Skokomish River Basin Fecal Coliform Total Maximum Daily Load (Water Cleanup Plan)

Submittal Report

June 2001
Publication No. 01-10-017


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Fecal Coliform
Total Maximum Daily Load
(Water Cleanup Plan)

Submittal Report

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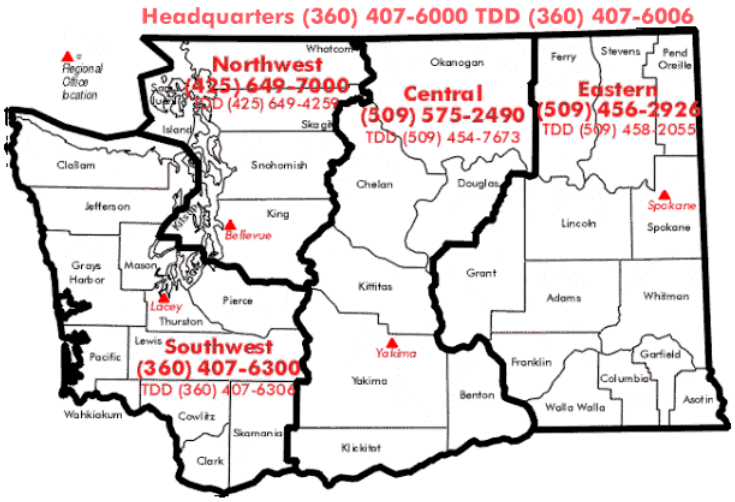

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List of Abbreviations

BMP	best management practice
cfs	cubic feet per second
Ch.	Chapter
CWA	Clean Water Act
DO	dissolved oxygen
DOH	Washington State Department of Health
Ecology	Washington State Department of Ecology
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FC	fecal coliform
GMV	geometric mean value
mg/L	milligrams per liter
ml	Milliliters
ppt	parts per thousand
RCW	Revised Code of Washington
RM	river mile
SIS	Summary Implementation Strategy
TMDL	Total Maximum Daily Load
Tribe	Skokomish Indian Tribe
U.S.	United States
WAC	Washington Administrative Code
WRIA	Water Resource Inventory Area
W.S.	Washington State

Introduction

Section 303(d) of the federal Clean Water Act requires Washington State Department of Ecology (Ecology) and the United States Environmental Protection Agency (EPA) to establish the Total Maximum Daily Load (TMDL) of each pollutant that causes a water body to not meet water quality standards. A TMDL is the amount of pollution that a waterbody can assimilate before beneficial uses are affected. The Skokomish River Fecal Coliform TMDL is established to address water quality impairments due to high fecal coliform bacteria (FC) levels in the lower Skokomish River basin and help protect marine water quality standards and shellfish harvesting in Hood Canal.

A TMDL includes: problem identification, technical analysis to determine the load capacity for the listed pollutant, and evaluation and allocation of pollutant loads for various sources. The TMDL must also consider seasonal variations and include a margin of safety that takes into account any lack of knowledge about the causes of the water quality problem or its loading capacity. Finally, a plan with an implementation schedule is developed to address the sources of pollution. This "Water Cleanup Plan" is developed with participation of the public and other government entities. All TMDLs must be approved by the EPA.

The TMDL applies to areas upstream of the Highway 106 bridge and includes part of the Skokomish Indian Reservation (Reservation) and areas under state jurisdiction. The EPA and the Skokomish Tribe (Tribe) have Clean Water Act jurisdiction on all lands within the Reservation. A cooperative effort among local residents and Tribal, local and state governments will be needed to address jurisdictional issues that may arise as a Detailed Implementation Plan is developed and implemented.

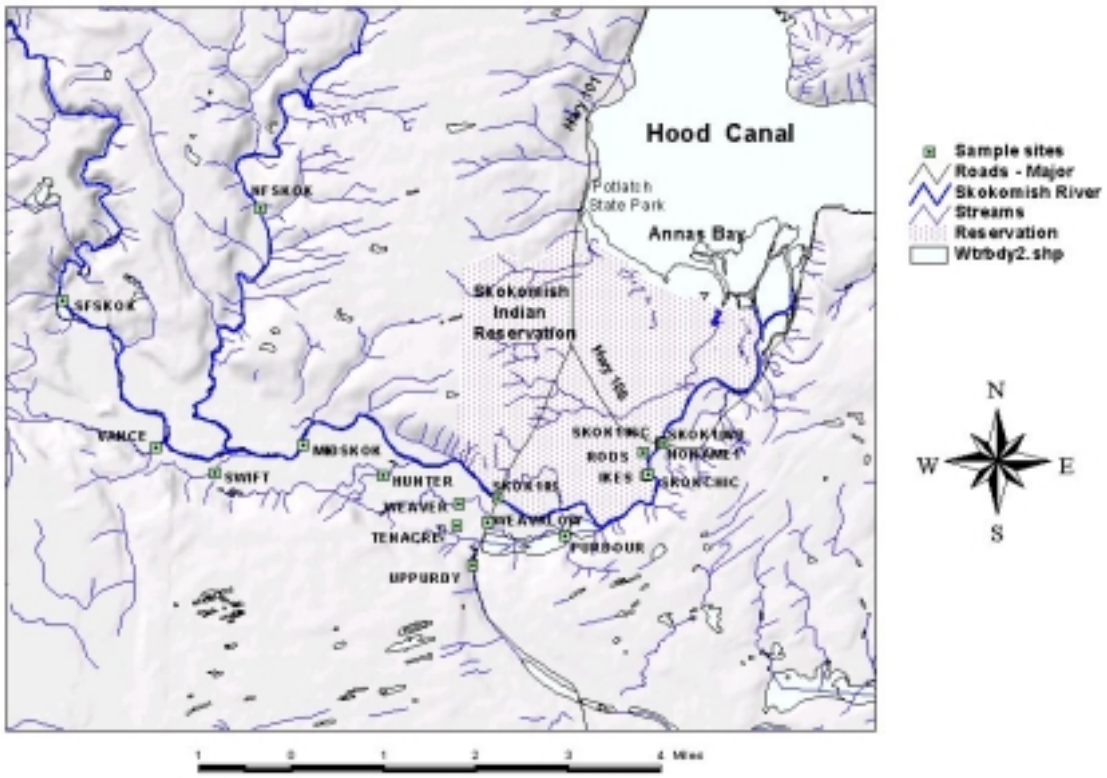

Figure 1. Skokomish River bacteria TMDL study area.

Sampling sites for the Skokomish River TMDL water quality study, 1999-2000

Site name	Site description
SFSkok	South Fork Skokomish, 3 different sites downstream of USGS gage: RM 3.1, RM 2.7, RM 2.2
NFSkok	North Fork Skokomish, at old log road wet crossing, RM 12.5
MidSkok	Skokomish mainstem, right bank at Church Dike along W Skokomish Valley Road, RM 8.1
Skok101	Skokomish mainstem, center of Hwy 101 bridge, RM 5.3
SkokChic	Skokomish mainstem, left bank at Chico's Eddy, RM 2.5
Skok106b	Skokomish mainstem, right bank at Hwy 106 bridge, RM 2.1
Skok106c	Skokomish mainstem, center of Hwy 106 bridge, RM 2.1
Skok106	Skokomish mainstem at Hwy 106 bridge; combines data from Skok106b and Skok106c
Vance	Vance Creek, at W Skokomish Valley Road bridge
Swift	Swift Creek, (aka Vanice Creek on USGS map) at W Skokomish Valley Road bridge
Hunter	Hunter Creek, at W Skokomish Valley Road bridge
UpPurdy	Purdy Creek, at upstream of all hatchery intake structures
TenAcre	TenAcre Creek, at culvert under sideroad off of W Skokomish Valley Road
Weaver	Weaver Creek, at W Skokomish Valley Road bridge
WeavrLow	Weaver Creek, at W Bourgault Rd bridge
PurBour	Purdy Creek, at bridge on E Bourgault Road
Ikes	Ikes Creek, small creek draining wetlands, at bridge on Skokomish River Road
Rods	Rods Creek, small creek draining wetlands, at bridge on Skokomish River Road
NoName1	unnamed creek joins mainstem near site Skok106b; at logjam 30 yards up from mouth

Background

The Skokomish River drains a basin of about 247 square miles and discharges to Annas Bay in southern Hood Canal near Potlatch, Washington (Figure 1). Major sub-basins include the North Fork Skokomish River (118 square miles), South Fork Skokomish River (104 square miles), and Vance Creek (25 square miles). The lower ten miles of the river pass through a broad floodplain, which is the primary area of residential and agricultural land use in the basin. The streams and springs in the lower valley contribute to several large wetland areas which then drain to the mainstem of the Skokomish River mostly downstream of Highway 101 at river mile (RM) 5.3. The river then discharges to the tidal estuary of Annas Bay and Hood Canal. Tidal influence on river water levels extends up to about RM 3.9, about 1.8 miles upstream of the Highway 106 bridge. Mainstem river flow ranges from about 200 cubic feet per second (cfs) up to about 20,000 cfs.

Rainfall levels in the basin range widely from 75 inches per year near the mouth to about 230 inches per year at the crest of the Olympic Mountains near 6,000 feet elevation (Phillips, 1968). Much of the winter precipitation in the mountains accumulates as snowpack that provides runoff in the North and South Forks through the spring and early summer months. The dry season runs from July into September, which is followed by a wet season in which more than 75 percent of the annual precipitation occurs between October and March. Weather systems moving across the basin during the wet season commonly alternate between cold and warm fronts. Snow deposited during cold fronts is commonly melted during the passage of rainy warm fronts, thus increasing runoff and contributing to valley flooding. Numerous studies of this chronic flooding problem have been done since the 1940s and are summarized in the Mason County Skokomish River Comprehensive Flood Hazard Management Plan (KCM, 1997).

Human activities have altered the natural hydrologic regime in the entire Skokomish basin. Forestry practices, road building, dikes, levies, and other land use practices have also caused an unnatural filling of the lower river channel with aggregate to over five times background levels. The effect has been an increase in the frequency and intensity of flood events, higher basin groundwater levels, and subsequent septic system failures (Barreca, 1998). The operation of the Cushman Dam for power generation diverts about 90 percent of the North Fork's flow to Potlatch on Hood Canal (KCM, 1997).

The Skokomish River basin is sparsely populated, rural in nature, and free of urban areas. The Skokomish Indian Reservation is located at the mouth of the basin and contains low-density residential areas. Land use and many other regulations within the Reservation are under the jurisdiction of the Skokomish Tribe. Commercial and noncommercial agricultural activities occur in the lower river valley and include cattle and other livestock culture, hay and Christmas tree production, and some vegetable cropping. Silviculture within National Forest Service and privately owned lands dominate the upper basins. The upper reaches of the Skokomish River lie within The Olympic National Park. The North Fork basin includes Lake Cushman, a reservoir maintained by Tacoma City Light for hydroelectric power generation. The shores of Lake Cushman have some residential development and the lake is used for recreation.

The varied resources of the lower Skokomish River area are shared by many groups. The Annas Bay estuary area contains a rich shellfish resource that is used by Tribal, commercial, and recreational harvesters. Recreational shellfish beds are located within, and to the south of, Potlatch State Park. Potlatch State Park is also a center of primary contact recreation, being used by swimmers and scuba divers. The mainstem Skokomish River and lower Vance Creek are also used by swimmers and waders during the summer months. The lower Skokomish River valley provides important habitat to a variety of terrestrial wildlife such as elk, deer, beaver, and waterfowl. The wildlife, shellfish, and fin-fish are important cultural and economic resources for the Tribe.

