify of changes in jurisdictional boundary with annual report.

G3 Notification of spill
- Report to Ecology within 24 hours a spill into the municipal storm sewer which could constitute a threat to human health, welfare or the environment.

G18 Duty to reapply
- Apply for permit renewal no later than August 16, 2011 (180 days before permit expiration).

G20 Non-compliance notification
- Notify Ecology with 30 days of awareness of permit non-compliance

This Implementation Plan assumes that compliance with the Phase II stormwater permit by the four municipalities is the only *requiremen*t they need to fulfill to accomplish the objectives of the TMDL. However, in order to adequately track progress, this plan *recommends* fecal coliform bacteria monitoring during the wet season of four of the Skagit tributaries that receive discharges of municipal stormwater: Gages Slough (city of Burlington); either Hansen Creek or Brictt Slough (Skagit County); Brickyard Creek (city of Sedro-Woolley); and Kulshan Creek (city of Mount Vernon).

The purpose of establishing wet season monitoring of these stormwater-receiving creeks and sloughs is to provide each municipality with a target water body to gauge the effectiveness of its stormwater program and to focus public awareness. If the monitoring can be used successfully to aid in locating sources of bacteria and these municipalities develop effective strategies for reducing bacteria inputs, then stormwater contributions of bacteria to the Skagit River will be reduced. In addition, these municipalities should focus their illicit discharge detection programs on the storm drains that discharge directly to the Lower Skagit River.

Ecology recommends that these municipalities, in developing their stormwater programs, review the types of commercial, industrial, agricultural, roadway, and residential uses of parcels that discharge to municipal storm systems and design a public information strategy in accordance with the most common – or, alternatively, the dirtiest – uses. In addition, Ecology encourages the municipalities to work cooperatively where possible, in order to use staff resources and equipment efficiently, and to avoid replication of messages to a message-weary public.

Private stormwater collection systems

Private stormwater systems are subject to the same pollution sources as publicly owned systems. However, municipalities under the Phase II municipal stormwater permit do not have responsibilities related to these private systems unless they are located geographically within their Phase II boundaries and discharge to the municipal storm sewer system. In Skagit County and within the Lower Skagit River watershed, there may be developments with private stormwater systems that are not within the Phase II boundaries. These systems will not have any regulatory oversight. The business owners and neighborhood associations that own them have responsibility for potential degradation of surface waters from stormwater runoff.

Commercial and non-commercial agriculture

Nonpoint water pollution in the watershed may be generated by poor land management, such as agricultural practices that fail to keep manure out of streams, and failing or improperly managed onsite septic systems. Tributaries such as Nookachamps Creek with significant numbers of farms and rural residences are especially susceptible to pollution from improper agricultural practices and failing onsite systems. The mainstem Skagit River is also not immune to impacts from these nonpoint sources. Poor agricultural practices may add pollutants to the river through pump stations, tributary streams, and overland flow. The area contains over 50,000 acres of farmland with over 50 commercial dairy operations holding more than 17,000 animals. Although the number of dairies has decreased in the last decade, numbers of animals at each dairy has generally increased. The number of small non-commercial farms is increasing.

Agriculture includes both permitted (those with National Pollutant Discharge Elimination System, or NPDES discharge permits) and non-permitted types. Permitted operations are those that meet the definition in the federal Clean Water Act of a concentrated animal feeding operation (CAFO– generally any farm with more than 700 animals confined) or animal feeding operation, including dairies, if they are a documented source of pollution.

Any agricultural activity that is not required to operate under an NPDES permit is considered "non-permitted." In Skagit County this includes most dairies, livestock operations, and crop farms. Non-commercial "hobby farms" are also included in this section because their impacts on water quality may be similar to those of commercial agriculture, though on a smaller scale. For both hobby farms and commercial agriculture, reducing impacts to surface water is achieved through implementation of farm plans that specify appropriate best management practices.

Dairies in Skagit County typically include a home site, cattle housing and confinement areas, milking facilities, feed storage areas, equipment sheds, and waste handling collection and storage facilities. The average dairy milks 250 cows and maintains replacement stock. Many are located in flood plains or are adjacent to rivers, lakes or streams. During the wet season from November through March, soils are saturated from rain resulting in high water tables. Feed waste, silage leachate, milk-house drainage and manure from animal confinement areas, or manure storage facilities are common sources of polluted runoff. Major contaminants to surface waters are nutrients and fecal coliform bacteria.

Class A dairies are regulated by Washington's Dairy Nutrient Management Act, RCW 90.64, and must have and implement a dairy nutrient management plan. The plan describes the management of nutrient-rich byproducts of dairy operations. If applied to pasture and hay lands, these byproducts must be applied at appropriate rates and times of year so that growing plants can capture and use the nutrients for plant growth and bacteria levels reduced to non-contaminating levels. Plans are approved by the Skagit Conservation District (SCD). Following farm plan approval, the plan must be certified by the SCD. In the first step of certification, SCD verifies that structural elements of the plan have been properly installed. In the second step, the dairy certifies that nutrients are being managed according to the plan. All dairies in Skagit County have met regulatory deadlines for approval and certification of farm plans.

Non-dairy commercial livestock operations are similar to dairies except that they do not include milking facilities, and animals tend to spend more time on pasture. These farms typically include fenced livestock pastures or feedlots.

"Hobby farms" are non-commercial properties, usually with smaller acreages, where the owner manages one or several domestic animals such as chickens, goats, pigs, cows or horses, for enjoyment or food supply rather than commerce.

Conservation practices recommended for both livestock operations and hobby farms are selected to improve forage production, nutrient utilization and wildlife habitat. Impacts to surface waters are reduced or eliminated by:

- Proper collection and storage of manure during the wet season.
- Reducing bare ground and improving cover crops through management or reseeding.

- Diverting runoff away from heavy animal use areas and “armoring” such areas with wood chips or similar materials.
- Excluding animals from watercourses.

Onsite septic systems

Onsite septic systems are a potential source of bacteria and nutrient pollution to water bodies in the Lower Skagit when they are not properly operated, monitored and maintained by the property owner. Without proper operation and maintenance (O & M) an onsite septic system has a greater probability of failing and directly discharging to a drainage ditch or tributary which flows directly into the Skagit River.

In some parts of the Lower Skagit basin, the number and density of septic systems have increased due to population growth and development. Old and new septic systems alike are subject to failure if they have not been operated or maintained properly. Without proper operation, monitoring and maintenance, septic systems fail, and those that are close to surface waters can pollute them. There is, in general, inadequate understanding among property owners regarding how to properly operate and maintain septic systems. The Skagit County Health Department (SCHD) has authority and requirements under Revised Code of Washington (RCW) to administer public health and onsite sewage programs in the county.

Other sources of fecal coliform bacteria

The watershed is also rich in wildlife, including waterfowl, deer, elk, and beaver. The fecal coliform bacteria measured in surface waters that originate from these natural sources is not targeted by the TMDL, which addresses human-caused excesses of fecal coliform bacteria in streams. If there are opportunities for human actions to buffer or in some way reduce bacteria loading from wildlife sources, this implementation plan favors consideration of such actions.

Organizations Responsible for Helping Reduce Fecal Coliform Pollution

This section describes the programs currently in place, and those that are still needed, to reduce inputs of fecal coliform bacteria to tributaries and the mainstem Lower Skagit River. These programs address nonpoint sources of bacteria including pet waste, failing septic systems, and both commercial and non-commercial agricultural waste (manure). This section also cites the stormwater management programs of the three cities and Skagit County that will be covered under the new Phase II NPDES stormwater permit to be effective early in 2007. (The primary point sources – the Mount Vernon CSOs and Wastewater Treatment Plants—are addressed through a compliance order and NPDES permits described in the previous section on Sources of Fecal Coliform Bacteria.)

Table 12 at the end of this section summarizes each organization's actions and programs that will be needed to help reduce fecal coliform bacteria in the Lower Skagit River. The schedule for these actions is provided in Appendix C, Implementation Tracking Sheets.

Federal, tribal, state and county entities

U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency (EPA) is responsible, with Ecology, for jointly evaluating TMDL implementation in Washington. EPA provides technical assistance and funding for states and tribes to implement the Clean Water Act.

Recommended Actions. Ecology encourages EPA to continue to provide Clean Water Act Section 319 funds and other grants that could be used to support nonpoint pollution-reduction projects in the Lower Skagit River watershed. EPA's Office of Water research section should continue developing better bacterial source identification methods and evaluating best management practices that reduce pollutants in urban stormwater.

Washington Department of Ecology

Ecology has authority, delegated by EPA, to implement several parts of the federal Clean Water Act, including development of state Water Quality Standards; the Section 303(d) List of Impaired Waters of the State; the NPDES permit program for point discharges, including WWTPs and direct industrial discharges to waters of the U.S. of stormwater and treated process water; and the TMDL program. Ecology's authority to protect water quality is specified in state regulations under RCW 90.48. Ecology responds to environmental complaints, conducts inspections, and issues NPDES permits as part of its responsibilities under state and federal laws and regulations. By referring landowners to consult with conservation districts, Ecology advises landowners to develop and implement farm plans and adopt best management practices (BMPs) for small farms and may use formal enforcement, including fines, if voluntary compliance is unsuccessful.

Under Section 319 of the Clean Water Act, the department developed programs to address nonpoint pollution in cooperation with local jurisdictions, resource agencies, watershed groups, and individual landowners. These programs are described in *Washington's Water Quality Management Plan to Control Nonpoint Source Pollution* (Ecology 2005). Ecology also coordinates with local watershed groups to facilitate projects that will assist the TMDL. Under the Centennial Clean Water Fund program, Ecology provides financial assistance to local governments, tribes, and conservation districts for water quality projects.

Ecology is also the permitting authority for State Waste Discharge Permits such as the General Industrial Stormwater Permit; the General Construction Stormwater Permit; and the Phase I and Phase II Municipal Stormwater Permits. Ecology will manage these permits consistent with this Water Quality Implementation Plan.

Ecology's role in administering the provisions of the Dairy Nutrient Management Act, RCW 90.64 was transferred to Washington Department of Agriculture (WSDA) in 2003. Under a Memorandum of Understanding (MOU) between Ecology and WSDA (2003) (http://www.ecy.wa.gov/programs/wq/permits/cafo/ag-mou.pdf), Ecology retains authority over certain agriculture-related nonpoint pollution, i.e.:

> *Landowners and/or agricultural operator(s) of pasture-based operations or field applications where the responsible party is not a dairy or animal feeding operation.*

Ecology also retains regulatory authority over other (non-agricultural) sources of nonpoint pollution.

Ecology's Northwest Regional Office (NWRO) has not had any staff positions with responsibility for Nonpoint Enforcement since 2004. Over the past year (2006), Ecology-NWRO has worked to reallocate time among current staff to begin to address this need. For the 2008-2009 biennium (start July 2007), Ecology will allocate 0.2 FTE to this role.

Using this 0.2 FTE capability over the next two years, where water quality monitoring data indicate a particular site has chronic exceedances of the water quality standard, Ecology will take the lead in reviewing the data and determining whether a followup investigation should be conducted. Ecology will also conduct a data review and investigation based on citizen complaint or local agency referral. Ecology will coordinate with appropriate agencies with enforcement authority, including Skagit County Planning and Development Services (code enforcement) and Skagit County Health Department (public health), and WSDA. Ecology will follow guidance for investigation and enforcement based on the Compliance Memorandum of Agreement among the Department of Ecology, the local conservation district, and the Washington State Conservation Commission (Ecology, 1991).

Ecology will coordinate an effectiveness monitoring program for this watershed at some time during the next eight years, with the timing dependent on evidence of progress in the county monitoring program for selected stations (Table 13).

Recommended Actions:

- Ecology's Water Quality Program should look for resources to increase the current level of staff dedicated to response to nonpoint pollution complaints, including developing appropriate response where water quality data point to a source of fecal coliform pollution.
- Coordinate with WSDA and local regulatory agencies on investigation and enforcement of nonpoint pollution.
- Convene responsible organizations for annual meeting to review water quality data for the TMDL and status of implementation activities and programs.
- Monitor Station 03A080 (mainstem Skagit River at Skiyou Slough) monthly, one year of every five years, for fecal coliform bacteria and other ambient water quality parameters.
- Provide information about funding opportunities to local organizations.
- Assist and facilitate implementation activities leading to clean water.
- Revisit Lower Skagit River monitoring data and prepare Effectiveness Monitoring Report in 2015.

