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DEPARTMENT OF
ECOLOGY

Water Cleanup Plan for Bacteria in Dungeness Bay

Total Maximum Daily Load (TMDL) Submittal Report

March 2004
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Total Maximum Daily Load (TMDL) Submittal Report

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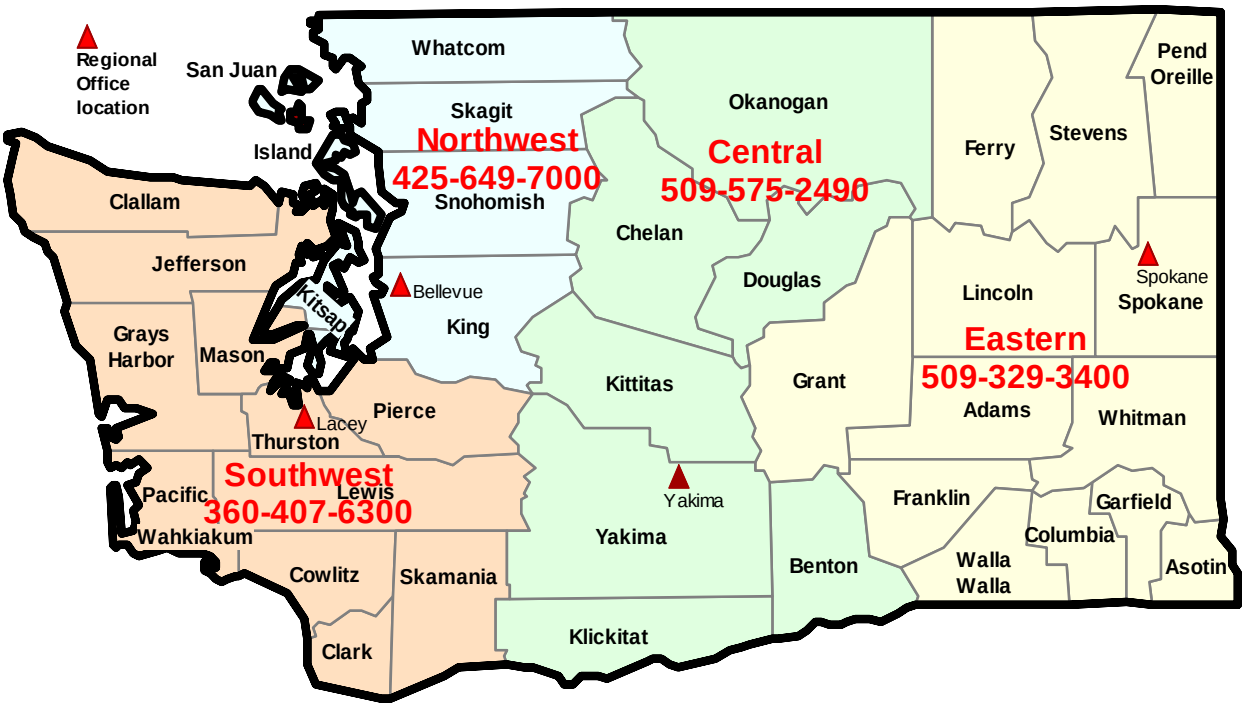

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Introduction

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 a water body can tolerate before beneficial uses, such as shellfish harvest or swimming, are affected. TMDLs are sometimes referred to as water cleanup plans.

The Dungeness Bay Fecal Coliform Bacteria TMDL is established to address elevated bacteria levels that are impairing water quality and shellfish harvest. It builds on the *Water Cleanup Plan for Bacteria in the Lower Dungeness Watershed* (Hempleman, Sargeant, 2002).

A TMDL includes: problem identification, technical analysis to determine the amount of a pollutant the water body can tolerate and still support its beneficial uses (called the "load capacity"), and evaluation and allocation of pollutant loads for various sources. A TMDL must 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 the water body's ability to assimilate pollution. Finally, a plan 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 EPA.

This TMDL summarizes information from a technical study conducted by a contractor to the Jamestown S'Klallam Tribe, Rensel Associates Aquatic Sciences Consultants. That study, Dungeness Bay Bathymetry, Circulation and Fecal Coliform Studies: Phase 2, can be viewed at www.jamestowntribe.org/natural_resources.htm. Figure 1 shows the study area and monitoring sites.

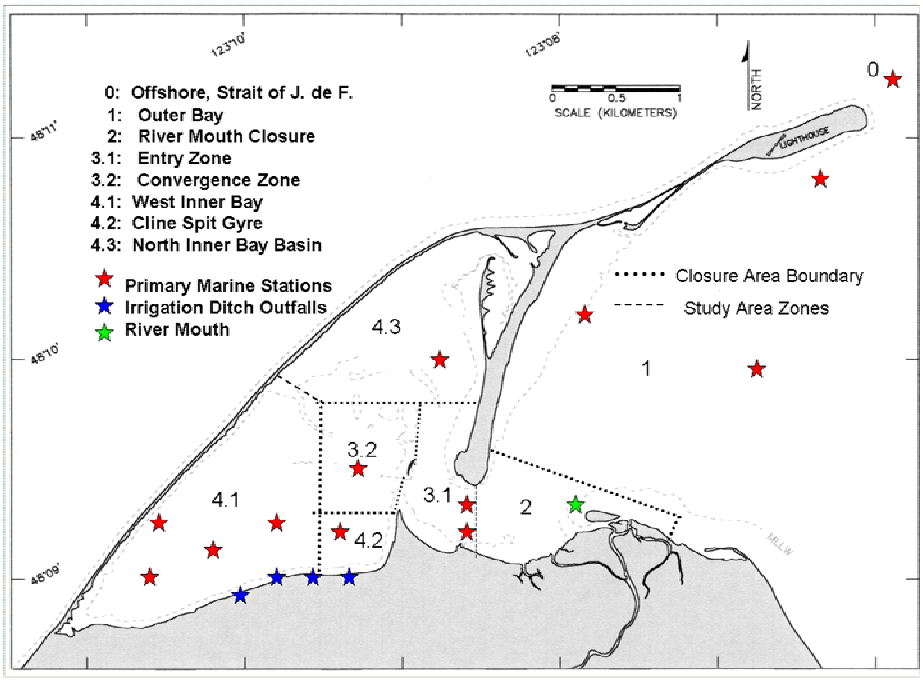

Figure 1. Study zone sub-areas and sampling station locations from Rensel (2003).

Background

The Washington State Department of Health (DOH) reported increasing levels of fecal coliform bacteria in Dungeness Bay (Figure 2) near the mouth of the Dungeness River in 1997 (DOH, 1998). Since then, bacteria levels have continued to increase, with higher levels of bacteria occurring in inner Dungeness Bay as well. As a result, DOH closed 300 acres in 2000near the mouth of the Dungeness River to shellfish harvest: stations 104, 105, and 113 (Figure 2). In 2001, 100 more acres were added to the closure area in the vicinity of station 108. In 2003, DOH changed the classification of the inner bay to "conditionally approved" for shellfish harvest from February through October with closure during November, December, and January (Melvin, 2003). The three stations near the mouth remain closed to shellfish harvest year-round, and an additional station (114) was added to the year-round closure.

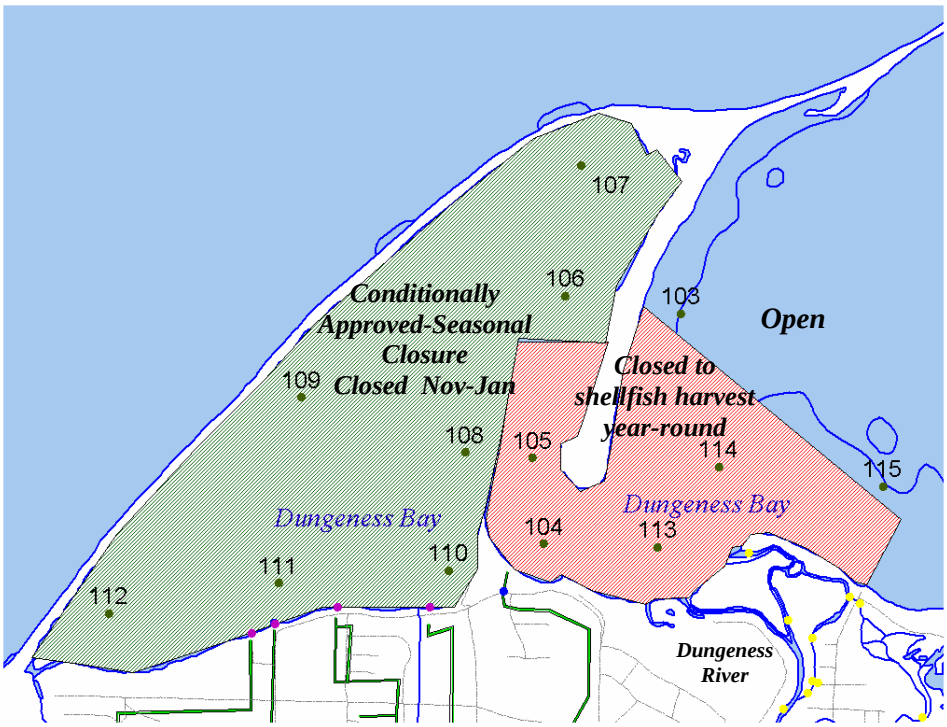

Figure 2. 2003 Department of Health Shellfish Harvesting Status of Dungeness Bay (Streeter, 2003).

Due to concerns about high bacteria levels in Dungeness Bay, Ecology completed a fecal coliform bacteria TMDL study for freshwater in 2002. That study included the Dungeness River, Matriotti Creek, and several tributaries that flow into the Dungeness Bay area. TMDL recommendations included a more stringent fecal coliform target for the Dungeness River and bacteria loading reductions for the tributaries to Dungeness Bay (Sargeant, 2002).

Due to increasing concerns about water quality in the bay and the possibility of marine sources, the Jamestown S'Klallam Tribe hired a consultant, J.E. Jack Rensel, Ph.D. of Rensel Associates Aquatic Sciences Consultants, to conduct a study of Dungeness Bay. Sampling for Phase One of the study focused on circulation patterns in the bay (Rensel and Smayda, 2001). Phase Two focused on collecting and providing information as the technical basis for a Dungeness Bay TMDL study. In addition to conducting bacterial sampling, Rensel conducted several circulation, bathymetry, and reflux studies on Dungeness Bay. A full description of results can be found in Rensel (2003) and Rensel and Smayda (2001). Rensel finalized a technical report in April 2003 (Rensel, 2003).

The Dungeness Bay TMDL study summarizes information from Rensel's technical report to develop the TMDL for Dungeness Bay. This TMDL addresses fecal coliform bacteria in inner and outer Dungeness Bay, irrigation ditches to the inner bay, and the Dungeness River.

Applicable Criteria

Table 1 lists the water quality criteria for marine classification AA and freshwater classifications A and AA. Freshwater standards apply where 95 percent of the vertically-averaged daily maximum salinity values are less than or equal to ten parts per thousand or greater; otherwise marine standards apply (Chapter 173-201A WAC).

Table 1. Washington State Water Quality Criteria for Fecal Coliform Bacteria (Ch. 173-201A WAC) and USDA DOH Shellfish Harvesting Standard.

