Grays Harbor/Chehalis Watershed Fecal Coliform Bacteria Total Maximum Daily Load

Submittal Report

December 2002
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Background

Grays Harbor is currently listed under section 303(d) of the federal Clean Water Act as not meeting water quality standards for fecal coliform bacteria because of inadequate controls of point or nonpoint sources (Table 1). Section 303(d) requires the states and USEPA to establish "Total Maximum Daily Loads" (TMDLs) for all waterbodies that are not meeting water quality standards because of inadequate controls of point or nonpoint sources. A complete TMDL includes problem identification, technical analysis to determine the capacity of a waterbody to assimilate pollutant discharges, establishing allocations of pollutant loading to various point and nonpoint sources, public participation, and development and implementation of cleanup strategies for the waterbody. The Summary Implementation Strategy of this report was prepared by an advisory group representing many affected interests (Appendix A). People affected by the TMDL will have the chance to participate in ongoing cleanup planning. Cleanup strategies identified in this report serve to fortify current cleanup efforts as well as focus additional efforts towards priority locations of pollution identified by the TMDL study. As ongoing monitoring further clarifies water quality conditions and priority sources in the watershed to focus on, cleanup strategies will be adjusted accordingly. An update to the Summary Implementation Strategy (conceptual cleanup plan) section of this report will be drafted, with local participation, approximately one year after EPA approves this interim cleanup plan.

Shellfish growers in the outer harbor are experiencing repeated temporary closures due to violations of fecal coliform discharge limits in existing point source permits. Limited sampling data also indicate that nonpoint sources of fecal coliform may be a concern in outer areas of Grays Harbor. Other examples of potential bacteria pollution sources include failures of pumping stations for sewage collection systems, septic systems, livestock operations, dairy farms, agriculture and hobby farms, urban areas, industrial operations, and wildlife. Infiltration and inflow (I&I) of groundwater and surface water into sewage collection systems can lead to bypasses and overflows of untreated sewage into the harbor. Efforts to reduce I&I have significantly reduced the frequency of sewage bypasses and overflows since the 1980s. The state Department of Health (DOH) has been particularly active with this issue.

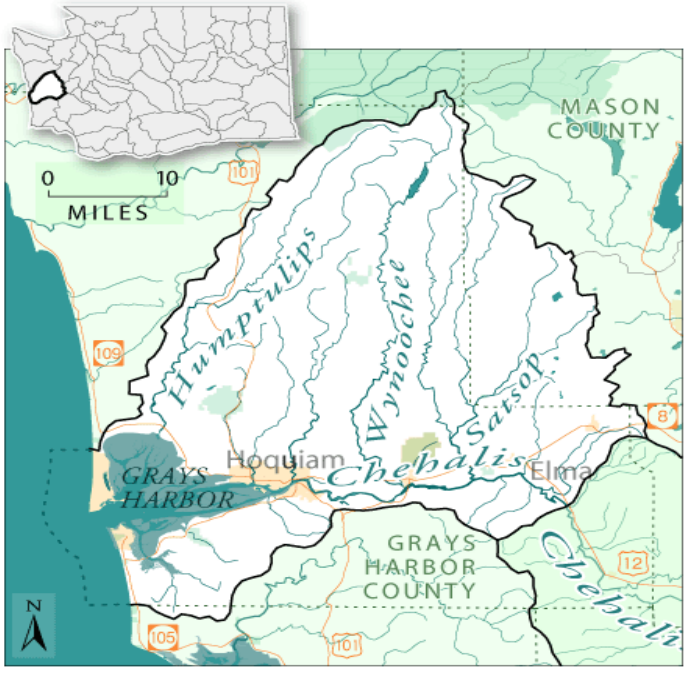

Figure 1. Map of Project Study Area

Applicable Criteria

The outer region of Grays Harbor, west of longitude 123 degrees 59'W, is designated class A marine water according the state of Washington water quality standards (WAC 173-201A). The class A marine standards contain criteria for fecal coliform to reduce the chance of people becoming ill after eating shellfish or as a result of swimming in natural water bodies. Ecology's current class A marine standard for bacteriological pollutants is based on the use of fecal coliform as an indicator of fecal contamination by humans and other warm-blooded animals. Ecology's current water quality standards for Class A waterbodies are as follows:

> *"Fecal coliform organism levels shall both not exceed a geometric mean value of 14 colonies/100 ml, and not have more than 10 percent of all samples obtained for calculating the geometric mean value exceeding 43 colonies/100 ml."*

Ecology's threshold levels of fecal coliform in the water quality standards match those of the Department of Health (DOH) and Federal Drug Administration (FDA) for class A marine waters. Ecology's standards do not specify a minimum number of samples. Ecology's standards specify that averaging of data beyond a thirty-day period, or beyond a specific discharge event under investigation, shall not be permitted when such averaging would skew the data set so as to mask non-compliance.