Washington Department of Agriculture

Washington State Department of Agriculture (WSDA) administers the Dairy Nutrient Management Act, RCW 90.64 and has water quality enforcement responsibility for Animal Feeding Operations (AFOs) and Concentrated Animal Feeding Operations (CAFOs). Under its regulations, WSDA has the authority to inspect dairies on a regular schedule and respond to complaints and conducts routine inspections of all dairies within an 18 to 24 month period. Ecology does not have authority to require WSDA to take specific actions but encourages WSDA to consider:

Recommended Actions:

- WSDA Nutrient Management Program inspector could assist in the annual review of water quality and tracking of implementation progress for this TMDL, by providing an annual report of inspections and problem sites.
- Continue its recent excellent support and communication with Ecology and local government in discussions of potential nonpoint, Dairy and CAFO inspections/investigations.

Washington Department of Health

The Department of Health (DOH) Office of Shellfish and Water Protection, under statutory authority of Chapter 43.70 RCW, monitors marine water quality in commercial shellfish growing areas, including South Skagit Bay, and provides an annual report on status and changes in classification of growing areas. DOH shellfish growing area monitoring is an excellent source of

information to Ecology. Ecology does not have authority to require specific actions of DOH, but encourages DOH to consider the following *Recommended Actions*:

- DOH Office of Water and Shellfish Protection should provide a South Skagit Bay status report for the annual review of monitoring and implementation progress.
- DOH should conduct a shoreline survey of South Skagit Bay as soon as resources become available. This work should be coordinated with Snohomish County and Skagit County monitoring staff in order to obtain a detailed characterization of sources including Douglas Slough, Big Ditch/Maddox Creek, and West Pass of Old Stillaguamish Channel.

Puget Sound Action Team/ Puget Sound Partnership

In spring 2007 the state legislature approved funding for the Puget Sound Partnership, a partnership of business, government, Tribes, and conservation organizations to address pollution and development-related challenges of the Puget Sound basin. The partnership will focus on stormwater, pollution, habitat protection and restoration, freshwater quantity, and fish and wildlife. The partnership's mission is to:

- Recommend key actions.
- Engage citizens, government, Tribes, business and conservation communities.
- Coordinate government agencies and private organizations working on Puget Sound issues.
- Access funding resources and set spending priorities.
- Work with scientists to recommend how broad-based scientific knowledge can be used to make policy decisions, set goals and protect Puget Sound.

Recommended Actions: Ecology encourages Puget Sound Partnership to allocate funding resources for projects and programs that could lead to improved water quality in Lower Skagit River watershed and South Skagit Bay.

County and cities

The geographic area of the Lower Skagit River TMDL Implementation Plan includes parts of Skagit County and part or all of the cities of Burlington, Mount Vernon and Sedro-Woolley. Each of these municipalities has responsibilities under this TMDL to review their surface water management plans, critical areas ordinances, solid waste ordinances, stormwater management plans, and shoreline management programs, to ensure that existing policies and programs provide adequate protections and plans for water quality improvement in Lower Skagit water bodies. The municipalities should not limit their activities to the recommendations in this TMDL but should work actively with TMDL staff to focus existing programs on the drainage areas of the creeks that do not yet meet water quality standards.

The four municipalities will be covered under the Phase II NPDES Municipal Stormwater permit, described in Section III. As this TMDL is implemented, should water quality improvement not occur and urban stormwater appear to be one of the significant causes of degradation, Ecology may determine that specific actions or programs should be made requirements under the Phase II permit when it is reissued in 2011.

Public involvement and education are two elements these municipalities are required to include in their stormwater programs under the Phase II permit. The four municipalities are encouraged to make available to citizens a brochure explaining how, and to what agency, to report surface water quality problems. An example is provided in Appendix E and municipalities are encouraged to modify this as appropriate.

Skagit County

Skagit County departments and programs that play key roles in water quality protection and improvement include Public Works, Health, and Planning and Development Services. In December 2005, Skagit County Commissioners voted to fund the Clean Water Program, which will provide assured funding for a number of water quality programs that were previously funded either largely from grants or from general funds. These include:

- Public Works water quality monitoring program
- Skagit Conservation District outreach and technical assistance
- Skagit Conservation Education Alliance funding
- County Health Department operations and maintenance program for on-site sewage systems
- Initial investigation of complaints regarding agricultural manure spreading practices.

Skagit County Public Works. Public Works has responsibility for stormwater infrastructure, surface water quality monitoring, drainage and flood protection, salmonid habitat assessment, and other functions. Public Works received a Centennial Clean Water grant to initiate a freshwater monitoring program for streams and other water bodies in the county. The program, which is funded through fall 2008, is designed to monitor changes in water quality in areas of ongoing agriculture and assess water quality at a number of locations of concern to this TMDL. Data are reported annually and available on the County website.

Public Works also has primary responsibility for stormwater management. The current stormwater management program has four of the six elements required for coverage under the Phase II NPDES Municipal Stormwater Permit. It will also need to develop an illicit discharge detection and elimination program and pollution prevention housekeeping programs for municipal facilities. For this Implementation Plan, compliance with the permit constitutes compliance with the TMDL. No additional *requirements* for this TMDL are attached to the final Phase II NPDES Municipal Stormwater Permit to be effective in January 2007. However, several *recommended actions* related to stormwater are listed below.

Recently, Skagit County was awarded a Centennial Grant to improve drainage and enhance salmonid habitat in Hansen Creek. The project is expected to improve water quality downstream through improvements to riparian vegetation and sediment control.

Ecology encourages Skagit County Public Works to consider the following *Recommended Actions:*

- Commit or obtain funding to continue water quality monitoring beyond the Centennial grant termination in 2008.
- Include in Annual Report on Monitoring: An analysis of how well the current CAO ordinance (14.24.120 Ongoing Agriculture) is achieving the no harm or degradation standard.
- Include in Annual Report on Monitoring: An examination of the effect of current BMPs on water quality trends so that guidelines can be adjusted in time to meet the TMDL goals by 2015.
- Conduct wet season fecal coliform monitoring of water body (such as Britt Slough or Hansen Creek) that receives stormwater from County infrastructure.
- Provide QAPP for stormwater monitoring to Ecology for review.
- Use monitoring results to design stormwater information useful to property owners along Britt Slough or Hansen Creek.
- Report results at annual Skagit-area water quality meeting.
- Provide assistance/education to diking and drainage districts regarding minimizing water quality impacts through best management practices.

Skagit County Health Department (SCHD) has authority and requirements under Revised Code of Washington (RCW) to administer public health and onsite sewage programs in the county. In addition, Chapter 246-272 (revised to 246-272A during 2004) Washington Administrative Code (WAC) Rules and Regulations of the Washington State Board of Health for Onsite Sewage Systems grants local health jurisdictions authority to administer the code.

With this authority SCHD has established Skagit County Code (SCC) Chapter 12.05 Onsite Sewage Code – Rules and Regulations:

1. Permits site evaluations, OSS designs and installations.
2. Inspects installations during construction and at completion.
3. Certifies OSS installers, Monitoring/Maintenance Specialists and pumpers.
4. Maintains records of OSS permits issued and of monitoring/maintenance activity in an integrated Operations, Monitoring, and Maintenance (O & M) database.
5. Requires annual monitoring/maintenance inspection of Health Department licensees such as food service establishments, campgrounds and mobile home parks.
6. Requires on site sewage system inspections at time of property transfer.
7. Requires annual O & M inspections of on site sewage systems with proprietary treatment products.

8. Investigates complaints related to improper sewage treatment and disposal.
9. The O & M program provides information and education programs to property owners about how septic systems work and how to take care of them (Septics 101 Clinics).
10. The Skagit County Water Quality Improvement Fund administered through the Treasurer's Office is a State Revolving Loan Program funded by Ecology's Centennial Clean Water Fund for repair/replacement of failed septic systems.

In recent years the SCHD provided the following number of loans and loan amounts:

- 2004 – 21 repair loans, totaling $171,135 (as of May 27, 2004)
- 2003 – 14 repair loans totaling $185,395
- 2002 – 36 repair loans totaling $483,783

In 2000, Skagit County established an OSS operations and maintenance program as required in the 1995 version of WAC 246-272. This program is designed to educate homeowners in the care of on site sewage disposal systems, certify operations and maintenance inspectors, and employ social marketing techniques for communities to solve their on site sewage disposal dilemmas. In the years since its inception, Skagit County has funded this program through the general fund, with help from Ecology in several areas.

The SCHD has implemented a Septic System Improvement Pilot Project as a result of a grant received from the Dept of Ecology. The project incorporates a Rebate Program into SCHDs on-site operations and maintenance program. This enables SCHD to provide homeowners with an incentive to have septic systems inspected and lids and risers installed to promote access. This program is available throughout Skagit County; however, in areas of special interest or concern, homeowner parcels (parcels with residences) are contacted by direct mail. This information is gathered through data management program detailing septic system status according to permit and operations and maintenance histories. The letter details what actions the homeowner must take to be eligible for the rebate. Those actions are: attending a Septics 101 class presented by SCHD and scheduling an O & M inspection. The letter also includes an enclosure with a list of O & M providers and the Rebate Program brochure/application. The SCHD has conducted 86 "Septic 101" clinics since September 2000, with over 1,800 attendees to date.

Using a Puget Sound Action Team Public Involvement and Education (PIE) grant awarded in 2002, the SCHD produced and aired on cable television, two public service announcements promoting O & M of septic systems. An additional PIE award in 2004 allowed the Department to expand its public involvement and education program and to increase social marketing efforts toward promoting O & M activity. The 2004 PIE project is also aimed at recruiting local residents to act as community septic educators and assist the SCHD in providing information to homeowners and to promote community development and involvement in septic issues.

The SCHD is providing community development assistance to several areas in the County related to septic system proximity to shorelines and potential and actual impacts on water quality and marine resources such as commercial and recreational shellfish harvesting areas. Current assistance is provided to the Dewey Beach community on Fidalgo Island, and the Bay View, Samish Island and Similk Beach communities to directly address water quality issues related to

failed septic systems. An important principle in this strategy is that solving community sewage issues is more likely to depend on finding an effective community process than on finding an appropriate science and engineering solution.

The SCHD is currently drafting the On site sewage Management Plan as required by WAC 246-272A On site sewage code, and Chapter 70.118A, On site sewage disposal systems- marine recovery areas. SCHD plans to establish marine recovery areas in Skagit County per this authority as part of its management plan. Implementation of the plan is required by July 2007.

Recommended Actions. This TMDL encourages the SCHD to:

- Continue to work proactively to educate landowners about the importance of septic system inspections, and to design new incentives and disincentives to motivate homeowners to have their systems inspected and repaired.
- As resources allow, conduct direct mailings to property owners on septic systems in Gages Slough and Fisher, Carpenter, Kulshan, Hansen and Nookachamps creeks inviting them to Septic 101 classes, explaining the relationship with clean surface waters and public health, and informing them of the need for septic system inspections and the potential availability of inspection rebates.

Planning and Development Services. Skagit County Planning and Development Services (SCPDS) enforce ordinances related to environmentally critical or sensitive areas as required under the state's Growth Management Act. Skagit County's Critical Areas Ordinance is currently being updated based on best available science. Currently, new development is required to observe a 50- to 200-foot buffer next to streams, depending on stream type, and a 25- to 150-foot buffer next to wetlands, depending on wetland category. In January 2004, Skagit County Critical Areas Ordinance for Ongoing Agriculture on Agriculture-NRL and Rural Resource-NRL zoned Lands (Skagit County Code 14.24.120) became effective.

SCPDS manages the Skagit County Local Loan Fund Project, funded by the Washington State Water Pollution Control Revolving Fund. This $1.5 million loan fund provides loans to Skagit County residents for on-site septic system repair.

Ecology encourages Skagit County Planning & Development Services to consider the following.

Recommended Actions:

- Promote Low Impact Development practices.
- Work cooperatively with Ecology on joint enforcement of nonpoint pollution regulations.
- Provide information to citizens on how to report water quality complaints.

City of Mount Vernon

Mount Vernon, a city of 30,000, is the urban center of Skagit County, located about 50 miles north of Seattle. The Skagit River flows through the western edge of the city, and as it passes through the Mount Vernon area receives discharges from a number of outfalls, including two Combined

Sewer Overflow pipes, the outfall from the WWTP, creeks that receive urban runoff and piped stormwater, and direct stormwater outfalls.

One creek that drains a central, commercial area of Mount Vernon is Kulshan Creek. This creek originates in two low-lying areas, one to the north of College Way and one south of College Way near Laventure Avenue. A 36-inch storm sewer discharges into Kulshan Creek on the upstream end near Laventure. This is a low spot in the topography and discharge to the creek provided the only feasible, non-pumping option for stormwater collection. There are also two detention ponds, one public, one private that convey flow to Kulshan Creek. One is located at the Laventure Middle School and the other on Continental Place.

The city is covered under the Phase II NPDES Municipal Stormwater Permit and has five of six required elements of the permit in place. This Implementation Plan does not add any special permit requirements to the Mount Vernon permit; compliance with the permit constitutes compliance with the TMDL.