Fecal coliform bacteria	Class AA marine water	DOH shellfish harvesting standard	Class A fresh water	Class AA fresh water	TMDL target for Dungeness R. RM 3.2 to mouth (Sargeant, 2002)
Shall not exceed a geometric mean value of (number of colonies/100mL)	14	14	100	50	13
With not more than 10% of samples exceeding (number of colonies/100mL)	43		200	100	
A 90th percentile not to exceed		43			43

Dungeness Bay is classified class AA marine. The bay supports recreational harvest of salmon and bottom fish, and provides important salt marsh habitat and eelgrass beds for brant, fish, crab, and other shellfish. Dungeness crab, oysters, hardshell clams, butter clams, and horse clams are harvested commercially and recreationally in Dungeness Bay (PSCRBT, 1991). Other activities in the area include recreational waterfowl hunting, bird watching, nature study, hiking and beach combing, and commercial and recreational boat use.

The Jamestown S’Klallam Indians have harvested fish and shellfish from Dungeness Bay for food, trade, and cultural ceremonies since time immemorial. In addition to subsistence harvest in the bay, the tribe currently harvests clams commercially, and they own and operate commercial oyster and clam farms in the bay (Muench, 1999).

The Dungeness River and Matriotti Creek TMDL established a bacteria target level for the mouth of the Dungeness River (river mile 0.1) of 13 fecal coliform (fc) per 100 mL geometric mean, and 43 fc/100mL 90th percentile (Sargeant, 2002). Meadowbrook Creek and other tributaries to Dungeness Bay are classified AA freshwater. In accordance with the water quality standards, all surface waters that are tributaries to Class AA waters (Dungeness Bay) are Class AA, unless otherwise classified.

Classification of the irrigation ditches is not specifically designated in the water quality standards. While water for the irrigation ditch system is obtained from Class A freshwater (Dungeness River at approximately RM 6.0), the ditches discharge to Class AA waters (Dungeness Bay). In order to protect the beneficial use of shellfish harvesting in Dungeness Bay, irrigation ditches discharging to the bay should, at a minimum, meet Class AA freshwater standards for bacteria.

Water Quality and Resource Impairments

Table 2 lists the water quality areas that do not meet water quality standards. Dungeness Bay is impaired, and is listed on the draft 2002 303(d) list. The six ditches, all of which empty to Dungeness Bay west of Cline Spit, were found to be impaired during the study. They are expected to appear on the 2004 303(d) list.

Table 2. Water bodies not meeting water quality standards for fecal coliform bacteria in Dungeness Bay and tributaries, including irrigation ditches.

Water body	Parameter	Watercourse ID	Location	1998 303(d) List	Proposed for 2002 303(d) List
Dungeness Bay	Fecal coliform	390KRD	31N 04W 23, 24, 39, 41	No	Yes
Ditch 1	Fecal coliform	None	Inner Bay at 48.1501499 N, 123.1560474 W	No	*No
Ditch 2	Fecal coliform	None	Inner Bay at 48.1501379 N, 123.1615627 W	No	*No
Ditch 3	Fecal coliform	None	Inner Bay at 48.1498313 N, 123.1640600 W	No	*No
Ditch 4	Fecal coliform	None	Inner Bay at 48.1493384 N, 123.1652547 W	No	*No
Ditch 5	Fecal coliform	None	Inner Bay at 48.1490078 N, 123.1668986 W	No	*No
Ditch 7	Fecal coliform	None	Inner Bay at 48.1482684 N, 123.1696922 W	No	*No

*Proposed for Category #5 of the 2004 Water Quality Assessment

Applicable water quality criteria are the state water quality standards for bacteria in marine waters. The resource impairment is shellfish rearing, spawning, and harvesting, under WAC 173-201A-030 (b) (iii). Commercial shellfish harvesting is subject to standards under the National Shellfish Sanitation Program (NSSP) administered by DOH. These standards are essentially the same as the state water quality standards for marine water Class A. This study is based on the state water quality standards, but DOH shellfish standards also are included for completeness.

Seasonal Variation

Clean Water Act Section 303(d) (1) (C) requires that TMDLs "be established at a level necessary to implement the applicable water quality standards with seasonal variations…"The current water quality regulation also states that the determination of "TMDLs shall take into account critical conditions for stream flow, loading, and water quality parameters" [40CFR 130.7(c) (1)]. In Dungeness Bay, the time period and locations of elevated fecal coliform levels vary throughout the year. Therefore, critical conditions vary by season and location, and load allocations account for the variability.

Dungeness Bay

The inner Dungeness Bay sub-area 4.1 did not meet fecal coliform standards; November through February had the highest fecal coliform concentrations, particularly in sub-surface samples. Sub-area 3.2, the convergence zone, had higher bacteria levels from August through February. While sub-area 3.1, the entry zone, met fecal coliform standards, the highest levels of bacteria occurred from August through February. Sub-area 2, near the Dungeness River mouth, did not meet standards annually or during March through July and August through October, with the highest bacteria levels seen in March through July. In summary, the critical period for sub-areas 4.1, 4.2, and 3.2 the inner bay sub-areas appear to be November through February, while the critical period for sub-area 2 near the river mouth is March-October due to high bacteria concentrations during that period.

Dungeness River

Dungeness River had the highest fecal coliform concentrations during March through October (Rensel, 2003). Fecal coliform loading results are presented in Table 3. To obtain seasonal and annual bacteria loading estimates for the river, daily stream flow data were obtained from Ecology's continuous stream flow gauging station at Dungeness RM 0.8 at Schoolhouse Road bridge (Ecology, 2003).

Table 3. Annual and seasonal fecal coliform loading estimates for Dungeness river mile 0.1, October 2001-September 2002.

Time period	Number of sample events	Average flow discharge in cfs for sample period*	Arithmetic mean FC concentration for sample period (cfu/100 mL)	FC loading in number of FC per day.
Annual	18	460	24	2.72×10^{11}
Nov - Feb	5	654	17	2.73×10^{11}
Mar - Jul	9	508	27	3.37×10^{11}
Aug - Oct	4	125	27	8.29×10^{10}

* Average flow obtained by averaging daily values for the sampling season.

While fecal coliform concentrations are highest during March through October, loading was highest during November through July. The critical period for this site is year-round. This is consistent with Dungeness River and Matriotti Creek TMDL results where higher bacteria

concentrations were seen during the irrigation season (April-September), and bacterial loading was consistent throughout the year, with a slight increase during the wet season.

Ditches to Inner Dungeness Bay

Rensel (2003) calculated fecal coliform loading for three periods: November through February, March through July, and August through October. Rensel found the highest loading from all irrigation ditches total to be during November through February, coinciding with the critical period for the southern inner Dungeness Bay sub-areas. The highest bacterial concentrations for the inner Dungeness Bay ditches were seen during the non-irrigation season of October through March.

In summary, the critical period for the inner bay and the ditches to the bay is November through February. For the Dungeness River and marine sites near the mouth of the river, the critical period is the entire year.

Technical Analysis

The modeling approach uses the statistical rollback method to determine the load reduction necessary to achieve the fecal coliform water quality standard in Dungeness Bay and tributaries to the bay. The statistical rollback method (Ott, 1995) has been used by Ecology to determine the necessary reduction for both the geometric mean value (GMV) and 90th percentile bacteria concentration (Joy, 2000) to meet water quality standards. Compliance with the most restrictive of the dual fecal coliform criteria determines the bacteria reduction needed. Fecal coliform sample results for each site in this study were found to follow lognormal distributions, and the 90th percentile was calculated as the antilog of the mean of the log-transformed data plus 1.28 times the standard deviation of the log-transformed data.

The rollback method uses the statistical characteristics of a known data set to predict the statistical characteristics of a data set that would be collected after pollution controls have been implemented and maintained. In applying the rollback method, the target fecal coliform GMV and the target 90th percentile are set to the corresponding water quality standard. The reduction needed for each target value to be reached is determined. The rollback factor, $f_{rollback}$, is

$$f_{rollback} = \text{minimum } \{(\text{fecal coliform water quality standard GM/sample GMV}), (\text{fecal coliform water quality standard 10\% value not to exceed/sample } 90^{th} \text{ percentile})\}$$

The percent reduction ($f_{reduction}$) needed is

$$f_{reduction} = (1 - f_{rollback}) \times 100\%$$

This is the percent reduction that allows both GMV and 90th percentile target values to be met. The result is a revised target value for both the GMV and the 90th percentile. In most cases, a reduction of the 90th percentile is needed and application of this reduction factor to the study GMV yields a target GMV that is usually less (i.e., more restrictive) than the water quality criterion. The 90th percentile is used as an equivalent expression to the “no more than 10 percent”

criterion found in the second part of the water quality standards for fecal coliform bacteria. The reduction factors and description of sources are included under Load and Wasteload Allocations.

Loading Capacity and Load Allocations

There are no point source permitted discharges in the study area; therefore, the waste load allocation is zero, and the entire load capacity is allocated to nonpoint sources.

Load Allocations

Load allocations are determined using the rollback method to determine reduction factors necessary to meet both parts of the water quality standard. In most cases application of the rollback method yields a more stringent target for one part of the standard (GMV or 90th percentile) than the applicable water quality standard. For this study the target standard is the applicable water quality standard. If the 90th percentile is limiting, then the goal would be to meet the 90th percentile goal (e.g., 43 fc/100 mL in marine water). No goals would be set for the geometric mean since, with the implementation of target reductions, the already low geometric mean would only get better. Similarly, if the geometric mean is limiting (e.g., 14 fc/100 mL in marine water), the goal would be to achieve a geometric mean of 14 fc/100 mL with no goals for the already low 90th percentile.

Dungeness Bay

The critical period for the inner bay is November through February. Table 4 summarizes the fecal coliform loading reduction factors necessary for the inner bay. The bacteria reductions are based on inner Dungeness Bay sub-areas meeting the Class AA marine standard.

The critical period for Dungeness Bay sub-area 2 (river mouth) is year-round. Using the rollback method to determine bacteria reductions needed, the most stringent reductions required are during March through July. To ensure water quality is protected in the bay, the most stringent bacteria reductions will be required and are presented in Table 4 for sub-area 2. It is assumed that if the bacteria reductions required during March through July are achieved, then water quality targets will be met year-round.

Table 4. Loading reductions necessary to meet water quality standards for Dungeness Bay marine sites and Dungeness River during the critical period.

Sub-area	Critical period or season	# of sample events in season	# of samples in season	Geo-mean	90th %tile	FC reduction needed to meet standards	Limiting criterion	Target value fc/100 mL
3.2 – Convergence zone	November-February	5	17	16	122	65%	90th percentile	43
4.1 – West inner bay	November-February	5	35	24	64	41%	Geometric mean	14
2 – River mouth	March-July	8	58	20	107	60%	90th percentile	43
Dungeness RM 0.1	March-July	9	33	13	80	46%	90th percentile	43

Dungeness River

As with marine sub-area 2, the critical period for Dungeness River at RM 0.1 is year-round, but the most stringent reductions required are during March through July. To ensure water quality is protected in the bay, the most stringent bacteria reductions will be required and are presented in Table 9. It is assumed if the bacteria reductions required during March through July are achieved, then water quality targets will be met year-round.