The inner region of Grays Harbor, east of longitude 123°59' W to longitude 123°45'45" W (Cosmopolis Chehalis River, river mile 3.1) is designated class B marine water, which allows for a geometric mean concentration of 100 colonies/100 ml with no more than 10 percent of samples greater than 200 colonies/100 ml.

All tributaries entering Grays Harbor, with the exception of the lower reaches of the Hoquiam and Wishkah Rivers, are designated class A freshwater, which allows for a geometric mean concentration of 100 colonies/100 ml with no more than 10 percent of samples greater than 200 colonies/100 ml. The standards are set to protect human health during recreational activities in the water.

The Hoquiam River from the mouth to river mile 9.3, and the Wishkah River from the mouth to river mile 6 are designated class B freshwater, which allows for a geometric mean concentration of 200 colonies/100 ml with no more than 10 percent of samples greater than 400 colonies/100 ml. Upstream reaches of the Hoquiam and Wishkah Rivers are designated class A freshwater.

Water Quality and Resource Impairments

Grays Harbor is currently listed under section 303(d) of the federal Clean Water Act as not meeting water quality standards for fecal coliform bacteria because of inadequate controls of point or nonpoint sources. The study area shown in Figure 1 includes thirty-three listed and otherwise impaired waters.

Listed segments are identified in Table 1. Additional impaired waterbodies identified during the study, for which load allocations have been calculated, are shown in Table 2. The waters named in Table 2 would have been included on the 303-d list had the water quality exceedances been

known at the time the list was compiled. The TMDLs provided for the non-listed water quality-limited segments meet all the technical requirements of a TMDL. Specific load allocations are identified for all segments, seasonal variation has been considered, and a margin-of-safety is included in the TMDL. The additional impaired segments will not have to be added to the next 303-d list because they are adequately addressed by this submittal report.

Cleanup strategies recommended in this report pertain to locations named in Tables 1 and 2, plus more 303(d) listed sites occurring in the upper Chehalis basin (Table3). The sites in Table 3 occur upstream of Porter, outside the area of this TMDL study. Because the upper sites collectively contribute approximately 40 percent of the fecal coliform bacteria load to Grays Harbor, cleanup strategies needed to achieve beneficial uses of water downstream and in Grays Harbor also pertain to the sites listed in Table 3. Numerical load allocations for the listed segments in the upper basin will be determined and submitted to EPA later in 2002.

Table 1. Streams and harbor sites in Chehalis/Grays Harbor Watershed on the 1996 and 1998 303(d) lists for FC bacteria

Location of listing	Old WBID	New Segment	1998 303-d list	1996 303-d list
Outer Grays Harbor	WA-22-0020	390 KRD	Yes	Yes
Inner Grays Harbor	WA-22-0030	390 KRD	Yes	Yes
Inner Grays Harbor	WA-22-0030	DS 29 ZH	Yes	No
Chehalis River	WA-22-4040	PB 33 WC	Yes	Yes

Table 2. Impaired waterbodies identified during study that have been given load allocations.

