


WASHINGTON STATE  
DEPARTMENT OF  
E C O L O G Y

# **Willapa River Dissolved Oxygen Total Maximum Daily Load**

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## **Water Quality Improvement Report and Implementation Plan**

**February 2006  
Publication Number 06-10-017**

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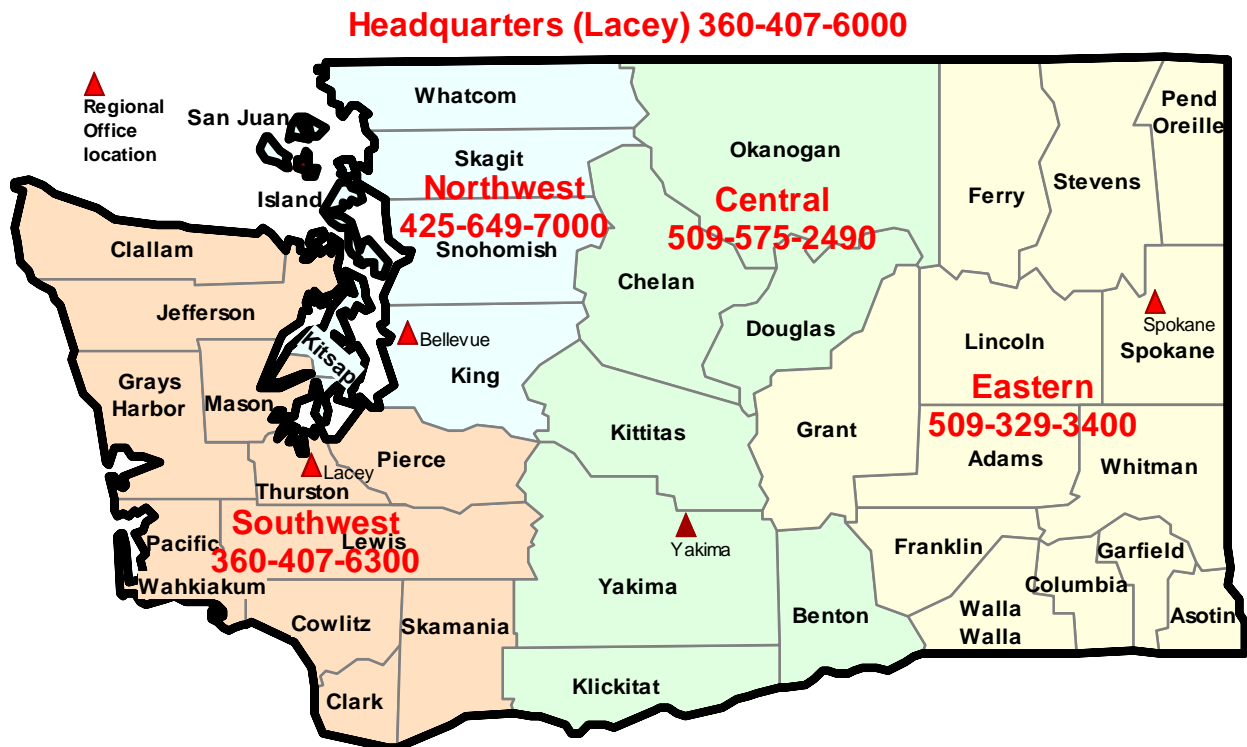
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# Table of Contents

Overview of Study and Cleanup Plan.....	1
Geographic Extent of Impaired Resources .....	4
Applicable Water Quality Criteria .....	6
Seasonal Variation .....	7
The TMDL Approach .....	9
Overview of the Technical Analysis and Loading Capacity .....	10
Pollution Sources Needing Management.....	11
Wasteload Allocations .....	13
Load Allocations.....	15
Margin of Safety .....	16
Facility Responsibilities for Managing Pollution .....	17
Schedule of Management Roles and Actions .....	19
Measuring Progress Toward Goals.....	19
The Effectiveness Monitoring Plan .....	19
Adaptive Management.....	19
Reasonable Assurances.....	21
Current Implementation Efforts.....	21
Public Involvement.....	22
Funding Opportunities .....	23
References.....	24
Appendix A - List of Acronyms .....	A-27
Appendix B - WERM MOA.....	B-29
Appendix C - Lower Willapa River DO TMDL Submittal Report .....	C-37
Appendix-D – Responsiveness Summary.....	D-39

## List of Figures

Figure 1. Willapa River TMDL Study Area .....	4
Figure 2. Dissolved Oxygen Data for Ecology Station WPA001 from 1990 through 2000 .....	7
Figure 3. The TMDL Equation .....	14

## List of Tables

Table 1: 2004 303(d) Listings for Dissolved Oxygen in the lower Willapa River Watershed .....	5
Table 2. Year 2022 Dry Season Point Source Waste Loads to the Willapa River Estuary .....	11
Table 3. NPDES-Permitted BOD Sources.....	12
Table 4. Example WLAs.....	14
Table 5. Wasteload Allocations for Equivalent Oxygen Demand (EOD).....	15
Table 6. Grants and Loans for Public Wastewater Facilities.....	23

# Overview of Study and Cleanup Plan

## Report Purpose

This report summarizes results of a dissolved oxygen total maximum daily load (TMDL) study in the Willapa River Watershed conducted by the Washington State Department of Ecology (Ecology), Pacific County Government, and private consultants. It also provides a detailed plan for limiting pollution discharges in the lower river to meet state water quality standards.

The final TMDL study was conducted as a cooperative effort by Cosmopolitan Engineering, Tetra Tech (contractor to USEPA), Gray and Osborne, and Ecology. Cosmopolitan was the principal contractor who finished the TMDL study and technical report. The technical basis for this cleanup plan is detailed in Cosmopolitan's report *Willapa River Watershed Dissolved Oxygen Total Maximum Daily Load Study* (Cosmopolitan, 2005). That report provides the technical support necessary for USEPA approval of the TMDLs addressed in this plan.

The 2005 TMDL report characterizes dissolved oxygen conditions in the lower river and recommends wasteload allocations (numerical limits) in order for facilities covered by wastewater discharge permits to meet dissolved oxygen standards. This document serves as the water quality Improvement Report and Implementation Plan because it includes the technical elements required for TMDL approval and it discusses a potentially successful approach for water quality protection. The Improvement Report and Implementation Plan are two project phases required for administrative completion of a TMDL project.

## Pollution Concerns and Causes

The lower Willapa River includes the tidally-influenced portion of the Willapa River from Camp One Road (Willapa River Mile 17.5) downstream to the river's mouth in northeast Willapa Bay (Figure 1). Monitoring of the lower Willapa River since the early 1970s shows that dissolved oxygen (DO) fell below the state water quality standard of 6.0 mg/L on many occasions during late summer and early fall (July through September). As a result, several segments of the lower Willapa River are included on Washington's 1998 303(d) list of impaired waters for dissolved oxygen. Adequate levels of dissolved oxygen are necessary to protect the health of aquatic organisms and to maintain other beneficial uses of the river system.

The pollutants believed to most affect DO levels are carbonaceous biochemical oxygen demand (CBOD) and ammonia nitrogen. Point sources for these pollutants include the Raymond and South Bend municipal wastewater treatment plants (WWTPs) and three seafood processors: Coast Seafoods, South Bend Packers, and East Point Seafoods. Potential nonpoint sources include failing septic systems and urban, industrial, and agricultural runoff. However, nonpoint sources account for less than 1 percent of the allowable DO deficit. Therefore, this TMDL applies just to the point sources.

## Water Quality Targets

State water quality standards pertinent to the estuarine conditions of this TMDL classify the lower Willapa River as Class A marine waters (as defined in WAC 173-201A-060 (2)). Applicable marine criteria require that DO shall exceed 6.0 mg/L. If natural conditions are found

to be near or below the criteria, natural dissolved oxygen levels may be degraded by up to 0.2 mg/L by human-caused activities.

The natural background concentrations in the study area are below 6.0 mg/L during late summer. Therefore, the numeric water quality target for this TMDL is the DO deficits that will meet the applicable water quality criteria.

### **Effects of Existing Discharges to Willapa River**

Leading up to this TMDL, the combined effects of wastewater loading to the receiving water during summertime conditions, exceeded the allowable DO deficit. However, industrial operation discharges are different now. One facility was contributing significantly to ammonia and BOD loading until they stopped operating in 2003.

During peak discharges from 1998 to 2003, all facilities collectively exceeded tolerable loading by 5% more than allowed. Recent wastewater analyses show that the facilities now collectively operate well within the maximum allowable DO deficit. Based on 2004 discharge data during peak critical operating conditions (assuming all facilities would be discharging peak pollution loads constantly and simultaneously) the facilities would only be utilizing 65% of the allowable pollution capacity. Therefore the environmental purpose of this TMDL is to protect rather than restore water quality. [However, the TMDL serves an additional administrative purpose: because the water body was "listed" several years ago as being impaired, this TMDL document forms the technical basis that the places of DO impairments can be removed from the 303-d list when the list is updated again.]

### **Loading Capacity**

Water quality surveys were conducted in 1998 and 2001 to collect field data for modeling. A modeling system with hydrodynamic and water quality elements was used to determine the capacity of the river to assimilate pollution. Modeling found that natural conditions cause the river to fail DO standards during the critical season (Cosmopolitan, 2005). The TMDL challenge is to limit the facilities to the extra 0.2 mg./l DO deficit that the water quality standards allow in this setting. The loading capacity is 0.2 mg./L decrease in dissolved oxygen during the critical season.

### **Wasteload Allocations Set By a 'TMDL EQUATION'**

Multiple model runs were made to isolate and quantify the effects of CBOD<sub>5</sub> and NH<sub>3</sub>-N from each point source. An equation was developed based on the solution to simultaneous equations derived from the model runs. Any combination of point source waste loads (in lbs/day) that satisfies the following TMDL equation meets the dissolved oxygen water quality standard:



+	(0.207) CBOD5 <sub>R</sub>	+	(0.420) NH3-N <sub>R</sub>	≤ 199 µg/L
+	(0.067) CBOD5 <sub>SB</sub>	+	(0.132) NH3-N <sub>SB</sub>	
+	(0.031) CBOD5 <sub>EP</sub>	+	(0.178) NH3-N <sub>EP</sub>	
+	(0.027) CBOD5 <sub>SBP</sub>	+	(0.155) NH3-N <sub>SBP</sub>	
	(0.019) CBOD5 <sub>CS</sub>	+	(0.109) NH3-N <sub>CS</sub>	

Where:

R	=	Raymond WWTP
SB	=	South Bend WWTP
EP	=	East Point Seafoods
SBP	=	South Bend Packers
CS	=	Coast Seafoods

The 'equation' is simply a calculation to figure the maximum amount of BOD and ammonia that each facility can discharge in order that the total discharges don't violate the water quality criteria. The equation provides the framework for setting both current and future WLAs for the affected facilities. The five facilities have since agreed to specific WLAs that are expressed in terms of equivalent oxygen demand (EOD) that combines the effects of both parameters on DO.