In Table 9, the marine reductions needed at sub-area 2 are greater than reductions needed in the river. There are two possible reasons for greater reductions necessary at sub-area 2 versus Dungeness RM 0.1:

Rensel (2003) observed large numbers of gulls congregating at the Dungeness River mouth during low tide periods during the day, especially during the late spring and summer. He also conducted sampling above and below bird groups near the mouth of the Dungeness River. His results showed that seven of the nine sample events had significantly higher downstream than upstream fecal coliform geometric means, and two other days had results of approximately equal values (Rensel, 2003).

Another reason could be that sampling of both sites was not always done on the same day. Table 5 compares fecal coliform results for both sub-areas when they were sampled on the same day. For the seven dates compared, Dungeness RM 0.1 did not meet marine water quality standards for fecal coliform bacteria while results from marine sub-area 2 did, because of the April 15, 2002, results; these exceeded 43 cfu/100mL, while the marine sub-area did not. Bacteria levels at Dungeness RM 0.1 strongly effect bacteria levels at marine sub-area 2.

Table 5. Fecal coliform concentrations (cfu/100mL), geometric mean, and 90th percentile for Dungeness RM 0.1 and sub-area 2 for coincident sample events.

Date	Dungeness RM 0.1	Marine sub-area 2 near river mouth
3/18/02	1	13
4/15/02	100	4
5/13/02	13	28
5/23/02	35	23
6/10/02	5	20
6/26/02	23	17
7/15/02	7	7
Geometric mean	12	13
90th percentile	81	33
Percent reduction	47%	0%
Limiting criterion	90th %tile	-
Target 90th percentile	43	-

Ditches to Inner Dungeness Bay

While the critical period for the ditches to the inner bay is November through February, due to lack of data for this period bacteria reductions necessary for the ditches were calculated for the annual period. Reductions are based on the ditches meeting Class AA Freshwater bacteria standards and are presented in Table 6. At a minimum, ditches should meet Class AA Freshwater standards due to shellfish harvesting use in Dungeness Bay, which is Class AA Marine.

Using Rensel's data the total loading contribution for each ditch per sample day was calculated annually and for the October through March period. Annually, the highest to lowest bacteria loading contributions to the bay is from ditches 7, 1, and 4 (same loading contribution), 2, 3, and 5. For the November through March period the bacteria loading contributions ranked as follows: ditch 7, 4, 1, and 2. Ditches 3 and 5 had no measurable flow during the November through March sample period.

Table 6. Loading reductions to meet Class AA freshwater standards for the ditches to the inner Bay, October 2001 – September 2002.

Ditch number	Number of sample events	Geometric mean	90th percentile	FC reduction necessary to meet standards	Limiting criterion	Target value fc/100mL
1	16	69	702	86%	90th %tile	100
2	7	111	805	88%	90th %tile	100
3	5	80	622	84%	90th %tile	100
4	14	78	2879	97%	90th %tile	100
5	8	18	149	33%	90th %tile	100
7	13	98	1874	95%	90th %tile	100

DOH sampling is typically conducted at high tide or near the end of a flood tide to access sites in the bay, and sampling targets conditions near beaches where shellfish stocks may occur. With this sampling regime, ditch outfalls will influence DOH sites that are close to inner Dungeness Bay beaches. Class AA marine bacteria standards are much more stringent than freshwater AA

standards. If ditches to the inner bay meet standards five years after TMDL approval but the bay does not, then even more stringent target standards may be required for the ditches.

Comparison of DOH and TMDL Results

Rensel's study design selected sub-areas that best represented geographic and loading averages which tended to be mid-channel areas in some cases. DOH sampling is typically conducted at high tide or near the end of a flood tide to access sites in the bay by boat, and sampling targets conditions near beaches where shellfish stocks may occur. By collecting samples at high tide the effects of the river and the ditches are exaggerated somewhat, specifically the river water only enters the inner bay during high tide and the ditch outfalls will influence DOH sites that are closer to inner Dungeness Bay beaches.

DOH results for the TMDL sample period are presented in Table 7. DOH stations (Figure 1) are matched up with the sub-areas in Rensel's study (Figure 2). DOH uses the MPN method of fecal coliform analysis. Fecal coliform results using this method can be higher than the MF method.

In comparing TMDL reductions for the critical period to DOH reductions needed (yearly basis), results are similar. Bacteria reductions recommended in the TMDL will be protective of DOH shellfish harvesting use in the bay, without taking into consideration the differences in the two methods (MPN and MF).

Table 7. DOH fecal coliform concentrations for Dungeness Bay October 2001- September 2002.

DOH station	103	104	106	108	110	111	112	109	113
Rensel sub-area	1	3.1	4.3	3.2	4.2	4.1			2
10/9/01	1.7	2.0	1.7	1.7	2.0	2.0	1.7	1.7	4.5
11/7/01	1.7	1.7	2.0	11	33	17	4.5	33	4.5
12/19/01	13	27	23	23	49	49	79	33	17
1/7/02	70	23	49	110	31	17	70	49	49
2/11/02	2.0	33	49	79	79	49	130	22	23
3/25/02	17	49	23	33	22	17	13	6.8	49
7/15/02	1.7	1.8	13	1.7	1.7	1.7	1.7	1.7	4.5
9/26/02	1.7	13	7.8	2.0	4.5	4.5	1.7	1.7	49
Geo mean	5	10	12	12	14	11	11	9	16
90th %tile	31	61	65	109	94	59	122	60	37
% reduction needed	0%	29%	33%	60%	54%	27%	65%	28%	66%
TMDL results reduction needed	meets standards	meets standards	meets standards	65%	insufficient data	41%			60%

Margin of Safety

A margin of safety to account for scientific uncertainty must be considered in TMDLs for load allocations to be protective. The margin of safety for this TMDL is implicit; it is contained within conservative assumptions used to develop the TMDL. Factors contributing to a margin of safety are:

- 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 fecal coliform values is likely to be less frequent, and thus reduce the variance and the 90th percentile of the post-management condition.
- The lower the sample set used for the rollback calculation the more stringent the reduction necessary. The lower sample size has greater variability in the data set, causing higher 90th percentiles. A variable data set and a higher 90th percentile meant greater reductions were needed. This is evident in the geometric mean that is necessary to achieve compliance with the 90th percentile target.
- The simple mass balance calculations for the Dungeness River and subsequent derivation of target values in freshwater assume no fecal coliform die-off. Mass-balance calculation for fecal coliform from Dungeness River to Dungeness Bay also disregarded die-off and dilution in the marine waters.

Summary Implementation Strategy

Introduction

The purpose of this summary implementation strategy (SIS) is to describe how the waters covered in the Dungeness Bay Fecal Coliform Bacteria TMDL Study can 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.

Overview

A concerted and coordinated effort to address bacteria contamination in Dungeness Bay began when Washington Department of Health first downgraded shellfish harvest areas in May of 2000, triggering a closure response process. A response team of local citizens, local, state and federal agencies, and the Jamestown S'Klallam Tribe began working together to find solutions. The response team became the Clean Water Workgroup, who developed a strategy called the Clean Water Strategy. The strategy laid out actions for improving water quality in a designated area, the Clean Water District.

The Dungeness River and Matriotti Creek Fecal Coliform Bacteria Total Maximum Daily Load Study (Sargeant, 2002), approved by EPA in 2002, provided new information to guide an update of the Clean Water Strategy. The Dungeness Bay TMDL is providing additional information.

This summary implementation strategy provides a general description of cleanup actions. Once EPA approves this TMDL, the Clean Water Workgroup will work together with local citizens to refine and update the Clean Water Strategy again, bringing the two TMDLs together and serving as the detailed implementation strategy (DIP) for both.

Information from the Dungeness Bay TMDL will help focus and prioritize actions in the Clean Water Strategy, and will build on work already underway. Cleanup actions will focus on human-related causes of bacteria, primarily pet and livestock waste, and on-site septic systems. Wildlife sources of bacteria are considered natural background. Generally, cleanup activities fall into the following categories:

- Source tracking investigations to help focus cleanup actions.
- Agricultural BMPs to reduce the amount of waste from livestock entering waterways.
- Piping of irrigation ditches and elimination of tailwater discharges to fresh and salt water where possible.
- Treatment of irrigation tailwater and stormwater prior to discharge to fresh and salt water where possible.

- Actions to reduce sewage from poorly maintained septic systems from entering waterways.
- Actions to reduce pet waste in stormwater and irrigation ditches.
- Follow-up enforcement actions, where necessary, under RCW 90.48.

Reductions identified in the TMDL study are expected to be achieved by 2012.

Implementation Plan Development

Following the initial shellfish closure in Dungeness Bay, a response team was formed to develop a response strategy. The response team was led by Clallam County and included:

- Shellfish growers: Jamestown S'Klallam Tribe, NW Corner Oyster Company
- Scientific entities: Battelle Marine Lab
- Members of local watershed planning groups: Dungeness River Management Team, Sequim–Dungeness Water Users Association, Marine Resources Committee
- Private citizens including tideland owners affected by the closure.
- Government agencies: the Jamestown S'Klallam Tribe (the tribe); Clallam Conservation District, Port of Port Angeles, Puget Sound Water Quality Action Team, Washington State Department of Health (DOH), Washington State Department of Ecology, Washington State Department of Fish and Wildlife, Washington Department of Natural Resources, U.S. Fish and Wildlife Service.

This core group has continued to coordinate monitoring and response actions in the Dungeness watershed. They elected to address water quality issues beyond the immediate concerns of shellfish closures, and formed a clean water district. It was adopted by ordinance in June 2001.

The *Clean Water Strategy* was developed by the workgroup and adopted as part of the ordinance. It describes on-going and proposed activities, an implementation schedule, and funding sources. The strategy was updated in early 2002 based on the conclusions and recommendations of Ecology's TMDL for bacteria in freshwater areas of the lower Dungeness watershed.

The Clean Water Workgroup has been part of developing this summary implementation strategy. Once the TMDL has EPA approval, the workgroup will reevaluate and update the *Clean Water Strategy* again based on new information from the Dungeness Bay TMDL, and on public involvement conducted prior to submittal of this TMDL for EPA approval.

Relevant Entities and Regulatory Authorities

General cleanup activities have been identified, as described above in the *Overview section.* Following is a description of the roles and responsibilities of those who will directly participate in the cleanup activities. The Clean Water Workgroup will identify specific actions and responsibilities, priorities, and potential funding sources as part of updating the *Clean Water Strategy,* following EPA approval of this submittal package.

Citizens of the Clean Water District

The citizens of the watershed are the most "relevant entity" in this TMDL. The water quality issues are all nonpoint. That means pollution originates from a number of sources throughout the watershed rather than from one "point source," such as a discharge pipe at a sewage treatment plant. Improvement in water quality will ultimately happen because citizens throughout the watershed improve the practices on their land that contribute to fecal coliform contamination.

Clallam Conservation District

Clallam Conservation District, under the authority of Ch. 89.08 RCW (conservation districts), works cooperatively with land users to conserve renewable natural resources. The conservation district is a non-regulatory subdivision of state government.

The conservation district works with dairy farmers to develop and implement nutrient management plans under Ch. 90.64 RCW (Dairy Nutrient Management). The conservation district and dairy farmers certify that dairy nutrient management plans are implemented. The conservation district works with other land users to help them develop conservation plans that address varied natural resource issues, including fish and wildlife habitat, woodland management, and stormwater management. Best management practices follow guidance and specifications from the USDA Natural Resources Conservation Service. They are often able to provide financial assistance for implementation of best management practices. Landowners receiving a notice of correction (NOI) from Ecology will normally be referred to the conservation district for assistance.