Tributaries to Grays Harbor	Recommended % reduction to meet freshwater or marine standard based on maximum month	Target maximum monthly geometric mean after rollback (colonies per 100 ml)	Percent of total load to Grays Harbor from all sources before rollback	Total fecal coliform load during 5/1/97 - 4/30/98 (colonies/ year)	Reduction needed to meet water quality standard (colonies/ year)	Load allocation to meet water quality standard (colonies/ year)
Chehalis River (excluding Satsop and Wynoochee)						
- based on 1988-98 samples aggregated by month	74%	30	50.0%	6.79E+15	5.00E+15	1.80E+15
Other tributaries (1)						
Humptulips R nr mouth (rollback to meet marine WQS)	67%	38	8.8%	1.20E+15	8.06E+14	3.97E+14
Satsop River	29%	95	7.9%	1.08E+15	3.13E+14	7.65E+14
Wishkah R near mouth (hypothetical class A)	62%	100	6.3%	8.60E+14	5.32E+14	3.28E+14
Wishkah R above river mile 6	78%	100	--	--	--	--
Hoquiam R near mouth (hypothetical class A)	58%	50	5.4%	7.39E+14	4.31E+14	3.08E+14
West Fork Hoquiam R above river mile 9.3 (Dekay Rd)	37%	58	--	--	--	--
East Fork Hoquiam River	14%	100	--	--	--	--
Wynoochee River	0%	83	3.2%	4.36E+14	0.00E+00	4.36E+14
Elk R nr mouth (rollback to meet marine WQS)	90%	40	2.8%	3.82E+14	3.44E+14	3.82E+13
Johns River near mouth	51%	73	2.4%	3.29E+14	1.69E+14	1.60E+14
Unnamed Central Park creek	94%	32	1.2%	1.64E+14	1.54E+14	1.02E+13
Grass Creek	67%	20	0.70%	9.56E+13	6.40E+13	3.15E+13
Chenois Creek	37%	34	0.66%	8.93E+13	3.28E+13	5.66E+13
Newskah Creek	28%	69	0.54%	7.39E+13	2.10E+13	5.29E+13
Charlie Creek	61%	100	0.51%	6.91E+13	4.25E+13	2.67E+13
Andrews Cr nr mouth (rollback to meet marine WQS)	90%	13	0.43%	5.78E+13	5.21E+13	5.78E+12
Elliot Slough	27%	100	0.33%	4.44E+13	1.18E+13	3.25E+13
Barlow Creek	79%	70	0.33%	4.43E+13	3.52E+13	9.10E+12
Grayland Ditch	71%	100	0.32%	4.31E+13	3.07E+13	1.24E+13
Oleary Creek	68%	95	0.28%	3.80E+13	2.60E+13	1.20E+13
Indian Creek	78%	34	0.28%	3.78E+13	2.94E+13	8.43E+12
Redman Slough	89%	100	0.13%	1.76E+13	1.58E+13	1.86E+12
Stafford Creek	71%	99	0.13%	1.75E+13	1.23E+13	5.12E+12
Chapin Creek	54%	50	0.10%	1.42E+13	7.63E+12	6.58E+12
Campbell Creek	66%	46	0.09%	1.25E+13	8.23E+12	4.32E+12
Unnamed Westport creek	92%	100	0.09%	1.22E+13	1.13E+13	9.30E+11
Dempsey Creek	53%	58	0.05%	6.15E+12	3.24E+12	2.91E+12
Other small tributaries	--	--	0.11%	1.56E+13	--	1.56E+13
Urban Drains (2)	98%	15	2.5%	3.40E+14	3.33E+14	7.48E+12
Total	65%			1.30E+16	8.48E+15	4.53E+15

1) maximum of 30-day geometric means and 90th percentiles of regression estimates of daily concentrations from 5/1/97 - 4/30/98.

2) based on geometric means and upper 90th percentiles of all samples during the study from 11 urban drains in the Aberdeen-Hoquiam-Cosmopolis areas.

Table 3. 303(d) listed surface waters in the Upper Chehalis Watershed upstream of Porter.