The Skokomish River system provides valuable habitat for important species of fish such as: chinook, coho, and chum salmon; steelhead; and various trout (Williams, 1975). Chinook salmon and summer chum in this basin are listed as threatened species under the Endangered Species Act (ESA). Bull trout reside in the South Fork and North Fork of the Skokomish River and are listed as threatened under the ESA.

Three fish rearing facilities comprise the only point sources of pollution in the study area. The first of these facilities was built in the 1940s, and all are located along the southern valley wall where nearby springs provide ideal supply water for fish rearing operations. Pollutant discharges from these facilities are managed under the Upland Fin-Fish Hatching and Rearing National Pollutant Discharge Elimination System Waste Discharge General Permit. Pollutants monitored under this permit generally relate to settleable and suspended solids; fecal coliform bacteria are not included since it has been documented that such operations are not a source of FC bacteria (Kendra, 1989).

Sources of FC pollution in the project area include humans, domestic animals, and wild animals. The domestic livestock population in the lower valley is estimated to include about 500 cattle, and a smaller number of horses, llamas, goats, and chickens (Mason County Conservation District, 2001). Estimates of wild animal populations (e.g. elk, deer, beaver, waterfowl, and other warm-blooded animals) were not obtained.

Applicable Water Quality Criteria

Water quality within the Skokomish Indian Reservation is under the jurisdiction of the Skokomish Tribe, who are currently developing water quality standards that will be applicable within tribal lands. Beyond tribal lands, water quality of the freshwaters of the Skokomish River and the marine receiving waters of Hood Canal are under the jurisdiction of the state of Washington. These waters are classified as Class AA (extraordinary) in Chapter 173-201A-030 WAC: Water Quality Standards for the Surface Waters of the State of Washington. Freshwater standards apply to the Skokomish River where salinity is less than ten parts per thousand (WAC 173-201A-060) and marine water standards apply in the receiving waters where salinity is 10 parts per thousand (ppt) or higher:

Freshwater - fecal coliform organism levels shall both not exceed a geometric mean value of 50 colonies/100 ml, and not have more than ten percent of all samples obtained for calculating the geometric mean value exceeding 100 colonies/100 ml.

Marine water – fecal coliform organism levels shall both not exceed a geometric mean of 14 colonies/100 ml, and not have more than ten percent of all samples obtained for calculating the geometric mean value exceeding 43 colonies/100 ml.

Other groups invested in water quality may use standards that are slightly different than those above. For evaluating the quality of water for shellfish harvest, Washington State Department of Health's criteria are similar but are not bound to the 10ppt salinity threshold since federal guidelines are used as part of the National Shellfish Sanitation Program. The Skokomish Tribe is in the process of developing water quality standards that will be applicable within Tribal lands. This TMDL may need to be re-evaluated in the context of Tribal water quality standards once they are adopted.

Water Quality and Resource Impairments

Bacterial contamination of fresh and marine waters in the lower Skokomish River basin were found through water quality monitoring programs since 1995 by the Department of Ecology (Ecology), Department of Health (DOH), and the Skokomish Tribe (Tribe). Ecology listed eleven streams in the lower Skokomish River basin under Section 303(d) of the federal Clean Water Act in 1996 for not meeting water quality standards for fecal coliform bacteria (FC). Only eight of these streams were listed in 1998 (Table 1). In all but one year since 1995 (1999 being the exception), DOH has listed the Annas Bay commercial shellfish harvest area as threatened due to FC contamination.

Characteristic uses impaired by FC pollution in these waters include recreation, domestic water supply, and shellfish harvesting. Nonpoint source pollution is the source of FC contamination as there are no point sources of FC or regulated stormwater discharges in the basin. Ecology began a Total Maximum Daily Load (TMDL) study in 1999 to determine the source areas of FC loading and to develop FC load allocations that would protect fresh water quality standards and help protect marine water quality standards. While there have not yet been shellfish harvest restrictions, there is growing concern that there will be in the future unless FC pollution is addressed.

Ecology also monitored dissolved oxygen (DO) in study area streams because anecdotal evidence suggested that DO levels were below standards and could potentially be affecting salmon and other fish. During the study period, seven streams were found where DO did not meet the Class AA water quality standard criterion of 9.5 mg/L. Causes for depressed DO levels were not investigated during this study. Possible contributors to low DO include groundwater, wetlands, agricultural activities, and fish hatchery operations. Currently, Skokomish Valley streams are not on the 303(d) list for DO, but as a result of this study, some segments will added to the list in the future.

The increasing frequency and intensity of flooding of the Skokomish River Valley is also a recognized problem for many reasons including water quality. The flooding problem is being addressed through a variety of other local, state, and federal mechanisms and is not the subject of this TMDL effort. While it is recognized that flood events can affect water quality, non-flood related problems of FC contamination require attention. This water quality study was designed to characterize the FC problem throughout a one-year period, which included a range of hydrologic conditions.

Table 1. Skokomish River basin streams on the 1996 and 1998 303(d) lists for FC bacteria

Stream Name	Old Waterbody Segment #	New Waterbody Segment #	1998 303d list	1996 303d
Hunter Creek at West Skokomish Valley Rd.	WA-16-1016	no #	yes	yes
Purdy Creek at E Bourgault Road	WA-16-1013	MJ89JI	yes	yes
Purdy Creek at mouth	WA-16-1013	MJ89JI	yes	yes
Skokomish River at Hwy. 101	WA-16-1010	WW06HB	yes	yes
Skokomish River at Hwy. 106	WA-16-1010	WW06HB	yes	yes
Skokomish River near mouth (@ Bobby Allens)	WA-16-1010	WW06HB	yes	yes
Ten Acre Creek at Campbell Ln.	WA-16-1015	no #	yes	yes
Weaver Creek at Skokomish Valley Rd.	WA-16-1014	no #	yes	yes
Skokomish River at Rocky Beach	WA-16-1010	WW06HB	no	yes
Skokomish River at Chico's Eddy	WA-16-1010	WW06HB	no	yes
Weaver Creek at E. Bourgault Rd.	WA-16-1014	no #	no	yes

Seasonal Variation

Seasonal patterns in all FC data were explored using various approaches. These approaches involved: reviewing plots of all FC at all sites over time; evaluating water quality standards compliance with data from various time periods; and examining FC loads to Annas Bay over time. The purpose was to find the largest data set (for statistical power) that did not mask periods of noncompliance with the fresh water quality standards.

Various sets of FC data were examined for seasonality by plotting the data by month. The data suggested a pattern where March and April have the lowest FC levels of the year. Another pattern appeared as a slight increase and higher levels of FC from April through October. The November through February months showed variable FC levels with no consistent patterns.

An averaging period for the TMDL analyses was chosen to be the ten-month period from May to February. Ecology found that averaging the data on an annual basis would mask periods of noncompliance. The ten-month period remained as sensitive to fresh water quality standards violations as did shorter averaging periods. This period covers most of the year while excluding the two months when bacteria concentrations were lowest. Seasonal patterns in FC concentrations or loads were deemed too weak to warrant development of TMDLs for separate seasons (e.g., wet season, dry season). Hence, this TMDL applies to the entire year. (The ten-month averaging period was used to develop the TMDL).

Technical Analysis

The TMDL was developed such that FC levels in the Skokomish River and tributaries would meet fresh water quality standards and help protect the marine water quality standards in Hood Canal. Simple mass-balance calculations were used to determine the TMDL and load allocations. A mass balance is a series of equations that account for the transport of material (e.g. pollutants) going into a defined area and leaving that area. The amount of material going in must equal (or balance) the material that goes out. The FC load is the concentration of fecal coliform in a stream multiplied by the flow of that stream. Pollutant load is usually expressed for some time frame, such as an instantaneous, daily, or annual load.

The analytical approach involved the following analyses:

- Target levels of FC were determined for the Skokomish River at Highway 106 that would be protective of the water quality standards for the marine waters of Hood Canal.

- FC target values were determined for freshwater sites such that freshwater sites would meet Class AA standards.

- The daily FC load was estimated for all sites for each survey during the critical period. Mean daily load balances were calculated for the Skokomish River at Highway 101, Purdy Creek at East Bourgault Road, and the Skokomish River at Highway 106 using the arithmetic mean of the daily FC loads from contributing streams. These three sites segmented the study area conveniently and allowed a more detailed look at each of these areas regarding FC concentrations and loads.

- The load balance was evaluated to determine whether load reductions needed to meet freshwater standards were adequate for FC loads at the Skokomish River at Highway 106 to be protective of marine standards.

- Additional reductions in tributary loads were made as needed to ensure that the FC load at the Skokomish River at Highway 106 would be protective of the marine standards.

The main assumptions used in the technical analyses include:

- The sample size, mean daily FC loads derived by averaging, and the simple mass balance approach were adequate for representing conditions throughout the year.

- The study year was representative of long-term conditions. The historical record for flow and FC in the Skokomish River at Highway 101 compared favorably with flow and FC statistics from the study period's selected ten-month critical period.

- The Skokomish River at Highway 106 represents the only FC load to Annas Bay. For the purpose of this TMDL, downstream areas, sloughs, and other shoreline areas were assumed to not contribute FC to Annas Bay.

- Die-off or decay of FC in fresh and marine waters was negligible (and so was not incorporated in the analyses).

- The Statistical Theory of Rollback (Ott, 1995) adequately predicts the distributional characteristics of water quality data collected in the future, after pollution management efforts have been implemented.

Loading Capacity

The maximum daily FC load that the Skokomish River at Highway 106 could deliver to Hood Canal without causing a violation of marine water quality standards is estimated to be 7.52×10^{11} FC/day. The maximum daily FC loads for other 303(d)-listed sites and non-listed sites are given in Table 2.

Load Allocations

The allocations of FC loads throughout the basin consist of target geometric mean values and 90^{th} percentile values that are more restrictive than the current water quality standards. The recommended target values for 303(d)-listed sites are shown in Table 2.

Sites that were not 303(d)-listed are also given allocations since their FC loads affect the FC loads at the 303(d)-listed sites. The allocations for non-listed sites (Table 2) could vary as long as their combined effect allows the listed sites to meet target values. In addition, unidentified FC sources (residuals) between the Skokomish River at Highway 106 and the closest upstream sites (Skokomish River at Highway 101 and Purdy Creek at East Bourgault Road) need to be found and managed. If no controllable sources of FC are found or managed in this area, then reductions will need to occur elsewhere. There are no wasteload allocations since there are no point sources of FC in the study area.

The load allocations include Reservation and non-Reservation areas upstream of the Highway 106 bridge. The EPA and the Tribe have Clean Water Act jurisdiction for parts of the watershed that are within the boundaries of the Reservation, while the state of Washington has jurisdiction for areas outside the Reservation. A cooperative effort among local residents and Tribal, local and state governments will be needed to address jurisdictional issues that may arise as a Detailed Implementation Plan is developed and implemented.