### Implementation Plan

The wasteload allocations will be implemented through NPDES permits issued to the individual facilities. The facilities identify themselves collectively as the Willapa Resource Estuary Management Group (WERM). According to a WERM MOA (Appendix B), which Ecology agreed with, each facility NPDES permit will include the pertinent WLA facility limit as well as an aggregate limit that the facilities must meet collectively. As long as technology-based and aggregate limits are met, permit holders will be in compliance with the permits and no action will be taken on individual performance. If the aggregate limit is exceeded, enforcement would be taken on the facility or facilities that exceed their individual WLA.

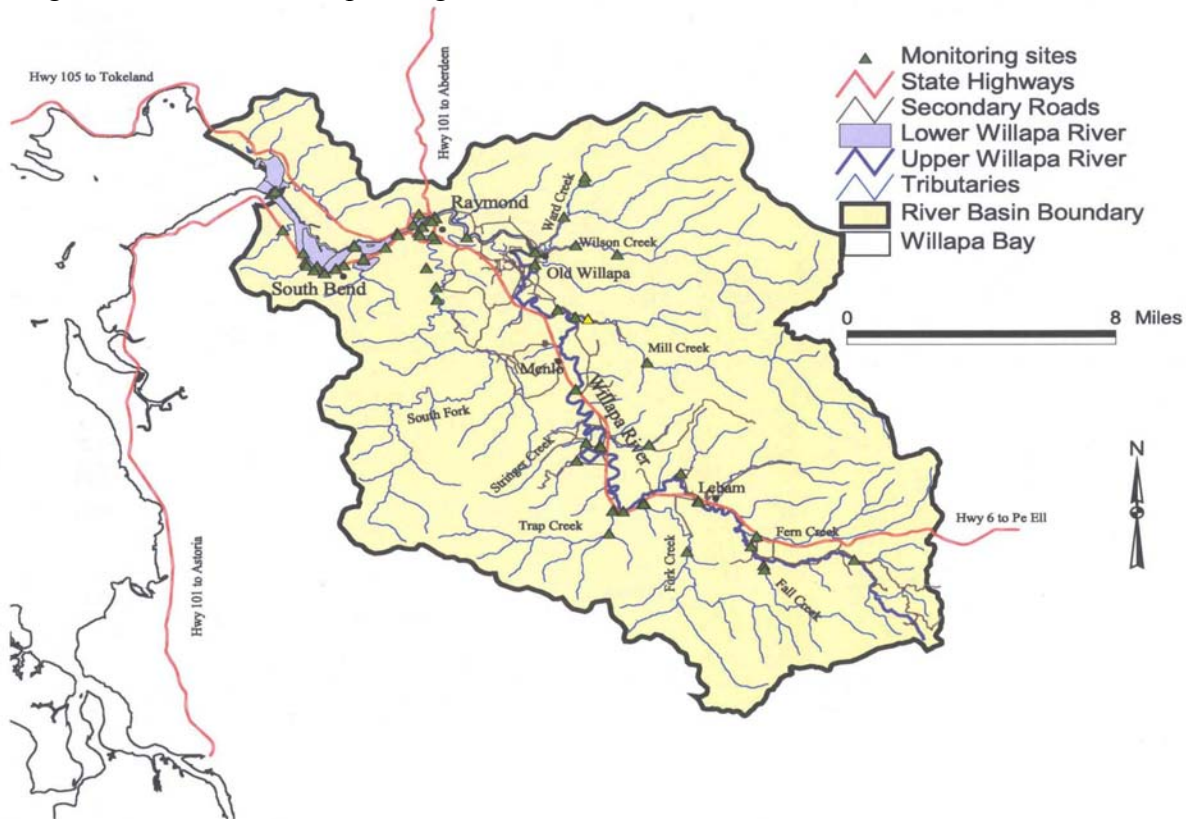
The TMDL may include adaptive management to adjust the individual allocations over time. The MOA includes protocols and guiding principals to reallocate WLAs based on future needs, including management of a reserve allocation. A TMDL reserve allocation typically serves as a kind of savings account to hold back some of the available loading capacity so that future pollution from population growth can be accommodated with the reserve, instead of having to withdraw from wasteload allocations already committed to a certain facility. Any reallocations of WLAs recommended by the collective facilities are subject to approval by Ecology and would be implemented through revisions to NPDES permits. If a change to the 'TMDL Equation' is needed in order to establish different wasteload allocations (for example if a new facility needs to access a portion of the aggregate wasteload allocation), then the resulting TMDL modification must also be approved by EPA. Opportunity for public comment will be provided in the event of a proposed change to either the TMDL or NPDES permits.

# Geographic Extent of Impaired Resources

The Willapa River drains a region of about 260 square miles. The study area covered about half of the basin - the lower portion of the upper river watershed. Figure 1 shows the entire watershed that has been the subject of several TMDL studies since 1998. This report addresses only the lower watershed affected by 303d listings for dissolved oxygen (DO) conditions. The lower river DO study and resulting cleanup plan covered by this report only affect the tidally influenced portion of Figure 1, which begins at the river mouth and ends at Camp One Road., - generally marked as river mile 14.5. A DO listing in the South Fork Willapa River is also covered in the scope of this report.

The Willapa River basin is largely rural with the exception of the cities of Raymond and South Bend. Principal industries in the cities are timber and seafood (mostly oysters). Agricultural land uses predominate in the river valley and silviculture is the main use throughout the rest of the basin. There are about four commercial dairy operations in the basin, and many smaller livestock operations for beef and young stock.

The lower Willapa River is a tidal estuary characterized by mixing of Willapa Bay marine waters with fresh water from the river and other tributaries. Tidal effects on river height can be observed just downstream of Camp One Road at River Mile (RM) 14.5, and saline marine water moves up through most of this area, depending on the flow.



*Figure 1. Willapa River TMDL Study Area*

Based on salinity data from the Willapa River, the marine DO criterion applies year-round at all sites in the Willapa River downstream from Willapa Road. The fresh water DO criterion applies at all times at Camp One Road and upstream. Department of Ecology personnel have collected marine ambient monitoring data at Station WPA001 (near the Port of Willapa Harbor docks in Raymond since 1973). Out of 299 measurements over 25 years, DO was observed at or below the standard of 6.0 mg/L on 25 occasions, all during the months of June through September. During the September 1998 TMDL survey, DO levels below the marine standards were found at all stations on the lower Willapa River from Ellis Slough to South Bend, including the South Fork at the Highway 101 Bridge. Table 1 identifies the segments in the lower Willapa River that are being addressed by this report and implementation plan.

**Table 1: 2004 303(d) Listings for Dissolved Oxygen in the lower Willapa River Watershed**

January 2006

<b>Name</b>	<b>Township, Range, Section &amp; River Mile</b>	<b>2004 Identification Number</b>
Willapa River at Johnson Slough	14N, 9W, 17 RM 0.4	9511
Willapa River below South Bend	14N, 9W, 28 RM 3.0	14882
Willapa River near Raymond Port	14N, 9W, 24 RM 6.4	10352
Willapa River at 101 Bridge	14N, 8W, 19 RM 7.7	14952
Willapa River near Ellis Slough	14N, 9W, 24 RM 9.5	43026
Willapa River at Willapa Rd.	14N, 8W, 28 RM 13.7	14961
Willapa River, South Fork	14N, 8W, 19 RM 7.1	14916
<b>Total</b>		<b>7</b>

# Applicable Water Quality Criteria

The TMDL is designed to address impairments of characteristic uses caused by DO deficits. The characteristic uses designated for protection in Willapa River basin streams are as follows (from Chapter 173-201A WAC):

Characteristic uses shall include, but not be limited to, the following:

- i. Water supply (domestic, industrial, agricultural).
- ii. Stock watering.
- iii. Fish and shellfish:
  - o Salmonid migration, rearing, spawning, and harvesting.
  - o Other fish migration, rearing, spawning, and harvesting.
  - o Clam and mussel rearing, spawning, and harvesting.
  - o Crayfish rearing, spawning, and harvesting.
- iv. Wildlife habitat.
- v. Recreation (primary contact recreation, sport fishing, boating, and aesthetic enjoyment).
- vi. Commerce and navigation."