Location of listing	Old WBID	New Segment	1998 303-d list	1996 303-d list
*Chehalis River	WA-23-1010	DS 29 ZH	Yes	Yes
*Scatter Creek	WA-23-1018	AQ 85 FY	Yes	Yes
*Lincoln Creek	WA-23-1019	AP 15 HC	Yes	Yes
*Lincoln Creek	WA-23-1019	AP 15 HC	Yes	No
*Chehalis River	WA 23-1020	DS 29 ZH	Yes	Yes
*Chehalis River	WA-23-1020	DS 29 ZH	Yes	No
*Salzer Creek	WA-23-1023	QF 44 VO	Yes	Yes
*Salzer Creek	WA-23-1023	QF 44 VO	Yes	No
*Dillenbaugh Creek	WA-23-1027	EV 39 SR	Yes	Yes
*Dillenbaugh Creek	WA-23-1027	EV 39 SR	Yes	No
*Dillenbaugh Creek	WA-23-1027	EV 39 SR	Yes	No
*Dillenbaugh Creek	WA-23-1027	EV 39 SR	Yes	No
*Berwick Creek	WA-23-1028	KB 60 UI	Yes	Yes
*Newaukum River	WA-23-1070	WC 81 BX	Yes	Yes
*Chehalis River	WA-23-1100	DS 29 ZH	Yes	Yes
*Chehalis River	WA-23-1100	DS 29 ZH	Yes	No
*Elk Creek	WA-23-1108	WI 74 SE	Yes	Yes
*Demsey Creek	WA-23-2060	FM 81 JM	Yes	Yes
*Skookum-chuck River	WA-23-1030	BV 55 DP	Yes	No

* These sites are located in upper watershed and are covered by summary implementation strategy actions. While cleanup of these segments is occuring now, actual load allocations for these sites will be calculated and submitted to EPA later as an addendum to the SIS.

Seasonal Variation and Critical Conditions

Seasonal variation and critical conditions are incorporated into the technical analysis in several ways:

Seasonal Variation:

- Water quality data were analyzed to quantify the seasonal variability of fecal coliform. A multiple regression method was used to quantify the seasonal relationships between fecal coliform, flow, and time of year.
- Comparisons with water quality standards were evaluated based on seasonal summaries of the geometric means and 90th percentiles as required by the water quality criteria. Data were aggregated over intervals of not longer than one month.
- A dynamic water quality model was used to continuously simulate the water quality in Grays Harbor over a 12-month period. Seasonal variability of model predictions was evaluated by summarizing model results over hourly, daily, and monthly intervals over a 12-month period.
- Seasonal variation was incorporated in the load allocations by applying the water quality criteria to observed and predicted fecal coliform at monthly intervals or less. Load allocations were based on the most restrictive month.

Critical conditions for point and non-point sources:

The critical conditions determined to be appropriate for point source evaluation is when potential dilution is at a minimum. The period of September 5-14, 1997, was chosen as a critical period because total inflows from the tributaries to Grays Harbor were lowest during that time.

For non-point sources, however, critical conditions occurred during high-rainfall periods, and especially right after the start of heavy rains which tended to "flush" bacteria from surface soils into surface water. For example, the highest daily loading of fecal coliform to Grays Harbor occurred on October 30, 1997, which was caused by increases in nonpoint sources during a relatively large storm.

Technical Analysis

The project objectives were met through a combination of monitoring of water quality and flow, modeling of fate and transport of fecal coliform distributions in Grays Harbor, and analysis of various loading scenarios and resulting water quality. Monitoring of water quality and quantity was conducted to quantify seasonal patterns of loading contributions from various sources and water quality in the harbor. The complete report of the technical study and analysis is available on the Internet at www.ecy.wa.gov/programs/eap/wrias/tmdl/ghfc/results.html.

Monitoring

Table 4 presents the list of stations monitored. The locations of monitoring stations are shown in Figures 2 through 7. The list of stations in Table 4 is intended to supplement ongoing monitoring by Ecology's Ambient Monitoring Section and DOH as described above. The purpose of monitoring is to address the following project objectives:

- Determine the contribution of all significant tributaries to the fecal coliform loading and concentration of the estuary, and

- Compare the levels of fecal coliform contamination to the Department of Ecology and Department of Health's water quality standards for the protection of shellfish and other beneficial uses.

Water quality samples were collected at approximately monthly intervals between March 1997 and April 1998. The list of stations was chosen to represent all significant tributaries to Grays Harbor. Stations were located upstream from tidal effects if it was considered possible to represent most of the tributary watershed. Several stations were located in the region of tidal effects to represent those tributaries where upstream stations were not feasible or to represent nonpoint contributions between upstream stations and the tributary mouth. Tidal stations were sampled during ebbing tides to represent nonpoint contributions upstream from the sample sites (sampled between 1 hour after high tide and 1 hour before low tide).