Table 2. Recommended FC TMDL load allocations for Skokomish River sub-basins (303d listings in bold)

Site	1996 303(d) list	1998 303(d) list	Study period FC GMV FC/100mL	Study period FC geometric 90th percentile FC/100mL	Target FC GMV FC/100mL	Target FC geometric 90th percentile FC/100mL	Required change from study period %	Target FC load (allocation) FC/day
Lower mainstem corridor	no	no	not monitored	not monitored	not determined	not determined	-66%	2.41E+11
Weaver Creek	**yes**	**yes**	55.0	314.6	17.5	100.0	-68%	5.86E+10
TenAcre Creek	**yes**	**yes**	34.1	133.2	25.6	100.0	-25%	8.23E+09
Purdy Creek (E Bourgault Rd)	**yes**	**yes**	54.3	146.6	25.7	69.4	-53%	1.16E+11
Skokomish River at Hwy 106 [1]	**yes**	**yes**	32.8	120.3	18.5	67.7	-44%	7.52E+11
Hunter Creek	**yes**	**yes**	21.9	88.2	21.9	88.2	0%	1.18E+11
Skokomish River at Hwy 101 [1]	**yes**	**yes**	11.6	30.8	11.6	30.8	0%	3.31E+11
Upper mainstem corridor	no	no	not monitored	not monitored	not determined	not determined	0%	9.62E+10
Purdy Creek corridor	no	no	not monitored	not monitored	not determined	not determined	0%	4.09E+10
Purdy Creek at mouth [2]	**yes**	**yes**	not monitored	not monitored	not determined	not determined	not determined	not determined
Skokomish River at Bobby Allen's [3]	**yes**	**yes**	not monitored	not monitored	not determined	not determined	not determined	not determined
Vance Creek	no	no	9.7	52.5	9.7	52.5	0%	3.65E+10
NoName1 Creek	no	no	28.5	44.6	28.5	44.6	0%	1.75E+09
North Fork Skokomish River	no	no	2.7	5.6	2.7	5.6	0%	1.38E+10
Upper Purdy Creek	no	no	5.8	25.7	5.8	25.7	0%	7.80E+09
South Fork Skokomish River	no	no	2.3	4.1	2.3	4.1	0%	6.61E+10
Ikes Creek	no	no	28.5	42.6	28.5	42.6	0%	3.78E+10
Rods Creek	no	no	25.8	49.2	25.8	49.2	0%	2.42E+10
Swift Creek	no	no	5.9	15.2	5.9	15.2	0%	9.54E+08
Skokomish River at Rocky Beach	**yes**	no	not monitored	not monitored	not determined	not determined	not determined	not determined
Skokomish River at Chico's Eddy	**yes**	no	23.9	60.0	not determined	not determined	not determined	not determined
Weaver Creek (W Bourgault Rd)	**yes**	no	use Weaver Creek data	use Weaver Creek data	see target for Weaver Creek	see target for Weaver Creek	not determined	see target for Weaver Creek

Notes:

1. Target levels should be reached if upstream sites met or bettered their allocated loads.
2. Expected to meet water quality standards when Purdy Creek at E Bourgault Rd meets target FC levels.
3. Monitoring is needed to see if this site at least meets FC target values for the Skokomish River at Hwy 106.

FC = Fecal coliform GMV = Geometric Mean Value

Margin of Safety

The margin of safety for this TMDL is implicit; it is contained within conservative assumptions used to develop the TMDL. Factors contributing to the margin of safety are:

- The simple mass-balance calculation for FC from the Skokomish River to Annas Bay uses simple dilution and disregards FC die-off in the marine waters. Mass balance calculations and subsequent derivation of target values in freshwater also assumed no FC die-off.

- The arithmetic means for FC and flow were used in mass balance calculations rather than geometric means. The advantage of using the arithmetic mean is that is not biased low (as is the geometric mean) and therefore more protective of water quality and public health.

- The rollback method assumes that the variance of the pre-management data set will be equivalent to the variance of the post-management data set. As pollution sources are managed, the occurrence of high FC values may be less frequent, and thus reduce the variance and the 90th percentile of the post-management condition.

- The Ecology FC data were used since they provide greater protection than the use of combined Ecology and Skokomish Tribal data.

- The North Fork Skokomish FC load is an overestimate because it is based on a higher flow (at RM 10.10) than that found at the actual sample site (RM 12.5). Several tributaries enter the stream between the sample site and the point of flow measurement.

Summary Implementation Strategy

Introduction

The purpose of this Summary Implementation Strategy (SIS) is to present the concept of how the waters covered in the Skokomish River Basin Fecal Coliform Total Maximum Daily Load Study will achieve water quality standards over time. This SIS meets the requirements of a TMDL submittal for approval as outlined in the 1997 Memorandum of Agreement between the U.S. Environmental Protection Agency and the Washington State Department of Ecology (Ecology). The SIS includes a description of the activities conducted to date and the process of how a Detailed Implementation Plan will be developed. This is an entirely non-point source TMDL.

Implementation Overview

Monitoring efforts by Ecology, the Skokomish Tribe and the Washington State Department of Health in the past ten years identified fecal coliform bacteria water quality violations in Skokomish Valley streams and Annas Bay. Because of concerns about shellfish harvestability and fish habitat, Ecology provided a grant to the Mason Conservation District in 1998 to conduct a farm inventory, and to provide technical assistance for farm planning and best management practices implementation in the Skokomish Valley.

Concerns about increased sedimentation, high ground water levels, increased frequency of flooding, declining salmon populations and declining water quality for shellfish harvesting have prompted federal, state, local and tribal efforts to restore the Skokomish watershed. The U.S. Forest Service and Simpson Timber Company are both committed to improving road and harvest management to decrease peak runoff volumes and the amount of sediment coming from the upper watershed. The U.S. Forest Service has conducted a Watershed Analysis for the upper watershed, and has been making progress on road projects since 1993. They are currently developing a Road Maintenance and Abandonment Plan. The Simpson Timber Company's Habitat Conservation Plan (2000) includes the Skokomish Watershed.

The Skokomish Tribe is replacing culverts on Skabob Creek with a bridge, which will eliminate a flow restriction there during high flows. This may reduce flooding in the vicinity, and so reduce fecal coliform contamination during floods.

Various organizations have provided grants to Mason Conservation District for restoration work in the Skokomish watershed. Washington State Department of Natural Resources sponsored a displaced fisher crew in 1996-1997 that helped with riparian plantings in the Skokomish Valley. U.S. Fish and Wildlife sponsored a crew for road decommissioning on forest land in the upper watershed. An Americorps crew has been helping with fencing and riparian re-vegetation work in the valley.

Some of the recommendations in the Mason County Skokomish River Comprehensive Flood Hazard Management Plan (KCM, 1997), such as enlarging bridge openings, would help reduce

flooding frequency and severity in the Skokomish Valley. As existing plans are implemented, flooding-related water quality impacts should decrease over time.

The Skokomish River historically produced large runs of Puget Sound Chinook and Hood Canal Summer Chum Salmon, both of which are listed as threatened under the federal Endangered Species Act. Implementation plans for recovery, such as the "Summer Chum Salmon Conservation Initiative" (Washington Dept. of Fish and Wildlife and Point No Point Treaty Tribes, 2000) encourage riparian restoration to improve salmon habitat. Riparian restoration will also help reduce the amount of fecal coliform contamination that reaches surface water.

Ecology will visit off-reservation Skokomish Valley farms adjacent to creeks in 2001. Farms with unrestricted animal access to streams, or with improper manure management that is threatening water quality, will be referred to Mason Conservation District for technical assistance. The conservation district has grant funds available to assist farmers with fencing and riparian re-vegetation. The conservation district is also able to provide assistance to farmers on the Skokomish Indian Reservation.

Mason County will continue implementing existing programs for on-site sewage systems in the Skokomish Valley, and is expected to complete its Comprehensive Plan and Critical Areas Ordinance in 2001. Ecology will consult with the Skokomish-Dosewallips Watershed Planning Unit regarding development of a Detailed Implementation Plan for this TMDL.

Although this TMDL only applies to the portion of the watershed under state jurisdiction, Ecology is recommending reductions on the Skokomish Indian Reservation as well. The Skokomish Tribe and EPA will use information from the TMDL to support their actions to achieve fecal coliform reductions within the Reservation.

The Skokomish Tribe, with assistance from Ecology, has been studying the possibility of building a wastewater treatment plant and drainfield for the reservation. A treatment plant could alleviate possible fecal coliform bacteria contamination entering the river or bay from reservation on-site systems.

Water quality in the Skokomish Basin should meet water quality standards by 2005, assuming that best management practices for animal management and on-site sewage systems are implemented both outside the Skokomish Indian Reservation and within the reservation.

Implementation Plan Development

This Summary Implementation Strategy was developed by Ecology, with the assistance of key local, state and Tribal entities. Ecology released the TMDL draft submittal report, including the Summary Implementation Strategy for a public comment period ending May 23, 2001. Ecology hosted a public meeting and hearing on the draft submittal report April 25, 2001, and ten residents expressed an interest in helping to develop the Detailed Implementation Plan.

The Detailed Implementation Plan, scheduled for completion one year following approval of the TMDL by EPA, will include plans to assess TMDL implementation, interim targets and

monitoring plans. Ecology will work with interested citizens other involved parties, and consult with the Watershed Planning Group for Water Resource Inventory Area 16 regarding development of the Detailed Implementation Plan.

Involved Parties and Regulatory Authorities

The following is a description of the key agencies and other groups that have influence, regulatory authority, information, resources or other involvement that will be included in the coordinated effort to implement the TMDL. Ecology will lead the coordination effort for development and implementation of the Detailed Implementation Plan.

- **Ecology**

  Washington Department of Ecology has been delegated authority under the federal Clean Water Act by the U.S. Environmental Protection Agency to establish water quality standards and enforce water quality regulations under Chapter 90.48 RCW. Ecology provides financial assistance to local governments, tribes, and conservation districts for water quality projects.

- **Skokomish Indian Tribe**

  The Skokomish Indian Tribe has been collecting water quality data in the Skokomish Valley since 1995, with financial assistance from Ecology and EPA. Tribal data led to inclusion of Skokomish River tributaries on the 303(d) list of impaired waterbodies, and to this TMDL study. Ecology and the Skokomish Tribe coordinated monitoring efforts during the TMDL study at several sampling locations. The Tribe is instrumental in providing follow-up monitoring for the TMDL.

  The Skokomish Tribe and EPA are responsible for enforcing water quality regulations on the Skokomish Indian Reservation. The Tribe has a goal to substantially restore watershed/ecosystem functions of the Skokomish River system and estuary on Hood Canal. There is a strong interest in protecting natural resources and harvest opportunities for tribal members. The Tribe intends to provide education and technical and financial assistance on the reservation, and to use enforcement when necessary to reduce fecal coliform contamination.

- **Mason Conservation District**

  Mason Conservation District, under the authority of Ch. 89.08 RCW, develops farm plans to protect water quality and provides education and technical assistance to residents. Farmers receiving a Notice of Correction from Ecology will normally be referred to Mason Conservation District for assistance. When developing farm plans, the district uses guidance and specifications from the U.S. Natural Resource Conservation Service. Mason Conservation District currently has a grant from the Department of Ecology for farm planning, technical assistance, riparian fencing, and riparian re-vegetation in the Skokomish Valley. They also receive financial assistance from other entities for restoration projects in the valley.

Mason Conservation District has committed to tracking farm planning and implementation, including Geographic Information System mapping of restoration projects in the Skokomish Valley through August 2002.

- **Mason County**

  Mason County regulates land use on non-reservation land in the Skokomish Valley. The County is revising its Comprehensive Plan and the Mason County Resource Ordinance to be in compliance with Washington State's Growth Management Act, Ch. 36.70A. The county is considering a modification to its resource ordinance to require best management practices plans for agricultural uses within shoreline buffers.

  Mason County regulates on-site sewage systems in accordance with Ch. 246-272 WAC, and has an on-site operations and maintenance program. It also requires that pumpers and installers be certified by the county. The operations and maintenance program currently applies to new, non-standard septic systems in the valley.

  In the event of a shellfish growing area downgrade, RCW 90.72.030 says "The legislative authority of each county having shellfish tidelands within its boundaries is authorized to establish a shellfish protection district to include areas in which nonpoint pollution threatens the water quality upon which the continuation or restoration of shellfish farming or harvesting is dependent." Mason County would also help with shellfish area recovery efforts.