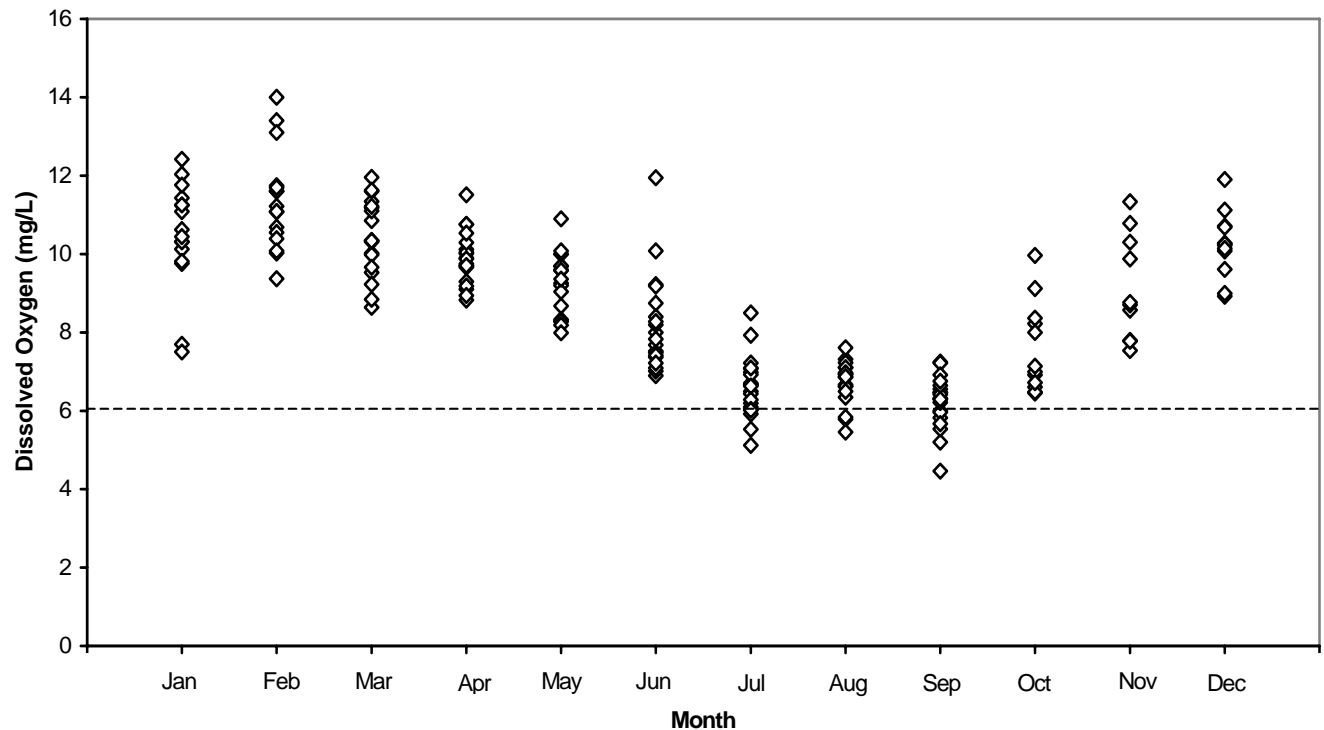
State water quality standards describe criteria for DO for the protection of characteristic uses. Streams in the Willapa River basin are designated as Class A. The criteria for Class A waters are as follows:

- **Water Quality Criteria:** Freshwater - dissolved oxygen shall exceed 8.0 mg/L. Marine water - dissolved oxygen shall exceed 6.0 mg/L. When natural conditions, such as upwelling occur, causing the dissolved oxygen to be depressed near or below 6.0 mg/L, natural dissolved oxygen levels may be degraded by up to 0.2 mg/L by human-caused activities. (Note- The added 0.2 deficit can be allowed only during the critical period.)
- **General Considerations:** In brackish water of estuaries, where the fresh and marine water quality criteria differ within the same classification, the criteria shall be applied on the basis of vertically averaged salinity. The freshwater criteria shall be applied at any point where ninety-five percent of the vertically averaged daily maximum salinity values are less than one part per thousand. Marine water quality criteria shall apply at all other locations.

# Seasonal Variation

Violations of DO standards occur only during the summer months. Therefore, the TMDL shall only apply during the months of June through September. DO data from Station WPA001 near the Port of Raymond are shown in Figure 2, along with the water quality criterion of 6.0 mg/L. This figure shows that the criterion has not been exceeded except during the period from July through September. Each diamond on the figure indicates a single sample result. Hence there are about 8 to 13 sample results for each month during the 10-year sampling period reflected in the table. In addition, the hydrodynamic and dissolved oxygen models were calibrated with data collected during that period (Cosmopolitan, 2005).

Dissolved oxygen concentration as low as 6.5 mg/L has been measured during October at Station WPA001. More analysis was done to determine if extension of wasteload allocations and permit limits through October would prevent DO levels dropping below the 6.0 mg/L Class A limit. Therefore, October critical conditions were evaluated and modeled separately from July through September critical conditions. However, based upon existing waste loads, the results demonstrated that there is no reasonable potential for violation of the DO criteria in October (Cosmopolitan, 2005).



*Figure 2. Dissolved Oxygen Data for Ecology Station WPA001 from 1990 through 2000*



# The TMDL Approach

The Clean Water Act mandates the Washington State Department of Ecology to develop total maximum daily load (TMDL) studies for water bodies that fail to meet water quality standards after technology-based water quality controls have been put into place. In 1997, Ecology signed a Memorandum of Agreement with the Environmental Protection Agency (EPA) assuring that TMDLs would be developed for all water bodies on the 1996 303(d) list. Ecology also agreed to develop submittal reports (Improvement Report) and detailed implementation plans (DIPs, renamed as Implementation Plans) for listed water bodies, obtain EPA approval, and to direct the implementation of these TMDLs.

Facility sampling during the critical dry-weather season in 2002 determined that the facilities were collectively discharging very close to the loading capacity of the river. (Gray and Osborne, 2003). The facilities proposed a wasteload allocation framework (the "TMDL Equation"-see Wasteload Allocations section below) to assure that their aggregate load will not cause the river to fail DO standards. The facilities further proposed that the WLAs be implemented through new NPDES permits that will administer both an individual facility limit as well as an aggregate limit that the facilities collectively must not exceed. The NPDES permits may also include more stringent technology-based (AKART) or mixing-zone based limits for CBOD<sub>5</sub> and ammonia for each facility, which supersedes the aggregate limit.

Ecology believes that the most important TMDL outcome is for the receiving water to meet standards and provide beneficial uses. Therefore, the most important measure of the NPDES permit effectiveness is the facilities collective performance to "ensure that DO in the receiving water drops no more than 0.2 mg/L below natural DO levels when natural levels are 6.2 mg/L or less".

To allow the facilities and community the maximum flexibility to work together to manage that outcome in ways that won't conflict with the TMDL, Ecology agreed to a flexible approach for enforcement of the facilities permits. The WERM Memorandum of Agreement (see Appendix B) that Ecology agrees with, defines how each facility NPDES permit will include the pertinent WLA limit as well as an aggregate limit that the facilities must collectively meet. Members of the WERM calculated and agreed to initial WLAs described in the Wasteload Allocations section (below). They will have the first opportunity to recommend modifying the WLAs, as necessary, when a new facility must be considered in reapportioning the aggregate wasteload among all affected facilities. As long as technology-based and aggregate limits are met, permit holders will be in compliance with the permits and no action will be taken on individual performance. If the aggregate limit is exceeded, enforcement would be taken on the facility or facilities that exceed their individual WLA.

Ecology plans to issue new NPDES permits during 2006 that will include the new limits. The facilities have agreed in their MOA to demonstrate permit performance using a coordinated monitoring program during the TMDL critical season. The city of Raymond volunteered to coordinate the monitoring by all facilities.

The WERM MOA also describes the process for modifying the individual facility WLAs. WERM will review possible changes in operations of facilities contributing to the aggregate limit (e.g., a current facility expands or a new business joins the community). WERM can modify the TMDL Equation to accommodate those facility changes as long as the total wasteload

doesn't increase beyond the current equation sum. Ecology doesn't plan to modify the TMDL or NPDES permits as long as the facilities that are part of the current TMDL Equation continue to meet the aggregate limit. However, if WERM proposes adding a different facility to the TMDL Equation, their MOA describes how the new facility could be considered. If the new facility is successful getting established as part of a new TMDL Equation, the new equation (with the current sum/aggregate limit) would serve as the starting point for a revised TMDL and new permit limits for each facility in the equation. Such changes to the TMDL or NPDES permit would be simple and straightforward since the TMDL equation will continue to serve as the operating limit for any changes. If revisions to the TMDL or NPDES are needed, Ecology will provide EPA a letter explaining the modified "TMDL Equation" to add as an errata or modification to the original TMDL and NPDES permit.

## **Overview of the Technical Analysis and Loading Capacity**

The sensitivity of the water to DO deficit or the lower limits that will still allow the river to meet water quality standards is called the "loading capacity". The technical consulting team used the calibrated WASP 51t water quality model to determine the loading capacity in the affected lower Willapa River.

Waste loads were specified for point source loading from the two municipal wastewater treatment plants and three seafood processors, and for nonpoint source and background tributary loading. Tributary loading, including runoff from the lumber mills, was calculated from input flows (determined for the DYNHYD flow model inputs) and concentrations measured during surveys. Unmonitored tributaries were assigned concentrations from neighboring monitored tributaries. Point source loading for calibration and verification was calculated from measured flows and concentrations during the surveys.

For critical conditions modeling, point source loading was developed from critical design flows and contaminant concentrations. Gray and Osborne (2000) provided municipal flows and ammonia concentrations. Seafood processor flows and loading were determined from NPDES permit fact sheet information, the EPA development document for the seafood processing industry, and historical Discharge Monitoring Reports. Nonpoint source loading, including the lumber mills, was set at the highest seasonal concentrations for critical conditions, and the lowest seasonal concentrations for natural conditions.

A complete description of the loading capacity calculations, analytical framework, and calibration and verification of the modeling is presented in Cosmopolitan, 2005 (Appendix C).

NPDES permitted point source loads to the Willapa River Estuary include the city of Raymond and city of South Bend wastewater treatment plants, East Point Seafoods, South Bend Packers and Coast Seafoods. Dry weather flow and wasteload projections for each facility are presented in a draft report by Gray & Osborne titled *Willapa Estuary Dissolved Oxygen TMDL Alternatives Analysis* dated December 2003. The projected 2022 loadings of 5-day carbonaceous biochemical oxygen demand (CBOD<sub>5</sub>) and ammonia nitrogen (NH<sub>3</sub>-N) are presented in Table 2.



**Table 2. Year 2022 Dry Season Point Source Waste Loads to the Willapa River Estuary**

<i>Facility</i>	<i>CBOD<sub>5</sub> (lbs/day)</i>	<i>NH<sub>3</sub>-N (lbs/day)</i>
City of Raymond WWTP <sup>(1)</sup>	221	266
City of South Bend WWTP	85	81
East Point Seafoods	2,500	14
South Bend Packers	10	16
Coast Seafoods	500	28
<sup>(1)</sup> Includes flows from the Port of Willapa Harbor <span style="float:right">WWTP means Wastewater Treatment Plant</span>		

The WASP51t model was run with the point source loads in Table 2. The nonpoint source loading was also included in the model run. Extensive sensitivity testing was performed. The critical model time and segment for dissolved oxygen deficit were found to be Day 20.751 of the model simulation, and Segment 25 (the confluence of the south fork and mainstem). The maximum DO deficit was 0.27 mg/L. The water quality standard allows a maximum deficit of 0.20 mg/L. Therefore, the final wasteload allocations represent a 26 percent reduction from the 2022 projected loadings in Table 2.