Recommended Actions: this plan encourages the city to:

- Conduct wet season fecal coliform bacteria monitoring of Kulshan Creek (Figure 15), and provide QAPP to Ecology for review. *(The city of Mount Vernon is commended for starting this program in 2006 with assistance from the Skagit Conservation District's Stream Team, and fecal coliform analysis by WWTP staff.)*
- Report monitoring results at annual Skagit-area water quality meeting.
- Use monitoring results to design stormwater educational materials targeting commercial property owners.
- Focus illicit discharge detection and elimination program on stormwater discharges to the Lower Skagit River.
- Promote Low Impact Development *(The city of Mount Vernon is commended for helping to organize and participate in a Low Impact Development training in October 2006 for city planners and members of the local building industry.)*
- Provide information to citizens on how to report water quality complaints.

Figure 15. Staff of city of Mount Vernon and Skagit Conservation District evaluate a possible monitoring site on Kulshan Creek

City of Burlington

The city of Burlington (pop. 8,120) is located north of the Skagit River and east of I-5 at the junction with SR 20. The major freshwater drainage in the city is Gages Slough, a meandering wetland and former floodway of the Skagit River. Gages Slough is no longer connected at its upstream end with the Skagit River but still discharges to the river at its downstream end by way of a pump station to the Skagit at RM 14.6. The city's stormwater infrastructure also includes direct outfalls to the Skagit River.

In August 2005, the city published "Update to the Surface Water Management Plan," which describes current surface water conditions and stormwater infrastructure, includes hydraulic modeling to estimate the effects on the city of three sizes of storm events, and provides recommendations for making improvements to both water quality and stormwater quantity management. The city is well prepared for coverage under the Phase II Municipal Stormwater Permit, with programs in place to address all six minimum measures of the permit, including public involvement and education about stormwater. Burlington conducts water quality monitoring at nine sites along Gages Slough, including bimonthly measurements of fecal coliform bacteria, total nitrogen, total phosphorus, and zinc, and less frequent measurements of nutrients, metals (except zinc) and pesticides.

Ecology encourages the city of Burlington to consider the following *Recommended Actions:*

- Promote Low Impact Development for future development within the city.
- Use Gages Slough and stormwater monitoring results to educate commercial property owners about the need to prevent/reduce pollution, including bacteria pollution, of stormwater.
- Focus illicit discharge detection and elimination program on stormwater discharges to the Lower Skagit River.
- Report water quality monitoring results at annual Skagit-area water quality meeting.
- Provide information to citizens on how to report water quality complaints.

City of Sedro-Woolley

Sedro-Woolley is a city of 9,800 located just north of the Skagit River on State Route 20 about five miles east of Interstate 5. The city has a number of required Stormwater Phase II elements in place and is using a special stormwater grant from Ecology to review and update its current stormwater management program and establish a permanent funding source. One element of the program that had been lacking was illicit discharge detection and elimination. The city recently employed smoke testing to verify that for seven homes recently connected to the city's sewer line, storm drain stubs and sanitary sewer stubs had been cross-connected, resulting in raw sewage entering the storm system. The city vactored out the storm catchbasins, cleaned the storm lines, and required the contractor to correct the connections. The special stormwater grant will enable the city to:

- Enhance the city's stormwater management program to comply with NPDES II Permit conditions, including public education, illicit connection detection, construction review/enforcement, maintenance, and adoption of current Ecology design standards.
- Develop recommendations for a permanent funding source, such as a stormwater utility.
- Inventory and develop cost estimates for the city's stormwater capital improvement program.
- Hold a public meeting in 2007 on the stormwater utility and capitol improvement plan

Ecology encourages the city of Sedro-Woolley to consider the following:

Recommended Actions:

- Survey and develop GIS data-layer for City stormwater system.
- Conduct a feasibility study for a regional stormwater treatment and wetland enhancement facility.
    - Work cooperatively with Skagit County to conduct wet season water quality monitoring of fecal coliform bacteria in Brickyard Creek and provide QAPP to Ecology for review.
    - Use monitoring results to educate property owners along Brickyard Creek about preventing discharge of fecal coliform bacteria to stormdrains or to the Creek.
    - Focus illicit discharge detection and elimination program on Brickyard Creek and direct stormwater discharges to the Lower Skagit River.
    - Report water quality monitoring results at annual Skagit-area water quality meeting.
    - Provide information to citizens on how to report water quality complaints.
    - Promote Low Impact Development in Sedro-Woolley.

Districts and non-profit organizations

Skagit Conservation District

The Skagit Conservation District (SCD) provides substantial technical and financial assistance to agricultural operators throughout the county. Their focus in recent years has been assisting dairy operators with Dairy Nutrient Management Plans. Depending on staff availability, the SCD also works with livestock owners and other small farm owners to develop farm plans. The SCD also provides education to residents interested in reducing their impacts to local surface waters and enhance wildlife habitat. The SCD holds several different workshop series, generally twice each year, "Living on the Land", "Watershed Masters," a Backyard Wildlife program, and Stream Team, where participants learn about and participate in water quality monitoring of streams that are part of TMDLs. SCD currently is working on public education in Fisher-Carpenter, Nookachamps, and Kulshan Creek watersheds.

- Nookachamps Watershed – The SCD is conducting classes to educate and motivate landowners to improve stream and lakeshore habitats, practice good land stewardship on rural parcels, use best management practices for small-scale and livestock farms,

install riparian buffers and protect cool water temperatures during late summer, low-flow conditions. The conservation district has completed Stream Team training for 12 participants in water quality monitoring in the Nookachamps basin. A Watershed Masters class is underway with about 20 participants, who will return volunteer hours to the community. Skagit CD's Livestock/Small Farm technician has provided direct technical assistance and conservation planning for several small farm owners in the basin. A land use inventory nearing completion will help target future educational efforts.

- Kulshan Creek – In fall 2006, the SCD trained an all-volunteer Stream Team to monitor Kulshan Creek twice monthly. This program is funded by city of Mount Vernon and provides valuable education to Skagit County residents as well as a public information focus on urban stormwater as a source of fecal coliform bacteria. It is intended to provide information to the city about sources of bacteria within this basin and lead to recommendations for reducing bacteria inputs, and improving water quality of the creek.

- Fisher-Carpenter Creeks Watershed – The SCD monitors stream temperature and fecal coliform concentrations and conducts workshops to educate landowners about better land management and the importance of protecting stream riparian habitat. The SCD has completed the following class series in the Fisher/Carpenter watershed, all well attended: Stream Team, Watershed Masters, and Living on the Land--Stewardship for Small Acreages. The SCD has also held workshops in Sustainable Yard Care and Gardening for Wildlife.

The SCD's Livestock/Small Farm technician has provided direct technical assistance and conservation planning for several small farm owners in the Fisher/Carpenter watershed. One plan involved drainage improvements and building a wet-season sacrifice area for horses (Figure 16).

Figure 16. Barn with sacrifice area belonging to Jim Lapp and Sally Lepper, Fisher Creek watershed
(photo: Joanne Polayes)

Recommended Actions: Ecology encourages the conservation district to:

- Focus outreach and evaluate effectiveness in reaching property owners with large amounts of riparian habitat.
- Continue its successful approach in developing programs that appeal to different types of audiences, particularly new residents, to provide information about the values and vulnerabilities of the land and water of Skagit County.
- Provide data for number of Conservation Reserve Enhancement Program projects implemented, number of attendees in class series, and number of farm plans implemented at the annual water quality review meeting.
- Secure adequate funding to enable rapid response in developing farm plans.

Skagit Fisheries Enhancement Group

The Skagit Fisheries Enhancement (SFEG) was formed in 1990 to engage communities in habitat restoration and watershed stewardship in order to enhance salmon populations. As a non-governmental, non-profit organization and one of 14 Regional Fisheries Enhancement Groups in the state, SFEG works with local landowners, conservation groups, government agencies and tribes. Using volunteers and a professional restoration crew, the group has completed numerous restoration projects in the Skagit watershed, including several in the Nookachamps basin.

Figure 17. Skagit Fisheries Enhancement Group volunteers plant native trees along Nookachamps Creek *(photo courtesy of SFEG).*

To involve and educate the public, in 2005 SFEG held a series of Stream Stewards classes designed for urban and suburban residents of the Nookachamps basin. Nine people completed the class and are contributing volunteer hours, participating in community education, stream cleanup events and riparian plantings.

The SFEG's current Centennial Grant project is designed to increase riparian shade in the Nookachamps in order to reduce summer maximum stream temperatures; however the riparian

plantings will likely also reduce bacteria inputs. By January 2006, SFEG had installed 1,753 native trees and shrubs along 2,010 linear feet of Nookachamps Creek stream bank (Figure 17), and more plants were added later that year. SFEG also performs site preparation for new plantings, maintains existing plantings, and, with the assistance of Skagit Land Trust, is identifying additional areas for restoration in the Nookachamps basin. Under the grant agreement, at least 10,500 plants will be installed over 40 acres along approximately 5000 linear feet of stream.

Recommended Actions: Ecology recommends that the SFEG continue its recent success in developing water quality-related Centennial grant proposals that will assist either TMDL development or development of 4b Water Quality Improvement Plans (alternatives to TMDLs).

Skagit Conservation Education Alliance.

The Skagit Conservation Education Alliance (SCEA) is a community-based, all-volunteer, non-profit 501(c)3 organization that is working for the benefit of the greater Skagit ecosystem to protect water quality and watershed functions. Its mission is "to bring people together in the spirit of cooperation to protect, conserve, and enhance the natural ecosystems in the Skagit Watersheds."

Based in Mount Vernon, SCEA works in all the watersheds of Skagit County. SCEA provides watershed stewardship information at fairs and educational events and has developed a program to place portable Sanican toilet "Timeshares" at popular fishing or recreation spots where public restroom facilities are not available. In 2004-2006, SCEA managed a multiple-agency five-year review of the implementation actions needed to address nonpoint pollution, based on the 400-12 nonpoint action plans for three Skagit watersheds, including the Nookachamps basin. The Implementation Review Committee report, completed in spring 2007, assessed progress and summarized high priority actions yet to be funded or completed.

Recommended Actions: Ecology believes that SCEA is a vital force in the lower Skagit watershed for educating and motivating citizens to be good stewards of land and water, and encourages SCEA to continue its quest for larger sources of assured funding so that its work can continue.

- Continue to provide portable restroom facilities at popular fishing and recreation areas where public facilities are not available.
- Develop and distribute information on portable and permanently-installed restroom facilities for hunting cabins and fishing platforms on the Skagit River.

Table 12. Fecal coliform implementation responsibilities

ENTITY	ACTION
Federal, Tribal and State Governments	
U.S. EPA	Administer Clean Water Act (CWA) 319 Program
Department of Ecology	Convene an annual Skagit-area meeting of responsible organizations to review status of TMDL water quality and implementation activities
	Provide information on State Revolving Fund (loan) and Centennial (grant) funding opportunities
	Monitor Station 03A080, mainstem Skagit River
	Coordinate with WSDA and Skagit County Health & Skagit County Planning to develop appropriate response and potential enforcement in relation to nonpoint pollution
	Conduct Effectiveness Monitoring in 2014-2015; Prepare Effectiveness Monitoring Report in 2016
Department of Health	Monitor and report annually on water quality of commercial and recreational shellfish beds in South Skagit Bay
	Conduct shoreline survey of South Skagit Bay (when resources available)
Puget Sound Partnership	Provide information on funding opportunities for water quality improvement projects and programs; assist Ecology in involving and engaging citizens, watershed agencies and organizations in improving water quality
	Provide financial and organizational support for workshops promoting Low Impact Development in WRIA 3
Washington State Department of Agriculture	Inspect all Dairies and Concentrated Animal Feeding Operations in Skagit County once every two years; respond to complaints
	Coordinate with Ecology and local government on Dairy and CAFO inspections/investigations
Special Purpose Districts	
Skagit Conservation District	Focus outreach and evaluate effectiveness in reaching property owners with large amounts riparian habitat
	Continue to develop programs on protecting Skagit water quality for new audiences
	Report at annual water quality review meeting: no. of CREP projects, no. of farm plans developed; no of class attendees; no of stream miles planted
	Secure adequate funding for rapid response farm planning
Diking District 17	Provide information about protecting water quality in drainage ditches to property owners
	Follow best management practices for drainage ditches in Ag-Fish Initiative Drainage Management Plans
City and County Governments	
City of Burlington	Monitor Gages Slough for fecal coliform bacteria and use monitoring results to educate commercial property owners and citizens about need to reduce bacteria and other pollution of stormwater
	Report water quality results at annual Skagit-area water quality meeting
	Apply illicit discharge detection program to Gages Slough and other City of Burlington stormwater discharges to the Skagit River
	Promote Low Impact Development practices
	Provide information to citizens about how to report water quality problems
City of Mount Vernon	Promote Low Impact Development Practices