  Since 1998 Mason County has been instrumental, with federal and state financial assistance, in buying out nearly 90 acres of frequently flooded properties, some of which may have contributed to fecal coliform problems in the recent past. The buildings have been removed from these properties, and Mason Conservation District is helping the county to restore vegetation buffers on properties eligible for federal Conservation Reserve Enhancement Program funds.

- **Washington State Department of Health**

  The Department of Health (DOH), under authority of Ch. 43.70 RCW, monitors marine water quality in commercial shellfish growing areas, including Annas Bay. DOH listed Annas Bay as "threatened," meaning its shellfish growing area is at risk for a downgrade, due to fecal coliform contamination. If DOH downgrades the area, commercial shellfish operations in the closure area would be curtailed, and local and state agencies would be required to develop a shellfish recovery strategy to improve water quality in the bay.

- **University of Washington Sea Grant Program**

  University of Washington Sea Grant staff in Mason County help homeowners manage property in ways that protect water quality. They provide education and facilitate solutions

for septic system, stormwater and other nonpoint source problems, as directed by the Puget Sound Water Quality Management Plan (2000).

- **Washington State University Cooperative Extension**

  Washington State University Cooperative Extension provides on-site septic system public workshops in Mason County, individual assistance for people who call in, and other educational opportunities regarding nonpoint source pollution. They host a display at the annual Mason County Fair, and plan to have nonpoint pollution signage and a demonstration on how to landscape over a drainfield at an eco-learning center in Hoodsport, Washington.

- **Puget Sound Water Quality Action Team**

  The Puget Sound Water Quality Action Team, under authority of Chapter 90.71 RCW, works with governments and organizations across the region to carry out the Puget Sound Water Quality Management Plan. Under different parts of the plan, agencies and governments provide technical and financial assistance to control pollution from septic systems, farm animal wastes and stormwater runoff in the Skokomish River watershed. Support staff of the Action Team assist directly with programs to protect and restore shellfish harvesting in Annas Bay. The Action Team also administers grant funds for public involvement and education projects.

- **Skokomish-Dosewallips Watershed Planning Unit**

  The mission of the Watershed Planning Unit for Water Resource Inventory Area 16 (Skokomish-Dosewallips), established under Ch. 90.82 RCW, includes developing a plan to address water quantity, water quality and habitat issues. The plan will include a recommended approach for implementing this TMDL. Members represent various governments and interest groups in the community that can directly influence and participate in implementation activities. They include: agriculture, growth management, forestry, trout and salmon advocates, the Skokomish Flood Control Board, the Skokomish Tribe, the local Public Utility District, Mason County, Mason Conservation District, Washington State Department of Ecology, W.S. Department of Fish and Wildlife, W.S. Department of Natural Resources, W.S. Department of Health, W.S. Department of Transportation, W.S. Conservation Commission, the Puget Sound Water Quality Action Team (Washington State), the U.S. Forest Service, the U.S. National Park Service, U.S. Fish and Wildlife, U.S. National Marine Fisheries Service, and two other counties in the Water Resource Inventory Area.

Approaches to Meet Load Allocations

The first step is to identify potential sources, either by land-use type or by general location from monitoring results and other available information. Mason Conservation District was tasked with identifying farms that are likely to contribute fecal coliform contamination to surface water in the Skokomish Valley. Farm owners and operators have been approached, and are eligible for assistance with farm planning and implementation. Voluntary source control through education and technical assistance is the preferred method for pollution reduction.

Ecology plans to visit the highest priority farms in the summer of 2001. Farms with a high potential to pollute will again be given the opportunity to get assistance from the conservation district, through formal referrals (Notices of Violation). Enforcement orders and penalties are expected to be necessary only in situations where education and technical assistance efforts fail to get pollution controls in place.

Mason County responds to complaints regarding suspected on-site septic system failures. Property owners will be given technical assistance. It is expected that public awareness and education programs will be a significant part of the Detailed Implementation Plan and will result in pollution reductions. Dye testing on-site systems on a voluntary basis will also be considered.

If human waste by anglers during the fall fishing season is confirmed to be a problem, the University of Washington Sea Grant Program is willing to help find funding and coordinate placement of portable toilets in the Skokomish Valley.

It should be noted that the sample data collected in 1999 as part of the TMDL Assessment, indicated watershed conditions and land uses at that time. Land use changes since the study period may have resulted in changes in pollution levels. Implementation of the Monitoring Strategy should provide a more accurate picture of current water quality conditions in the basin. It is possible that the results garnered in the Monitoring Strategy will alter the approach taken in the Detailed Implementation Plan. The current and proposed structure for this TMDL readily accommodates an adaptive management approach to attain water quality standards in the basin.

One essential element of the Detailed Implementation Plan will be defining Success Measures. The primary success measure will be fecal coliform bacteria reductions, but other measures will also be discussed and proposed for inclusion in the Detailed Implementation Plan.

Implementation Activities

Ecology will visit off-reservation Skokomish Valley farms adjacent to creeks in 2001. Agricultural sources identified as contributors to fecal coliform bacteria pollution will be referred to Mason Conservation District. The district, under the guidance of Natural Resources Conservation Service, will assist landowners in developing or modifying an existing farm plan to eliminate the potential to pollute. During 2001-2002, the conservation district will continue to work with small farm owners in the Skokomish Valley to implement best management practices using the existing Ecology Centennial Grant for funding. After a farm is referred to a conservation district, they normally have six months to develop a farm plan and an additional 18 months to implement the farm plan.

EPA and the Skokomish Tribe have federal Clean Water Act authority on the Skokomish Reservation. It is anticipated that they will work with farmers and residents to reduce fecal coliform loading coming from the reservation. Landowners within the Skokomish Reservation are also eligible for assistance from Mason Conservation District.

Summary of Public Involvement Methods

Before and during the TMDL study, Ecology made presentations to the Skokomish Flood Control Board, to keep local farmers and other residents informed of the study's purpose and interim findings. A local paper, the Shelton Mason County Journal, ran stories related to the study in April and September of 1999. Ecology presented the draft TMDL to the Skokomish-Dosewallips Watershed Planning Unit on March 15, 2001.

Ecology mailed a fact sheet to local residents and other interested parties, notifying them of the availability of the draft TMDL, the comment period, and the upcoming public meeting. The draft TMDL was made available on the internet, at local repositories, and by mail for the public comment period, April 23-May 23 2001. Ecology held a public meeting and hearing for the Skokomish River Basin Fecal Coliform Bacteria TMDL Water Cleanup Plan (Submittal Package) the evening of April 25, 2001 at Hood Canal School in Potlatch, Washington.

After submittal of the TMDL to EPA, Ecology will work with interested parties and consult with the Skokomish-Dosewallips Watershed Planning Unit regarding development of a Detailed Implementation Plan. The plan will be submitted to EPA within one year of approval of the TMDL by EPA. For more information about public involvement associated with this TMDL, please see Appendix A, Public Participation.

Reasonable Assurance

Local involvement and commitment to resolving fecal coliform problems in the Skokomish River area are considerable. Organizations and their commitments under laws, rules, programs and contracts to resolve the bacteria problem are listed below.

- Ecology will enforce water quality regulations under Chapter 90.48 RCW, and will continue monthly water quality monitoring of the Skokomish River at Highway 101 long-term station.

- Washington State Department of Health will continue monitoring water quality in Annas Bay, and will downgrade any commercial shellfish growing area which no longer meets its classification criteria for harvesting. The Puget Sound Water Quality Management Plan (2000) requires the development of a closure response strategy following a shellfish area downgrade. The response strategy outlines specific tasks and schedules and will help coordinate a multi-agency effort to address fecal coliform bacterial sources affecting shellfish beds.

- Mason Conservation District will continue providing and tracking technical assistance and best management practices implementation for landowners in the Skokomish watershed, as required by a grant from Ecology, through September 2002.

- Mason County regulates on-site sewage systems in accordance with Ch. 246-272 WAC and the Mason County Board of Health On-Site Sewage Regulation. The county regulates land use on non-reservation land in the Skokomish Valley, and restricts building in the Skokomish floodplain through regulations adopted under Ch. 36.70A RCW.

Adaptive Management

Ecology will annually evaluate monitoring results from Washington State Department of Health's Commercial Shellfish Growing Area Report for Annas Bay, from Ecology's Skokomish River monthly monitoring station, and from the Skokomish Tribe's stream monitoring program. Ecology will determine if fecal coliform water quality standards are being met in non-reservation waters, including Annas Bay. If water quality standards are not being met, Ecology will determine if the reduction goals listed in this TMDL are being met, and whether adjustments to the load allocations or implementation strategy are necessary.

If Annas Bay water quality continues to decline, Department of Health will initiate a shellfish growing area downgrade, which will trigger state, local, and tribal agencies and other entities to develop a strategy to restore water quality in the affected area.

Monitoring Strategy

Over the next year, Mason Conservation District will track farm planning and best management practices implementation in the Skokomish Valley. Ecology will continue monthly ambient monitoring at a long-term station on the Skokomish River at the Highway 101 Bridge. The Skokomish Tribe will continue monthly monitoring at several sites within the watershed. Washington State Department of Health will continue monitoring Annas Bay. Additional monitoring will be considered if necessary for source identification or for determining if TMDL target loads are being met.

Identification of potential or actual sources of FC pollution is needed to help focus clean up actions in areas where the greatest benefit can be gained. An initial examination of land uses, agricultural practices, and on-site septic system practices can help in prioritizing cleanup actions. Particular attention should be given to areas of known residential or agricultural land, such as the mainstem river corridor between the Highway 101 bridge and the Highway 106 bridge and stream corridors that contain residential and/or agricultural uses. While not within the study area, land use practices adjacent to the mainstem and sloughs downstream of the Highway 106 bridge should be evaluated for their FC pollution potential.

Potential Funding Sources

Many elements of the implementation plan will be covered by minor adjustments of existing staff and resources and shifting priorities within various agencies and organizations. Thus a good portion of the implementation can be funded within existing resources.

The Centennial Clean Water Fund, Section 319, and State Revolving Fund grants are available through Department of Ecology to fund activities to help implementation of the TMDL (water cleanup plan). The Puget Sound Water Quality Action Team has Public Involvement and Education grants available for additional assistance. A limited amount of federal money is available through Mason Conservation District via the Conservation Reserve Enhancement Program for conservation easements and as cost-share for implementing agricultural best management practices (BMPs). The federal Natural Resources Conservation Service also administers federal money, the Environmental Quality Incentive Program, which provides cost

share funds for BMPs on agricultural sites. Stream restoration activities are eligible for salmon restoration grants through various sources. Some activities and property purchases that alleviate the risk of flood damage are also eligible for grants from federal and state sources.

Currently, a Centennial Clean Water Fund grant to Mason Conservation District helps fund farm plan and stream restoration projects. The federal Environmental Protection Agency is providing funding to the Skokomish Indian Tribe for monitoring. The Skokomish-Dosewallips Watershed Planning Unit is funded by a Watershed Planning grant from Ecology.