The TMDL model was run with the maximum measured loadings from each facility measured between 1998 and 2002. The model results indicated a DO deficit of 0.21 mg/L, which is just above the 0.20 limit. The loading and deficit during 1998-2002 included operation of a biopolymer manufacturing business, Vanson Halosource, Inc. Vanson processed crab shell into “Chitosan,” producing a wastewater high in ammonia and CBOD. In 2003, when Vanson was not in operation, the DO deficit was reduced to 0.13 mg/L, which met the water quality standard. Chitosan production at the Vanson plant stopped in 2003 but they are still located at the Port of Willapa and expect to continue operating in some capacity for the foreseeable future.

## Pollution Sources Needing Management

The pollutant believed to most affect DO levels is biochemical oxygen demand (BOD). BOD is categorized into two forms: carbonaceous BOD (CBOD) and nitrogenous BOD (NBOD). NBOD, measures the oxygen used by the oxidation of organic nitrogen to ammonia (mineralization) and ammonia to nitrate (nitrification). CBOD is a measurement of the amount of oxygen needed to oxidize the carbon in organic materials.

In the Willapa River basin, possible sources of BOD include both point and nonpoint sources. Table 3 lists the facilities that are sources of BOD and have NPDES permits from Ecology.

**Table 3. NPDES-Permitted BOD Sources**

<i>Facility Name</i>	<i>Type</i>
City of Raymond	Municipal Wastewater Treatment Plant
City of South Bend	Municipal Wastewater Treatment Plant
East Point Seafoods	Seafood Processor
Coast Seafoods	Seafood Processor
South Bend Packing	Seafood Processor
Weyerhaeuser Company	Lumber Mill (storm water)
Pacific Hardwoods (Raymond facility)	Lumber Mill (storm water)
Pacific Hardwoods (South Bend facility)	Lumber Mill (storm water)

The wastewater treatment plants (WWTPs) and the seafood processors have individual NPDES permits with BOD limitations. Both cities have secondary treatment with lagoon systems, and have been working over the years to correct infiltration/inflow problems. Raymond receives industrial wastewater from the Weyerhaeuser mill and, until recently, from the Biopolymer plant owned by Vanson on Port property near the docks. The Port provided pretreatment to Vanson prior to discharge to the city of Raymond sewer system.

The fish processors screen their wastewater and discharge directly to the Willapa River. Coast Seafoods processes oysters and uses a mixture of saline river water for shell washing and city water for processing. East Point seafood processes a variety of products, including fish, crab and shrimp, and uses city water for processing. South Bend Packers does mostly reprocessing of fish filets, and sometimes processes oysters.

An industrial NPDES stormwater general permit covers the lumber mills. The Weyerhaeuser mill has two oil-water separators and recently installed a biofiltration system. Otherwise the three mills provide no stormwater treatment. Historically there have been many more mills in the area, but economic conditions have led to a consolidation. There was woodchip loading operations at docks near the Port in the past, but barges have not been entering the Willapa River for many years.

Other possible sources of BOD typically found in nonpoint source pollution and also occurring in the Willapa basin include:

- On-site septic systems
- Urban stormwater run-off
- Livestock
- Natural background sources

Since most of the lower Willapa River is either tidal wetlands or behind levies, nonpoint sources are mostly assumed to reach the river through tributary creeks, sloughs, and drains. Nonpoint sources were estimated conservatively to contribute only an estimated 0.5 percent of the BOD load to the lower Willapa River during the critical dry weather conditions for dissolved oxygen. Impacts of those sources during the dry season are obviously extremely small but the study assigned them a numerical loading anyway, to be conservative. That assures that all of the available loading is not inaccurately assigned to the point source facilities. Also, identifying nonpoint as being presently inconsequential to this TMDL helps reinforce that preventive controls are important to maintain.

Compliance with the DO standard will be sustained primarily from application of wasteload allocations to the point sources.

## Wasteload Allocations

NPDES permitted point source loads to the Willapa River Estuary include the city of Raymond and city of South Bend wastewater treatment plants, East Point Seafoods, South Bend Packers and Coast Seafoods. Dry weather flow and wasteload projections for each facility are presented in a draft report by Gray & Osborne titled *Willapa Estuary Dissolved Oxygen TMDL Alternatives Analysis* dated December 2003. The alternatives analysis reviewed many possible WLA options.

There are unlimited combinations of WLAs that would satisfy the TMDL model. Each discharge has a different impact on DO deficit at the critical segment at the mouth of the Willapa South Fork because of location (Cosmopolitan, 2005). For example, the Raymond wastewater treatment plant discharge has the greatest impact due to its proximity to the confluence, and Coast Seafoods has the least because it is the farthest away.

During critical conditions, the estuary is characterized by strong tidal mixing and relatively slow net flushing, due to the low river runoff. Waste materials discharged to the estuary are rapidly dispersed but slowly flushed from the system, which provides a significant buffer to short-duration peak discharges. Therefore, the WLAs will be implemented in NPDES permits as weekly average limits rather than daily limits.

### **The "TMDL Equation"**

Multiple model runs were made to isolate and quantify the effects of CBOD<sub>5</sub> and NH<sub>3</sub>-N from each point source. A TMDL equation was developed based on the solution to simultaneous equations derived from the model runs (Cosmopolitan, 2005). Any combination of point source waste loads (in lbs/day) that satisfies the following TMDL equation (Figure 3) meets the dissolved oxygen water quality standard:

+	(0.207) CBOD <sub>5R</sub>	+	(0.420) NH <sub>3-NR</sub>	≤ 199 µg/L
+	(0.067) CBOD <sub>5SB</sub>	+	(0.132) NH <sub>3-NSB</sub>	
+	(0.031) CBOD <sub>5EP</sub>	+	(0.178) NH <sub>3-NEP</sub>	
+	(0.027) CBOD <sub>5SBP</sub>	+	(0.155) NH <sub>3-NSBP</sub>	
	(0.019) CBOD <sub>5CS</sub>	+	(0.109) NH <sub>3-NCS</sub>	

Where:

R	=	Raymond WWTP
SB	=	South Bend WWTP
EP	=	East Point Seafoods
SBP	=	South Bend Packers
CS	=	Coast Seafoods

**Figure 3. The TMDL Equation**

The TMDL equation was tested with several examples. The WASP51t model was run for each of the WLA scenarios listed in Table 4. Note that these are **example** WLAs only for model confirmation, and not TMDL recommendations. These results confirmed that the TMDL equation is reliable.

**Table 4. Example WLAs**

Loading Scenario	Raymond WWTP		South Bend WWTP		East Point		SB Packers		Coast	
	CBOD <sub>5</sub> lb/day	NH <sub>3-N</sub> lb/day	CBOD <sub>5</sub> lb/day	NH <sub>3-N</sub> lb/day	CBOD <sub>5</sub> lb/day	NH <sub>3-N</sub> lb/day	CBOD <sub>5</sub> lb/day	NH <sub>3-N</sub> lb/day	CBOD <sub>5</sub> lb/day	NH <sub>3-N</sub> lb/day
2022 Projection	221	266	86	81	2,500	14	10.0	16	500	28
1998-2002 Max Loading	181	218	70	29	2040	6	7	16	430	3
2003 Max Loading (Vanson down)	62	74	70	29	2040	6	7	16	430	3
Baseline WLA	163	197	64	60	1,848	10	7.4	11.8	370	21
Raymond Nitrify	221	99	86	81	2,500	14	10.0	16	500	28
Muni Only (Seafood to SB)	221	266	420	102						
Cities 50% Seafood 118%	111	133	43	41	2,950	17	11.8	18.9	590	33
No East Point	221	266	100	90			50	25	700	40
Regional WWTP in South Bend			2,400	290						

2022 projection exceeds WQS by 0.07 mg/L

1998-2002 max loadings exceed WQS by 0.01 mg/L

2003 max loadings w/Vanson down meets WQS by 0.07 mg/L

All other scenarios meet WQS exactly

(The WERM group chose to reserve approximately 5 percent of the available wasteload allocation to help accommodate future need for treatment capacity due to population growth in Raymond and South Bend.) Since both CBOD and ammonia affect ambient DO, the allocations to each discharger are expressed in terms of equivalent oxygen demand (EOD) that combines the effects of both parameters on DO. Accordingly, an exchange of wasteload between CBOD and ammonia is allowable as long as the overall load remains constant. EOD will be stated as mass limits in the facilities NPDES permits, similar to existing permits for the wastewater treatment plants in Lake Stevens and Duvall, Washington. The formula used for comparing CBOD and NH<sub>3</sub>-N mass is:

$$\text{EOD (lbs./day)} = \text{CBOD}_5 \text{ (lbs./day)} + (2.1 * \text{NH}_3\text{-N (lbs./day)})$$

The facilities represented by WERM negotiated the individual facility WLAs that met their local needs and satisfies the TMDL Equation. Wasteload allocations that will apply from July through September are provided in Table 5.

**Table 5. Wasteload Allocations for Equivalent Oxygen Demand (EOD)**

<i>Facility</i>	<i>EOD (µg/L)</i>	<i>Formula<sup>(1)</sup></i>
Raymond WWTP	99	$(0.207)(\text{CBOD}_5) + (0.420)(\text{NH}_3\text{-N}) \leq 99$
South Bend WWTP	25	$(0.067)(\text{CBOD}_5) + (0.132)(\text{NH}_3\text{-N}) \leq 25$
East Point Seafoods	45	$(0.031)(\text{CBOD}_5) + (0.178)(\text{NH}_3\text{-N}) \leq 45$
South Bend Packers	5	$(0.027)(\text{CBOD}_5) + (0.155)(\text{NH}_3\text{-N}) \leq 5$
Coast Seafoods	15	$(0.019)(\text{CBOD}_5) + (0.109)(\text{NH}_3\text{-N}) \leq 15$
Reserve <sup>(2)</sup>	10	
Total WLAs	199	

<sup>(1)</sup> CBOD<sub>5</sub> and NH<sub>3</sub>-N loadings are in units of lbs/day weekly average.  
<sup>(2)</sup> Reserve capacity is set aside for future allocation based on local needs.