In addition to one-to-one assistance to farm operators, the conservation district provides more general education and technical assistance to residents, including workshops on such topics as land management for horse owners, natural landscaping, and residential stormwater management.

The conservation district receives $10,000 in base funding annually from the Washington Conservation Commission. The remainder of their work, and the cost-share funds they are able to provide to landowners is funded by grants from sources including the Washington Conservation Commission, the Centennial Clean Water Fund, the Salmon Recovery Funding Board, and others.

Clallam County

Clallam County is co-lead for the Dungeness River management team and lead for the Clean Water District. The Clean Water Workgroup coordinates implementation for the Clean Water District. It is also the water quality subcommittee of the Dungeness River management team. The Clean Water Workgroup meets several times a year to oversee and coordinate water quality activities in the Clean Water District. It includes representatives of all the groups described here, and will oversee implementation of the TMDL.

Environmental Health's purpose is to protect public health by insuring that septic systems are functioning properly and that sewage is not being discharged onto the ground or into surface or groundwater sources. That requirement is met by ensuring that septic systems are being designed and installed to meet the state required standards, by regulating and certifying installers, pumpers, and operations and maintenance specialists, by enforcing county and state regulations regarding proper sewage disposal and by having an Operations and Maintenance (O&M) program in place to emphasize the need for septic system monitoring and maintenance.

Clallam County Environmental Health regulates on-site sewage systems in accordance with Ch. 246-272 WAC (On-site sewage systems). The Clallam County Environmental Health Onsite program is responsible for soil and site evaluations for septic systems, septic permit plan review and installation inspections, certification of onsite professionals (i.e., installers, pumpers, operations and maintenance specialists), tracking septic tank pumper activities with pumping and disposal reports required monthly, investigating septic complaints, and providing educational material and information to the general public regarding safe wastewater sanitation practices.

The O&M program duties include updating Clallam County Health Regulations and Policies to include O&M requirements on proprietary devices for septic systems, O&M certification of onsite professionals, and new requirements for O&M on more complex systems such as mounds and sand filters. There is a strong educational component of the program, offering technical assistance to onsite professionals and homeowners, septic care classes for homeowners and specialized septic classes for groups and businesses. Environmental Health has developed an educational septic care tab along with brochures, stickers, postcards, and business placards to notify the public of the need for septic pumping and maintenance.

In response to the TMDL study results, Clallam County is currently offering an incentive for pumping, inspecting, and minor repairs of high-risk systems in areas of water quality concerns, septics of concern (SOCs). These systems were identified by a records search on the basis of age, type, and location of the system. Owners have been notified by letter of the program and several have had inspections and pumping. There are still many of those high risk properties who have not volunteered for inspections. If voluntary compliance continues to be inadequate, the county will consider a more enforcement-oriented approach. In addition, SOC property owners have been individually notified about Septic 101 classes being offered this fall and winter.

Clallam County has a critical areas ordinance (CAO) which has buffer (setback) requirements to streams, creeks, wetlands, and bays. Those requirements, which apply to both building and septic system locations, are 50 feet. The Dungeness River is a listed exception in the CAO and has a

minimum requirement of 75 feet. Further, because of listed species, Clallam County adopted "Guidance for Threatened Species of Salmonids in Clallam County" in April 2000. The adopted ESA guidance promotes a setback of at least one site potential tree-height (115' for most of Dungeness River) and recommends planting the setback area with native vegetation if possible. The entire area draining to the Dungeness Bay is mapped as a Critical Aquifer Recharge Area, and in this area, the CAO requires all new (since CAO adoption; 2001) agriculture and hobby farms to use best management practices for animal waste disposal and stream corridor management.

The critical area buffer requirements are most often addressed and applied prior to a new building activity or septic system installation. Older septic systems are exempt from critical area code buffer requirements, except in geological hazard areas. In these areas a geotechnical evaluation is required prior to repair.

A Stormwater Ordinance has been developed by the Clallam County Planning Commission. This ordinance contains standards that are the same, or of similar intent, to those standards found in WA Dept. of Ecology's 2001 Stormwater Manual. Best Management Practices (BMPs) must be used to comply with the minimum requirements of the recommended ordinance. In addition, the planning commission developed findings and identified additional issue areas for further action, which include:

1) direct staff to develop a minor project stormwater design guidebook;
2) finalize code compliance rules for stormwater;
3) prepare cost estimates for single-family home construction;
4) designate who is the responsible county official;
5) seek further expert testimony in relation to the major project flow control and runoff treatment requirements;
6) consider the ability of existing staff to effectively administer (including compliance) new stormwater rules; and
7) continue communication with cities for working towards complimentary stormwater regulations in the county.

For all new construction on lots that abut irrigation ditches, an educational brochure is available informing new residents of the responsibilities of living along the ditch system. This brochure is being revised by the Water Users Association and will be available at the Clallam County Dept. of Community Development.

Dungeness River Management Team

The Dungeness River Management Team (DRMT) is a partnership of individuals and stakeholders in the Dungeness River Watershed who are working together to develop and implement locally based, long-term solutions to watershed management issues. Some of these include degraded fish habitat, especially related to endangered/threatened stocks of salmon (under the Endangered Species Act), flooding, bank erosion and property damage, excessive sedimentation, water conservation, and water quality and quantity problems. The DRMT meets monthly to discuss these issues and others, to describe problems in the watershed, and to define

possible solutions and opportunities, using past and current data and scientific information, along with a cooperative exchange of ideas.

The Clean Water Workgroup serves as the water quality subcommittee for the DRMT.

Jamestown S'Klallam Tribe (the tribe)

It is a tribal saying that "Every River Has Its People" and the Dungeness Watershed has been the home of the Jamestown S'Klallam people and their ancestors for thousands of years. The Jamestown S'Klallam Tribe jointly chartered the Dungeness River Management Team with Clallam County. The tribe participates on the Dungeness River Restoration Work Group (technical advisory team to the Dungeness River Management Team) and the Clean Water Work Group.

The tribe operates a commercial shellfish farm in Dungeness Bay on beds that have now been prohibited for harvest by Washington Department of Health because of elevated fecal coliform levels. Since 1997 the Jamestown S'Klallam Tribe has conducted water quality monitoring of the lower Dungeness River and tributaries adjacent to the bay. The tribe participated in the TMDL study for the freshwater areas, and sponsored (under a grant through EPA) the Rensel study that is the basis of the current Dungeness Bay TMDL to identify the sources of bacterial pollution.

The tribe has been active in planning, studies, restoration, and monitoring activities in the Clean Water District and its upland sources for a number of years and is especially concerned about water quality. They take the lead in communicating with other tribes which have treaty rights to harvest shellfish in the bay (Lower Elwha Klallam and Port Gamble S'Klallam Tribes.)

Puget Sound Action Team

The Puget Sound Water Quality Action Team, under authority of Chapter 90.71 RCW, works with tribal and local governments, community groups, citizens and businesses, and state and federal agencies to develop and carry out two-year work plans that guide protection of water quality and biological resources in the sound. The biennial work plans are based on the Puget Sound Water Quality Management Plan, Washington's strategy for protecting Puget Sound. Members include a governor-appointed chair, the directors of ten state agencies, a city and a county representative, and a representative of federally recognized tribes, each appointed by the governor; and non-voting representatives of three federal agencies.

Washington Department of Ecology

Ecology has been delegated authority under the federal Clean Water Act by the U.S. Environmental Protection Agency (EPA) to establish water quality standards and enforce water quality regulations under Chapter 90.48 RCW (water pollution control). Ecology has responsibility to track water bodies that fail to meet water quality standards and, in most cases, to conduct a TMDL process for impaired waters. Ecology provides financial assistance to local governments, tribes, and conservation districts for water quality projects.

Ecology's regulatory responsibility includes a role in overseeing agricultural practices. Ecology, the Conservation Commission, and local conservation districts entered into the Agricultural Compliance Memorandum of Agreement in 1988. The agreement defines a consistent series of steps that coordinate Ecology's water pollution control responsibilities with the conservation district programs that provide technical assistance to landowners and farm operators. The steps are:

1) Ecology receives an agricultural complaint, then verifies whether the complaint is valid or not.
2) If a pollution problem is verified, the farm is referred to the local conservation district for assistance. If the problem is an immediate or substantial threat, Ecology is committed to require immediate corrective action.
3) Usually, the landowner, working with the conservation district, has up to six months to develop a farm plan and an additional 18 months to implement the plan.
4) If the landowner chooses not to work cooperatively with Ecology or the conservation district, Ecology will take appropriate action, which may include formal enforcement.

In some situations, Ecology may initiate the investigation/enforcement process rather than responding to a complaint. This would typically be situations where the environmental concern is heightened, such as when shellfish beds are threatened, other public health or economic resources are at risk, or where water quality violations are being addressed through a TMDL.

Ecology monitors two locations on the Dungeness River monthly.

Washington Department of Health

The Department of Health (DOH), under authority of Ch. 43.70 RCW (Department of Health), monitors marine water quality in commercial shellfish growing areas of the state, including Dungeness Bay. DOH has restricted commercial shellfish harvest in areas of the bay due to fecal coliform levels in excess of public health-based water quality standards. DOH continues to monitor water quality in the bay six times/year.

Sequim-Dungeness Water Users Association (WUA)

The Dungeness watershed is webbed with irrigation ditches. The WUA comprises the irrigation districts and companies that deliver the irrigation water. The WUA is part of the Dungeness River Management Team and the Clean Water Workgroup, and have been active partners in the water cleanup activities accomplished to date. They are developing the first Comprehensive Irrigation District Management Plan in Washington State. This plan spells out WUA management practices that meet Endangered Species Act and Clean Water Act requirements. The WUA has a long term plan to replace open irrigation ditches with pipes and eliminate tailwaters, conserving water and protecting water quality. They also have policies in place to prohibit water users from practices that allow pollution of the ditches.

U.S. Fish and Wildlife Service (USFWS)

The USFWS is the principal federal agency responsible for conserving, protecting, and enhancing fish, wildlife, plants, and their habitats for the continuing benefit of the American people. The service manages the 95-million acre National Wildlife Refuge System, which encompasses 540 National Wildlife Refuges, thousands of small wetlands and other special management areas. It also operates 69 national fish hatcheries, 64 fishery resource offices, and 81 ecological services field stations. The agency enforces federal wildlife laws, administers the Endangered Species Act, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat such as wetlands, and helps foreign governments with their conservation efforts.

As a unit of the National Wildlife Refuge System, USFWS manages the Dungeness National Wildlife Refuge, which includes Dungeness and Graveyard Spits, and a portion of Dungeness Bay (Executive Order 2123). Dungeness National Wildlife Refuge is managed from the Washington Maritime National Wildlife Refuge Complex office in Port Angeles, Washington.

The USFWS cooperatively works with Washington Department of Fish and Wildlife to monitor and conserve Dungeness Bay wildlife populations, including their coastal habitats, and enforce applicable wildlife laws. USFWS management of Dungeness Bay wildlife populations is directed by a number of applicable federal laws and regulations including: *Migratory Bird Treaty Act of 1918* (16 U.S.C. 703-712), *National Wildlife Refuge System Administration Act of 1966* (U.S.C. 668dd-668ee), *Marine Mammal Protection Act* (16 U.S.C. 1361-1407), *Endangered Species Act* (16 U.S.C. 1531-1543), and *National Wildlife Refuge System Improvement Act of 1997* (Public Law 105-57).