Continuous flow gauging stations were installed at selected representative tributary sites (Figure 4). The selected sites for gauging stations were chosen because they are the largest ungauged tributaries with suitable locations for development of accurate rating curves. Flow gauging stations consisted of water level sensors connected to dataloggers for recording of water levels at 15-minute or hourly intervals. Discharge measurements were made at approximately monthly intervals to develop rating curves for estimation of continuous discharge rates versus time. Continuous discharge from ungauged sites was estimated by regression analysis of instantaneous measurements at gauged versus ungauged sites, analysis of historical records of discharge, watershed area, or other appropriate techniques.

Table 4. Sampling Stations For The Grays Harbor Fecal Coliform Study, Feb-97 Through Apr-98.

Station Name	Station Location
Northern Tributaries	
Humptulips River near mouth	at highway 109 bridge near mouth
Humptulips River near Humptulips	Ecology station 22A070 at highway 101 bridge near Humptulips
Chenois Creek near mouth	at highway 109 bridge near mouth
Grass Creek near mouth	at highway 109 bridge near mouth
West Fork Hoquiam River near New London	Ecology station 22B070 at Dekay Road bridge
East Fork Hoquiam River below Nisson	at F-line logging road bridge approx 2 mi downstream from Nisson
Hoquiam River at Hoquiam	near mouth at Riverside Bridge in Hoquiam/East Hoquiam
Wishkah River at Aberdeen	near mouth at highway 12 bridge in Aberdeen
Wishkah River at Wishkah	Ecology station 22D070 at Aberdeen Gardens Road bridge at Wishkah
Wishkah River near Greenwood	at Hoquiam-Wishkah Road bridge below confluence with West Fork
Elliot Slough near Aberdeen	near mouth at road bridge near Aberdeen
Central Park Slough near Central Park	near mouth at Central Park Drive bridge near intersection with Fairway Park Drive
Wynoochee River near Montesano	near mouth at Devonshire Road bridge near Montesano
Chehalis River near Montesano	Ecology station 22C050 at highway 107 bridge near Montesano
Chehalis River at South Elma	Road bridge at South Elma
Chehalis River at Porter	Road bridge at Porter (Ecology station 23A070)
South Shore Tributaries	
Charley Creek near mouth	at highway 105 bridge near mouth
Newskah Creek near mouth	at highway 105 bridge near mouth
Chapin Creek near mouth	at highway 105 bridge near mouth
Campbell Creek near mouth	at highway 105 bridge near mouth
Indian Creek near mouth	at highway 105 bridge near mouth
Stafford Creek near mouth	at highway 105 bridge near mouth
O'Leary Creek near mouth	at highway 105 bridge near mouth
Johns River near mouth	near mouth at Wildlife boat launch above highway 105
Johns River near Western	at Darnell or Doyle residence near Western
Dempsey Creek near mouth	at Plum Street bridge near mouth
Barlow Creek near mouth	at Plum Street bridge near mouth
Elk River near mouth	adjacent to logging road nearest to mouth
East Branch Elk River	foot path from logging road
Middle Branch Elk River	foot path from logging road
West Branch Elk River	foot path from logging road
Andrews Creek near DNR gate	near DNR gate from foot path from logging road
Grayland Ditch near mouth	above tide gate at hunt club road bridge
Grayland Ditch at Schmidt Road	at Schmidt Road Bridge
Grayland Ditch at Grange Road	at Grange Road Bridge
Unnamed Creek at Westport	corner of Second and Sprague Streets at Westport
South Bay and Redman Slough (Brady Engvall)	
DOH station 54	Dept. of Health station 54 in South Bay upstream from highway 105
DOH station 55	Dept. of Health station 55 in South Bay upstream from highway 105
DOH station 56	Dept. of Health station 56 in South Bay upstream from highway 105
DOH station 59	Dept. of Health station 59 in South Bay upstream from highway 105
DOH station 60	Dept. of Health station 60 in South Bay upstream from highway 105
DOH station 61	Dept. of Health station 61 in South Bay upstream from highway 105
Redman Slough near mouth	at mouth from shore
Ecology Ambient Monitoring Section Marine Flight	
Chehalis River near Elliot Slough	Chehalis R in Aberdeen Reach near mouth of Elliot Slough
South Channel near Stafford Cr	South Channel of Grays Harbor near Stafford Creek
North Channel near Moon Island	North Channel of Grays Harbor "Moon Island" Reach near Moon Island
Grays Harbor N of Whitcomb Flats	Grays Harbor N of Whitcomb Flats
Grays Harbor NE of Damon Point	Grays Harbor NE of Damon Point
Cow Point Reach near Cow Point	Grays Harbor Cow Point Reach off of Cow Point
South Channel near Stearns Bluff	South Channel of Grays Harbor off of Stearns Bluff
Crossover Channel near G "27"	Crossover Channel of Grays Harbor near G "27"