## Load Allocations

No load allocations are needed for this TMDL because the combined nonpoint sources are unlikely to be a problem during the defined critical period. Potential nonpoint sources named earlier include: stormwater runoff from the South Bend and Raymond urban areas, runoff from lumber mills, failing or inadequate septic systems, and livestock operations. Nonpoint sources throughout the study area (as far upstream as river mile 13.7 at "Old Willapa") were estimated during the technical study to have contributed only about one-half of one percent of the total impact to DO. The nonpoint loading estimate assumed the sources were steady, at their maximum loading rate during the critical dry-season period of this TMDL. But does "stormwater" loading really occur during July through September in the lower Willapa?

In fact, nonpoint loads to the tributaries and river are not constant, instead are driven by precipitation events; true stormwater pollution loads occur outside the window of this TMDL. The critical dry-season period evaluated in the model was a period of lowest seven-day average river flows with a recurrence interval of ten years (7Q 10). If a storm were to happen during the

low-flow critical period, the de minimus load of 0.5 percent estimated for the combined nonpoint sources would have even less impact than the model predicted, because of the dilution.

Hence, the estimated "stormwater" or other nonpoint source discharges have no reasonable potential to contribute to a violation of water quality standards, and there is no need to give them a water-quality based limit. It is important, however to assure that those sources don't become a problem. Several protective mechanisms already in place must continue:

- Stormwater from facilities covered by the *NPDES Industrial Stormwater General Permit* must continue to meet their permit conditions including, if required, sampling for BOD or NH<sub>3</sub>-N;
- Failing or inadequate septic systems must be found and corrected as required by local county health department ordinances and rules, as well as the overarching state laws of RCW 70.118.030 (County Health Departments will... "Identify failing septic tank drainfield systems in the normal manner and will use reasonable effort to determine new failures.");
- Agricultural livestock waste sources with risk of pollution runoff should continue to be managed according to farm plans approved by the local conservation district and/or using standard practices recognized by the United States Dept. of Agriculture Natural Resource Conservation Service;
- Urban stormwater sources will continue to be addressed according to local wastewater management plans, other local initiatives, or other approaches identified in the Western Washington Stormwater Guidance Manual.

## Margin of Safety

A margin of safety (MOS) is required by the Clean Water Act in all TMDLs to ensure that the TMDL is sufficiently protective of water quality when the uncertainty of the analysis is considered. The MOS may be explicit (*e.g.*, wasteload allocations set below the criterion) or implicit (*e.g.*, use of conservative assumptions) per Ecology and EPA TMDL protocol. The MOS for the Willapa Estuary Dissolved Oxygen TMDL is implicit. Conservative assumptions have been made where reasonable, such as assuming that critical conditions for tides, river discharge, pollutant loadings and other parameters coincide and are steady state. Conservative assumptions used in the TMDL model that provide an implicit MOS include:

- River discharge is steady state at the critical 7Q10 conditions.
- Nonpoint sources are at steady state critical conditions.
- The TMDL is based on the critical tidal condition.
- Algal productivity, which is normally present and contributes oxygen, is shut off.
- Water temperatures are set at the highest levels coinciding with dissolved oxygen below 6.0 mg/L (observed 7/17/95).

# Facility Responsibilities for Managing Pollution

## Raymond and South Bend

Industrial facility conditions have changed since the TMDL studies began in 1998; today the industry and city facilities collectively are managing their discharges within the allowable 0.2 mg./L DO deficit. Of the five facilities currently affected by this TMDL, facility planning is underway for both cities' wastewater treatment plants. Facility planning has been occurring since 1998, in a process parallel to the TMDL studies. Until the TMDL study was recently completed, it was felt that the facilities were causing too much of a DO deficit and that the TMDL would end up requiring facility corrections for that.

The TMDL and planning processes are somewhat related in that the TMDL found that facility improvements are needed for the community to grow and develop without creating future oxygen deficiencies in the Willapa River. Facility planning, however, has been driven more by inadequate treatment capacity at the plants as well as many violations of their NPDES permit limits. Inadequate plant capacity and permit violations have held back opportunity for community growth in recent years.

The municipal wastewater treatment facility planning to reduce BOD and ammonia discharges provides significant future value. Improvements will help ensure the community is prepared for industrial and residential growth without exceeding the remaining pollution loading capacity for DO. The facility planning is about *protecting the communities' future needs* rather than restoring a waterway suffocating today.

Because the Raymond WWTP has the largest impact on dissolved oxygen at the critical river location (mouth of the South Fork), several facility alternatives involve reducing ammonia in either the Raymond or Port of Willapa Harbor effluents. The cost estimates for the alternatives, not including operation and maintenance, range from \$1.6 million to \$3.2 million.

The Departments of Community Trade and Economic Development, and Ecology have been actively assisting the cities with their facility planning and with funding. That collaboration will continue.

## Seafood Processing Plants

This TMDL doesn't require any operation changes at the three seafood facilities. Coast Seafoods, East Point Seafoods, and South Bend Packers each have NPDES permits and are signatories on the Willapa Estuary Resource Management MOA that designates individual WLAs for all the permitted facilities. The TMDL technical study showed that based on 2002 and 2003 operating conditions each of the seafood operations were operating within the individual WLAs that they have agreed to uphold.

The WERM MOA describes the facilities' responsibilities to specifically monitor plant discharges as part of TMDL implementation. Monitoring will help the facilities collectively manage their discharges to meet the aggregate limits. Ongoing technical assistance by Ecology's facility permit managers is available to help the plants meet their permit limits.





## **Schedule of Management Roles and Actions**

The sequence for implementing TMDL activities starts with the Department of Ecology changing all of the facility NPDES permits to reflect the individual and aggregate facility WLAs and other provisions of the WERM MOA. Ecology will write the permit changes during 2006 and the changes will become effective 30 days after the new permit is approved.

The facilities will adhere to their MOA responsibilities, including performance of effluent sampling and reporting of monitoring results to Ecology. Ecology and the facilities will routinely evaluate the facilities performance of their individual and aggregate limits. That information will receive critical review when a new or increased facility discharge is proposed by WERM. (The information will be crucial to adaptive management considerations.)

The cities of South Bend and Raymond will continue with wastewater facility planning. Facility changes aren't required by this TMDL but improved wastewater operations will help provide continued protection of the receiving water and ensure community flexibility for economic development and community growth.

## **Measuring Progress Toward Goals**

### **The Effectiveness Monitoring Plan**

Effluent monitoring by the facilities will occur routinely to show that the aggregate limit is protected. That monitoring process was described in previous sections and is also in the WERM MOA (Appendix B). Ecology plans to continue sampling the receiving water as part of the monthly "Ambient Monitoring Program". Sampling stations are located at Johnson Slough (river mile 0.5), near the Port of Willapa Harbor docks in Raymond (river mile 6.4), and at Willapa Road where the tidal effects end. Those stations cover the impaired locations identified by this TMDL. Ecology will be responsible for determining compliance with the water quality standards.

## **Adaptive Management**

The WERM MOA describes the process for considering and qualifying changes to TMDL implementation (Appendix B). Review of the facilities NPDES monitoring reports for individual and aggregate loading to the river as well as ambient monitoring of the receiving water by Ecology will help show if any changes to the wasteload allocations are required or appropriate. Ecology will assess the critical season information each year.

An overview of the process for adapting WLAs to suit local needs and protect water quality is covered in the following excerpt from the WERM MOA: "*WERM's policy shall be to accommodate water-dependent economic development in Raymond and South Bend. Third parties requesting WLAs in the future, or existing WERM members seeking to expand, may be accommodated through adaptive management of the TMDL. The TMDL equation will guide all potential future WLA reallocations.*"

The following criteria will be considered favorably by WERM when considering modification of WLA allocations:

- Existing investments in treatment infrastructure (e.g., Port of Willapa Harbor's wastewater treatment facilities).
- Economic development benefits in terms of jobs per wasteload equivalent or similar surrogate
- Expansion of sewer service to meet population growth or respond to environmental health concerns. TMDL modifications for new or expanded dischargers shall be evaluated as follows:
- Any party inside or outside this MOA can convene WERM for purposes of proposing changes to the allocations, including any third party who would like a brand new allocation.
- The proposing party shall be obligated to demonstrate a need for revised WLAs by submitting an Engineering Report to Ecology as required under WAC 173-240-060 (municipal discharges) or WAC 173-240-130 (industrial discharges).
- If WERM and the third party (if applicable) are able to reach consensus on a reallocation plan, the recommendation will be forwarded to Ecology for approval.
- If no consensus is reached by WERM, then the decision shall be elevated to Ecology.

WERM shall have three months to reach consensus before the issue is elevated to Ecology, beginning on the date the Engineering Report is submitted to Ecology and WERM from the party seeking changes to the TMDL allocations.

Changes approved by Ecology shall be implemented by modifying affected NPDES permits. (excerpt from Appendix B).

If the adjustment of individual wasteload allocations results from a change to the 'TMDL Equation' (for example a change of facilities or their locations named in the TMDL Equation) such a modification of the TMDL must also be approved by EPA. Opportunity for public comment will be provided in the event of a proposed change to either the TMDL or NPDES permits.

The facilities are currently operating within the loading capacity of the river, and they have provided additional "cushion" in the reserve allocation. So there's some capacity now to fairly quickly accommodate *limited* changes to the loading if community or industrial growth occurs. Since the TMDL Equation governs the total amount of loading that can be safely discharged, all proposals to change the current facility loads will be determined according to local interests and decisions, as long as the total or aggregate wasteload is not increased. If a new facility enters the community and the TMDL Equation, then Ecology will also have a role through the NPDES permitting process for determining whether a new facility discharge is appropriate. Should the TMDL Equation be changed to accommodate such a need, Ecology will provide EPA a letter explaining the modified "TMDL Equation" to add as an errata or modification to the original

TMDL and NPDES permit (s). That kind of official TMDL modification (change of facilities or their locations named in the TMDL Equation) must be approved by EPA.

Implementing the MOA requirements and TMDL Equation is the major action needed for adaptive management.

## **Reasonable Assurances**

### **Current Implementation Efforts**

The MOA was signed by all of the affected parties. The facilities are already meeting TMDL goals, which include an implicit margin-of-safety.

The WERM MOA is a valuable tool for local management of the community industrial and community growth. It provides the TMDL Equation as a tool for controlling facilities' discharges, to assure group success. Also, WERM dedicated a small "reserve allocation" (Table 5) which provides some added safety measure, although the reserve is intended for accommodating future planned growth.

Official signatories to the WERM MOA include five facilities which are provided WLAs.