Clean, uncontaminated water is essential for the long-term survival of marine wildlife. The USFSW is an active participant on the Clean Water Workgroup and the Dungeness River Management Team. The USFWS recognizes that to keep Dungeness National Wildlife Refuge healthy, it must be managed in concert with adjacent lands within its surrounding watershed. Also, with more than 100,000 visitors annually and the efforts of more than 100 community volunteers, Dungeness National Wildlife Refuge offers a key site for public outreach and education on water quality issues.

Approaches to Meet Load Allocations

The TMDL study cites possible sources of bacteria as animal-keeping practices, pet waste, failing on-site systems, stormwater, and wildlife. Cleanup activities will focus on the human-related activities. Since no human activities have been identified that enhance wildlife, that portion of the bacteria is considered natural and not subject to control.

Implementation Activities

The first step is to identify potential sources. Bacteria sources to the bay include human and domestic animal sources to ditches, freshwater streams and the Dungeness River.

Clallam County recently conducted an assessment of “septics of concern” (those on-site systems that have the most potential to pose a risk to water quality), and are now implementing the incentive program. The Jamestown S’Klallam conduct an ongoing water quality monitoring program, the Streamkeepers have an ambient water quality monitoring program and conduct more targeted monitoring on request, DOH continues to monitor the shellfish harvest areas in Dungeness Bay, and Ecology conducts monthly monitoring at two locations on the mainstem Dungeness.

Because water quality in the bay has continued to degrade in spite of cleanup work in the uplands, the Clean Water Workgroup will seek funding to conduct microbial source tracking to help target source reduction more effectively.

The conservation district continues to monitor land use changes. They work with land owners and managers to address agricultural sources of fecal coliform bacteria through education/outreach activities and technical assistance. They help land users develop farm plans and implement conservation practices. They have specifically worked with landowners in reaches shown through monitoring to be sources of fecal coliform. The conservation district provides cost-share funding to landowners and directs landowners to other financial assistance programs for implementation of best management practices.

The Jamestown S’Klallam Tribe has provided funding to the county and conservation district for cost-share best management practices and provided funding to the Water Users Association (WUA) to implement water conservation projects which also benefit water quality.

Ecology will contact farms that have a high potential to pollute but have not chosen to work voluntarily with the conservation district. Enforcement orders and penalties will be issued if improved practices are not implemented voluntarily.

The WUA is involved in an ongoing program to replace open irrigation ditches with pipelines as a measure to conserve water as well as improve water quality. In some places they are constructing wetlands or reregulating reservoirs that eliminate tailwater returns to stream. They have worked with the conservation district to target piping in the Matriotti Creek area, where monitoring results have shown particularly high fecal coliform levels. Contaminated irrigation tailwater from three ditches in the Matriotti Creek area has been completely eliminated. As funding allows and this project continues, bacteria concentrations in the bay will be reduced because of source reduction and flow augmentation.

Clallam County's Environmental Health Division regularly responds to complaints regarding suspected on-site septic system failures. Property owners are contacted, given technical assistance and inspections are conducted, if needed. Clallam County has compiled a list of “septics of concern,” based on systems’ potential to be in need of repair or lack of information. They currently have a program underway to provide financial assistance (funding provided through the tribe) to encourage landowners to pump, inspect, and repair these systems where necessary. The county also regulates stormwater, the Critical Areas Ordinance, and the Critical Aquifer Recharge Area requirements. The county conducts and/or participates in general

education and outreach activities including Septic 101 public workshops, publishing the *Clean Water Herald,* and periodic special events such as watershed tours.

Summary of Public Involvement Activities

All members of the Clean Water Workgroup have been involved in and/or informed of the water quality study from the beginning. The local newspapers, the Sequim Gazette and the Peninsula Daily News, have run news stories about the various efforts to deal with the water quality problems, including the TMDL. The Dungeness River Management Team has kept informed through the Clean Water Workgroup.

We will conduct a public comment period for this submittal package. Public notice will include a display ad, and a factsheet to watershed residents. We will expand our existing website, now specific to the freshwater TMDL, to include the bay study and submittal package. And we will establish at least three information centers in the community, at which we will make the relevant documents available to the public in hard copy. Comments received during the public comment period will be carefully considered by Ecology and other members of the Clean Water Workgroup. Ecology will prepare a response to comments documenting how comments were addressed.

Following EPA approval, the Clean Water Workgroup will reevaluate the Clean Water Strategy. It will be updated to address new information in the water quality study for the bay.

Reasonable Assurance

Local commitment to addressing the bacteria problems in Dungeness Bay has been well demonstrated over the last few years. Responsible entities have worked together to refine and strengthen approaches to reducing bacteria sources:

- Agricultural sources have been addressed by on-going education, technical assistance, and cost-share programs through the conservation district. Ecology is currently revisiting several landowners who were previously referred to the conservation district, but did not follow through on improving their land-use. Enforcement orders and penalties are a possibility.

- The county and the tribe have partnered to fund and conduct the on-site septic of concern incentive program. If this approach does not get a good voluntary response, the county will consider a more enforcement-oriented approach.

- Education and outreach continues to be a major element of the approach. The conservation district works with land managers on best management practices; the county provides workshops to advise homeowners on proper maintenance of on-site septic systems; the county produces the Clean Water Herald, which reaches every home in the

Clean Water District with information on water quality; the tribe and its partners sponsor the Dungeness River Audubon Center, which provides classes, workshops, lectures, and permanent exhibits on water quality issues in the watershed.

- In addition, state laws and local ordinances are in place to prevent pollution from entering waterways: 90.48 RCW, the Water Pollution Control Act; Ch. 246-272 WAC which regulates on-site systems and Clallam County Health Regulation Chapter 4, On-site Sewage Systems, as well as the county's Critical Areas Ordinance and Stormwater Ordinance; and the Water Users Association's policies which prohibit water users from practices that introduce pollution into the irrigation ditches.

There is considerable commitment to improving water quality in the lower Dungeness River watershed. Clallam Conservation District has worked with two irrigation companies and one irrigation district to eliminate tailwater returns from three ditches to Matriotti Creek (the area identified in the technical study for the freshwater as the most significant source of fecal coliform bacteria). The county has continued to conduct and develop their on-site program, and are considering options for high risk areas. Ecology conducted an evaluation of agricultural operations of concern, referred several landowners to work with the conservation district to update management practices, and is planning further interaction with properties still contributing to pollution. A variety of public outreach activities have been conducted; and monitoring efforts continue.

With the creation of the Sequim-Dungeness Clean Water District, Clallam County formalized the commitment to improving water quality. The members of the Clean Water Workgroup will continue to evaluate progress and priorities, and coordinate activities. Agencies will pursue the regulatory authorities identified in the above section, Involved Parties and Regulatory Authorities. And, as funding allows, additional activities from the *Clean Water Strategy* will be implemented.

Adaptive Management

The workgroup will continue to evaluate ambient, source identification and effectiveness monitoring data and make appropriate adjustments to management strategies. When funding can be obtained for a microbial source tracking (MST) study, the results will help with prioritizing subsequent cleanup activities.

Monitoring Strategy

The only change planned to the overall on-going monitoring program is the MST study. This study will evaluate what species are contributing to the bacteria problems. Elements of the on-going monitoring are:

Freshwater:

- The Jamestown S'Klallam monitor sites from the TMDL study monthly.
- The Streamkeepers monitor a number of sites quarterly.
- Ecology monitors two locations on the Dungeness mainstem monthly.

Saltwater:

- Washington Department of Health monitors in Dungeness Bay six times/year.

While the overall monitoring program will continue, adjustments may be made in site location or sampling frequency on the basis of new information or developing source identifications questions.

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. Some 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 water cleanup plan. State and federal funds for water quality or watershed restoration are also available from time-to-time through the watershed planning initiative, HB 2514. The Puget Sound Water Quality Action Team has Public Involvement and Education grants available for additional assistance.

Several federal programs are available through Clallam Conservation District to help with conservation easements or cost share on best management practices, such as EQIP (the Environmental Quality Incentive Program, and CREP (the Conservation Reserve Enhancement Program). EQIP is a Natural Resources Conservation Service program that does not directly involve the conservation district. CREP involves multiple federal, state, and local agencies but is delivered and administered by the conservation district. Presently, the activities of Clallam Conservation District are funded almost entirely by grants; however, RCW 89.08 allows for a special assessment to fund conservation district programs. Special assessments must be approved by the county commissioners.

The Environmental Protection Agency helps fund special scientific studies, environmental education projects, and, through the Jamestown S'Klallam Tribe, a variety of best management practices and public education projects.

Stream restoration activities are eligible for salmon restoration grants through various sources.

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Appendix A

Public Involvement

Public Involvement on the Dungeness Bay TMDL

The Dungeness Bay water cleanup plan is one step in an ongoing local process to deal with the bacteria problems in the bay.

In 1997, DOH notified Clallam County that part of Dungeness Bay was threatened with restrictions on commercial shellfish harvest. Clallam County convened a workgroup to identify sources of contamination and coordinate a response to reduce or eliminate those sources. The workgroup included representatives of:

- Government agencies: the Jamestown S'Klallam Tribe; Clallam Conservation District, Port of Port Angeles, Puget Sound Water Quality Action Team, Washington State Department of Health, Washington State Department of Ecology, Washington State Department of Fish and Wildlife, U.S. Fish and Wildlife Service

- Shellfish growers: Jamestown S'Klallam Tribe, NW Corner Oyster Company

- Scientific entities: Battelle Marine Lab

- Members of local watershed planning groups: Dungeness River Management Team, Marine Resources Committee

- Private citizens including tideland owners affected by the closure.

In April of 2000, when DOH restricted commercial shellfish harvesting in an area of Dungeness Bay, the workgroup became the required shellfish response team. When the county decided to take a broader approach to water quality issues and form a Clean Water District, the shellfish response team became the Clean Water Workgroup. Creation of the district and workgroup were subject to pubic review.

The workgroup has been meeting approximately monthly since October 1999 to coordinate response to water quality issues. The workgroup also functions as the water quality technical subcommittee of the Dungeness River Management Team; the two groups remain in close communication about technical as well as policy issues. Members of the Clean Water Workgroup were involved in all phases of the Lower Dungeness Watershed TMDL.

The Jamestown S'Klallam Tribe contracted for the technical study that is the basis for the Dungeness Bay TMDL. The workgroup has coordinated with Ecology throughout the technical study and TMDL analysis. We have worked together during the submittal process, and will work together through detailed cleanup planning.

Outreach activities leading to completion of the submittal package include:

- Briefings on the study of bay water quality to the Dungeness River Management Team (DRMT) and the DRMT technical subcommittee.

- Briefings on the TMDL analysis to the DRMT and DRMT technical subcommittee.

- Submittal package packets mailed to over 40 stakeholders soliciting comments.

- Display ad announcements (copy attached) of the public comment period on the submittal package appeared twice in the Peninsula Daily News, and once in the Sequim Gazette.

- Hard copies of the submittal package were made available for public review at the following community locations:

  - Sequim Public Library, 630 N. Sequim Ave., Sequim
  - Dungeness River Audubon Center, 2151 Hendrickson Rd, Sequim
  - Jamestown S'Klallam Tribal Center, 1033 Old Blyn Hwy, Sequim
  - Clallam County Courthouse, 223 E. 4th St., Port Angeles

- Fact sheets noticing the public comment period and providing a brief summary of the TMDL were also available.