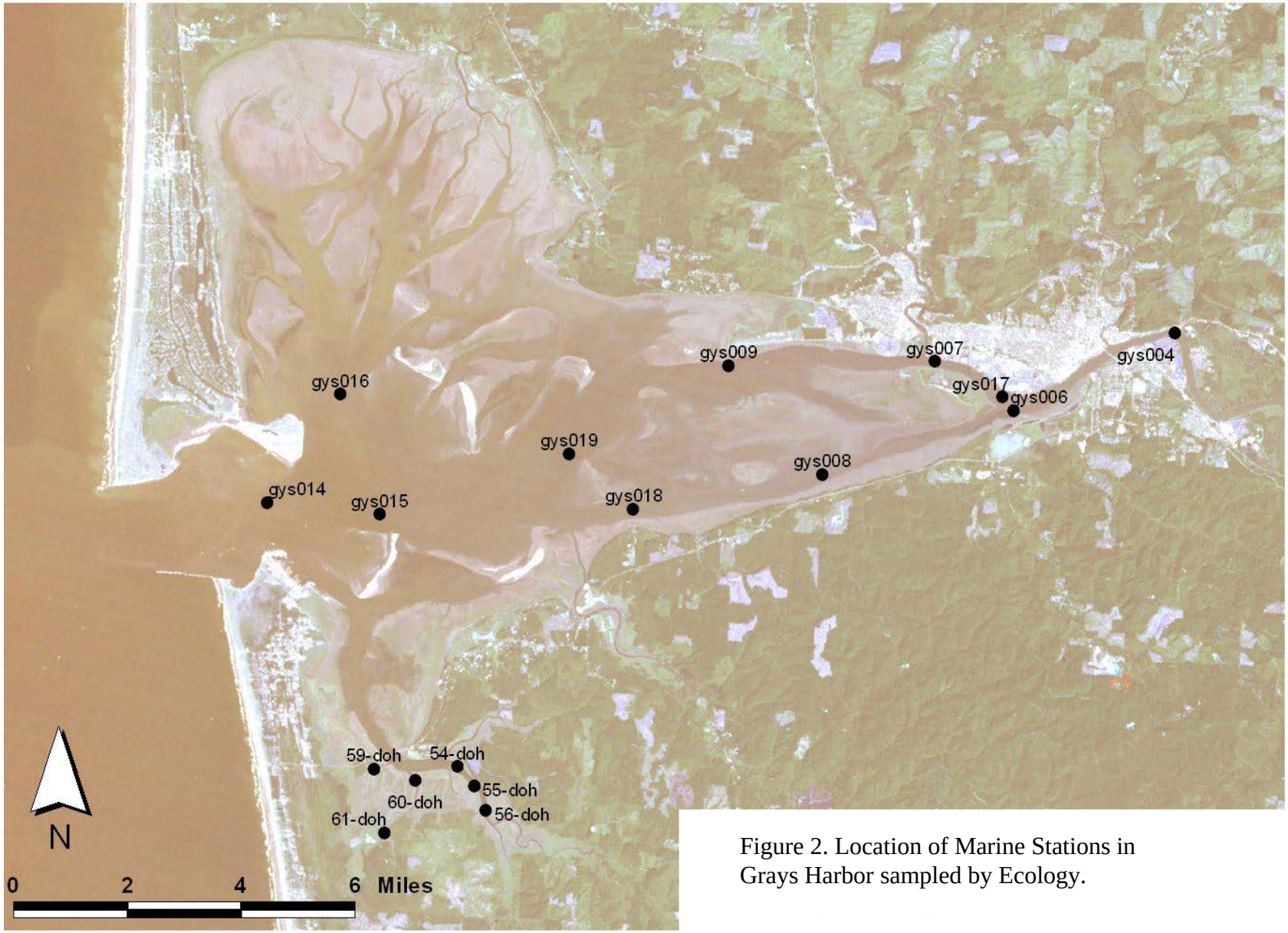

Figure 2. Location of Marine Stations in Grays Harbor sampled by Ecology.