- City of Raymond
- City of South Bend
- East Point Seafoods
- Coast Seafoods
- South Bend Packers

By their signature to the MOA the parties agree to uphold their WLAs and collaborate with the other dischargers to maintain the aggregate WLA set for protecting the receiving water. In addition to meeting other elements of their NPDES permits all the facilities will conduct effluent sampling during the critical TMDL season and routinely report results to a local coordinator who will tally the results and keep Ecology informed.

Ecology will routinely monitor the facilities compliance with their permit responsibilities.

### **Supporting Regulations, Legal Agreements, and Enforcement**

The most significant assurance that water quality standards will be maintained is the wastewater facilities planning that the cities of Raymond and South Bend are doing. Planning is proceeding consistent with the NPDES permitting process. The city of South Bend has committed to complete their facility planning and implement certain improvements according to a court-approved settlement agreement with a private party. Expected outcomes of facility improvements by both cities are reduced discharges of BOD and ammonia which will serve the TMDL goals and better position the community for economic growth and development.

Washington's Water Pollution Control Act (Chapter 90.48 RCW) provides broad authority to issue permits and regulations, and prohibits all unpermitted discharges of pollutants to water. The act declares that it is state policy to maintain the highest possible standards to ensure the purity of all waters of the state and to require the use of all known, available, and reasonable means to prevent and control water pollution. The act defines waters of the state and pollution, and it authorizes Ecology to control and prevent pollution, to make and enforce rules, including water quality standards. Compliance with existing laws and legal agreements will prevent enforcement or other legal action by appropriate organizations.

## Public Involvement

Local community representatives and stakeholders have worked closely with Ecology during the development of this TMDL. A regional planning group was formed in 1997 to better plan for water and wastewater needs. Called the North Pacific County Infrastructure Action Team (NPCIAT), they became the local advisory group for this dissolved oxygen and other TMDL study projects in the Willapa River system. A discussion of the TMDL and related obligations were major discussion topics at monthly NPCIAT meetings for much of the past five years.

Ecology released a draft report in 2001 of preliminary TMDL findings and a range of possible or hypothetical options for reducing facility pollution discharges. The preliminary draft report indicated that major facility improvements and wasteload reductions would be needed to meet the TMDL targets. A cooperative effort of technical professionals representing Ecology, EPA and local interests worked through allocation options and identified an alternative approach which was acceptable to all. The solution proposed by the technical group is reflected in this final TMDL.

The WERM group, representing the facilities directly affected by the TMDL, was formed in 2004 to collectively develop wasteload allocations and implementation plans. The meetings were open and announced to the public, and often attended by Ecology. The wasteload allocations and implementation strategies in this report were developed collaboratively in the WERM meetings. Local buy-in of the final TMDL is perhaps best shown by the signatories to the WERM MOA: the cities and all three affected industrial plants, and Pacific County (Appendix B).

Throughout the study and report completion process Ecology invited public involvement by various methods: direct mailings, e-mail networks. At least eight articles in local newspapers, *The Willapa Herald*, and the *Aberdeen World*, reported on the project status. Ecology participated in more than 60 meetings with local interests affected by this project. A formal public comment process on the final draft report occurred from September 9 to October 10, 2005. Only four people submitted comments: two by e-mail indicating acceptance of the report, and two formal letters which are summarized in Appendix D, Responsiveness Summary.

## Funding Opportunities

Fortunately there are several sources of public funding to help the cities conduct wastewater facility planning and improvements. Facility improvements will be needed to meet the TMDL and community development goals over the long-term. Table 6 shows funding sources that the cities have utilized recently. Those financial opportunities are expected to continue, in the foreseeable future.

**Table 6. Grants and Loans for Public Wastewater Facilities**

Recipient	Name of \$ Source	Activity/Purpose of Funding	Date and Amount of Award
South Bend	State Revolving Fund Loan	Install improvements to reduce Inflow and Infiltration (I and I)	'02 \$1 M
South Bend	SRF loan	WWTP Construction Improvements	'06 \$804,000
South Bend	Public Works Trust Fund loan	Install I and I improvements	'03 ~\$982,000
NPCIAT: South Bend and Raymond	DOE SRF loan, Part A*	TMDL – related work (between 1999 and 2003): participation in TMDL development, testing of effluent for BOD, some TMDL development contract work by Cosmopolitan Engineering and Gray & Osborne	'99 \$212, 000 total for NPCIAT [\$80,690 spent by Raymond, \$59,216 spent by South Bend]
NPCIAT: South Bend and Raymond	DOE SRF loan Part B*	Wastewater facilities plan, Phase I	'99 (renewed '03)  [\$40,000 spent by South Bend]
NPCIAT: South Bend and Raymond	DOE SRF loan Part B*	General Sewer Plan and Wastewater Facilities Plan, Phase II	'99 (renewed '05) [\$35,000 for South Bend, \$63,000 for Raymond]
South Bend	Community Development Block Grant	General Sewer Plan and Wastewater Facilities Plan, Phase II	'05 \$35,000

Recipient	Name of \$ Source	Activity/Purpose of Funding	Date and Amount of Award
South Bend	Community Development Block Grant	Replace sewer laterals for up to 250 homes to reduce I and I	'05 \$382,000
Raymond	Community Development Block Grant	General Sewer Plan and Wastewater Facilities Plan	'05 \$35,000

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## Appendix A - List of Acronyms

303(d) list	List of water bodies that do not meet Washington State water quality standards
AKART	All known, available, and reasonable methods of treatment
BOD	Biochemical Oxygen Demand
CBOD <sub>5</sub>	Five-day Carbonaceous Biochemical Oxygen Demand; a measure of the oxygen-demand in a wastewater discharge
DIP	Detailed Implementation Plan
DMR	Daily Monitoring Report
DO	Dissolved Oxygen
DYNHYD	Mathematical model used to calculate the influence of river flows on pollution transport. Used in combination w/ the WASP 51t water quality model to determine loading capacity and an appropriate wasteload allocation for the receiving water
EOD	Equivalent Oxygen Demand ??(Wasteload allocation value that combines the effects of both CBOD and ammonia on dissolved oxygen )??
LA	Load Allocation (for river and tributaries)
MOA	Memorandum of Agreement
NH <sub>3</sub> -N	Ammonia nitrogen, an oxygen demanding substance in many wastewaters
NPCIAT	North Pacific County Infrastructure Action Team. This is a committee of local parties that have been working together for several years to conduct wastewater facility planning and compliance with water quality issues
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System. These are the permits issued by Department of Ecology that allows discharge of pollutants from point sources such as the municipal wastewater treatment plants and the seafood processors.
SIS	Summary Implementation Strategy
SRF	State Revolving Fund
TMDL	The Total Maximum Daily Load of pollution that can be discharged to a water body without causing a violation of a water quality standard. This TMDL assigns a <i>maximum weekly load</i> .
TMDL Study	A study to determine the total maximum daily load that can be discharged to a water body without causing a violation of a water quality standard.
WASP51t	Water Analysis Simulation Program. This is the updated water quality computer program, along with the input file WRBK2.INP that established the natural background conditions for dissolved oxygen in the Willapa Estuary.
WERM	Willapa Estuary Resource Management Partnership.

WLA Waste Load Allocation. A defined amount of pollution that a municipality or industry may legally discharge, once that waste load allocation is incorporated into a discharge permit.

WWTP Waste Water Treatment Plant

# Appendix B- WERM MOA

## WILLAPA ESTUARY RESOURCE MANAGEMENT PARTNERSHIP MEMORANDUM OF AGREEMENT

### 1.0 BACKGROUND

The Willapa River is located in Pacific County in southwestern Washington State. The river drains approximately 200 square miles of mostly forest and agricultural land before flowing into Willapa Bay. The lowest seven miles of the river are estuarine, an area where salt water from Willapa Bay mixes with fresh water in the river. Most of the watershed's population centers and businesses are located in this lower reach of the river. Dissolved oxygen in this area of the river occasionally falls below the state water quality standard of 6 mg/L during late summer (July through September).

In the late 1990's, Ecology began a TMDL study of the river to determine the cause of intermittent low dissolved oxygen. Pacific County assumed responsibility for completing the study in 2002 and subsequently determined that low dissolved oxygen levels are in part a natural condition of salt water in the estuary, and in part a result of the combined effects of several discharges of CBOD<sub>5</sub> and NH<sub>3</sub>-N.

### 2.0 PURPOSE

The purposes of the Willapa Estuary Resource Management (WERM) Partnership are to (1) provide local control over the distribution of wasteload allocations in the months of July through September pertaining to the dissolved oxygen TMDL, and (2) coordinate implementation of controls necessary to comply with these requirements. Local control over the distribution of wasteload allocations will allow the community to balance economic, engineering and ecological priorities in the implementation of the TMDL.

The goals of WERM shall include:

- Provide maximum stakeholder involvement in TMDL implementation
- Achieve cost efficient compliance with the dissolved oxygen TMDL
- Determine equitable wasteload allocations based on demonstrated need
- Promote economic development through adaptability of TMDL allocations

### 3.0 GOVERNANCE

#### 3.1 Membership

WERM membership shall consist of Ecology and directly affected parties; that is, the local governments and businesses that have or contribute to the NPDES-permitted wastewater discharges. Initial members shall include:

- Raymond
- Port of Willapa Harbor
- Weyerhaeuser

- City of South Bend
- Pacific County
- East Point Seafoods
- South Bend Packers
- Coast Seafoods
- Department of Ecology (*ex-officio* status)

Membership is voluntary. Any signed member may opt out of this MOA at any time by written notice.

If a business or individual expresses a desire to be a member of WERM, and can demonstrate that their interest or operation is affected by the recommendations of WERM, they shall be added to the membership by signing on to this agreement. The need for an allocation shall be demonstrated through submission of an engineering report, which is required under WAC 173-240-060 or –130.

### *3.2 Authority*

The authority to establish wasteload allocations and implement the TMDL through NPDES permits rests exclusively with Ecology. Therefore, WERM shall have only advisory capacity and be capable of no binding agreements. However, Ecology shall not implement the TMDL contrary to consensus decisions of WERM without written explanation of cause.

### *3.3 Decisions*

The decisions and recommendations of WERM shall be by consensus only. Any party may participate in the meetings, but only WERM members shall be polled for the consensus decisions. Ecology shall be an *ex-officio* member of WERM, participating in an observational and advisory capacity only.