Ecology held a thirty day public comment period, January 19 through February 23, 2004. The *Response to Comments* is Appendix B of this document. Commenters will receive a copy of the final document.

Display ad

SEQUIM DUNGENESS
CLEAN WATER DISTRICT

Cleaning up Dungeness Bay

As part of the ongoing effort to restore water quality and shellfish harvest to Dungeness Bay, the Dept. Of Ecology (Ecology) has prepared the *Water Cleanup Plan for Bacteria in Dungeness Bay*. It is now available for public comment. Ecology will present a briefing on the cleanup plan at the Dungeness River Management Team meeting on February 11, from 2-5 p.m., at the Dungeness River Audubon Center. The public is invited to attend.

The water cleanup plan (also called a total maximum daily load, or TMDL) is based on a recent study of the bay conducted by Rensel Associates Aquatic Sciences Consultants. The water cleanup plan summarizes the Rensel study, provides an analysis of bacteria reduction needed in order to restore shellfish harvest to the inner bay, and describes the framework for cleanup.

After addressing comments, Ecology will submit the water cleanup plan to the Environmental Protection Agency. Once it is approved, Ecology will work with local partners in the Clean Water District and with citizens to develop a detailed plan for cleanup. That plan will be incorporated into an update of the Clean Water Strategy adopted by Clallam County.

Public comment through February 23, 2004

The plan is available on the web at http://www.ecy.wa.gov/pubs/0410004.pdf You can also review it locally at:

- Sequim Public Library, 630 N. Sequim Ave., Sequim
- Jamestown S'Klallam Tribal Center, 1033 Old Blyn Hwy, Sequim
- Dungeness River Audubon Center, 2151 Hendrickson Rd, Sequim
- Clallam County Courthouse, 223 E. 4th St., Port Angeles

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Please send comments to Christine Hempleman, WA Dept of Ecology, POB 47775, Olympia WA 98504, or chem461@ecy.wa.gov.
For more information please use this email or call 360-407-6329.

Cleaning up Dungeness Bay

Public comment through Feb 23

The Washington State Department of Ecology has prepared a water cleanup plan for fecal coliform bacteria in Dungeness Bay. The water cleanup plan determines how much bacteria needs to be reduced in order to restore commercial shellfish harvest in the inner bay and describes a framework for cleanup. The plan is available for comment through February 23, 2004. It is based on, and summarizes, information from a technical study of the bay that was conducted by Rensel Associates Aquatic Sciences Consultants.

The water cleanup plan is part of the ongoing effort restore water quality and shellfish harvest in Dungeness Bay. Problems with too much bacteria in the bay began in 1997. Shellfish restrictions and closures have severely reduced this local economic base. The Rensel study shows that most of the bacteria are delivered to the bay by the Dungeness River and several small ditches west of Cline Spit. Bacteria levels in some of these freshwater sources pose an increased risked of illness to people who fish or play in the water.

Fecal coliform bacteria come from the feces of warm blooded animals. The most common sources are leaky septic systems, livestock and pet waste, and wildlife. Water Cleanup plan recommendations for reducing bacteria focus on human-related activities like animal keeping practices, septic system maintenance, and storm water management. Wildlife is a natural part of Dungeness Bay.

We Want Your Comments!

The Water Cleanup Plan for Bacteria in Dungeness Bay will be available for public review and comment until February 23.

You can view this document on line at http://www.ecy.wa.gov/pubs/0410004.pdf. Copies are also available for public review at the following locations:

- Clallam County Courthouse, 223 E. 4th St., Port Angeles
- Sequim Public Library, 630 N. Sequim Ave., Sequim
- Dungeness River Audubon Center, 2151 Hendrickson Rd, Sequim
- Jamestown S'Klallam Tribal Center, 1033 Old Blyn Hwy, Sequim

The Rensel study is available on line at
www.jamestowntribe.org/natural_resources.htm (Please send your comments, by February 23) **to:**

Christine Hempleman
Department of Ecology, SW Regional Office
POB 47600
Olympia WA 98504-7600
or email them to chem461@ecy.wa.gov

What Happens Next?

Ecology is working closely with the Clean Water Workgroup. This local workgroup was formed in 2000, in response to shellfish downgrades. It includes representatives of all the main entities who have legal responsibility or interest in clean water, including citizen representatives. Ecology will work with the Clean Water Workgroup to address comments received during the public comment period. The final document will be submitted to EPA for approval, Ecology and the Clean Water Workgroup will work with local citizens to reevaluate the existing Clean Water Strategy and update it on the basis of this new information from the water cleanup plan study and analysis. We will make the updated strategy available for public comment, likely in late 2004. For more information about water quality in Dungeness Bay please contact:

- Val Streeter, Clallam County Dept. of Natural Resources, 360-417-2543 or email at her at VStreeter@co.clallam.wa.us
- Lyn Muench, Jamestown S'Klallam Tribe, 360-681-4631 or email her at lmuench@jamestowntribe.org

In the future there will be a request for public input after Ecology submits the water cleanup plan to the Environmental Protection Agency. Once it is approved, Ecology will work with local partners in the Clean Water District and with citizens to develop a detailed plan for cleanup. That plan will be incorporated into an update of the Clean Water Strategy adopted by Clallam County.

To Learn More

The public is invited to a presentation of the cleanup plan at the Dungeness River Management Team meeting.

What: Dungeness Bay Clean Up Plan
Where: Dungeness River Audubon Center
When: Feb 11, 2004, 2:00 p.m. to 5:00 p.m.

Appendix B

Response to Comments

Response to Comments

Water Cleanup Plan for Bacteria in Dungeness Bay

The Department of Ecology held a public comment period on the *Water Cleanup Plan for Bacteria in Dungeness Bay* from January 19 to February 23, 2004. Following are the comments we received, and Ecology's response.

These websites may be interesting and helpful to your understanding of the comments and responses:

1) Dungeness Bay Bathymetry, Circulation and Fecal Coliform Studies: Phase 2, referred to below as the "Rensel study", can be viewed at www.jamestowntribe.org/natural_resources.htm
2) Water Cleanup Plan for Bacteria in the Lower Dungeness Watershed, also referred to as the Matriotti Creek and Dungeness River TMDL, can be viewed at http://www.ecy.wa.gov/pubs/0210015.pdf

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Comment from Virginia Clark

I tried some numerical examples in your roll back factor formula given on page 18. Please note that if the sample GMV=100 and the sample 90th percentile = 200, then the minimum of those two results is 1 since the minimum of 100/100 and 200/200 is 1.

Then substituting 1 in the percent reduction formula results in (1-1)x100% or zero or no rollback needed. But at the top of page 9, the draft states that the DR and Matriotti Creek TMDL established a bacteria target of GM=13 and 90%tile of 43 (class AA).

> ***Response****: The rollback example was for the Class A Freshwater Standard. To determine rollback for the Class AA marine standard a GMV of 14, and a 90th percentile of 43 should be used in the equation. I have clarified this in the TMDL. Thank you for catching this.*

Page 12, last paragraph, I am uncertain about the wording in some parts of this paragraph. The first two sentences are clear. Then, you might consider…

The geometric mean was calculated by taking the antilog of the mean of the log-transformed data. The 90th percentile was calculated as the antilog of (the mean of the log-transformed data plus 1.28 times the standard deviation of the log-transformed data). The 90th percentile corresponds to a value for which 90 percent of the observations are expected to lie below it and 10 percent above. A daily value for an area better represents the fecal coliform conditions for that day and that area,

while obtaining a geometric mean from a sample of observations for an area may under or over estimate the fecal coliform values for the area that day.

Please also see page 18, 10 lines from the bottom, where the phase "to encompass levels within one standard deviation of the mean is also included". I am just uncertain why that was included.

> ***Response****: Comments noted and report text changed to be more clear.*

On page 16 where the paired t-test is mentioned. Was the log-transformation performed prior to running the t-test? If not you might consider doing a Wilcoxon matched pairs signed-ranks test.

> ***Response****: I ran the statistical tests again using the non-parametric Wilcoxon matched paired test. The results are included in the report. I agree with you the non-parametric test is the more appropriate test in this case. Thank you for your input.*

Comment from Sue Chickman, for the Olympic Peninsula Audubon Society

I attended your presentation at the Dungeness River Management Team meeting on February 11th. Can you e-mail me the map of the areas in the Dungeness Bay that had concentrations of fecal coliform? Also, I was under the impression that you were going to discuss the plan for clean up but I don't recall hearing you say anything about that. Are there any plans? Thanks for your assistance.

> ***Response****: The Clean Water Workgroup, which coordinates water quality efforts in the Clean Water District, will be the main vehicle for cleanup planning. This group, facilitated by the County, includes representatives of the County, the Conservation District, the Tribe, the Water Users Assn., citizens, Puget Sound Action Team, Depts of Health and Ecology, US Fish and Wildlife, and others.*
>
> *Using the results of Ecology's TMDL analysis, the Clean Water Workgroup will look carefully at the existing Clean Water Strategy and consider what updates are needed in light of the new information. Once we have a draft update, we will work with the community - likely a couple of neighborhood meetings in areas with particular concerns, as well as a public meeting during a public comment period. Our goal is to have a final cleanup plan no later than mid-September.*

Comment from Laurie Mann, Environmental Protection Agency

1) In the "Water Quality and resource Impairments" section, the irrigation ditches are described as not being on the 1998 303(d) list - but as being on the proposed 2002 list. Are those ditches listed as 1 waterbody on the proposed 2002 list? Or are they listed as 4 waterbodies (because

there are 4 different Township/Range/Section locations).

> ***Response****: There are actually six different ditches that fail water quality standards. Data were apparently not evaluated in time to be on the draft list (now out for pubic comment), but we expect the ditches to appear in Category 5 on the final list. They will appear as six separate listings.*

2) Often, the statistical rollback method yields revised targets that are more stringent that water quality standards. In the Loading capacity and Load Allocation section, however, it appears as if the targets (e.g. Table 4, far right column) are exactly the same as the WQ standards (43/14) for marine standards. If the rollback method didn't change the targets, I think it would be good say that in the Rollback section. If it did change the targets, perhaps you could make that more clear in the LA section.

> ***Response****: I added the following language to the Load Allocation Section: In most cases application of the rollback method yields a more stringent target for one part of the standard (GMV or 90th percentile) than the applicable water quality standard. For this study the target standard is the applicable water quality standard.*

3) on page 9, Table 9 is referenced a few times; I think you mean Table 4 (there is no Table 9).

> ***Response****: Corrected.*

4) The SIS is supposed to identify the timeframe for meeting water quality standards; I didn't see this mentioned anywhere.

> ***Response****: Please see Overview, last sentence. Our goal is to achieve water quality standards within eight years (2012).*

5) Just FYI, you don't need to discuss reasonable assurance in this TMDL. From my perspective, reasonable assurance (as defined in the regulations / guidelines) is required ONLY when a point source has received a waste load allocation in a TMDL. In this situation, "reasonable assurance" that non-point sources will indeed reduce their pollutant loading is needed in order to justify allowing point sources to continue adding pollutants to the waterbody. Since you don't have any point sources, you don't need to discuss reasonable assurance.