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Appendix A

Public and Intergovernmental Participation

- Ecology met with the Skokomish Tribe to discuss water quality needs in June 1997. The Tribe presented data and identified fecal coliform contamination in the Skokomish Valley as the biggest problem. Also met with other state and county agencies and the Mason County Commissioners (August 1997). Department of Health said the Annas Bay shellfish area had marginal water quality.
- Ecology sent copies of the Skokomish Tribe's Skokomish Water Quality Monitoring Draft Report, documenting water quality problems in the Skokomish Valley, to Mason County Commissioners, Mason County Health Department, Mason Conservation District and WSU Cooperative Extension in October, 1997.
- Ecology made public our plan to conduct a fecal coliform study in the Skokomish River beginning with drafts of the Needs Assessment for the Eastern Olympic Water Quality Management Area (Barreca, 1998). Draft project prioritization, listing the Skokomish project as high, was sent to Mason County Health Services and the Skokomish Tribe in December, 1997. The draft Needs Assessment was sent to the Skokomish Tribe, each Mason County Commissioner, Mason County Dept. of Community Development, Mason County Health Services, Mason Conservation District, Mason County WSU Cooperative Extension, and Taylor United Shellfish in Shelton in April 1998.
- Ecology presented information about past findings and the upcoming study to the Mason County Commissioners on October 20, 1998
- News releases about the study and an upcoming presentation were sent to the Hood Canal Coordinating Council and to the Shelton-Mason County Journal, respectfully, in October, 1998.
- Ecology presented information about past findings, water pollution control laws, farm visits, and the upcoming study at a public Skokomish Flood Control District Board meeting in the Skokomish Grange on October 29, 1998. At the meeting, convened by chair Paul Hunter, Tish Bennett volunteered to review the Quality Assurance Project Plan for the study. Jerry Richer expressed interest in observing the sampling.
- Ecology began sampling in cooperation with the Skokomish Tribe in January 1999, and released the draft Quality Assurance Project Plan to the Skokomish Tribe, Mason County Health Services, Mason Conservation District, Tish Bennett for the Skokomish Flood Control Board, Department of Health, U.S. Geological Survey, and EPA for comment in February 1999.
- Ecology met with the Mason Conservation District Board of Supervisors to discuss the Skokomish TMDL study in March, 1999.
- Resident Jerry Richert accompanied Ecology for the March 15, 1999 sampling event.
- A reporter from the Shelton-Mason County Journal accompanied Ecology staff on a sampling day and published an article on the fecal coliform study in April 1999. The paper mentioned the study again in an article in September 1999.
- Ecology mailed interim preliminary study results in July 1999 to the Skokomish Tribe, Mason County Dept. of Health Services, Mason County Community Development, Mason

County Public Works, Mason Conservation District, Paul Hunter for the Skokomish Flood Control Board, and residents Jerry Richert and Guy Parsons.

- Ecology completed sampling in January 2000 and in March 2000, mailed preliminary results to the Skokomish Tribe, Mason County Health Services, Mason County Community Development, Mason County Public Works, Mason Conservation District, residents Tish Bennett, Jerry Richert, Paul Hunter, Jerry Twidwell, Guy Parsons, and Joe Parsons, as well as W.S. Department of Health Shellfish Division, U.S. Forest Service, U.S. Geological Survey and EPA
- Ecology presented information about the study and preliminary results, information about farm visits in another basin, and what is next in the process at a Skokomish Flood Control Board meeting in August 2000. Mason Conservation District presented information about services they can offer. Residents Moirya Dehe, Jeff Heinis, Evan Tozier, and Candi Kuhr asked to be placed on a mailing list for the Water Cleanup Plan. Evan Tozier was subsequently sent water quality data he requested for the Skokomish River.
- After consulting with the Skokomish Tribe, Mason Conservation District, Mason County Health Services, and W. S. Department of Health Shellfish Division, Ecology drafted a Summary Implementation Strategy, which was discussed with the Skokomish-Dosewallips Watershed Planning Unit in March 2001.
- On April 18, 2001, Ecology mailed a fact sheet to over 450 local residents and other interested parties, notifying them of the availability of the draft TMDL, the comment period, and the upcoming public meeting. On April 19, 2001, the Shelton-Mason County Journal and Olympian newspapers published advertisements for the public comment period and meeting, and the journal also published a story on the Water Cleanup Plan. The draft TMDL was made available on the internet, at local repositories, and by mail for the public comment period, April 23-May 23 2001. Ecology discussed the TMDL with the Mason County Commissioners on April 24, 2001.
- Ecology held a public meeting and hearing for the Skokomish River Basin Fecal Coliform Bacteria TMDL Submittal Package the evening of April 25, 2001 at Hood Canal School in Potlatch, Washington. Mason Conservation District presented information on assistance they can provide to landowners. Not including Ecology and Mason Conservation District staff, 32 people signed in at the meeting/hearing. Joe Bourgault, Commissioner Herb Baze, Paul Hunter, Jerry Richert, Bill Hunter, John Smith, Tish [Bennett] Greenfield, Commissioner Mary Jo Cady, Jim Hunter and Commissioner Wes Johnson testified at the hearing. Annas Bay data was subsequently sent to Bob Sund, as requested at the meeting. Ten residents indicated they were interested in helping develop the Detailed Implementation Plan.
- The Olympian newspaper published a story on the Skokomish Water Cleanup Plan May 10, 2001.
- Ecology met with the Skokomish-Dosewallips Watershed Planning Unit May 10 to discuss what level of involvement the planning unit wanted in development of the Detailed Implementation Plan for the TMDL. The Planning Unit said they would prefer to be kept informed of the progress on the plan, with an opportunity for input, rather than be directly involved in development (although some members of the Planning Unit will be representing their agencies/entities in the Detailed Implementation Plan workgroup).

- Ecology received written comments on the draft Water Cleanup Plan from Keith Dublanica for the Skokomish Indian Tribe, Paul Hunter, Sydney Anderson, Greg Stairs and Constance C. Ibsen. Ecology's Response to Public Comments is included as Appendix B of this report. The Submittal Report has been amended in response to particular comments.

Appendix B

Response to Public and Intergovernmental Comments

Response to Public and Intergovernmental Comments

The Washington Department of Ecology (Ecology) held a public comment period on the Draft Water Cleanup Plan for bacteria in the Lower Skokomish River (Draft Water Cleanup Plan) from April 23 through May 23, 2001.

We placed display ads announcing the comment period in the Shelton-Mason County Journal and the Olympian on April 19, 2001. We also direct mailed notice to over 450 people. We held a public meeting/hearing at the Hood Canal School on April 25. Thirty-two people (other than Ecology and Mason Conservation District staff) signed in at the meeting.

The following people commented orally during the public hearing:

- Joe Bourgault
- Paul Hunter
- Jerry Richert
- Bill Hunter
- John Smith
- Tish Greenfield
- Jim Hunter
- Herb Baze, Mason County Commissioner
- Mary Jo Cady, Mason County Commissioner
- Wes Johnson, Mason County Commissioner

The following provided written comments:

- Keith Dublanica for the Skokomish Indian Tribe
- Paul Hunter
- Sydney Anderson
- Greg Stairs
- Constance C. Ibsen

Comments covered a wide range of subjects including past logging, salmon restoration, and government regulations. This response to comments will address those comments having to do with the Draft Water Cleanup Plan.

In the responses below, related comments have been grouped and paraphrased. You may request a transcript of verbal comments and copies of written comments by contacting Jeannette Barreca, Dept. of Ecology, P.O. Box 47775, Olympia WA 98504-7775, email jbar461@ecy.wa.gov, (360) 407-6556.

In the responses that follow, "Water Cleanup Plan" refers to the "Skokomish River Basin Fecal Coliform Total Maximum Daily Load (Water Cleanup Plan) Submittal Report", and "technical report" refers to the Skokomish River Basin Fecal Coliform Bacteria Total Maximum Daily Load Study."

On the basis of comments received, we have made a number of changes to the draft as we finalized the Water Cleanup Plan. Those changes are noted in the responses below. We will submit the final Water Cleanup Plan for fecal coliform bacteria in the Skokomish River Basin to the U.S. Environmental Protection Agency for approval.

The Water Cleanup Plan is a framework for the community-based work needed for water quality improvement. Under the federal Clean Water Act, Ecology must develop a detailed plan for water quality improvement (called a Detailed Implementation Plan) within one year of EPA's approval of the Water Cleanup Plan. The Detailed Implementation Plan will describe specific activities and funding sources for achieving and monitoring water quality standards in the lower Skokomish River Basin.

There are families who have lived in and cared for the Skokomish valley for many years. Due to changes in river hydrology, groundwater levels, government regulations and economics, the families of the Skokomish Valley are in a particularly difficult situation. Multiple layers of technical complexity, regulations, and government agencies are involved in the flooding and water table issues.

Ecology is aware that this water quality improvement process is yet another burden. We are also aware that the solution to water quality problems lies with the people of the valley.

Although Ecology is required to develop a Detailed Implementation Plan that assures bacteria numbers in the Skokomish Valley are reduced to acceptable levels, there is some flexibility in how those levels are achieved. We are committed to working with the people of the Skokomish Valley and other responsible agencies and groups to develop the Detailed Implementation Plan.

We will form an advisory group to help develop the plan. The advisory group will also help to identify and conduct activities to keep other residents of the valley informed. Ten valley residents have expressed an interest in being part of the advisory committee. We will form the advisory committee and begin work on the Detailed Implementation Plan later this fall.

Comments and responses

Wildlife contributions

A number of commenters attributed increases in fecal coliform counts in Annas Bay to increases in the seal population.

According to Washington State Department of Wildlife, the average numbers of seals found in Annas Bay haven't changed significantly in the past 15 years. The highest numbers occur in October, with around 300 seals. The haulout sites that the seals use are at least half a mile away from Department of Health sampling stations (a map showing the locations of seal haulouts and DOH sampling stations has been added in Appendix C of the Water Cleanup Plan).

A few commenters mentioned beavers as a source of fecal coliform bacteria. Wes Johnson mentioned that one trapper trapped 26 beaver and 13 otter between Highways 101 and 106 in

December 1999 through January 2000. Herb Baze said that the beaver population between Highways 101 and 106 has exploded since the ban on trapping beavers was passed.

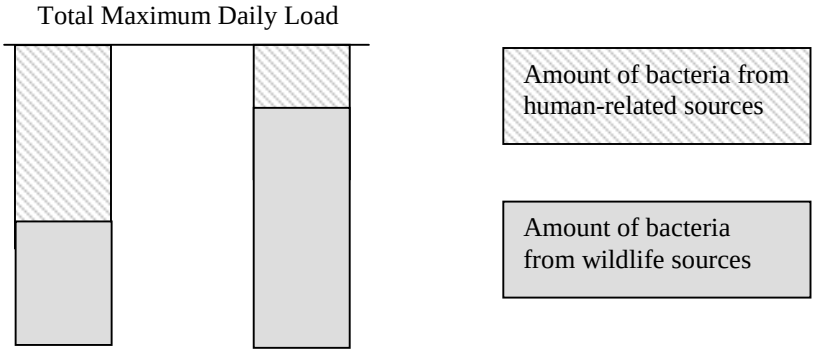
Ecology collected water quality samples for this TMDL from January 1999 through January 2000. The voter-approved ban on using body-gripping traps to take animals became effective December 7, 2000. Any resulting increase in the beaver population is not reflected in the study results.

Joe Bourgault also mentioned large numbers of geese and ducks.

Regarding warm-blooded wildlife in general, under Washington's water quality standards, the "health" of a stream is determined by how well it supports what we call "beneficial uses." Beneficial uses include things like recreation, fishing and shellfish harvest. When a stream doesn't meet water quality standards, it means those uses are in jeopardy. A stream (or other water body) has a certain capacity to absorb pollution and still meet water quality standards. A main goal of the technical study for any water cleanup plan is to determine the total amount of a pollutant, regardless of its source, that can enter the stream without jeopardizing beneficial uses of the stream.