ENTITY	ACTION
City and County Governments (Continued)	
	Establish program for monitoring bacteria and improving water quality in Kulshan Creek, and report results annually to property owners and to Skagit-area water quality meeting
	Use Kulshan Creek monitoring results to target education of commercial property owners to reduce stormwater pollution
	Apply illicit discharge detection program to city-managed pump stations that discharge to the Lower Skagit River
	Provide information to citizens about how to report water quality problems
City of Sedro-Woolley	Survey and develop GIS data layer for municipal stormwater system
	Conduct feasibility study for a regional stormwater treatment and wetland enhancement facility
	Coordinate with Skagit County to conduct water quality (bacteria) monitoring of Brickyard Creek
	Use Brickyard Creek water quality data to educate property owners about preventing discharge of pollutants to creek, storm drains
	Provide information to citizens about how to report water quality problems
	Apply illicit discharge detection program to stormwater discharges to Brickyard Creek and to city stormwater drains to the Lower Skagit River
	Promote Low Impact Development Practices
Skagit County	Conduct ambient water quality monitoring program. Research funding options to continue when grant ends.
	In Triennial Review of Ag-CAO, report on how well the Ag-CAO is working in meeting the No Harm and Degradation standard.
	Publish annual report on results of Water Quality Monitoring Program; provide on County web site.
	Monitor water quality (bacteria) to assess impacts of stormwater discharges. Determine appropriate creek location in consultation with Ecology
	Use monitoring results to inform property owners about stormwater pollution prevention along selected creek
	Promote Low Impact Development Practices
	Apply illicit discharge detection program to County MS-4 storm drains that discharge to the Lower Skagit River
	Enforce Critical Areas Ordinances and support Ecology's technical assistance & enforcement program for nonpoint agricultural pollution
	Provide information to citizens about how to report water quality problems
	Continue targeting problem neighborhoods with Septic 101 classes and to design new incentives for homeowner septic inspections
	Conduct targeted mailings to property owners in Fisher, Carpenter, Hansen, Kulshan and Nookachamps basins explaining need for OSS inspections. Look for additional incentives for OSS inspections.
	Local Organizations, Citizens, Businesses
Skagit Fisheries Enhancement Group	Develop new Centennial Grant proposal targeting riparian restoration needs in Lower Skagit River watershed
Skagit Conservation Education Alliance	Convene state and local agencies every five years to review implementation status of 400-12 Non Point Action Plans, including Nookachamps Nonpoint Action Plan
	Research funding opportunities to support expanded efforts to educate and involve Skagit County residents on water quality, shellfish resources and wildlife and aquatic habitat improvements

Measuring Progress Toward Goals

Annual review of water quality and implementation tracking through coordination with local agencies will continue until Lower Skagit water quality goals are reached by 2015. Ecology will be responsible for convening this annual meeting of agencies and organizations. The first annual review is scheduled for January 2008.

If a listed tributary or reach is meeting targets (Table 13), it is not necessary to conduct detailed monitoring in a specific sub-area or to refocus implementation activities in that tributary watershed.

It is anticipated that this TMDL will take approximately eight years to reach water quality standards. If fecal coliform reductions have not progressed one-eighth (12.5%) of the way toward the target after one year (and 25% after two years, and so on), then Ecology will work with local implementing organizations to review the implementation plan and assess the additional activities needed to ensure progress. Detailed monitoring could be needed to increase the probability of identifying sources and meeting targets on schedule. It may also be helpful to assign targets for sub-areas.

Progress in implementation will be evaluated using three measures: (1) ambient water quality monitoring, (2) tracking of implementation activities, and (3) source identification. Each is used to evaluate the adequacy of implementation of control measures, (e.g., "best management practices," or BMPs). Each year Ecology will prepare a status report on these measures.

Water quality monitoring

Monitoring data from Ecology, Skagit County and the cities of Burlington and Mount Vernon will be reviewed annually to assess the current status of water quality with respect to bacteria concentrations. (Ecology basin stations 03A080 and 03D050 will be monitored for one year, every five years.) Station name, location, monitoring organization, monitoring frequency and start date, and target bacteria concentrations for key monitoring stations in Lower Skagit Basin are provided in Table 13.

Implementation tracking

Ecology will work with the cooperating agencies listed in Appendix C on a yearly schedule to update the list of activities completed and determine or measure results of implementation. Ecology will work with these agencies and provide technical assistance and funding/resource information as requested.

Source identification

If monitoring results suggest that a particular sampling site has chronic bacteria pollution problems, and if a source has not been identified, Ecology will work with local agencies to refine the list of potential sources and develop an approach to identifying the pollution source. The approach could involve windshield surveys; more detailed monitoring or sampling investigations to distinguish among a number of potential sources; review of septic system ages and potential for failures in the vicinity of the problem; and/or review of land use practices upstream.

Ecology will follow agreed-on citizen complaint, and water quality data-based referral procedures that are currently being developed through cooperative discussions with Skagit County Planning and Permit Center; Skagit County Health Department; Skagit Conservation District; and the Washington Department of Agriculture.

Table 13. Water quality monitoring stations and fecal coliform bacteria targets

Station Description	Station ID	Monitoring Organization	Monitoring Frequency	Start Date	Currrent[1] FC Conc./Percent Above Target(T)[2]		January 2008 Bacteria Target Conc./Target Percentage[3]		TMDL Target Conc./Target (T) that 10% of Samples May Not Exceed[4]
					Oct-April	May-Sept	Oct-April	May-Sept	
Skagit River mainstem upstream of Sedro Woolley	03A080	Ecology Basin Station	Monthly	Monthly every 5 years; next October 2009	2.4/0%	2.2/0%	6/80 (T)	6/80 (T)	6/80
Hansen Creek at Hoehn Road	19	Skagit Public Works	Biweekly	October 2003	30/13%	263/77%	100/10%	230/64%	100/200
Brickyard Creek at Hwy 20	28	Skagit Public Works	Biweekly	October 2003	33/14%	152/67%	100/10%	140/56%	100/200
Nookachamps Creek at Swan Road	12 03D050	Skagit Public Works or Ecology Basin Station	Biweekly	October 2003	36/3%	170/45%	100/10%	156/38%	100/200
Nookachamps Creek at Knapp Road	15	Skagit Public Works	Biweekly	October 2003	56/17%	110/27%	100/16%	108/23%	100/200
Skagit River near Mount Vernon	03A060	Ecology Long Term River Monitoring	Monthly	1982	4/0%	5/0%	100/200(T)	100/200(T)	100/200
Gages Slough	River Mile 14.6	City of Burlington	Bimonthly	Ongoing	n/a	n/a	100/200(T)[5]	100/200(T)[5]	100/200[5]
Kulshan Creek	River Mile 11.9	City of Mount Vernon/Skagit Stream Team	Twice monthly, October - June	October 2006	n/a	n/a	100/200(T)	100/200(T)	100/200
Carpenter Creek (Hill Ditch at Cedardale Road)	42	Skagit Public Works	Biweekly	October 2003	13/4%	46/5%	100/200(T)	100/200	100/200
North Fork Skagit R at Moore Road	45	Skagit Public Works	Biweekly	October 2003	6/0%	11/0%	24/74(T)	24/74(T)	24/74

Station Description	Station ID	Monitoring Organization	Monitoring Frequency	Start Date	Currrent[1] FC Conc./Percent Above Target(T)[2]		January 2008 Bacteria Target Conc./Target Percentage[3]		TMDL Target Conc./Target (T) that 10% of Samples May Not Exceed[4]
					Oct-April	May-Sept	Oct-April	May-Sept	
South Fork Skagit River at Conway	46	Skagit Public Works	Biweekly	October 2003	5/0%	28/5%	24/74(T)	24/74(T)	24/74
Fisher Creek at Franklin Road	48	Skagit Public Works	Biweekly	October 2003	49/7%	185/43%	100/200	168/36%	100/200

1 Most recent monitoring data. Skagit County Public Works October 2004 – September 2006.

2 Units are cfu/100 mL. Geometric mean/Percent of samples that exceed second part of standard or TMDL target if different from standard.

3 Geometric mean/Target value that10 percent of samples may not exceed. January 2008 target value is a concentration that is 20 percent of the reduction needed to meet the TMDL target concentration.

Shaded cells do not meet target concentrations.

4 Target fecal coliform concentrations and target value (T) that 10% of samples may not exceed are 100/200 unless otherwise established in the TMDL (Ecology 2000).

5 Gages Slough is classified as a wetland. Wetlands in Washington State do not have water quality standards. These target concentrations are provided as an informal goal to the City of Burlington as it works with parcel landowners along Gages Slough.

Reasonable Assurance that Water Quality Goals Will Be Reached

Rationale for a 2015 target date to meet water quality standards

Fecal coliform pollution in the Lower Skagit River watershed has both point and nonpoint sources, which require very different approaches and uses of public resources.

Point sources in the Lower Skagit River watershed are regulated either under NPDES permits (wastewater treatment facilities and municipalities covered under the Phase II Stormwater permit) or WAC 173-245 which requires cities with CSOs to reduce the incidence of overflows to one per year. The following observations suggest that the point sources in the Lower Skagit River watershed will continue to manage operations and programs in ways that will control and/or reduce contributions of fecal coliform bacteria to the river:

- Most stations in the river and the two forks are already in compliance with state water quality standards for bacteria
- The four wastewater treatment facilities monitor fecal coliform bacteria in their discharge and are subject to permit limits that are in compliance with the TMDL. Monthly discharge reports are reviewed for compliance with permits by Ecology municipal staff. Ecology works with permit holders if there are problems and issues fines when appropriate.
- The Mount Vernon wastewater treatment facility is in compliance to reduce CSOs to one per year by 2015. Construction of expanded and upgraded facilities to enable the city to meet this deadline was initiated in 2007.
- The four municipalities – Skagit County and the cities of Mount Vernon, Burlington, and Sedro-Woolley – are in the first months of coverage under the Phase II NPDES stormwater permit. Some of the elements of the new permit, such as the IDDE program, public education, and inspections of municipal facilities and operations are expected to lead directly or indirectly to reduced contamination of stormwater by many pollutants including bacteria. Each municipality is expected to participate in voluntary monitoring of a water body that receives municipal stormwater, and this activity is expected to lead to increased understanding of the sources of pollutants to stormwater, and improved stormwater management. In addition, the four municipalities will have enforcement authority to eliminate illicit discharges to their systems.

Nonpoint sources of fecal coliform pollution include failing or poorly operating onsite septic systems and improper management of manure from livestock operations, small non-commercial farms and pets. These are more difficult to identify and confirm as sources of pollution to surface waters. The following observations suggest sufficient progress will be made in reducing nonpoint bacteria pollution to meet water quality standards in this watershed by 2015.

- Ecology's Northwest Regional Office has committed 0.2 FTE for the biennium 2008-2009 for technical assistance, coordination with local authorities, and nonpoint source

investigations. While limited, this represents a renewed commitment by this office to making progress in addressing nonpoint pollution and will lead to direct improvements in surface water quality by working with parcel owners where livestock manure is degrading streams. It is expected there will be indirect benefits as these investigations are publicized. Such publicity may motivate other nonpoint source correction.

Efforts by Ecology's Northwest Regional Office to follow up evidence of bacteria exceedances in water quality data have already resulted in reducing discharges to the Samish River and Gages Slough in Burlington. Our effort to document manure discharges led to the spring 2007 requirement that a Burlington egg processor apply for coverage under a Combined Animal Feeding Operation (CAFO) permit and operate according to a nutrient management plan.

- Skagit County Health Department will conducted additional Septics 101 workshops in the Nookachamps basin as staff resources become available. Under its proposed Onsite Septic System Management Plan (WAC), SCHD will have the ability to declare all or parts of the Nookachamps basin a "sensitive area," which would require annual inspections of all septic systems.

Washington State Department of Health monitoring of water quality in shellfish areas helps alert local agencies to changes in quality of the receiving waters. DOH Office of Shellfish and Water Protection will continue monitoring marine water quality in the Bay and will downgrade any commercial shellfish growing area that no longer meets its classification criteria for harvesting. Such downgrades call attention to the sources contributing to the water quality problem, initiate shellfish closure response plans, and dedicate resources that help address bacteria sources.

Current Skagit County Public Works water quality monitoring of several key Skagit River and tributary locations will provide data valuable for assessing status and trends and defining specific reaches that may require further investigation.

Skagit County and the three cities are developing stormwater management programs in accordance with the requirements of the Phase II NPDES Municipal Stormwater Permit. It is expected that these programs will lead to reductions of several types of pollutants, including bacteria, in stormwater. Should improvements not occur by the time of permit reissuance and stormwater proves to be an impediment to reaching water quality standards, Ecology will add specific requirements focused on reducing bacterial pollution consistent with this Implementation Plan.