### *3.4 Amendments*

Amendments to this agreement shall require the written approval of all WERM members.

### *3.5 Disputes*

WERM shall be the first venue to resolve any disputes pertaining to the allocations and implementation of the dissolved oxygen TMDL. If WERM is unable to resolve such dispute through development of a consensus, the dispute shall be elevated to Ecology for resolution. WERM shall have two months to resolve any such dispute after receiving written notification from an aggrieved party before it is elevated to Ecology.

### *3.6 Meetings and Notices*

All WERM meetings shall be open to the public. WERM shall maintain an email distribution list of interested or participating parties that will be notified of meetings and provided minutes after

all meetings. Meetings shall not follow any established schedule, but shall be conducted on an as-needed basis when called for by its members.

#### 4.0 STIPULATIONS

##### 4.1 TMDL Model and Equation

All parties to this agreement stipulate that the TMDL shall be defined by the WASP model. The current NPDES-permitted discharges to the Willapa Estuary include the City of Raymond WWTP, City of South Bend WWTP, East Point Seafoods, South Bend Packers and Coast Seafoods. The TMDL may be established by any combination of CBOD<sub>5</sub> and NH<sub>3</sub>-N loadings (expressed in lbs/day weekly average) from the current dischargers that satisfies the following TMDL equation:

+	(0.207) CBOD <sub>5R</sub>	+	(0.420) NH <sub>3</sub> -N <sub>R</sub>	≤ 199 µg/L
+	(0.067) CBOD <sub>5SB</sub>	+	(0.132) NH <sub>3</sub> -N <sub>SB</sub>	
+	(0.031) CBOD <sub>5EP</sub>	+	(0.178) NH <sub>3</sub> -N <sub>EP</sub>	
+	(0.027) CBOD <sub>5SBP</sub>	+	(0.155) NH <sub>3</sub> -N <sub>SBP</sub>	
+	(0.019) CBOD <sub>5CS</sub>	+	(0.109) NH <sub>3</sub> -N <sub>CS</sub>	

Where:

R	=	Raymond WWTP
SB	=	South Bend WWTP
EP	=	East Point Seafoods
SBP	=	South Bend Packers
CS	=	Coast Seafoods

The coefficient units are in µg/L *per* lbs/day weekly average discharge. For example, 0.207 is 0.207 µg/L *per* lbs/day of weekly average discharge.

##### 4.2 Community Resource

All parties agree that wasteload allocations are a community resource and not a private or public capital asset. There is no implicit or explicit transferability of assigned wasteload allocations by the permit holders.

##### 4.3 AKART and Water Quality-based Requirements

All parties acknowledge that there are requirements for AKART technology-based effluent limits imposed by RCW 90.48, 40 CFR 122, 40 CFR 133 WAC 173-221 for CBOD<sub>5</sub>, and water quality-based limits for NH<sub>3</sub>-N applied at mixing zone boundaries established in WAC 173-201A. No wasteload allocations shall be authorized that do not comply with these requirements.

#### 5.0 INITIAL WASTE LOAD ALLOCATIONS

The first task of WERM shall be to set equitable initial WLAs for the existing dischargers. The TMDL may initially be fully allocated to the existing dischargers based on demonstrated needs, or there may be an allocation set aside for future needs.

### *5.1 Principles*

This agreement does not include specific criteria that will be used by WERM to set the initial allocations. However, all parties agree that the following principles will guide the allocations:

- Existing dischargers will be required to demonstrate realistic needs for numerical wasteload allocations through past effluent or production data, and/or the 2004 monitoring data described below. Effluent monitoring shall not be the exclusive measure for establishing the allocations.
- Existing investments in treatment infrastructure shall be beneficially considered in setting the allocations (*e.g.* Port of Willapa Harbor's wastewater treatment facilities).
- Economic development benefits in terms of jobs per wasteload equivalent or similar surrogate shall be beneficially considered.
- Expansion of sewer service to meet population growth or respond to environmental health concerns shall be beneficially considered.

### *5.2 Discharge Monitoring*

Each discharger shall participate in an expanded effluent monitoring program for CBOD<sub>5</sub> and ammonia-N during the months of July through September 2004. The monitoring shall be conducted according to a Sampling and Analysis Plan prepared by NPCIAT.

### *5.3 Facility Planning*

The Cities of Raymond and South Bend shall resume wastewater facility planning per WAC 173-240 that began in 1998. The planning shall include projections of wastewater flows and loadings, treatment plant improvements, and projected loadings of CBOD<sub>5</sub> and ammonia-N. TMDL compliance shall be one of the criteria considered in the planning.

The East Point Seafoods, South Bend Packers and Coast Seafoods shall continue to review their operations and look for cost effective opportunities to reduce their wasteload through best management practices.

### *5.4 Workshop*

WERM shall convene a workshop or series of workshops in the first quarter of 2005 to establish the initial WLAs. The workshop shall include the following:

- Summary of effluent monitoring data from July-September 2004
- Summary of facility planning status and results
- Brainstorming allocation alternatives meeting the TMDL equation
- Establish consensus on the recommended allocations

If WERM fails to reach a consensus on the initial WLAs by April 1, 2005, the initial WLAs will be established by Ecology.

## **6.0 IMPLEMENTATION PLAN**

The TMDL Water Cleanup Plan developed by Ecology must include an implementation plan. The implementation plan shall include the following:

- The implementation plan shall include the TMDL equation presented above, with language that allows Ecology to modify the WLAs in the future as long as the equation is satisfied, subject to AKART, mixing zone requirements, and public participation.
- WLAs shall be implemented through NPDES permits that are updated simultaneously for each of the point source dischargers. The WLAs shall be implemented as weekly-average CBOD<sub>5</sub> and NH<sub>3</sub>-N mass limits.
- The NPDES permits shall also include aggregate limit provisions (*a.k.a.* bubble limit). The aggregate limit would be established by the TMDL equation presented above. Details of the aggregate limits are described below.

### *6.1 Aggregate Limits*

NPDES permits may include aggregate limit provisions. In addition to the individual WLAs assigned from the TMDL, each permit may contain the aggregate limit for all discharges defined from the TMDL equation. As long as the technology-based and aggregate limits are met, permit holders shall be in compliance with the permits and no action shall be taken on individual performance. If the cumulative limit is exceeded, enforcement would be taken on the facility or facilities that exceed their individual WLA.

Inclusion in the aggregate limit would be strictly voluntary. If any discharger does not want to be in the aggregate group, only their individual WLAs are reflected in their NPDES permit. In this event that WLA would be subtracted from the aggregate limits for other parties according to the TMDL equation.

### *6.2 Effluent Limits, Monitoring and Enforcement*

The following provisions apply to the implementation of the TMDL in NPDES permits:

- NPDES permits shall include technology-based limits for BOD<sub>5</sub> or CBOD<sub>5</sub> and may include water quality-based limits for ammonia as determined from site-specific mixing zone studies.
- TMDL-based permit limits shall be expressed as lbs/day for weekly average, and shall apply only during July through September.
- Each permit holder included in the aggregate limit shall have effluent monitoring requirements that are coordinated with each of the other permit holders, as stipulated in each NPDES permit. Monitoring shall be subject to oversight established in a QA/QC plan developed by WERM and approved by Ecology. Failure to comply with the effluent monitoring stipulated in the approved QA/QC plan shall be subject to enforcement by Ecology.
- Individual effluent data shall be included in each discharger's own NPDES Daily Monitoring Reports (DMRs). An appointee of WERM shall be responsible for compiling the weekly averages and calculating the aggregate discharge for each week. This result would then be entered onto the DMRs for each discharger. DMRs would be submitted monthly to Ecology as usual.

- If the aggregate limit is exceeded in any week, then any discharger that also exceeded its individual limits would be subject to enforcement by Ecology. Any discharger that met their individual limit would not be subject to enforcement. If the aggregate limit is met, no discharger would be subject to enforcement, subject to technology-based and water quality-based limitations described above.

### 6.3 Growth Provisions

The initial WLAs may include no reserve allocation for new or expanded discharges in the future. However, WERM’s policy shall be to accommodate water-dependent economic development in Raymond and South Bend. Third parties requesting WLAs in the future, or existing WERM members seeking to expand, may be accommodated through adaptive management of the TMDL. The TMDL equation will guide all potential future WLA reallocations.

The following criteria will be considered favorably by WERM when considering modification of WLA allocations:

- Existing investments in treatment infrastructure (*e.g.* Port of Willapa Harbor’s wastewater treatment facilities).
- Economic development benefits in terms of jobs per wasteload equivalent or similar surrogate.
- Expansion of sewer service to meet population growth or respond to environmental health concerns. TMDL modifications for new or expanded dischargers shall be evaluated as follows:
  - Any party inside or outside this MOA can convene WERM for purposes of proposing changes to the allocations, including any third party who would like a brand new allocation.
  - The proposing party shall be obligated to demonstrate a need for revised WLAs by submitting an Engineering Report to Ecology as required under WAC 173-240-060 (municipal discharges) or WAC 173-240-130 (industrial discharges).
  - If WERM and the third party (if applicable) are able to reach consensus on a reallocation plan, the recommendation will be forwarded to Ecology for approval.
  - If no consensus is reached by WERM, then the decision shall be elevated to Ecology.

WERM shall have three months to reach consensus before the issue is elevated to Ecology, beginning on the date the Engineering Report is submitted to Ecology and WERM from the party seeking changes to the TMDL allocations.

Changes approved by Ecology shall be implemented by modifying affected NPDES permits.

## 7.0 PUBLIC PARTICIPATION

The recommended TMDL allocations and implementation plan shall be presented to the public, and comments shall be solicited, prior to submittal to EPA for final approval. Ecology shall



publish and make available through public notice a draft Water Cleanup Plan. Following the public notice, WERM shall host a public meeting held in Raymond or South Bend to present the results and recommendations of the TMDL and solicit oral and written public comments. All future NPDES permit modifications shall also include public notice and comment.