The federal Clean Water Act only applies to human-caused sources of pollution. If water quality standards have been exceeded, and the natural background level of pollution is relatively high, then people have to cut back on their fecal coliform bacteria contributions even further, in order to protect water quality and beneficial uses. Therefore, the greater the wildlife contribution, the smaller the allocation for human-related sources.

The state's Water Pollution Control law (RCW 90.48.080) prohibits nonpermitted discharges of pollution. That means it's illegal for fecal coliform or any other pollutant to flow from someone's yard, field, or septic system, for instance, into a stream or other waterbody without a wastewater permit. So, potentially the allowable amount of pollution from human-related sources in a TMDL could be zero.



Ecology is proposing a moderate approach to improving water quality - fix the obvious human-related sources, and monitor to see if water quality improves. If it doesn't, we will need to take a closer look at human-related sources. If we find that addressing the human-related sources fails to sufficiently improve water quality, we will consider sampling to prove high natural

background (i.e., wildlife) so that streams in the Skokomish River Basin can be removed from the state's list of impaired waters for fecal coliform.

Flood hazard reduction

A number of commenters identified a raised riverbed increased flooding and a higher water table as the main reason that fecal coliform contamination has increased in the lower Skokomish River watershed. Two solutions were recommended to solve both the chronic flooding and fecal coliform problems. Most commenters recommended dredging the river. Associated with this were requests for "real" funding (rather than funding just for fencing). The Skokomish Tribe requested Ecology's support for restoring flow to the North Fork of the Skokomish River to help move sediment.

A number of plans and reports have been written in the past, such as the Mason County Skokomish River Comprehensive Flood Hazard Management Plan (KCM, 1996) and the Skokomish River 905(b) Reconnaissance Analysis (U.S. Army Corps of Engineers, 1999). These studies identify potential alternatives to reduce flood hazards, including dredging, but more work is needed to determine their feasibility and potential impacts. The U.S. Army Corps of Engineers has the ultimate authority for regulating dredging in the Skokomish River.

Ecology and the Skokomish Tribe will be discussing the possibility of issuing new permits to Tacoma Public Utilities with increased flow requirements in the North Fork of the Skokomish River for the Cushman Hydroelectric Project. The National Marine Fisheries Service and U.S. Fish and Wildlife Service are also evaluating what flows are necessary for threatened Chinook and Bull Trout stocks in the North Fork. The Federal Energy Regulatory Commission has licensing authority for the dams.

Ecology acknowledges that a high ground water level in the wet season compromises on-site septic systems, and flood events wash fecal coliform bacteria into surface waters. However, the TMDL study showed that fecal coliform concentrations in problem areas were high in summer as well as winter, so implementation actions unrelated to flooding are also necessary.

The Summary Implementation Strategy acknowledges that implementing some of the recommendations in the Flood Hazard Management Plan would benefit water quality over time. Flood hazard reduction alternatives that are likely to reduce fecal coliform contamination and do not significantly harm salmon and water quality can be explored further in the Detailed Implementation Plan.

Septic Systems

Some commenters said septic systems in the valley weren't a problem and others said they were. The Skokomish Tribe stated that high groundwater does affect septic systems, and the Tribe is proactively investigating funding opportunities for a wastewater treatment facility to service the Reservation.

Septic tanks do not destroy disease-causing pathogens. Wastewater from septic tanks is distributed into the soil by a drainfield or mound system. The soil surrounding the network of pipes in the drainfield or mound provides treatment by allowing naturally occurring aerobic bacteria in the soil to destroy pathogens. Complete treatment of wastewater depends on unsaturated soil (at least three feet deep). During a flood, soil saturation would prevent proper treatment of fecal coliform bacteria, and overland water flow could carry the bacteria into nearby streams and eventually Annas Bay, or into shallow wells, contaminating drinking water.

Further investigations regarding existing septic systems is a good idea, which can be pursued further in the Detailed Implementation Plan. Ecology will add a statement in the Summary Implementation Strategy that Mason County will consider dye testing on-site systems on a voluntary basis. We will also mention the potential of a wastewater treatment facility for the Skokomish Indian Reservation in the Summary Implementation Strategy.

Septage treatment facility

The Skokomish Tribe is concerned that septic effluent sprayed on Webb Hill, east of the study area, could make its way through groundwater to the Skokomish River.

BioRecycling Inc., a regional septage treatment facility, treats the septage by keeping it at a pH of 12 for over 24 hours. Fecal coliform bacteria cannot survive under these conditions. The treated effluent is then applied at agronomic rates for pasture fertilization. Results of regular groundwater monitoring at test wells near the site's boundaries have consistently met state water quality standards.

The need for further studies

Some commenters requested further studies in order to identify specific pollution sources within stream reaches and in marine water.

In addition to ongoing monitoring, additional sampling is an option that can be explored further for the Detailed Implementation Plan. Ecology will begin investigating potential sources in the summer of 2001, by visiting farms to see if they are likely to contribute fecal coliforms to the river and tributaries. The TMDL technical study identified the areas where FC bacteria loads need to be addressed, but additional sampling could help identify specific sources.

The need for local involvement

There were several comments that there are a lot of experts in the Skokomish Valley whom Ecology should be seeking advice from, and that Ecology isn't listening.

Ecology is committed to working with the people of the Skokomish Valley and other responsible agencies and groups to develop the Detailed Implementation Plan. We will form an advisory group to help develop the plan and to help to identify and conduct activities to keep other residents of the valley informed. Ten valley residents have expressed an interest in being part of

the advisory committee. We will form the advisory committee and begin work on the Detailed Implementation Plan later this fall.

Stormwater

Greg H. Stairs commented that the study does not address all the new housing overlooking the basin, and runoff.

Ecology acknowledges that stormwater can contribute to fecal coliform contamination, and that the study didn't address this. Hopefully stormwater problems can be identified and discussed during development of the Detailed Implementation Plan.

The Water Cleanup Plan is confusing

Mary Jo Cady commented that the document was confusing, written in technical terms with acronyms, and had no glossary. There was no definition for "WBID" (in Table 1).

We apologize for having a draft Water Cleanup Plan that was not as easy to read as it could have been. Ecology will strive to make future Water Cleanup Plans more readable. In response to this comment, Ecology has changed the headings in Table 1 so that "Old WBID" (Water Body Identification) is now "Old Waterbody Segment #." We have also added a List of Abbreviations to the front of the document.

Mary Jo Cady commented that on page 8 (of the Water Cleanup Plan) Ecology said that March and April have the lowest FC levels of the year and then averaged the other ten-month period to develop the TMDL. Without explanation, Ecology threw out the low numbers but not the high numbers, so the average is higher.

In response to this comment, we have added the sentence, "Ecology found that averaging the data on an annual basis would mask periods of noncompliance" to the Seasonal Variation section of the Water Cleanup Plan. WAC 173-201A-060(3) states "In determining compliance with the fecal coliform criteria in WAC 173-201A-030, averaging of data collected beyond a thirty-day period, or beyond a specific discharge event under investigation, shall not be permitted when such averaging would skew the data set so as to mask noncompliance periods." For a more detailed explanation of how the ten month period was selected, please see "Seasonal Variation and Critical Conditions" on page 19 of the technical report.

Dissolved oxygen

Mary Jo Cady questioned why the paragraph about dissolved oxygen is included in the Water Cleanup Plan if we didn't investigate it in this study.

Ecology collected data for dissolved oxygen in Skokomish Valley streams during the fecal coliform study. We found that some of the streams did not meet water quality standards for dissolved oxygen; those streams under state jurisdiction will need to be added to the next Clean Water Act Section 303(d) list of Impaired Waterbodies. Although causes of low dissolved

oxygen were not investigated, Ecology believes the problem is worth noting in the fecal coliform Water Cleanup Plan. Reducing pollution from fecal coliform sources will likely reduce nutrient contributions from those sources, which will reduce plant growth and decomposition, and so have a positive effect on dissolved oxygen.

Some workgroups in other watersheds have chosen to address as many water quality problems as possible in one implementation plan. The workgroup developing the Detailed Implementation Plan for this TMDL may want to address dissolved oxygen in addition to fecal coliform. We have added the following sentence to the "Water Quality and Resources Impairments" section, paragraph 3: "Currently, Skokomish Valley streams are not on the 303(d) list for DO, but as a result of this study, some segments will be added to the list in the future."

Paul Hunter commented that low DO levels need to be further examined in relation to natural background and wetland effects. It is obvious the low flow systems are experiencing a different DO profile. This needs to be explored before a goal or standard is established.

Ecology agrees that dissolved oxygen (DO) needs to be examined further. No load allocations were established for DO under this Water Cleanup Plan. As a result of the study, some stream segments will be added for DO to the Clean Water Act Section 303(d) list of Impaired Waterbodies.

Livestock numbers

Many commenters mentioned that there used to be a lot more cattle than there are now. Jim Hunter said that the estimate of 900 cattle included in the report is too high, that there are really 300-400 cattle.

Although water quality data for the Skokomish River dates back to 1960, Ecology did not start collecting fecal coliform data until 1983. We do not know what the water quality was like when cattle were more abundant in the valley. Ecology has updated the cattle estimate for the Skokomish Valley to approximately 500 (Mason Conservation District, 2001) in the final Water Cleanup Plan.

Shellfish Growing Area

Mary Jo Cady requested that Ecology include Washington State Department of Health data for Annas Bay in the report.

Ecology has added Washington State Department of Health fecal coliform data for Annas Bay, 1999 as Appendix C of the Water Cleanup Plan.

Mary Jo Cady commented that the draft Water Cleanup Plan states that under Ch. 90.72 RCW, if the Annas Bay shellfish area is downgraded, Mason County will designate a shellfish protection district for the watershed, and help with shellfish recovery efforts. She requested that Ecology clarify this wording, since the district would not necessarily be the entire watershed.

The commenter is correct, RCW 90.72.030 says "The legislative authority of each county having shellfish tidelands within its boundaries is authorized to establish a shellfish protection district to include areas in which nonpoint pollution threatens the water quality upon which the continuation or restoration of shellfish farming or harvesting is dependent." Ecology has quoted rather than paraphrased the law in the final Water Cleanup Plan. The full text of RCW 90.72.030 is included at the end of this appendix.

Paul Hunter commented that the report doesn't state whether the shellfish beds are decertified.

Department of Health has listed the Annas Bay shellfish area as "threatened" for five of the past six years; the shellfish beds are not yet decertified.

Wasteload allocations vs. load allocations

Jerry Richert commented that the Water Cleanup Plan says that it does not include wasteload allocations since there are no point sources of FC in the study.

A point source is a wastewater discharge, usually from a pipe, and would be required to get a permit under the National Pollutant Discharge Elimination System. Examples of fecal coliform point sources are wastewater treatment plants and dairies; if these were present, they would be given a "wasteload" allocation. In the Skokomish Valley, there are only nonpoint sources of fecal coliform, which are given "load" allocations rather than "wasteload" allocations.

Comments on the technical report

Paul Hunter commented that under WAC 173-201A, the thresholds for AA waters are outlined. In the report no variance is presented on the samples for the various months at each of the sample stations. It is not clear that there are multiple samples per station from this report.

The variance of fecal coliform for each of the sample stations was not specifically reported as part of effort to reduce the volume and complexity of the report. The variance for any water quality parameter may be calculated from the data provided in Appendix C of the technical report (electronic copies of Appendix C are available upon request). Figures 2a and 4 provide a graphic sense of FC variability at many of the sample stations for various periods of time.

The Methods section (paragraph 2 on page 9) of the technical report summarizes the sampling plan for the study and explains that monitoring surveys were performed once per month for most sites. The Results section (page 12) references Appendix C of the technical report , which provides dates and times of sample collection for each sample station during the study period.