Adaptive management

An adaptive approach will be used to adjust implementation strategy in response to new water quality monitoring data. If the implementation actions outlined in Appendix C are completed as expected but a stream or reach still does not meet water quality standards, then revised implementation actions will be developed in consultation with appropriate local agencies. Consultation with local agencies will include discussion of whether the existing program of activities is appropriate; whether the current suite of enforcement tools available is adequate and effective; whether some sources are not being addressed effectively using existing tools; and whether additional resources such as staff time or equipment or educational programs would make a difference in reaching the TMDL targets according to the schedule.

For the adaptive approach to be successful there must be good understanding of pollution sources and fate and transport of bacteria. It is expected that Adaptive Management will be facilitated if there is a thorough understanding of local land uses, parcel by parcel; an improved scientific understanding of the conditions in water and sediment that affect bacteria survival and growth; and an improved ability to distinguish among various bacteria sources – human, livestock, pets, waterfowl, and other wildlife.

Enforcement

Organizations with enforcement responsibility that are critical to the Implementation Plan's success are Ecology, WSDA, Skagit County Health Department, and Skagit County Planning and Development Services. Ecology has authority under the Water Pollution Control Act (chapter 90.48 RCW) to issue permits and regulations and to prohibit illegal discharges to surface water. Ecology is delegated as the state water pollution control agency for all the purposes of the federal Clean Water Act. It is the policy of the state to maintain the highest possible standards to ensure the purity of all waters of the state and to require the use of all known, available and reasonable means to prevent and control water pollution. Ecology is authorized to administer the Phase II NPDES Municipal Stormwater Permit, which includes audits and enforcement as elements of the stormwater permit program.

Ecology's enforcement authority adds reasonable assurance that the Lower Skagit River TMDL will be successful. Ecology will act to enforce state water quality laws when monitoring data indicate that pollution problems are continuing, when local enforcement programs are not successful in resolving water quality complaints, and/or when there is evidence that individual sites or facilities are causing pollution in violation of RCW 90.48.080. Ecology may pursue orders, directives, permits, or civil or criminal sanctions to gain compliance with state water quality standards. Ecology enforces water quality regulations under RCW 90.48.

As an example of the role Ecology's NPDES permits play in enforcement of water quality regulations, in late 2005 during inspection of an industrial facility in Mount Vernon, an Ecology stormwater inspector identified a turbid discharge of stormwater to Kulshan Creek. After Ecology notified the facility of the violation, the owner agreed to temporarily divert the stormwater discharge into their connection to the sanitary sewer. Ecology has given the facility a deadline of September 30, 2007, to separate its discharges and make sure that its stormwater discharges are not contaminated.

Washington State Department of Agriculture has inspection and enforcement responsibilities under the Nutrient Management Act, which covers dairies and concentrated animal feeding operations. Ecology may assist WSDA where Ecology's water quality enforcement authority will help resolve pollution problems at dairies or CAFOs. Local governments are expected to continue to exercise their authority to protect public health and enforce local codes and ordinances. Ecology is available to assist local government in water quality enforcement where state enforcement authority is considered appropriate.

Public Involvement

Ecology held a public meeting March 20, 2000 in Mount Vernon to explain the contents and goals of the Lower Skagit River Fecal Coliform TMDL, which was approved by EPA on September 1, 2000. During the development of the Water Quality Implementation Plan, Ecology held meetings of local agency and watershed organization staff in May and September 2004. In 2005 and 2006, Ecology held individual meetings with the jurisdictions to be covered under the Phase II NPDES Municipal Stormwater Permit, to determine areas of overlap of municipal stormwater systems covered by the permit and the areas of interest to the TMDL Implementation Plan.

Ecology staff presented Skagit watershed TMDL goals and progress to various local audiences: the Skagit Conservation District's Fisher-Carpenter small farms class series in spring 2005, the Conservation District's Kulshan Creek Stream Team volunteers in September 2006, Skagit County Beachwatchers volunteers (Washington State University Beachwatchers Program) in October 2006, as well as to a Shoreline Landowners Workshop on Fidalgo Island in February 2007.

Ecology made the draft version of this Water Quality Implementation Plan available to the public for 30-day review via the Ecology website during December 2006 and held a local agency review meeting in Mount Vernon on December 11, 2006.

Funding Opportunities

Financial assistance for water cleanup activities is available through Ecology's grant and loan programs, local conservation districts, and other sources. Some of the potential sources of funding for projects to improve water quality are shown in Table 14 and are described below. As this report goes to print, Puget Sound Partnership is a new state agency to begin operation July 2007 that will have funding resources to support Puget Sound water quality, water supply, toxics, stormwater and endangered species restoration goals. Formerly separate funding sources such as the Salmon Recovery Funding Board and Oyster Reserve Account are now part of the Partnership's mission and may be offered in different form in the future.

Table 14. Potential funding sources for projects to improve water quality

Fund Source	Type of Project Funded	Maximum Amounts
Centennial Clean Water Fund	Watershed planning, stream restoration, & water pollution control projects.	$500,000
Section 319 Nonpoint Source Fund	Nonpoint source control; i.e., pet waste, stormwater runoff, failing septic systems, & agriculture, etc.	$500,000
State Water Pollution Control Revolving Fund	Low-interest loans to upgrade pollution control facilities to address nonpoint source problems.	10% of total SRF annually
Coastal Protection Fund	Coastal and estuarine stream restoration projects.	~$50,000
Conservation Reserve Enhancement Program (CREP)	Projects restoring salmon & steelhead habitat on private land.	100% soil rental + 100% for restoration costs
Environmental Quality Incentives Program (EQIP)	Environmental and conservation farm improvements.	~$450,000
Puget Sound Partnership	Salmon recovery, water quality, water supply, toxics, and other priority areas.	To be determined
Oyster Reserve Account	Loans to fund shellfish protection.	0 to 5% interest loans
Rural Housing Repair & Rehabilitation Loans	Loans to low-income rural homeowners for safety & sanitation.	~$250,000
Wetland Reserve Program	Wetland enhancement in exchange for retiring marginal ag. land.	average payment ~$195,000
Emergency Watershed Protection	Easement purchases and construction on floodplain land.	construction costs (75%)

The Washington State Centennial Clean Water Fund (CCWF), Section 319 grants under the federal Clean Water Act, and State Revolving Fund loans are available to fund activities that help implement the Lower Skagit River Fecal Coliform Water Cleanup Plan. If additional funding is necessary to reach standards, Ecology will work with stakeholders to develop funding applications and prepare appropriate scopes of work to help implement this TMDL.

In addition to Ecology, other state, local, and federal agencies are available to financially assist water cleanup activities. A limited amount of federal money is available through Skagit Conservation District via the Natural Resources Conservation Service (NRCS) Conservation Reserve Enhancement Program (CREP) for conservation easements and as cost-share for implementing agricultural best management practices (BMPs). The federal NRCS also administers the Environmental Quality Incentive Program (EQIP), which provides cost share funds for BMPs on agricultural sites. Stream restoration activities and some land acquisitions are eligible for salmon restoration grants through the state Salmon Recovery Funding Board. Potential funding available from these and other sources to help accomplish water cleanup activities are described below.

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. The CCWF is currently helping fund the Skagit County Public Work's Phase II – Watershed Scale Baseline Monitoring Project and Skagit Conservation District's Fisher and Carpenter Creeks TMDL Implementation Project. The former is providing an updated water quality assessment for locations of interest to this TMDL, and the latter will provide educational outreach to landowners and may fund stream protection or riparian improvement projects. The application process is the same for CCWF, 319 Nonpoint Source Fund, and the state Water Pollution Control Revolving Fund.

Section 319 Nonpoint Source Fund

The 319 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 of pollution, 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

Ecology also administers the Washington State Water Pollution Control Revolving Fund, which uses federal funding from 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

Since July 1998, water quality penalties issued under Chapter 90.48 RCW have been deposited into a sub-account of the Coastal Protection Fund. 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 funds.

Conservation Reserve Enhancement Program (CREP)

The Conservation Reserve Enhancement Program (CREP) is part of the U.S. Department of Agriculture Farm Service Agency's Conservation Reserve Program and provides incentives to restore and improve salmon and steelhead habitat on private land. The Washington CREP is a voluntary program for agricultural landowners to establish forested buffers along streams where streamside habitat is a significant limiting factor for salmonids. In addition to providing habitat, the buffers improve water quality and increase stream stability.

Through the CREP, farmers can receive annual rental and maintenance payments and cost-share assistance under 10-15 year contracts for establishing long-term resource conserving covers on eligible land. Annual payments can equal 100 percent of the weighted average soil rental rate (110 percent in areas designated by Growth Management Act). Assistance is available in an amount equal to not more than 50 percent of the participant's costs to establish approved practices. This program is administered by NRCS and managed by Skagit Conservation District.

Environmental Quality Incentives Program (EQIP)

The federally funded Environmental Quality Incentives Program (EQIP) is also administered by NRCS and managed by Skagit Conservation District. EQIP combines several conservation programs that address soil, water, and related natural resource concerns. EQIP encourages enhancements on land that are environmentally beneficial and cost-effective. The program:

- Provides technical assistance, cost share, and incentive payments to assist crop and livestock producers with environmental and conservation improvements on the farm.
- Involves $5.8 billon over next six years (nationally).
- Has 75 percent cost share but allows 90 percent if producer is a limited resource or beginning farmer.
- Divides program funding 60 percent livestock-related practices, 40 percent cropland.
- Has contracts lasting five to ten years.
- Has no annual payment limitation; sum not to exceed $450,000 per farm.

Rural Housing Repair and Rehabilitation Loans

The Rural Housing Repair and Rehabilitation Loans are funded directly by the federal government. Loans are available to low-income rural residents who own and occupy a dwelling in need of repairs. Funds are available for repairs to improve or modernize a home, or to remove health and safety hazards such as a failing onsite system. This loan is a one percent loan that may be repaid over a 20-year period.

To obtain a loan, homeowner-occupants must have low income (defined as under 50 percent of the area median income), and be unable to obtain affordable credit elsewhere. They must need to make repairs and improvements to make the dwelling more safe and sanitary. Grants are only available to homeowners who are 62 years old or older and who cannot repay a Section 504 loan.

Wetland Reserve Program (WRP)

The Wetland Reserve Program (WRP) is a voluntary program administered by NRCS to restore and protect wetlands on private property (including farmland that has become a wetland as a result of flooding). The WRP provides technical and financial assistance to eligible landowners to address wetland, wildlife habitat, soil, water, and related natural resource concerns on private lands. The program offers three enrollment options: permanent easement, 30-year easement, and restoration cost-share agreement. Landowners receive financial incentives to enhance wetlands in exchange for retiring marginal agricultural land.

Under WRP, the landowner limits future use of the land, but retains ownership, controls access, and may lease the land for undeveloped recreational activities and possibly other compatible uses. Compatible uses are allowed if they are fully consistent with the protection and enhancement of the wetland. There are currently 1,074,000 acres enrolled in the Wetland Reserve Program. The 2002 Farm Bill authorized continuation of the WRP by enabling the NRCS to enroll up to 250,000 additional acres annually into the program.

Emergency Watershed Protection

The Emergency Watershed Protection (EWP) program was established to respond to emergencies created by natural disasters. It is designed relieve imminent hazards to life and property caused by floods, fires, windstorms, and other natural occurrences through purchase of easements on floodplain lands and the right to conduct restoration activities in exchange for limited future use by the landowner. The NRCS administers the EWP program and cities, counties, general improvement districts, and conservation districts sponsor the projects.

Under the floodplain easement option, a landowner voluntarily offers to sell to the NRCS a permanent conservation easement that provides NRCS with the full authority to restore and enhance the floodplain's functions and values. In exchange, a landowner receives the least of one of the three following values as an easement payment: (i) a geographic rate established by the NRCS state conservationist, (ii) a value based on a market appraisal analysis for agricultural uses or assessment for agricultural land, and (iii) the landowner offer.

The NRCS has purchased floodplain easements on lands that qualify for EWP assistance since 1996. Floodplain easements restore and enhance the functions of the floodplain; conserve natural values including fish and wildlife habitat, water quality, and flood water retention; reduce the need for long-term federal disaster assistance; and safeguard lives and property from floods, drought, and the products of erosion. The average EWP project size is 177 acres and average cost per acre is approximately $1,100. The EWP work is not limited to any one set of prescribed restoration measures and can include: removing debris from stream channels, bridges, and road culverts; reshaping and protecting eroded banks; correcting damaged drainage facilities; repairing levees and reseeding damaged areas.

Conclusions

The Lower Skagit River Bacteria TMDL was approved by EPA on September 1, 2000. The TMDL determined the loading capacities of Lower Skagit water bodies, identified point and nonpoint sources of fecal coliform bacteria, and set bacteria load and wasteload reduction targets for the river and tributaries. Swimming and fishing in the river and tributaries are beneficial uses protected by state water quality standards and the Lower Skagit TMDL.