## 8.0 GLOSSARY

AKART	All known, available and reasonable treatment. This is a requirement in state law requiring minimum levels of treatment for wastewater discharges.
Consensus	The concurrence and/or consent of all of the parties. “Consensus” does not necessarily mean unanimous agreement, but it means, at the least, that the parties can live with the decision for the sake of proceeding.
CBODs	Five-day Carbonaceous Biochemical Oxygen Demand; a measure of the oxygen-demand in a wastewater discharge.
Ecology	The Washington State Department of Ecology.
NH <sub>3</sub> -N	Ammonia nitrogen, an oxygen demanding substance in many wastewaters.
NPCIAT	North Pacific County Infrastructure Action Team. This is a committee of local parties that have been working together for several years to conduct wastewater facility planning and compliance with water quality issues.
NPDES	National Pollutant Discharge Elimination System. These are the permits issued by Department of Ecology that allows discharge of pollutants from point sources such as the municipal wastewater treatment plants and the seafood processors.
TMDL	The total maximum pollution load (usually a <i>daily</i> load, or <i>TMDL</i> ) that can be discharged to a water body without causing a violation of a water quality standard.
TMDL Study	A study to determine the total maximum daily load that can be discharged to a water body without causing a violation of a water quality standard.
WASP	Water Analysis Simulation Program. This is the computer program, along with the input file WRBK2.INP that establishes the natural background conditions for dissolved oxygen in the Willapa Estuary.
WLA	Waste Load Allocation. A defined amount of pollution that a municipality or industry may discharge, once that waste load allocation is incorporated into a discharge permit.
WERM	Willapa Estuary Resource Management Partnership.

**9.0 SIGNATURE PAGE**

The following entities shall enter into this MOA by action of the authorized signatures below:

**SIGNATURES**

  
\_\_\_\_\_  
For the City of Raymond

8/25/04  
Date

  
\_\_\_\_\_  
For the City South Bend

8/25/04  
Date

  
\_\_\_\_\_  
For Pacific County


8/25/04  
Date

  
\_\_\_\_\_  
For the Port of Willapa Harbor

8/25/04  
Date

  
\_\_\_\_\_  
For Eastpoint Seafoods

8/26/04  
Date

  
\_\_\_\_\_  
For South Bend Packers

8/25/04  
Date

  
\_\_\_\_\_  
For Coast Seafoods

8/25/04  
Date

~~\_\_\_\_\_  
For Weyerhaeuser~~

~~\_\_\_\_\_  
Date~~

  
\_\_\_\_\_  
For Washington Department of Ecology

11/9/04  
Date

# **Appendix C**

## **Lower Willapa River Dissolved Oxygen TMDL Submittal Report**

***Prepared for:***

**Pacific County  
300 Memorial Avenue  
South Bend, Washington 98586**

***Prepared by:***

**Cosmopolitan Engineering Group  
117 South 8<sup>th</sup> Street  
Tacoma, Washington 98402  
June 2005  
PAC001**

Civil, Environmental, and Recreational Consulting

**8<sup>th</sup> & Pacific  
117 South 8<sup>th</sup> Street  
Tacoma, WA 98402  
253-272-7220  
Fax: 253-272-7250**

The report forms the technical basis for the Willapa Dissolved Oxygen TMDL

A paper copy of the report is available at the Department of Ecology Southwest Region Office, and  
Office of Cosmopolitan Engineering Group



# Appendix-D

## Responsiveness Summary

The draft report was circulated and discussed with the primary affected interests at a meeting on September 9, 2005. A display ad announcing and providing instruction for involvement in a 30-day public comment opportunity was published in the local Willapa Herald newspaper.

Four parties responded with written comments. Favorable comments were received from Bryan Harrison, Pacific County Administrator and Bill Fox, principal of Cosmopolitan Engineering who represented the County and affected permit holders as their primary technical agent for completing the TMDL. We believe those positive responses are representative of the other local interests affected by the TMDL. The local Memorandum of Agreement in Appendix B of this report is further evidence that the community supports the TMDL wasteload allocations. The TMDL and water quality trading process it provides, gives the community a way to keep their river clean as well as plan ahead for responsible growth and economic development.

Comment letters were supplied by Ken Johnson of Weyerhaeuser Company, on behalf of their sawmill operation in Raymond, and by U.S.E.P.A Region 10 who have responsibility for approving the TMDL. The correspondence is included in this appendix.

### Summary of Comments:

#### Weyerhaeuser Company sawmill-

Mr. Johnson did not disagree with the technical validity or findings of the TMDL. He offered two points:

- 1) He understood that the TMDL study found the river to be meeting state standards for dissolved oxygen and suggested that the river should be 'delisted' to absolve the need for a TMDL.
- 2) He also said that if/when the TMDL was approved, the sawmill and other local operations currently covered by the *Industrial Stormwater General Permit* would ask to be covered instead by the TMDL stormwater management requirements. He felt that their current general stormwater permit would no longer be relevant or needed.

#### *Department of Ecology Response:*

1) The lower Willapa River was actually found to not be meeting the state standard during the low flow summer months, the standard being in this case the natural condition of the river. The study found that oxygen in the river fell below natural conditions, an impairment caused by the dischargers. In cases where the natural condition is the criteria, state standards allow a lowering of dissolved oxygen levels, up to 0.2 mg/L below natural conditions, from human sources. While the facilities collectively are operating within the allowable deficit, they are consuming half of that allowable capacity, collectively causing the river to fall about 0.1 mg/L below natural conditions. The TMDL is needed in order to ensure that the facilities and other sources don't exceed the allowable deficit of 0.2 mg/L. The other local facilities acknowledge that and are

committed to apply the TMDL process to keep the river clean and the community open to growth.

2) The TMDL doesn't change responsibilities for the Weyerhaeuser sawmill. For the mill, the TMDL only says that the facilities with general stormwater permit coverage must continue to meet those permit requirements. The *Industrial Stormwater General Permit* represents conditions of the federal National Pollutant Discharge Elimination System. Weyerhaeuser sawmill and the other facilities cannot be excused from those requirements because a TMDL is in place for the water receiving the facilities' discharges.

Environment, Health & Safety

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EC2-2C1  
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Federal Way, WA 98063-9777  
Telephone: (253) 924-3426  
Fax: (253) 924-2013  
E-Mail: ken.johnson@weyerhaeuser.com

October 5, 2005

Dave Rountry  
Water Quality Program  
Washington Department of Ecology  
P. O. Box 47775  
Olympia, WA 98504-7775

Subject: Willapa River Dissolved Oxygen Total Maximum Daily Load (Water Cleanup Plan) – Submittal Report and Detailed Implementation Plan

Dear Mr. Rountry:

Thank you for the opportunity to offer comments on the draft Water Cleanup Plan (September 2005). Our comment relates to the linkage of conclusions presented in this Water Cleanup Plan with Ecology's presentation of information in the 2002/2004 Clean Water Act Section 303(d)/305(b) report.

The draft Water Cleanup Plan states on page 2 that

“Modeling found that natural conditions cause the river to fail DO standards during the critical season (Cosmopolitan, 2005).”

The draft Water Cleanup Plan moves on to say that NPDES permitted dischargers are not causing greater than the 0.2 mg/l dissolved oxygen deficit allowed by WAC 173-201A. In essence, the technical analysis found the lower Willapa River to be compliant with the dissolved oxygen criterion.

This determination needs to effect the development of the 303(d) list. Table 1 on page 6 of the draft Water Cleanup Plan identifies the proposed 303(d) Category 5 waterbody segment listings for dissolved oxygen in the lower Willapa. Ecology's technical analysis now indicates these waterbody segments should be listed in Category 1 or 2.

While the presentation of this draft Water Cleanup Plan and Ecology's work on the current 303(d) list are slightly out-of synch, we note that EPA has yet to make a regulatory determination on the 303(d) list submitted by Washington in spring 2005. We would encourage Ecology to contact EPA for the purpose of updating the lower Willapa River dissolved oxygen listings.

This regulatory action would yield multiple benefits for both NPDES permit holders and Ecology. First, a decision not to place lower Willapa waterbody segments in Category 5 will alleviate the requirement imposed on stormwater dischargers authorized under the Industrial Stormwater General Permit to monitor for dissolved oxygen (re. ISWGP Special Condition S3.G. and assuming the EPA's approval of the 303(d) list precedes approval of this TMDL). Second, if the water bodies stay on the Category 5 list and this TMDL is eventually approved by EPA, ISWGP permit holders will eventually request that requirements of the TMDL supersede current ISWGP requirements and Ecology will need to respond with an administrative order. (re: ISWGP Special Condition S3.E.) Unwillingness to update the list now simply creates additional work in the future. Third, although the renewal of the Construction Stormwater General Permit is not finalized, a parallel set of work requirements on eligible construction projects discharging to 303(d)-listed or TMDL controlled waters could likely be avoided with proper categorization of the lower Willapa.

Thank you for your consideration of these comments.

Sincerely,

Ken Johnson  
Washington Regulatory Affairs Manager

cc Melissa Gildersleeve - WDOE  
Susan Braley – WDOE  
Dave Roane  
Connie Hamilton



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10  
1200 Sixth Avenue  
Seattle, WA 98101

Rec'd  
11/3  
[Signature]

October 18, 2005

Dave Rountry  
Washington State Department of Ecology  
Water Quality Program  
P.O. Box 47600  
Olympia, WA 98504-7600

Subject: Comments on the Willapa River Dissolved Oxygen Draft Total Maximum Daily Load (TMDL)

Dear Dave,

Thank you for the opportunity to comment on the Willapa River Dissolved Oxygen (DO) TMDL. The partnership between the Willapa Estuary Resource Management Group (WERM) and Ecology has resulted in an innovative approach to address water quality in the Willapa River. EPA appreciates the work that Ecology and WERM have invested to protect aquatic life and fish habitat. The TMDL Equation is a creative approach that is appropriate for the Willapa River's unique watershed characteristics, pollutant sources, and critical location. However, this TMDL Equation approach may not be appropriate in other watersheds, and many factors should be considered before the approach is used in areas other than the Willapa River.

As you know, the EPA TMDL program cannot and does not approve implementation language in the TMDL, including NPDES permits, enforcement, and compliance. However, we look forward to the implementation of the TMDL wasteload allocations in the NPDES permits. During oversight review of Ecology's draft NPDES permits, EPA's NPDES program will determine whether the implementation of the wasteload allocations is appropriate within the permits.

We appreciate your work in this complicated watershed. If you have questions, please feel free to contact me by phone at (206)553-6328 or by e-mail at [Wu.Jennifer@epa.gov](mailto:Wu.Jennifer@epa.gov).

Sincerely,

A handwritten signature in cursive script that reads "Jennifer C. Wu".

Jennifer Wu  
EPA TMDL Project Manager  
Watershed Restoration Unit