Paul Hunter commented that fecal coliform is defined under the WAC 173-201A-020. In the cases where the samples were not analyzed within 24 hours it does not meet the definition and therefore is not fecal coliform. These values should not be used in the evaluation of AA water criteria.

The disparity between the definition of "Fecal coliform" in WAC 173-201A-020 and actual sampling/analytical practices by Ecology and others is widely recognized. The longer holding time for FC samples analyzed by Ecology is acknowledged and explained in Appendix A of the technical report (page A-1). The use of the 30–hour holding time for microbiology samples has been a long-accepted practice by Ecology, EPA, and others for studies, TMDLs, and evaluation of water quality criteria.

Paul Hunter commented that fecal coliform loading to Annas Bay is not measured by the Hwy. 106 station. The seal haulout needs to be accounted for if direct contributions to fecal coliform are to be modeled.

The technical study focused only on the FC load of the Skokomish River as measured at the Highway 106 bridge. The marine water quality standards in Annas Bay were being met at the time of the study design, so a TMDL effort was deemed unnecessary for Annas Bay. The study was not designed to address all sources of FC to Annas Bay. Should Annas Bay be downgraded, a TMDL study for Annas Bay would likely be conducted.

Paul Hunter commented that Sisters Point is not a correct reference to calculate background levels for this marine environment. The background does not account for the contribution of the seal haulout. The entire TMDL is in large part driven by this incorrect baseline.

The water quality data from the Sisters Point long-term station are adequate for defining a background salinity and FC concentration for the purpose of this study; the background values need to reflect conditions without the impact of the Skokomish River on salinity or FC. (Interestingly, use of Annas Bay salinity and FC data for background would result in the Skokomish River being required to have an even smaller FC load than is currently recommended. With Annas Bay FC values being higher than the background values that were used, even less FC from the Skokomish River would be allowed in order for marine water quality standards to be protected.)

The TMDL is driven by water quality standards for both fresh waters and marine waters. Water cleanup actions would still be needed if the TMDL were driven only by freshwater standards.

*Paul Hunter commented that the use of GMW (*geometric mean value) *for unsampled months at specified sampling locations grossly overestimates annual fecal coliform loading. This is because sampling was only done for the higher flow winter months.*

This comment is interpreted to be referring to the method of amending water quality data from several sites (last paragraph, page 11 of the technical report). The resulting FC loads may indeed overestimate FC loading from the tributaries where data sets were amended by using the arithmetic mean value (AMV) of the data collected as the value for months when the site was not sampled (for Swift, Ikes, Rods, and NoName Creeks only). An overestimate of the FC load from these streams has little impact on the outcome of the study; reductions in FC needed at specific sites are derived from target loads that are based on the need to meet water quality standards. The effect of overestimating the FC load found during the study is that a larger FC load value is

used for calculating the percent reduction needed in FC to meet the target load. The value of the target FC load remains the same.

The report erroneously states (page 12, continuing paragraph at top of page) that data for the Skokomish River at the center of the Highway 106 bridge and for Weaver Creek at West Bourgault Road were also amended in this manner. For the Skokomish River at Highway 106, bank and bridge sample data were combined for use in the TMDL analyses. When bank and bridge samples were collected, the AMV of each pair of bank and bridge samples was used in conjunction with the bank-only sample results to generate an AMV for the period of interest. The GMV and 90th percentile for the combined bank and bridge data is actually lower than the GMV and 90th percentile for the bank data alone: see Table 8 on page 27 of the technical report. (The first full paragraph on page 12 could be improved as it is not entirely clear about how the study-period AMV for the Skokomish River at Highway 106 was determined).

For Weaver Creek at West Bourgault Road, the data were not amended nor were they used in TMDL analyses. Only the data from Weaver Creek at West Skokomish Valley Road were used for TMDL analyses. The selection of water quality data for use in TMDL analyses is partly driven by the need to have complete and representative data sets for all sites involved so that mass balance calculations can be performed. Where data are missing, or their representativeness is not optimal, reasonable assumptions are made to improve the data sets so they can be used.

Paul Hunter commented that the issue surrounding the difference in analysis techniques between fecal coliform, membrane or (mpn) and fecal form (mf) is significant. Ecology estimates using the referenced equation may actually overestimate FC levels in the loading models by 75 percent.

Appendix A of the technical report discusses the comparability of FC values determined by two different methods: the membrane filter (abbreviated as "mf"), and the multiple tube fermentation (abbreviated as "mpn" which stands for "most probable number" – a statistical estimate of the number of bacteria present). The TMDL analyses, and targets, used FC data generated by the "mpn" method. The equation on page A-4, first paragraph, was not used in the TMDL analyses. The equation was developed for the potential use of "mf" data in the future to evaluate progress in reaching the TMDL target FC values. The equation would, in effect, "translate" membrane filter values to "mpn" values, which would then be comparable to the target FC values described in the TMDL. The technical report also states that the implications of using "mf" data for evaluating compliance with the water quality standards should be examined.

Paul Hunter commented that using the FCmf method, none of the tributaries exceed the GMV for class AA waters. However, two of the streams have ten percent values exceeding 100 colonies/ml. The ten percent criteria is in a sense a way of addressing sampling variance. In examination of the pooled variances, it appears that most of the variances exceed the GMV threshold value itself. There are large variances. This study may be primarily suffering from inadequate sampling to measure the standards for all tributaries through various flow events.

The second paragraph of page 19 of the technical report explains why the "mpn" data were used for the TMDL analyses. The study used "mpn" values for FC because DOH and the Skokomish

Tribe use this technique for enumerating bacteria. The "mf" technique also generally underestimates bacteria densities; use of the "mpn" technique is more conservative and was used for TMDL analyses.

The second part of the comment appears to be referring to the pooled standard deviations in Table A2 of the technical report, in which many of the pooled standard deviations are greater than the Class AA FC criterion of a GMV not to exceed 50 FC/100mL. The values in Table A2 are estimates of precision for replicate samples from two different sampling programs using different laboratories: one set collected and analyzed by Ecology, the other set collected by the Tribe and analyzed by the Thurston County lab. The development of the TMDL used only the FC "mpn" data from Ecology's sampling effort. Precision for Ecology's replicate FCmpn samples are given in Table A1 which shows a pooled standard deviation of 5.8 FC/100mL - a value below the water quality standard criterion, and also within the limits defined in the study plan.

The water quality standards do not address the adequacy of sampling programs to determine compliance with water quality standards criteria except for the length of time used for the averaging period (WAC 173-201A-060(3)). Violations of the FC standards can (and have been) based on as little as two samples. The TMDL analyses examined many sets of FC data with different sample sizes and averaging periods for comparison to the water quality standards criteria as explained in the section on Seasonal Variation and Critical Conditions (page 19 of the technical report).

Paul Hunter commented that both of the above two issues are easily seen in reviewing the data for Weaver Low using the FCmf technique. This is supposedly one of the worst streams as far as FC contributions. However, using the winter data collected on this system it has a GMV of 18.9 and a 90th percentile value of 50. Using the same data sampled further down on the system supposedly with greater human contributions the tributary meets the AA standards and this is supposedly the worst of the contributing tributaries.

Data from the FCmpn technique was used for developing the TMDL with one reason being that the FCmf techniques tend to underestimate FC densities and would thus be less protective than FCmpn data for evaluating compliance with water quality standards.

Paul Hunter commented that the rollback technique is not a valid approach to the FC issue based on the fact that GMV are met. Rather the ten percent higher value is the issue. The values are not normally distributed. Peak value spikes are occurring during flood events or other occurrences. The reduction in fecal coliform will occur as spike reductions. No spike is observed downstream at Lower Weaver.

EPA and others have accepted the rollback technique as a valid approach in the development of FC TMDLs. The rollback technique accounts for log-normal distributions of data (such as the FC data from this study). Ecology agrees that the reduction in FC is likely to occur as reductions in peak values and allow water quality standards to be met. However, the TMDL targets are values that are less than the water quality standards because of the need for marine water quality standards to be met.

Paul Hunter commented that the logic of the selected model does not follow from the explanation in Appendix D. This appears to be somewhat arbitrary given the problem with the rollback technique and measurement inadequacies. This needs to be further modeled and explained why parameters are selected.

Appendix D of the technical report explored various scenarios in order to determine how and if target FC values could be met. The allocation scenario that was selected allows flexibility in how targets at critical sites could be met. The selection of target FC values for sites that met water quality standards during the study period was somewhat arbitrary; the key drivers were targets for sites that did not meet standards. The targets for sites that met standards during the study can vary, as long as their combined effects allows downstream sites to meet their targets (see page 35 of the technical report, first paragraph).

Paul Hunter commented that the logic that a freshwater stream or even the background upstream level meets the AA standard, and is fit to be used for drinking water but is not clean enough to go into the estuary is counter intuitive. It is likely not correct. It is more likely that the assumptions and the modeling did not correctly analyze effects on water as it enters the marine environment with the decomposition of bacteria in the marine environment as well as the tidal and salinity effects.

The study acknowledged that bacterial die off due to salinity and other factors was not examined and likely results in an overestimate of FC load delivered by the river to Annas Bay. This likely overestimate was included as a factor in the Margin of Safety (page 35 of the technical report) for the TMDL.

Waters that meet the Class AA criteria for FC are not necessarily fit for drinking water. None of the streams sampled during the study are fit to be used for drinking water. The Federal Safe Drinking Water Act (42 U.S. Code) mandates that no more than five percent of samples taken per month from a drinking water source can contain any total coliforms (see also WAC 246-290-310).

Paul Hunter commented that the margin of safety built into this may exceed 200 percent of the actual values when all of the assumptions are included as well as the selection of the FCmpn technique. This seems excessive.

The Margin of Safety was not quantified in this study and may be overly excessive. Yet this does not change the need for a cleanup plan and its implementation. The Margin of Safety and other aspects of this TMDL can be revised during the next evaluation of this TMDL in about five years.

Paul Hunter commented that overall, the data seems deficient to draw many of the conclusions and management targeted reductions. This data may actually show only one tributary exceeds the AA FC standard, PurBour.

While varied interpretations could result in different target FC values and extent of cleanup actions, the need for water clean up planning and implementation of actions would remain. The data from this study and information gathered during water cleanup planning and implementation could be used to improve the assessment and development of TMDL targets during the next evaluation of the TMDL in about 5 years. Table 8 on page 32 of the technical report shows that using FCmpn data, none of the sampling sites targeted for reduction (Weaver Creek, Ten Acre Creek, Purdy Creek at Bourgault Road and the Skokomish River at Highway 106) met water quality standards.

Jerry Richert commented that he was told that tribal data was the red flag that brought Ecology to the valley to do this study. He expressed disappointment that Ecology used the tribal FC data which was so far out of line that it was just obvious there was something wrong with it.

Water quality data from the efforts of the Skokomish Tribe were reviewed and deemed acceptable for characterizing water quality and identifying problem areas for the 303(d) listing of some stream sites in the lower Skokomish River Valley. Data from three sources (Ecology, DOH, and the Tribe) were reviewed prior to beginning this TMDL study as explained in Page 1, paragraph 4 of the technical report. A comparison of Ecology and Skokomish Tribal data is presented on page A-4 of the technical report. Tribal data from the 1999 study were deemed comparable to Ecology data.