This Water Quality Implementation Plan for the Lower Skagit River Bacteria TMDL details existing agencies, programs, requirements, watershed groups; and additional recommended actions and schedules that are expected to get Lower Skagit Basin water bodies to meet water quality standards by year 2015. The plan takes into account water quality monitoring results collected under Skagit County's monitoring program (funded by CCWF grant) since 2003 and relies on continued active participation by state agencies, tribes, Skagit Conservation District, Skagit County Public Health Department, Skagit County Public Works, Skagit County Planning and Development Services, and the cities of Mount Vernon, Burlington, and Sedro-Woolley. Ecology, Washington Department of Agriculture, and EPA have programmatic and enforcement responsibilities in the Lower Skagit River Bacteria TMDL.

Key elements of the Implementation Plan for the Lower Skagit River Bacteria TMDL are:

- Reduction of Mount Vernon Combined Sewer Overflow (CSO) discharges.
- Continued discharge compliance at the four municipal wastewater sewage treatment plants: Mount Vernon, Sedro Woolley, Burlington, and Skagit Sewer District No. 2.
- Effective administration of Ecology's Phase II General Municipal Stormwater Permit and continued discharge compliance by the four municipal stormwater permittees with conditions of the Phase II permit and additional recommendations to focus on education, detecting illicit discharges and reducing bacteria in stormwater.
- Improved agricultural and manure-handling practices at dairies and other large and small farm operations and continued technical assistance to small farms by Skagit Conservation District through farm planning and farm BMP implementation.
- Improved coordination between Skagit County Health Department and Ecology to follow up water quality data indicating sources of fecal coliform pollution where failing septic systems are a likely cause.

- New commitment by Ecology to follow up water quality data indicating fecal coliform pollution where livestock have unlimited access to streams.
- Public education and involvement on best management practices for pet waste, livestock, and operation and maintenance of domestic on-site sewage systems.
- Continued funding of Skagit-area water quality projects under the Centennial Clean Water Fund, Section 319 Fund, and State Revolving Fund.
- Continued funding of agricultural and livestock BMPs through NRCS-administered cost-share programs such as CREP and EQIP.
- Annual review of water quality monitoring results and water quality trends combined with an Ecology-coordinated meeting of local agencies and watershed organizations to track implementation and identify next steps to water quality improvement.

With the participation of the various agencies, Tribes, municipalities, and watershed groups, and provided the recommendations of this plan are implemented, water bodies in Lower Skagit Basin are expected to meet water quality standards for fecal coliform bacteria by the year 2015.

References

Ecology, 1991. *Water Quality Program Policy #1-05: Guidance for Implementation of the Agricultural Compliance Memorandum of Agreement*. Washington State Department of Ecology, Water Quality Management Section, Nonpoint Source Unit, July 1991.

Ecology, 1996. *Lower Skagit River Fecal Coliform and Dissolved Oxygen TMDL: Data Report.* Washington State Department of Ecology. Report No. 96-345.

Ecology, 1997a. *Lower Skagit River Fecal Coliform Total Maximum Daily Load Study*. Washington State Department of Ecology. Report No. 97-326a.

Ecology, 1997b. *Water Quality Standards for Surface Waters of the State of Washington, Chapter 173-201A WAC*. Washington State Department of Ecology, Water Quality Program, Olympia, WA, updated November 18, 1997.

Ecology. 2000. *Lower Skagit River Fecal Coliform Total Maximum Daily Load: Submittal Report*. June 2000. Washington State Department of Ecology, Water Quality Program, Olympia, WA. Report No. 00-10-010.

Ecology, 2005a. *Stormwater Management Manual for Western Washington*, prepared by Washington State Department of Ecology Water Quality Program, Olympia, WA, Publication Numbers 99-11 through 99-15, Volumes 1-5. 2005 edition and 2006 revisions now available online at: http://www.ecy.wa.gov/programs/wq/stormwater/manual.html

Ecology, 2005b. *Washington's Water Quality Management Plan to Control Nonpoint Source Pollution.* Washington State Department of Ecology, Water Quality Program, Olympia, WA.

Ecology, 2005c. *Stillaguamish River Watershed Fecal Coliform, Dissolved Oxygen, pH, Mercury, and Arsenic Total Maximum Daily Load: Submittal Report*. April 2005. Washington State Department of Ecology, Water Quality Program, Olympia, WA.

May, C.W., D. Woodruff, V. Cullinan, N. Evans, L. O'Rourke, L. Miller, R. K. Johnston, P. F. Wang, H. Halkola, K. E. Richter, B. Davidson, V. Whitney, and J. Wright. 2005. An analysis of microbial pollution in the Sinclair-Dyes Inlet Watershed. Washington Department of Ecology, Report No. 05-03-042. 428 pp + Appendices. http://www.ecy.wa.gov/biblio/0503042.html

Nookachamps Watershed Management Committee. 1995. *Nookachamps Watershed Nonpoint Action Plan*. Prepared by the Nookachamps Watershed Management Committee and the Skagit County Department of Planning and Community Development. Approved by Washington Dept. of Ecology, May 1995.

Padilla Bay/Bay View Watershed Management Committee. 1995. *Padilla Bay/Bayview Watershed Nonpoint Action Plan.* Prepared by the Padilla Bay/Bayview Watershed Management Committee and the Skagit County Department of Planning and Community Development. Approved by Washington Dept. of Ecology, May 1995.

Pitt, R. 1998. *Epidemiology and stormwater management.* In: Stormwater Quality Management. CRC/Lewis Publishers. New York, N.Y.

Samish Bay Watershed Management Committee. *1995. Samish Bay Watershed Nonpoint Action Plan and Final Closure Response Strategy*. 1995. Prepared by Samish Watershed Management Committee and the Skagit County Department of Planning and Community Development. Approved by Washington Dept. of Ecology, Dec. 1995.

Skagit County. 2007. Skagit County Monitoring Program Annual Report - 2006 Water Year (October 2005-September 2006). Skagit County Public Works, Mount Vernon, Washington, February 2007. 90 pp + Appendices.

U.S. Environmental Protection Agency. 1997. *Memorandum of Agreement Between the USEPA and Washington State Department of Ecology Regarding the Implementation of Section 303(d) of the Federal Clean Water Act*, 1997, 22 pp.

U.S. Environmental Protection Agency. 2001. *Protocol for Developing Pathogen TMDLs*, EPA 841-R-00-002, Washington D.C., 90 pp. and appendices.

U.S. Environmental Protection Agency. 2002. *Establishing Total Maximum Daily Load (TMDL) Wasteload Allocations (WLAs) for Storm Water Sources and NPDES Permit Requirements Based on Those WLAs.* Memorandum from Robert H. Wayland, III, Director, Office of Wetlands, Oceans and Watersheds, and James A. Hanlon, Director, Office of Wastewater Management, U.S. EPA, to Water Division Directors, U.S. EPA Regions 1 – 10. November 22, 2002. 6 pp.

Varner, P. 1995. *Characterization and source control of urban stormwater quality*. City of Bellevue Utilities Department. City of Bellevue, Washington.

Appendices

(this page intentionally left blank)

Appendix A: Glossary

BMP .....Best Management Practice
CCWF .....Centennial Clean Water Fund
CFR .....Code of Federal Regulations
CSO…… Combined Sewer Overflow
cfs.....cubic feet per second
cfu .....colony forming units
CREP.....Conservation Reserve Enhancement Program
DOH.....Washington State Department of Health
Ecology ....Washington State Department of Ecology
EPA.....U.S. Environmental Protection Agency
EQIP.....Environmental Quality Incentives Program
GMA .....Growth Management Act
gpd.....gallons per day
IRC……Implementation Review Committee (for Non-Point Action Plans)
LID.....Low impact development
LOSS.....Large Onsite Sewage System
MG/yr.....million gallons/year
mL .....milliliters
MS4.....Municipal Separate Storm Sewer System
NPDES.....National Pollutant Discharge Elimination System
NRCS .....Natural Resources Conservation Service
O & M…..Operations, Monitoring and Maintenance
OSS .....Onsite Sewage System
PIC .....Pollution Identification and Correction
PIE.....Public Involvement and Education
PSAT.....Puget Sound Action Team
PSP……...Puget Sound Partnership
RCW .....Revised Code of Washington
RM .....River Mile
SCD.....Skagit Conservation District
SCEA .....Skagit Conservation Education Alliance
SFEG.....Skagit Fisheries Enhancement Group
SCHD.....Skagit County Health Department
SCPW.....Skagit County Public Works
SRFB.....Salmon Recovery Funding Board
SRSC.....Skagit River System Cooperative
SWC.....Skagit Watershed Council
SWPPP.....Stormwater Pollution Prevention Plan
TMDL .....Total Maximum Daily Load
UGA.....Urban Growth Area
WAC .....Washington Administrative Code
WSDA.....Washington State Department of Agriculture
WSDOT ...Washington State Department of Transportation
WWTP .....Wastewater Treatment Plant

(this page intentionally left blank)

Appendix B. Response to Comments

Response to Comments

Comment: The report should provide evidence for the statement that water quality standards for bacteria will be met in five years.

Response: The text has been edited to reflect a change in the estimate of the time needed to reach water quality standards for bacteria (changed to 2015). This is a more realistic estimate, and the basis for this estimate (summarized briefly here) is provided in the text.

Rationale for an estimate of 2015 to meet water quality standards for bacteria:

- The decrease in fecal coliform bacteria data at Ecology's long term monitoring station on the Skagit River at Mount Vernon over the years 1982 to 2006, and also from 1995 to 2006, is statistically significant. Improvements in point sources have been documented. It is not possible with available data to determine whether, overall, bacteria from nonpoint sources have declined, increased, or remained the same. Some tributary stations have shown improvements; but in general, remain above the water quality standard for bacteria. This Implementation Plan suggests that work on nonpoint sources (septic systems and livestock manure management) is likely to be very important to effectively reducing bacteria concentrations in the tributaries.
- Combined sewer overflows from city of Mount Vernon WWTP are on target to meet the compliance order of, on average, one overflow per year, in 2015.
- Ecology's Northwest Regional Office has committed 0.2 FTE for the biennium 2008-2009 for technical assistance, coordination with local authorities, and nonpoint source investigations in two Skagit watersheds. Resources have not been available for this position since 2004. While limited, this represents a renewed commitment by this office to making progress in addressing nonpoint pollution and is expected to lead to direct improvements in surface water quality by working with parcel owners where livestock manure is degrading streams. It is expected there will be an indirect benefit as these investigations are publicized.

  Efforts by Ecology's Northwest Regional Office to follow up evidence of bacteria exceedances in water quality data have already resulted in reducing discharges to the Samish River and Gages Slough in Burlington. Our effort to document manure discharges led to the spring 2007 requirement that a Burlington egg processor apply for coverage under a Combined Animal Feeding Operation (CAFO) permit and operate according to a nutrient management plan.
- As resources become available, Skagit County Health Department will conduct Septic 101 classes in the Nookachamps and Hansen Creek watersheds and coordinate with Ecology on nonpoint investigations.
- Four municipalities whose jurisdictions border the lower Skagit River will be developing education, enforcement, illicit detection, and improved operations and maintenance programs under Ecology's Phase II Municipal Stormwater Permit, issued January 2007.

Comment: Please provide evidence that continuing the past approach using voluntary measures will result in improved water quality. We would expect DOE to develop an implementation plan that would be more directed at approaches that either have been tested and found to be successful, or to advocate for innovative approaches that have a high likelihood of success. This implementation plan does neither.

Response: This Implementation Plan acknowledges the role of enforcement as a necessary tool among others including financial and technical assistance, in the effort to improve water quality. Ecology is an advocate of Kitsap County Health Department's Pollution Identification and Correction (PIC) approach which focuses on small basins, education and outreach, technical assistance and enforcement, and which has proven effective in reducing fecal coliform pollution in streams. Ecology has provided information about this approach to other counties and in spring 2006 organized a tour of KCHD's Dogfish Creek project that was attended by staff from Snohomish County and Skagit County.

Comment: We have not found evidence in any of Ecology's reports that would lead to the conclusion that the County's Critical Areas Ordinance will lead to a reduction in bacteria in agricultural areas.

Response: The reference citing Skagit County's Critical Areas Ordinance has been deleted.

Comment: Additional discussion and clarification is needed to describe possible further actions if water quality does not improve as the plan is implemented.

Response: Some clarification and details regarding further actions have been added to the text under Adaptive Management. It is expected that local organizations will provide ideas and direction during the Ecology-sponsored annual water quality review meetings to determine what new programs and activities will be needed to reduce bacteria in this watershed.

Comment: Success of plan is dependent on reaching citizens that so far have been outside the process.