> ***Response****: Noted. However we have chosen to retain that section of the Summary Implementation Strategy because of the tie to accountability.*

The TMDL is very clear and easy to read - good job. I hope we start seeing fecal coliform reductions in this area.

> ***Response****: We do too!*

Comment from C.S. Weller

1. Overall- On February 11 representatives from the Department of Ecology gave a presentation on the Cleanup Plan at the Dungeness River Management Team meeting. The presentation was quite informative. The presenter was asked the following question: If we could make all man-made sources of the contamination vanish, would the fecal coliform levels fall sufficiently to meet the water quality standards? The answer from the presenter was: We don't know.

I believe this tells us three things. (1) This Cleanup Plan will likely not succeed if it deals only with man-made sources. (2) Further research should be done on the nature and sources of the "marine water" and methods to mitigate it. (3) There should be a mitigation plan for the "natural" sources, wild birds.

***Response**: I responded to your question during the recent meeting in Sequim. I mentioned since there were no definitive trends in bird population data (either up or down) it might be helpful to look at historic Department of Health (DOH) data to see if the bay met standards in the past (presumably the birds were present in the same numbers as now). The results below show that all sites except site 113 (near the mouth of the Dungeness River) met DOH standard for the 1995-99 period. In looking at the 2000-04 period we see that only one site meets standards. All sites except site 108 show higher levels of bacteria during the 2000-04 period. There is no evidence of bird abundance levels increasing or decreasing.*

DOH sampling data for 1995-2004. Shaded values do not meet water quality standards.

DOH Station	1995-1999			2000-2004		
	GM	90th%tile	n	GM	90th%tile	n
104	9	42	37	11	63	33
105	7	43	38	9	55	32
106	6	26	37	10	60	33
107	6	25	37	6	43	33
108	7	33	37	6	35	32
109	4	21	37	7	45	33
110	4	14	37	7	49	33
111	4	23	37	7	47	33
112	3	11	37	8	59	33
113	8	47	36	13	79	33
114	6	28	37	9	51	33

During the November through February time period, there is greater bird abundance in inner Dungeness Bay. Portions of the bay are within a national wildlife refuge and are an important winter migration and feeding area for waterfowl. During this period, there will be naturally occurring higher levels of bacteria. Any additional human inputs during this period put an additional loading stress on the bay.

While there is not conclusive evidence that we can clean-up the bay dealing with only man-made sources, we do know that eliminating or greatly reducing human-related sources of bacteria contamination to Dungeness Bay will improve water quality and reduce potential human health risks. Considering the amount of population growth Clallam County has experienced in the last decade, it is reasonable to expect human related sources as being a major part of the problem. In addition, Washington's water quality standards require that human-related sources be reduced a level that complies with water quality standards, or to natural background levels.

In order to reduce human related sources, the Clean Water Workgroup will be looking more closely at the nature and sources of all the contamination reaching the bay, and considering a variety of mitigation options. Details will be developed during the update of the Clean Water Strategy (which will begin as soon as this document is submitted to EPA), but will include, at least, a microbial source tracking study (as funding allows), land use surveys, and additional water quality monitoring.

Wildlife, including birds, is considered part of natural background. Mitigation is only considered for birds if human-related activities (e.g., landfills) were artificially increasing their numbers. Mitigation would be particularly inappropriate in the case of Dungeness Bay, a national wildlife refuge. "The USFWS is the principal federal agency responsible for conserving, protecting, and enhancing fish, wildlife, plants and their habitats for the continuing benefit of the American people" [cite from Pam Sanguinetti, U.S. Fish and Wildlife Service}.

2. Dungeness River mouth and adjacent Outer Bay- The data from the Rensel Report Tables 6 and 8 clearly demonstrate that there is fecal coliform (FC) contamination in the river.

In the Cleanup Plan's Implementation Strategy the proposed activity of "source tracking investigations to help focus cleanup actions" is thus supported by the results of the Rensel Report. An additional step is needed: Identification of the origins of contamination as humans, livestock or birds. Although this step will be expensive, it would likely pay for itself in limiting the geographical scope and time required to successfully locate sources.

***Response**: While microbial source tracking is very expensive, the Clean Water Workgroup agrees that the information would be useful. They recently funded a Batelle analysis of existing source tracking methods, which determined that DNA typing is the best method to be used in the Dungeness situation. DNA typing will identify species from which fecal contamination originates (i.e., bovine, canine, avian, human, etc). It will not help pinpoint sources geographically and is generally felt to provide only a general idea*

of relative contributions. Nonetheless, it is valuable information. The Clean Water Workgroup is looking for a funding source for a DNA typing study.

Meanwhile, a lot of state, federal, tribal, and local dollars have gone into studying the water quality problems in the Dungeness. The Dungeness Matriotti Creek TMDL study details locations where high bacteria levels occur. Water quality studies, conducted in conjunction with land-use observations, can provide fairly accurate deductions regarding sources of fecal coliform bacteria. Along with microbial information, this will help us really target cleanup activities. Microbial information will be especially helpful in the bay, where the complexity of the system leaves much to be understood. And, though the studies provide information to help us move ahead effectively, our first priority continues to be implementing actions to control pollution rather than additional studies of the area.

The proposed activities of "agricultural BMPs to reduce the amount of waste from livestock entering waterways" and "actions to reduce sewage from poorly maintained septic systems from entering waterways" address reasonable suspects, but are nevertheless speculative (except for obvious sources) until tracking and identification is begun.

***Response**: See comment above. We do need to better define the location of pollution sources for the ditches especially during the winter season. Locations of bacterial sources to the Dungeness River were fairly well defined in the Dungeness River Matriotti Creek TMDL Study. By locating problem areas first, then looking at upstream land uses, we can often narrow down or identify likely sources.*

We believe that geographic water quality information combined with microbial information (when funding allows) will help us really focus cleanup activities.

In addition, mitigation of the considerable but highly variable contribution of seagulls needs to be addressed.

***Response**: Please see response to your first comment regarding mitigation for birds.*

3. Inner Bay- The fecal coliform sources in order of importance are: (1) marine water, 63%; (2) wild birds, 21%; (3) Dungeness River, 14%; and (4) irrigation ditches and harbor seals, about 1% each. (From the data of the Rensel Report Table 24)

Obviously, it is unlikely that substantial reduction in FC contamination can occur until the nature of the marine water is understood and a mitigation plan is developed. Therefore further study on the composition and sources of the marine water is urgently needed. This should include identification of the origins of contamination as humans, livestock or birds.

***Response**: It is important to look at the appropriate data set, the Rensel report table 24 presents annual loading results for inner Dungeness Bay. In the TMDL report and presentation I stated that the inner bay does not meet water quality standards during the November through February time period (that is also when the inner bay is closed to shellfish harvest).*

To re-open the shellfish beds it is important to look at loading data during the November through February time period. For this data bacteria loading is as follows (from Table 8, Dungeness Bay Fecal Coliform Bacteria Total Maximum Daily Load Study):

1) *Outer bay water including reflux 43% (reflux is the water that was previously in the inner bay, and it is now returning to the inner bay on an incoming tide).*
2) *Ducks 24%*
3) *Unknown 22%*
4) *Dungeness River 9%*
5) *Irrigation ditches 2%*
6) *Geese, gulls, seals, groundwater < 1%*

Please see response to your first comment regarding source tracking.

In the Rensel Report Section 3.2 a relatively high 45% reflux, or return rate, of water leaving the Inner Bay is described. It would be worthwhile to do a study of the structure of the Bay near the river mouth to see how this contributes to the high reflux rate, whether there have been significant changes in recent times, and what options may be possible.

***Response**: The Rensel report includes the results from the extensive circulation study that he conducted on the bay in 2000. The structure of the bay is well documented in this report and his previous report. It is difficult to determine how much change has occurred over time because there is little historical data available. The Rensel study did conclude the volume of the bay below mean low low water has decreased by 35% in the 1967-2000 interval. Rensel cautions that we do not know what changes have occurred in that 33-year interval.*

The contribution from wildlife birds, although "natural", should not be ignored. The US Fish and Wildlife Service should be asked to consider what changes in their management practices could reduce this contribution.

***Response**: The Dungeness Bay National wildlife refuge and an important winter migration and feeding area for waterfowl. Rensel found no conclusive evidence that bird populations in Dungeness Bay are increasing or decreasing. Wildlife is considered a natural contribution that will not be reduced; human related sources are required to reduce inputs in order to meet WQ standards.*

With contributions about 1% each there appears to be no justification to indict either irrigation ditches or seals as serious problems.

***Response**: Irrigation ditch contribution during the critical November through February period is 2%. This contribution may seem low but the ditches input pollution into the area of the bay that has higher bacteria levels, sub-area 4.1. In addition the bacterial levels in the ditches during the non-irrigation season are extremely high and could be considered a public health hazard. The irrigation ditches should be cleaned up to ensure a safe environment for the public.*

4. Irrigation ditches – As noted earlier, the contribution to Inner Bay contamination by the ditches is quite minor. In Table 2 of the Cleanup Plan it is proposed to list the irrigation ditches as a "water body". This is far-fetched. As noted in the Cleanup Plan the Water Users Association has a long-term plan to reduce water loss and surface water collection by piping. To impose stringent water quality standards on the ditches would not seem to meet a reasonable benefit-to-cost test.

***Response**: Please see previous comment. Ditches are considered to be "waters of the state" and are subject to the water quality standards under 173-201A WAC (Washington Administrative Code). Many ditches discharge to other high quality water bodies, such as Dungeness Bay.*

5. Accurate measurement of FC levels- There must be accurate, scientifically valid measurements of the FC levels in order to determine whether there is a problem, how much, where and when. Currently there is great inconsistency among the measurements.

***Response**: Fecal coliform is an indicator of possible harmful pathogens in the water. Bacteria are a very variable parameter. It is a living organism and is much more susceptible to changes in the environment than conventional parameters such as nutrients or sediment. Scientists nationally have been working on developing better indicators for years. For now this is our best measurement tool.*

The FC geomeans and 90th percentiles presented in Table 4 of the Cleanup Plan are higher than those presented in Table 8 of the Rensel Report; many are considerably higher by factors of 2 to 4. Yet these were derived from the same data.

***Response**: Rensel and I analyzed the data differently. Rensel analyzed the data set for a season as a whole, he lumped all the data for the season together then he calculated the geometric mean and 90th percentile. I obtained a daily fecal coliform value for each sample day, then I then I took the GM and 90th percentile of those values. I mention this difference and why I did it this way on page 12 under Compliance with Standards in the TMDL technical report. "A daily value for an area better represents fecal coliform conditions for the area and day, while obtaining a geometric mean for an area may underestimate fecal coliform values for the area that day. During the sampling for some days 1 sample was obtained in an area and on other days more, up to five samples. Treating each sample individually data point would bias the water quality results, weighing the result for toward the days when more samples were obtained. Averaging the data for the day and obtaining a daily value more represents average conditions.*

Apparently there are also considerable differences between the above results and those of the Dept. of Health.

> ***Response****: Differences in results were in part due to sampling regime. Please see the discussion under Comparison of DOH and TMDL Results in the technical report.*

Uniform methods of sampling and analysis that are well supported scientifically need to be established. Otherwise we will not be able to accurately state how much of a problem there is, how much reduction is really needed, and whether we have been successful.