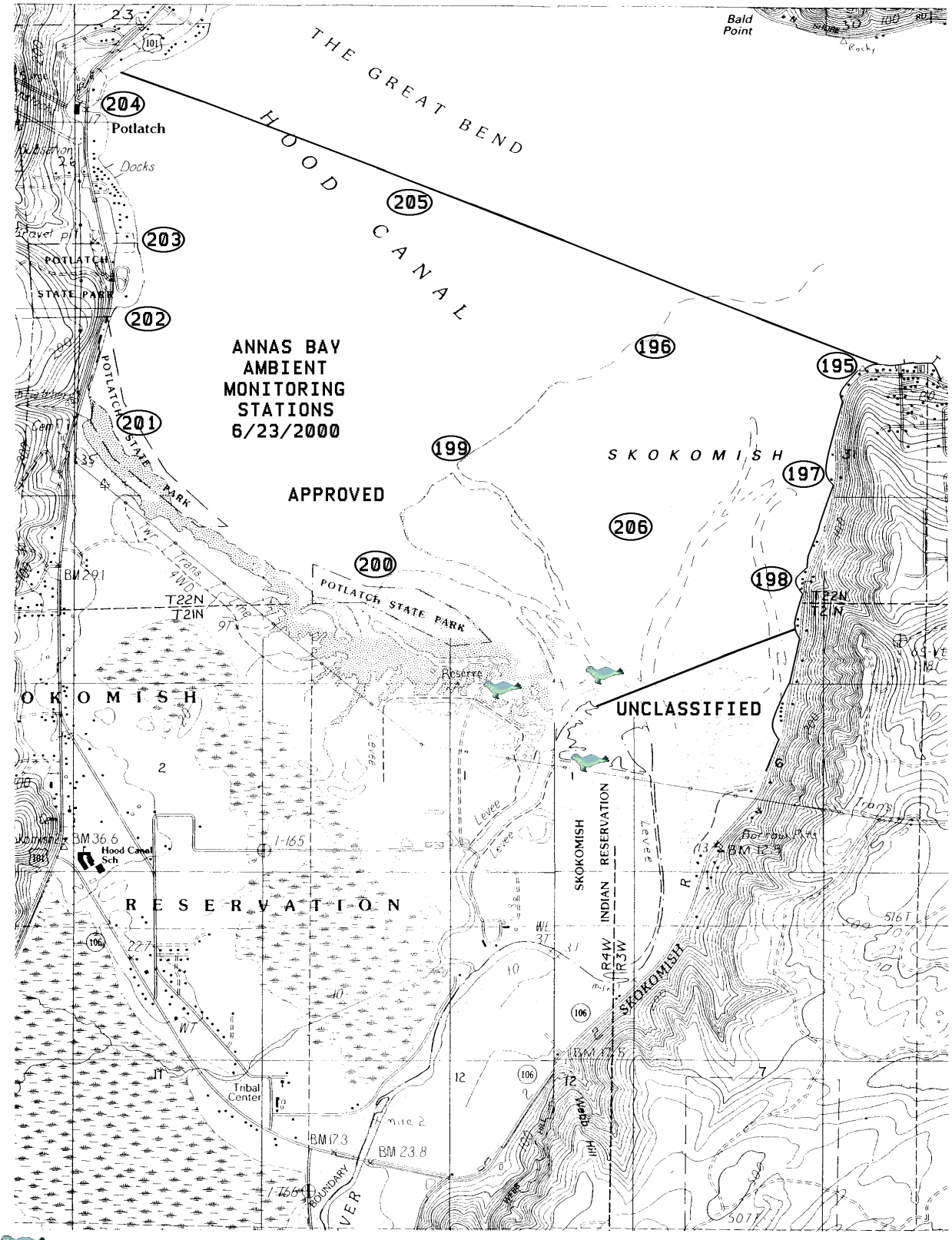
RCW 90.72.030
Shellfish protection districts -- Establishment -- Governing body -- Programs.
The legislative authority of each county having shellfish tidelands within its boundaries is authorized to establish a shellfish protection district to include areas in which nonpoint pollution threatens the water quality upon which the continuation or restoration of shellfish farming or harvesting is dependent. The legislative authority shall constitute the governing body of the district and shall adopt a shellfish protection program to be effective within the district. The legislative authority may appoint a local advisory council to advise the legislative authority in preparation and implementation of shellfish protection programs. This program shall include any elements deemed appropriate to deal with the nonpoint pollution threatening water quality, including, but not limited to, requiring the elimination or decrease of contaminants in storm water runoff, establishing monitoring, inspection, and repair elements to ensure that on-site sewage systems are adequately maintained and working properly, assuring that animal grazing and manure management practices are consistent with best management practices, and establishing educational and public involvement programs to inform citizens on the causes of the threatening nonpoint pollution and what they can do to decrease the amount of such pollution. An element may be omitted where another program is effectively addressing those sources of nonpoint water pollution. Within the limits of RCW 90.72.040 and 90.72.070, the county legislative authority shall have full jurisdiction and authority to manage, regulate, and control its programs and to fix, alter, regulate, and control the fees for services provided and charges or rates as provided under those programs. Programs established under this chapter, may, but are not required to, be part of a system of sewerage as defined in RCW 36.94.010.

Appendix C

Washington State Department of Health

Fecal Coliform Data for Annas Bay 1999

WA Dept of Health Shellfish Growing Area Sampling Station Locations for Annas Bay



Seal haulout locations (Steve Jeffries, WA Fish and Wildlife, correspondence, 2001)

Fecal Coliform Data for Annas Bay 1999 (water quality exceedances in bold)

Date	Station #	Fecal #/100 ml	Time	Salinity	High Tide Time	High Tide Height	Low Tide Time	Low Tide Height
1/19/99	195	**17**	10:16	4	6:48	13.2	12:32	6.7
1/19/99	196	**79**	10:26	5	6:48	13.2	12:32	6.7
1/19/99	197	**22**	10:19	2	6:48	13.2	12:32	6.7
1/19/99	198	**23**	10:21	0	6:48	13.2	12:32	6.7
1/19/99	199	7.8	10:30	4	6:48	13.2	12:32	6.7
1/19/99	200	**49**	10:32	4	6:48	13.2	12:32	6.7
1/19/99	201	**33**	10:37	4	6:48	13.2	12:32	6.7
1/19/99	202	**23**	10:39	6	6:48	13.2	12:32	6.7
1/19/99	203	7.8	10:41	8	6:48	13.2	12:32	6.7
1/19/99	204	2	10:44	0	6:48	13.2	12:32	6.7
1/19/99	205	**33**	10:28	2	6:48	13.2	12:32	6.7
1/19/99	206	7.8	10:24	0	6:48	13.2	12:32	6.7
3/16/99	195	1.7	15:14	18	15:36	10.7	10:20	4.7
3/16/99	196	1.7	15:06	14	15:36	10.7	10:20	4.7
3/16/99	197	1.7	15:12	4	15:36	10.7	10:20	4.7
3/16/99	198	1.7	15:10	4	15:36	10.7	10:20	4.7
3/16/99	199	1.7	15:00	22	15:36	10.7	10:20	4.7
3/16/99	200	1.7	14:56	20	15:36	10.7	10:20	4.7
3/16/99	201	1.7	14:53	24	15:36	10.7	10:20	4.7
3/16/99	202	4.5	14:50	24	15:36	10.7	10:20	4.7
3/16/99	203	4.5	14:48	18	15:36	10.7	10:20	4.7
3/16/99	204	2	14:46	16	15:36	10.7	10:20	4.7
3/16/99	205	1.7	15:03	22	15:36	10.7	10:20	4.7
3/16/99	206	1.7	15:08	8	15:36	10.7	10:20	4.7
5/4/99	195	1.8	9:31	24	7:05	10	14:17	-0.4
5/4/99	196	1.7	9:41	28	7:05	10	14:17	-0.4
5/4/99	197	2	9:34	22	7:05	10	14:17	-0.4
5/4/99	198	4.5	9:36	20	7:05	10	14:17	-0.4
5/4/99	199	1.7	9:46	30	7:05	10	14:17	-0.4
5/4/99	200	1.7	9:51	30	7:05	10	14:17	-0.4
5/4/99	201	1.7	9:56	28	7:05	10	14:17	-0.4
5/4/99	202	1.7	9:58	30	7:05	10	14:17	-0.4
5/4/99	203	1.7	10:00	20	7:05	10	14:17	-0.4
5/4/99	204	1.7	10:02	6	7:05	10	14:17	-0.4
5/4/99	205	1.7	9:44	28	7:05	10	14:17	-0.4
5/4/99	206	1.7	9:39	22	7:05	10	14:17	-0.4
8/30/99	195	**49**	8:00	20	7:45	10.5	14:03	1.8
8/30/99	196	1.7	8:12	24	7:45	10.5	14:03	1.8
8/30/99	197	**49**	8:03	19	7:45	10.5	14:03	1.8
8/30/99	198	**79**	8:06	22	7:45	10.5	14:03	1.8
8/30/99	199	1.7	8:18	24	7:45	10.5	14:03	1.8
8/30/99	200	4.5	8:21	24	7:45	10.5	14:03	1.8
8/30/99	201	4.5	8:24	20	7:45	10.5	14:03	1.8
8/30/99	202	2	8:29	23	7:45	10.5	14:03	1.8

Fecal Coliform Data for Annas Bay 1999 (water quality exceedances in bold)

Date	Station #	Fecal #/100 ml	Time	Salinity	High Tide Time	High Tide Height	Low Tide Time	Low Tide Height
8/30/99	203	1.7		8:32 2 2	7:45	10.5		14:03
8/30/99	204	2	8:35	20	7:45	10.5	14:03	1.8
8/30/99	205	2	8:15	24	7:45	10.5	14:03	1.8
8/30/99	206	**17**	8:10	22	7:45	10.5	14:03	1.8
9/29/99	195	1.7	14:07	10	8:48	11.4	14:36	4.7
9/29/99	196	11	13:53	10	8:48	11.4	14:36	4.7
9/29/99	197	4.5	14:05	10	8:48	11.4	14:36	4.7
9/29/99	198	2	14:02	10	8:48	11.4	14:36	4.7
9/29/99	199	2	13:48	12	8:48	11.4	14:36	4.7
9/29/99	200	1.7	13:46	18	8:48	11.4	14:36	4.7
9/29/99	201	1.7	13:43	12	8:48	11.4	14:36	4.7
9/29/99	202	1.7	13:41	16	8:48	11.4	14:36	4.7
9/29/99	203	1.7	13:38	12	8:48	11.4	14:36	4.7
9/29/99	204	2	13:36	12	8:48	11.4	14:36	4.7
9/29/99	205	4	13:51	8	8:48	11.4	14:36	4.7
9/29/99	206	7.8	13:55	8	8:48	11.4	14:36	4.7
12/27/99	195	2	14:58	2	9:03	13.5	15:14	5.8
12/27/99	196	1.7	14:45	4	9:03	13.5	15:14	5.8
12/27/99	199	4	14:43	4	9:03	13.5	15:14	5.8
12/27/99	200	2	14:41	4	9:03	13.5	15:14	5.8
12/27/99	201	4.5	14:39	4	9:03	13.5	15:14	5.8
12/27/99	202	7.8	14:37	4	9:03	13.5	15:14	5.8
12/27/99	203	1.7	14:33	4	9:03	13.5	15:14	5.8
12/27/99	204	1.7	14:31	4	9:03	13.5	15:14	5.8
12/27/99	205	2	14:35	4	9:03	13.5	15:14	5.8
12/27/99	206	1.7	14:47	4	9:03	13.5	15:14	5.8

Appendix D

Skokomish River Basin Coliform Bacteria TMDL Quality Assurance Project Plan

(Published Separately)

Appendix E

Technical Report: Skokomish River Basin Fecal Coliform Bacteria total Maximum Daily Load Study April 2001

Pub # 01-03-014

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