Response: The earlier phase of the TMDL, the submittal report, was presented at a public meeting and made available for a 30-day public review in 2000 as required by law. Ecology is in full agreement that educating and involving citizens is critical to success of this plan. Most of the activities and programs cited as elements of this plan include public education and outreach:

- Centennial Grants awarded to Skagit Conservation District and Skagit Fisheries Enhancement Group, and Skagit County Health Department.
- Four lower Skagit watershed municipalities—Skagit County, Sedro-Woolley, Burlington and Mount Vernon—have received permit coverage under the NPDES Phase II Municipal Stormwater Permit. Under this permit, these municipalities have requirements to educate and involve the public on ways to reduce stormwater impacts to surface waters.

Ecology is soliciting recommendations from local organizations regarding increasing public awareness of, and participation in, activities to reduce fecal coliform discharge to the lower Skagit River and its tributaries.

Comment: Clarify the term "infrastructure" in Ecology's recommendation that the County establish a site to monitor the impacts of stormwater to a surface water body.

Response: This term includes both engineered systems such as pipes, catch basins and outfalls, and passive systems such as roadside ditches. This term was intended to capture all components of municipal separate storm sewer systems (see definitions in Permit page 46 of 50).

Comment: The discussion of Adaptive Management Plan should provide more information on the annual review and how progress will be measured.

Response: Some text added. Local agency and organization participation in, and ideas for, this annual review are encouraged.

Comment: Please provide documentation showing that the target date of 2012 is achievable.

Response: A new section providing a basis for a slightly longer time to meet standards (new target date of 2015) has been added to the Reasonable Assurance section. Also, the review of data under "Current Water Quality Conditions" provides evidence of reduced bacteria concentrations in the mainstem and some tributaries.

Comment: There is no current information on Ecology's web pages that outlines which basin will be prioritized after 2006. Ecology's two TMDLs in the lower Skagit – the Lower Skagit Tributaries Temperature TMDL and the Lower Skagit Fecal Coliform TMDL are not coordinated.

Response: WRIA 3 (Skagit and Samish watersheds) is scheduled for scoping of future water quality improvement projects (TMDLs) in fall 2008. The two TMDLs were initiated at different times and address different pollutants so Ecology has not integrated these two efforts. Once Ecology and Skagit organizations have begun to work together on annual reviews of these TMDLs, it is expected that some elements of implementation can be integrated.

Comment: The bacteria targets set forth in this report are based on concentrations, which are dependent on flows yet there is no mention of how the new Instream Flow Rule will be integrated into this program.

Response: The water quality standards for bacteria are expressed in terms of concentrations of bacteria, so monitoring results must be reported in terms of concentration, so that comparison can be made. TMDLs also employ measurements of flow of pollutant discharges, because of the potential for higher-flow discharges to have greater influence on water quality of receiving waters. The TMDL analysis evaluates this impact of flow by comparing relative load (load = flow x concentration) of all pollutant sources. The TMDL analysis also includes a determination of the critical season for the parameter of interest, which in Western Washington may be correlated with either late-summer, low flow season or the winter storm (high flow) season.

Instream Flow Rules are established under a separate set of state regulations for the purpose of providing minimum flows to support fish and other aquatic life. The fact that these minimum flows have been established for Nookachamps, Fisher and Carpenter Creeks under the Skagit Instream Flow Rule is a legal protection for these minimum flows. Protecting these minimum

flows does provide some assurance that a certain level of dilution will be available for pollutants that tend to occur at higher concentrations during low flow conditions. In the case of bacteria, however, Ecology's policy is to reduce this category of pollutant at the source rather than rely on dilution to decrease concentrations in order to meet water quality standards.

Comment: Ecology has stated that the goal of this TMDL is to "ensure that the Skagit River load of bacteria is sufficiently low that it does not contribute to closure of harvestable shellfish beds in South Skagit Bay." Why then are not all potential sources of Fecal Coliform addressed in this TMDL?

Response: The purpose of the original TMDL was to evaluate storm season (wet season) discharges of bacteria to the lower Skagit River and to ensure that the Skagit River discharge *alone* did not contribute excessive bacteria to South Skagit Bay. The original TMDL did not have a goal of reopening shellfish beds in South Skagit Bay and did not include other freshwater discharges to the Bay. The freshwater targets are not intended to equate to shellfish bed reopening – that would require assessing all the sources of bacteria to South Skagit Bay. This Implementation Plan includes some additional analyses of the effect of Skagit River bacteria loading on South Skagit Bay water quality, because of the current interest in reopening shellfish beds, and to make use of recent data.

Comment: The submittal report (Ecology 2000) stated that watershed plans will be developed for Nookachamps, Carpenter and Fisher Creeks, and Drainage District 15. What is the status of these plans?

Response: The purpose of this Water Quality Implementation Plan is to take the place of separate watershed plans for the Nookachamps, Carpenter and Fisher Creeks. This plan includes the activities and programs needed to be undertaken by local government and other organizations in order for bacteria discharges to be reduced in all of these streams.

Comment: Will Ecology conduct another year of sampling for all water bodies that have been assigned a load allocation in Table 3 sometime prior to or in 2012?

Response: Ecology has identified 12 monitoring locations on the lower Skagit River and its tributaries to be used to assess yearly progress (Table 13). If these principal locations meet standards, Ecology will likely choose not to use resources to monitor all the discharges listed in Table 3. If, however, the downriver monitoring locations continue not meeting targets, then it may be helpful to reassess some of these additional locations to determine whether they are significant contributors of bacteria to the river system.

Comment: The submittal report (Ecology 2000) stated that "The Skagit River and its tributaries do not show a significant pattern of seasonal variation." A better statistical examination should be completed to determine if increased concentrations are correlated with rain or flow.

Response: The original monitoring for the TMDL was conducted in 1994 and 1995 and was focused on wet season discharges of bacteria to the Skagit River. It included no monitoring during the months of May through August. In this Implementation Plan's update of the TMDL, significant seasonal variation was discovered through review and analysis of the detailed (biweekly monitoring; all months of the year) conducted by Skagit County Public Works'

monitoring program initiated in 2003. We looked for correlation between bacteria concentration and flow and these were not significantly correlated. Review of the data suggest that bacteria concentrations reflect a complex of several factors that vary seasonally including river temperature, river flow, day length and light intensity, and seasonal inputs of manure in rural areas.

Comment: The statement on page 14 that the winter wet season is not the critical period for bacteria in this watershed needs to be supported with additional analysis and not just based on a figure. What statistical methods were used to determine seasonal loading? Also the data shown in Appendix B only looks at 3 sampling stations that are assigned a Load Allocation from Table 3. The report needs to establish that this seasonality occurs at other stations assigned a load allocation in Table 3.

Response: Additional data review performed for this Implementation Plan suggests that loading in the Skagit River is higher in fall, but is not high throughout the wet season. In 2004 and 2005, the highest loads occurred in October and November and lowest loads in February through April. Seasonal increases in fecal coliform bacteria in stream systems has been noted in a number of watersheds throughout western Washington (Personal Communication, D. Sargeant, Environmental Assessment Program, Washington Department of Ecology, Lacey, Washington, May 2007).

Comment: Regarding the recommendation on page 22 that Skagit County monitor either Britt Slough or Hansen Creek to assess stormwater impacts to surface waters, it would be preferable to monitor Hansen Creek, since the County already monitors Hansen Creek and no data currently exist for Britt Slough.

Response: This recommendation will be considered along with other criteria, such as whether the stream reach monitored is largely in a county Urban Growth Area.

Comment: For new infrastructure, Ecology should encourage local Phase II municipalities to conduct proper project review and follow up enforcement to ensure infrastructure was built as planned.

Response: This issue is not under the scope of this TMDL.

Comment: Given a local increase in hobby farming, an outreach effort should target these new owners or residents to supply them with technical tools and information about stream health. For instance, the SCD could develop brochure and hold classes for realtors and insurance agencies because they are the point of contact of new land owners.

Response: The intent of this comment is already conveyed in Ecology's recommendation that Skagit Conservation District continue to target new audiences to provide education on water quality values and stream health.

Comment: The Implementation Plan states that 0.5 FTE will be available for nonpoint investigations and that five investigations per year will be conducted. The number of investigations does not sound appropriate for 0.5 FTE.

Response: The question of Ecology resources available for nonpoint investigations has been the subject of exploration and discussion during the writing of this Plan. A commitment has been made for 0.2 FTE to nonpoint investigations for FY 2008-2009. This commitment is for five counties. It is expected that two to five investigations per year in Skagit County, including the Samish basin, could be conducted at this level of effort.

Comment: The Implementation Plan should recommend that a nonpoint source investigation be conducted for tributaries that exceed water quality standards. The Plan should include timelines for completing the investigation. This recommendation should be added to the "Fecal Coliform Implementation Responsibilities Table."

Response: A recommendation has been added that Ecology will coordinate with local government on nonpoint source investigations, however, Ecology's own resources for conducting investigations is severely limited.

(this page intentionally left blank)

Appendix C. Implementation Tracking Sheets

The actions and programs listed in the following tables are organized by responsible entity. The tracking sheets lists the actions and programs to be taken by the organizations that are active in this watershed.

Appendix C Table:
Implementation Responsibilities Tracking Sheet

ENTITY	ACTION	Year									Comments
		2007	2008	2009	2010	2011	2012	2013	2014	2015	
	Federal, Tribal and State Governments										
U.S. EPA	Administer Clean Water Act (CWA) 319 Program	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	
Dept of Ecology	Convene annual Skagit-area meeting of responsible organizations to review status of TMDL water quality and implementation activities		**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	
	Publicize State Revolving Fund (loan) and Centennial (grant) funding opportunities	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	
	Monitor basin stations 03A080 (mainstem Skagit) and 03D050 (Nookachamps Creek at Swan)				**x**					**x**	
	Coordinate with WSDA and Skagit County Health & Skagit County Planning on appropriate response & potential enforcement of nonpoint pollution	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	
	Provide 0.2 FTE nonpoint enforcement capability. Look for additional funding to increase this capability; Conduct 5 nonpoint investigations per year in the geographic area of this TMDL.		**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	
	Conduct Effectiveness Monitoring(1) and Report (2)							**1**	**1**	**2**	

	ACTION	Year									Comments
		2007	2008	2009	2010	2011	2012	2013	2014	2015	
	Federal, Tribal and State Governments										
Dept of Health	Monitor and report annually on water quality of commercial and recreational shellfish beds in South Skagit Bay	x	x	x	x	x	x	x	x	x	
	Conduct shoreline survey of South Skagit Bay (when resources available)		x					x			
Puget Sound Partner-ship	Provide leadership, coordination support and funding for agencies and organizations working to improve water quality in Puget Sound basin	x	x	x	x	x	x	x	x	x	
	Provide financial and organizational support for workshops promoting Low Impact Development in WRIA 3	x		x		x		x		x	
WSDA	Inspect all Dairies and Concentrated Animal Feeding Operations; respond to complaints	x		x		x		x		x	
	Coordinate with Ecology and local government on Dairy and CAFO and nonpoint inspections/investigations	x	x	x	x	x	x	x	x	x	
	Special Purpose Districts										
Skagit Conserva tion District	Focus outreach and evaluate effectiveness in reaching property owners with large amounts riparian habitat		x	x	x	x	x	x	x	x	

ENTITY	ACTION	Year									Comments
		2007	2008	2009	2010	2011	2012	2013	2014	2015	
	Educate new audiences about protecting Skagit water quality		x	x	x	x	x	x	x	x	
	Report at annual water quality review meeting: no. of CREP projects per stream; no. of farm plans developed; no of class attendees; stream miles planted		x	x	x	x	x	x	x	x	
	Secure adequate funding for rapid response farm planning			x	x	x	x	x	x	x	
Diking District 17	Inform property owners about protecting water quality in drainage ditches	x		x		x		x		x	
	Follow best management practices for drainage ditches in Ag-Fish Initiative Drainage Management Plans	x	x	x	x	x	x	x	x	x	
	City and County Governments										
City of Burling-ton	Use Gages Slough and stormwater monitoring results to educate commercial property owners, citizens about need to reduce pollution of stormwater		x	x	x	x	x	x	x	x	
	Report water quality results at Skagit area annual meeting		x	x	x	x	x	x	x	x	
	Promote Low Impact Development practices		x		x		x		x		
	Provide information to citizens about how to report water quality problems	x	x	x	x	x	x	x	x	x	