> ***Response****: See first response under comment 5.*

References-

"Cleanup Plan" – "Water Cleanup Plan for Bacteria in Dungeness Bay – Total Maximum Daily Load (TMDL) Submittal Report, Draft" Christine Hempleman and Deborah Sargeant, Washington State Dept. of Ecology, January 2004.

"Rensel Report" – "Dungeness Bay Bathymetry, Circulation and Fecal Coliform Studies: Phase 2" J.E.Rensel, April 2003.

Comment from Judy Larson

I have just had an opportunity to read the plan on website and make a few summary observations and suggestions, which I hope will be considered and be useful.

Does data showing increased contaminants during winter/rainy season correlate with hydrologic continuity of shallowest aquifer with Dungeness River? Besides surficial run-offs into waterways, is there increased seepage of contaminants to the shallow groundwaters that then flow in the direction of D.R. ? Is this the time most septic systems have failures? If yes to these questions, could the plan include "dye" or other indicators into ALL septic systems to determine if in failure mode? If done by sectors or specific community areas, would measurements at D.R. locations help to show locations and relative contributions, so that worst problems could be remedied first?

> ***Response****: Ecology publication number 02-03-027, August 2002 entitled Surface Water-Ground Water Interactions Along the Dungeness River and Vertical Hydraulic Conductivity of Streambed Sediments, Clallam County, Washington, September 1999-July 2001 looked at water flow in the Dungeness River aquifer but water quality issues were not examined.*
>
> *The data shows higher levels of bacteria during the November-February time period. This could be associated with increased run-off to the ditches. We did not look at bacterial correlation with the level of the aquifer. During the wet season there may be some lateral movement of on-site system discharge, especially if the river level is higher that the level of the drainfield. Surfacing on-site system failures can be seen through out*

the year, but during the wet season when soils are saturated (maybe due to high water table) you are more apt to see failures. We do recommend that on-site systems be tested to determine if they are functioning properly. However you can't find all failures this way, failing on-site in porous soils may allow sub-surface flow to enter the waterway (like the Dungeness River). These types of failures are difficult to dye test because the large volume of water dilutes the dye.

Large commercial or residential developments -especially any located near ANY waterways that flow into D. Bay OR its watershed (groundwaters) should be of special concern not just for stormwater/runoff but for septic failures (i.e. Wal-Mart). Septic systems for such developments need design checks based on real records of established water usage for similar sized facilities PLUS a SAFETY FACTOR. All operations using septic systems need to have protective covenants or conditions for permits that hold owners accountable for knowing how to maintain healthy septic systems and require periodic verifications of performance checks. (Show when pay tax bills?) Structures with septic TANKS (including some that also tie into city sewerage systems) need to have locations of tanks and responsibilities for maintenance outlined in records of sale. City systems/ infrastructures need to be tested to verify there are no leaks in lines and that stormwater will not overload sewer treatment capacities. Marine systems need to have some testing done also.

Response*: All large commercial or residential developments on septic systems are a concern and the proposed septic system design must go through review by Clallam County and either the Washington State Department of Health (DOH) or Department of Ecology prior to approval. There are guidelines that must be followed by the engineer designing the septic system and those guidelines have several safety factors to follow. Design flows are based on EPA models but there are times when the model doesn't fit the type of development proposed. In those circumstances, engineers are required to provide "real-life" records of water use (from similar facilities) to ensure the system is designed appropriately. Another example of a safety factor DOH requires for these larger onsite septic systems is the installation of the entire required drainfield area plus installation of 50% of the reserve area. The drainfield is then split into 3 different drainfields which are rotated in use. This allows each drainfield time to dry out or "rest". For those properties which have porous soils (often near rivers or streams) another safety factor is the design requirement of the addition of a minimum of 2 feet of sand under the dispersal pipe and 6-12 inches of sand along the sidewall of the trenches. The sand serves to provide further treatment of the wastewater before it gets to the water table.*

All larger onsite septic systems are required to have an operations and maintenance contract with a third party to do the maintenance on the system.

As for homeowners on a septic system, Clallam County Environmental Health is currently in the process of updating county health regulations to require operations and maintenance on all septic systems. Some homeowners (those with the more complicated systems) will be required to have a third party do the maintenance on their system. For those owners of less complex systems they can do the maintenance on their systems themselves. Clallam County will provide training to those homeowners who want to do

their own maintenance. The maintenance records will be kept with the title to the property so that in the event of a sale the new owners will have a record of what has been done to the septic system.

Clallam County agrees that maintenance is an important part of preventing septic system failures and is striving to get that message out. Thank you for your comments and interest.

Comment from Val Streeter, Water Quality Planner, Clallam County Environmental Health

Thanks for the opportunity to comment on the Dungeness Bay TMDL study and Water Clean-up Plan. Clallam County has enjoyed the close working relationship with WA Dept. of Ecology in developing this report and communicating its results. We look forward to further collaboration on the Detailed Implementation Plan and the revision of the Sequim-Dungeness Clean Water Strategy. I have three comments on the TMDL report. Below are my comments in detail.

(1) Page 13, under Sub-area 4.2: In reference to the sentence, "there were insufficient sample events to determine whether this area met water quality standards..." Please define somewhere how many sampling events are needed to determine whether an area meets or doesn't meet water quality standards. Also, you may want to reference the tables in the Appendix that provide detail on the number of sampling events for each sub-area.

***Response**: I have provided more detail on sample size.*

(2) Page 24: In the last paragraph of the Section entitled, "Ditches to Inner Dungeness Bay", the last sentence reads, " If ditches to the inner bay meet standards five years after TMDL approval but the Bay does not, then even more stringent target standards may be required for the ditches." Given the small volumes of water draining from these ditches to the Bay, it is difficult to assume that bacteria from these ditches would do more than affect water quality at DOH stations , #110, #111, #112. Dr. Rensel's study implicated these ditches as having only a local effect on Bay water quality. Clallam County recommends that Ecology revise the last sentence to read that if ditches to the inner bay meet standards five years after TMDL approval but DOH stations, #110, #111, #112 do not meet standards, then even more stringent target standards may be required for the ditches.

***Response**: I have included your comment.*

(3) Page 27, first paragraph on the page: Although I agree with your conclusion that "wildlife contributions are considered natural and controls are not appropriate", I find the discussion of wildlife contributions lacking in the study. Members of the public will see this omission as a fault in the study. I suggest adding more language from Dr. Rensel's report to more fully address the impact from wildlife on bacteria concentrations. For example on Page 26 after the discussion on bird populations, you could reference Dr. Rensel's consideration of fecal matter consistency (on page 53 of his report) and how this relates to its availability in the water column. He also looked at studies from other areas of Puget Sound related to wildlife inputs of fecal coliform bacteria. Further, I think that you should balance Dr. Rensel's assumptions and speculations of wildlife contributions with the National Wildlife Refuge's (via Pam Sanguinetti) concern's over the accuracy of his wildlife counts. After all it is true, Dr. Rensel is not a wildlife biologist and some of his

conclusions are based on spotty data at best. Dr. Rensel put together a water budget to the best of his ability, which was limited by the lack of accurate wildlife counts by a wildlife biologist. An honest evaluation and presentation of the facts about wildlife contribution will add to the credibility of this study as well as public acceptance.

> ***Response****: The goal of the TMDL study is to determine how much pollution needs to be reduced to meet water quality standards. The Rensel report did not contain all the requirements for a TMDL report and a lot of information that is not normally included in a TMDL. The TMDL report contains the elements required for this kind of study. The Rensel report was referenced extensively. If one wants more information on wildlife contributions the Rensel provides some information on this topic* (www.jamestowntribe.org/natural_resources.htm).
>
> *If there are no anthropogenic activities (such as land fills) that cause increases in wildlife populations then wildlife contributions are considered natural and controls are not appropriate. The TMDL focuses on the source controls that can be made and that includes improvements in bacterial levels in the irrigation ditches, the Dungeness River, and other human sources.*

Thanks for your hard work on this TMDL study!

J. Anne Shaffer, Washington Department of Fish & Wildlife

I was surprised to see no mention of the macroalgae work that we published two years ago. I have attached a copy of the paper for courtesy. As you all know the work focused heavily on macroalgae blooms in Dungeness Bay and has significant implications to the seasonal fecal coliform levels of the inner and middle bay. The work is particularly germane to the TMDL given the broader discussion of other interactions in the bay, including seasonal variation of fc levels and sources. Linking the findings of this paper to the hyrdodyamics of the bay, including Rensell's findings as well as the TMDL analysis, is warranted from both a habitat and water quality management perspective. Omitting the work leaves the TMDL study and analysis incomplete. Please let me know if I can provide additional information. Thanks in advance for the professional consideration.
http://www.psat.wa.gov/Publications/01_proceedings/sessions/oral/8d_shaff.pdf

> ***Response****: Higher nutrient levels are often associated with bacteria sources and can be a water quality concern. The goal of the TMDL study is to determine how much bacteria pollution needs to be reduced to meet water quality standards. The macroalgae study has limited application to the bacteria TMDL study.*

Comment from Hansi Hals, Natural Resources Dept., Jamestown S'Klallam Tribe

Pg 26 Add a paragraph – suggest inserting as second paragraph (after marine load and before NWR / birds).

Rensel study found that Inner Bay fecal coliform sources appear to dominate by 41% in the winter period (Nov- Feb) while Outer Bay sources seem to dominate at other times. (Show Figure 27. Measured Inner Bay inflow versus outflow of fecal coliform loading by season). Rensel investigated relationship of Inner Bay wildlife with fecal coliform levels to detect any correlation. Rensel found that combined ducks and cormorants abundance was positively correlated with FC concentrations in the Inner Bay over the entire year (r = .81) and suggested that the slower flushing rate of the Inner Bay would be more likely to retain a wildlife signal (Table 20: Correlation matrix between annual geometric mean fecal coliform and selected wildlife taxa abundance for two Inner Dungeness Bay subareas).

> ***Response****: The goal of the TMDL study is to determine how much pollution needs to be reduced to meet water quality standards.. The Rensel report did not contain all the requirements for a TMDL report and a lot of information that is not normally included in a TMDL. The TMDL report contains the elements required for this kind of study. The Rensel report was referenced extensively. If one wants more information on wildlife contributions the Rensel provides some information on this topic* www.jamestowntribe.org/natural_resources.htm).
>
> *Ecology's position is that if there are no anthropogenic activities (such as land fills) that cause increases in wildlife populations then wildlife contributions are considered natural and controls are not appropriate. The TMDL focuses on the source controls that can be made and that include improvements in bacterial levels in the irrigation ditches, the Dungeness River, and other human sources.*

Comments from Kevin Ryan, Dungeness National Wildlife Refuge, Manager

U. S. Fish and Wildlife Service is highly concerned with the quality of water entering the Dungeness National Wildlife Refuge and commends all of the participants in this Department of Ecology study. The majority of the wildlife species using the Refuge live most of their life in water and are dependent on aquatic plants and animals for their food. Poor water quality can seriously impact the survival of these water-dependent species, many of which are already under pressures from human activities, such as loss of habitat. The USFWS will continue to work with the watershed-based community efforts, Clean Water Workgroup and the Dungeness River Management Team, to implement the goal of the Clean Water Act.

> ***Response****: Thank you for your support and participation in this important effort.*

Appendix C

Dungeness Bay Fecal Coliform Bacteria Total Maximum Daily Load Study

Publication No. 04-03-012

Available under separate cover by contacting:

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