ENTITY	ACTION	Year									Comments
		2007	2008	2009	2010	2011	2012	2013	2014	2015	
City of Mount Vernon	Promote Low Impact Development Practices		x		x		x		x	x	
	Establish program for monitoring and improving water quality in Kulshan Creek, and report results annually to property owners and to Skagit-area water quality meeting		x	x	x	x	x	x	x	x	
	Use Kulshan Creek monitoring results to target education of commercial property owners to reduce stormwater pollution		x	x	x	x					
	Provide information to citizens about how to report water quality problems	x	x	x	x	x	x	x	x	x	
City of Sedro-Woolley	Survey and develop GIS datalayer for municipal stormwater system		x	x							
	Conduct feasibility study for a regional stormwater treatment and wetland enhancement facility						x	x	x	x	
	Conduct water quality monitoring of Brickyard Creek (or coordinate with Skagit County to monitor)		x	x	x	x	x	x	x	x	
	Use Brickyard Creek data to educate property owners about preventing discharge of pollutants to creek, storm drains		x	x	x	x	x	x	x	x	
	Inform citizens about how to report water quality problems	x	x	x	x	x	x	x	x	x	
	Promote LID Practices		x		x		x		x		

ENTITY	ACTION	Year									Comments
		2007	2008	2009	2010	2011	2012	2013	2014	2015	
Skagit County	Conduct ambient water quality monitoring program.	x	x	(x)	(x)	(x)	(x)	(x)	(x)	(x)	**(x) After 2008, new funding source required**
	Publish annual report on Water Quality Monitoring	x	x	(x)	(x)	(x)	(x)	(x)	(x)	(x)	**(x) Current funding of monitoring program ends in 2008.**
	Look for funds to continue monitoring program beyond 2008	x	x	x	x	x	x	x	x	x	
	Work with Ecology to select creek location appropriate to assess stormwater impacts		x								
	For selected creek, use monitoring results to provide information about stormwater pollution prevention to property owners in drainage			x	x	x	x	x	x	x	
	In Triennial Review of Ag-CAO, analyze how well the current CAO is working to achieve the no harm and degradation standard		x			x			x		
	Promote Low Impact Development Practices		x	x	x	x	x	x	x	x	
	Support Ecology's investigations of nonpoint agricultural pollution.	x	x	x	x	x	x	x	x	x	
	Provide information to citizens about how to report water quality problems	x	x	x	x	x	x	x	x	x	
	Target problem neighborhoods with Septic 101 classes and design new incentives for homeowner septic inspections	x	x	x	x	x	x	x	x	x	
	Conduct targeted mailings to property owners in Fisher, Carpenter, Hansen, Kulshan and Nookachamps basins explaining need for OSS inspections. Look for additional incentives for OSS inspections.	x	x	x	x	x	x			x	

ENTITY	ACTION	Year									Comments
		2007	2008	2009	2010	2011	2012	2013	2014	2015	
	Local Organizations, Citizens, Businesses										
Skagit Fisheries Enhancement Group	Develop new funding proposals targeting riparian restoration needs in Lower Skagit River watershed			x		x		x		x	
	Continue public involvement & education efforts for stream restoration and water quality		x	x	x	x	x	x	x	x	
SCEA	Convene state, local agencies every five years to review implementation status of 400-12 Non Point Action Plans, including Nookachamps Nonpoint Action Plan	x					x				
	Research funding for expanded effort to educate, involve Skagit County residents on water quality, shellfish resources and wildlife and aquatic habitat improvements	x	x	x	x	x	x	x	x	x	

(this page intentionally left blank)

Appendix D

Data Summary and Load and Wasteload Allocations from the 1997 TMDL Study

Table D1. Fecal coliform loading capacity in Lower Skagit River watershed (page 1 of 2)

Station Name	Discharge Type[2]	River Mile	Fecal Coliform Measurements, December 1994 – April 1995 & September-October 1995 (cfu/100 mL)[1]			Load Reduction Needed (%)[3]	Fecal Coliform Loading Capacity (target conc. in cfu/100 mL)[4]
			Range of Monthly Geometric Means		Maximum Weekly or 10th Percentile Geometric Means		
			Min	Max			
Skagit River above Sedro-Woolley	R	24.6	1	11	154	48	6/80[4]
Hansen Creek	C	24.3	20	2078	2592	93	100/200
Northern State Hospital SD	SD	24.2	no flow	13	13	0	100/200
Tributary at Riverfront Park	C?	23.6	no flow	379	670	70	100/200
South Sedro-Woolley SD	SD	22.9	no flow	1997	10342	98	100/200
Sedro-Woolley WWTP	WWTP	22.8	28	22264	36742	0	200/400
Brickyard Creek	C	21.1	no flow	655	2020	90	100/200
Nookachamps Creek	C	18.8	37	315	1056	93	100/200
Burlington WWTP	WWTP	18.1	2	17		0	200/400
Gages Slough Pump Station	PS	14.6	no flow	24	76	0	100/200
Possible Unidentified Source above Kulshan Creek discharge[5]	U	14.6	N/A	N/A	N/A	100	100/200

[1] From Table C.1, Compliance with Fecal Coliform Standards (Ecology TMDL Data Summary 96-345, 1996)

[2] Discharge Types: C = Creek; CSO = Combined Sewer Overflow; PS = Pump Station; R = River; SD = Storm Drain; U = Unidentified Source; WWTP = Wastewater Treatment Plant

[3] From Table 12, TMDL Fecal Coliform Mass Balance, Standards Met at All Locations (Ecology TMDL Water Quality Study, Publication No. 97-326a, 1997). Shaded cells are for required load reductions under the TMDL.

[4] From Table 13, Compliance with Fecal Coliform Standards, Standards Met at All Locations (Ecology TMDL Water Quality Study, Publication No. 97-326a, 1997). The two target concentrations (n/n) are the geometric mean and the value that 10% of samples are not to exceed. Targets of 200/400 for Wastewater Treatment Plants are technology based permit limits.

[5] From page 37, Ecology TMDL Water Quality Study, Publication No. 97-326a, 199

Table D2. Fecal coliform loading capacity in Lower Skagit River watershed (page 2 of 2)

Station Name	Discharge Type[2]	River Mile	Fecal Coliform Measurements, Dec 1994-April 1995 & September-October 1995 (cfu/100 mL)[1]			Load Reduction Needed (%)[3]	Fecal Coliform Loading Capacity (target conc. in cfu/100 mL)[4]
			Range of Monthly Geometric Means		Maximum Weekly or 10th Percentile Geometric Means		
			Min	Max			
Kulshan Creek (Mount Vernon Frontage Rd. Pump Station)	PS, C	11.9	46	1590	1997	94	100/200
Freeway Dr PS	PS	11.9	no flow	194	610	92	100/200
Division St CSO	CSO	11.4	no flow	244676	481871	0	100/200
Westside PS	PS	11.0	no flow	4146	9322	98	100/200
Park St CSO	CSO	10.9	no flow	18753	80976	0	100/200
Mt Vernon WWTP	WWTP	10.7	2	2570	2863	0	200/400
Britt Slough PS	PS	8.3	no flow	71	120	0	100/200
Big Lake WWTP	WWTP	7.8	1	21	33	0	200/400
Conway PS	PS	4.4	no flow	10	107	0	100/200
Carpenter/Fisher Creeks at Hill Ditch	C	3.1	no flow	181	205	54	100/200
Rexville Pump Station	PS	4.2	no flow	208	2398	92	100/200
North Fork Skagit River at Rexville	R	4.1	3	48	101	0	24/74

[1] From Table C.1, Compliance with Fecal Coliform Standards (Ecology TMDL Data Summary 96-345, 1996)

[2] Discharge Types: C = Creek; CSO = Combined Sewer Overflow; PS = Pump Station; R = River; SD = Storm Drain; U = Unidentified Source; WWTP = Wastewater Treatment Plant

[3] From Table 12, TMDL Fecal Coliform Mass Balance, Standards Met at All Locations (Ecology TMDL Water Quality Study, Publication No. 97-326a, 1997). Shaded cells are for required load reductions under the TMDL.

[4] From Table 13, Compliance with Fecal Coliform Standards, Standards Met at All Locations (Ecology TMDL Water Quality Study, Publication No. 97-326a, 1997). The two target concentrations (n/n) are the geometric mean and the value that 10% of samples are not to exceed. Targets of 200/400 for Wastewater Treatment Plants are technology based permit limits.

(this page intentionally left blank)

Appendix E.

Draft Brochure for Local Government: "How to Report a Water Quality Problem - A Citizen's Guide"

- in approaching these pollutants to ensure your personal health. The Washington State Department of Ecology and local Fire Departments should do any close investigations of these types of pollutants.

The basics on reporting

The following are good practices to follow for reporting a potential pollution problem and for providing information that will be helpful to the follow-up investigator.

Take good notes

A good set of notes will provide a complete and accurate set of facts for others. Use the following as a checklist when reporting a suspicious event:

- Location of observation.
- Time/date of your observation. Does it occur at a certain time? (e.g., everyday at 6:00 a.m.?)
- Could you determine the source?
- How did the water look?
- Did you observe any dead fish?
- Are there any odors?
- Were there other witnesses?

Take photographs

Photographic evidence can be very valuable in establishing the presence of pollution, especially where erosion problems exist. When taking photographs, remember to record the time, date, and location that the photo was taken. Wherever possible, try to include an established landmark so that the location of the pollution problem cannot be challenged. Digital photos are very helpful to investigators in understanding the location and severity of certain discharges.

About taking samples

Because of the potential for personal injury from contact with dangerous chemicals or entry into unsafe environments, sample collection should be left to local authorities.

Things to watch out for!

- Be careful, safety first, do not attempt anything dangerous
- Do not sample unknown liquids

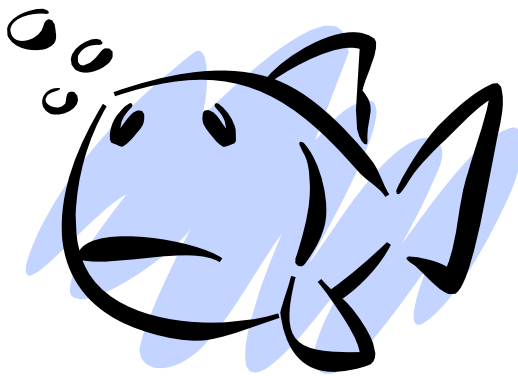
Contact list

The following is a list of contacts to report potential pollution problems. It is recommended that you contact the Department of Ecology Environmental Tracking System (ERTS) desk first.

- Ecology ERTS desk
  425-649-7000
  (This is a 24-hr number. After normal working hours, calls are received at the Washington Emergency Response Center, which will notify the Department of Ecology of your call.)

- Local Health Department

Reporting Water Quality Problems



A Citizen's Guide

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Publication Number 01-10-039

What is the problem?

Water pollution comes from a wide variety of sources. It is economically infeasible to have pollution inspectors on every corner 24 hours a day; however, citizen reporting of pollution problems can help to fill the gaps in water quality protection.

How can citizens help?

Your observations can help federal, state, and local officials investigate, and prosecute if necessary, the polluting of local waters. By taking good notes and perhaps a picture or two, you can help local authorities respond to pollution when it is occurring.

How will your information be used?

Local governments have different policies on how to respond to pollution events. Your information alerts local authorities and may lead to additional collection of evidence and possible enforcement. Most agencies consider technical assistance first before penalizing a polluter. All responses are considered on a case-by-case basis and generally consider:

- Past history of the violator;
- Impact on the environment; and
- Was the violation done knowingly?

Local authorities may not have resources to respond to all calls, but your information will be used to prioritize resources when such constraints exist.

Mysterious! but not dangerous…

There are a few "not-so-obvious" situations where natural conditions create what appear to be serious pollution problems. Examples include:

- ***Iron oxide discharges.*** When oxygen poor, iron rich water surfaces, the iron becomes oxidized and much or all of a stream can turn orange in color. Chemical interactions with plants and other parts of the stream may cause iron to precipitate on aquatic plants or sometimes cover the entire streambed.

- ***Foaming.*** It is normal for some small creeks to have a small amount of foam. The foam is caused by nutrients and proteins and is not a pollution indicator. If you see handfuls of suds, it is probably not due to this natural cause.

- ***Tannins and lignins.*** These natural compounds are derived from leaves and other organic materials and turn water a deep brown tea-like color. Some healthy water bodies have this color due to the presence of deciduous leafy material or a peat bog upstream.

Where we need your help

Typical problems you can identify and report for further investigation include:

- ***Emergency Situations.*** A sudden threat to human health or the environment is an environmental emergency. Examples include a spill of raw sewage, chemical spill, or radioactive discharge. Because of the potential for the presence of hazardous gases and other serious threats, ***do not*** attempt to document an environmental emergency. Immediately report the location of the event to local authorities.

- ***Erosion.*** Wherever land clearing activities are taking place there is a potential for erosion. Erosion clogs streams and suffocates fish. If you see brown, sediment-laden water entering a ditch or stream, it should be reported.

- ***Manure problems.*** Farmers reapply manure as fertilizer during the growing season. If you observe manure being sprayed during winter months or overspray onto roadways or into local streams or ditches, report this. If you observe manure from equestrian facilities that appears to be polluting a creek, report this.

Oil or other spills. Oil and other chemical spills can be hazardous for both people and fish. Be very careful.