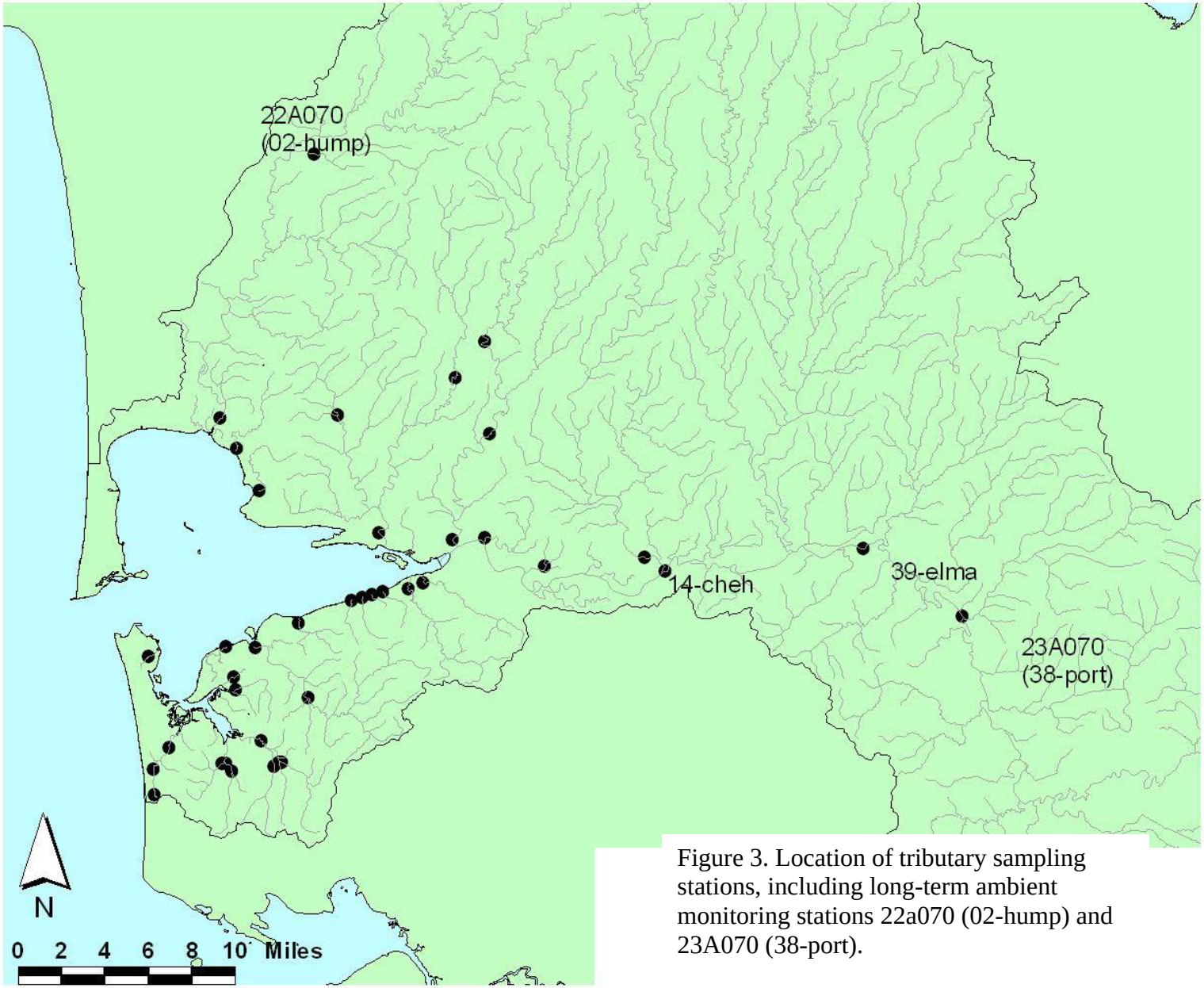

Figure 3. Location of tributary sampling stations, including long-term ambient monitoring stations 22a070 (02-hump) and 23A070 (38-port).

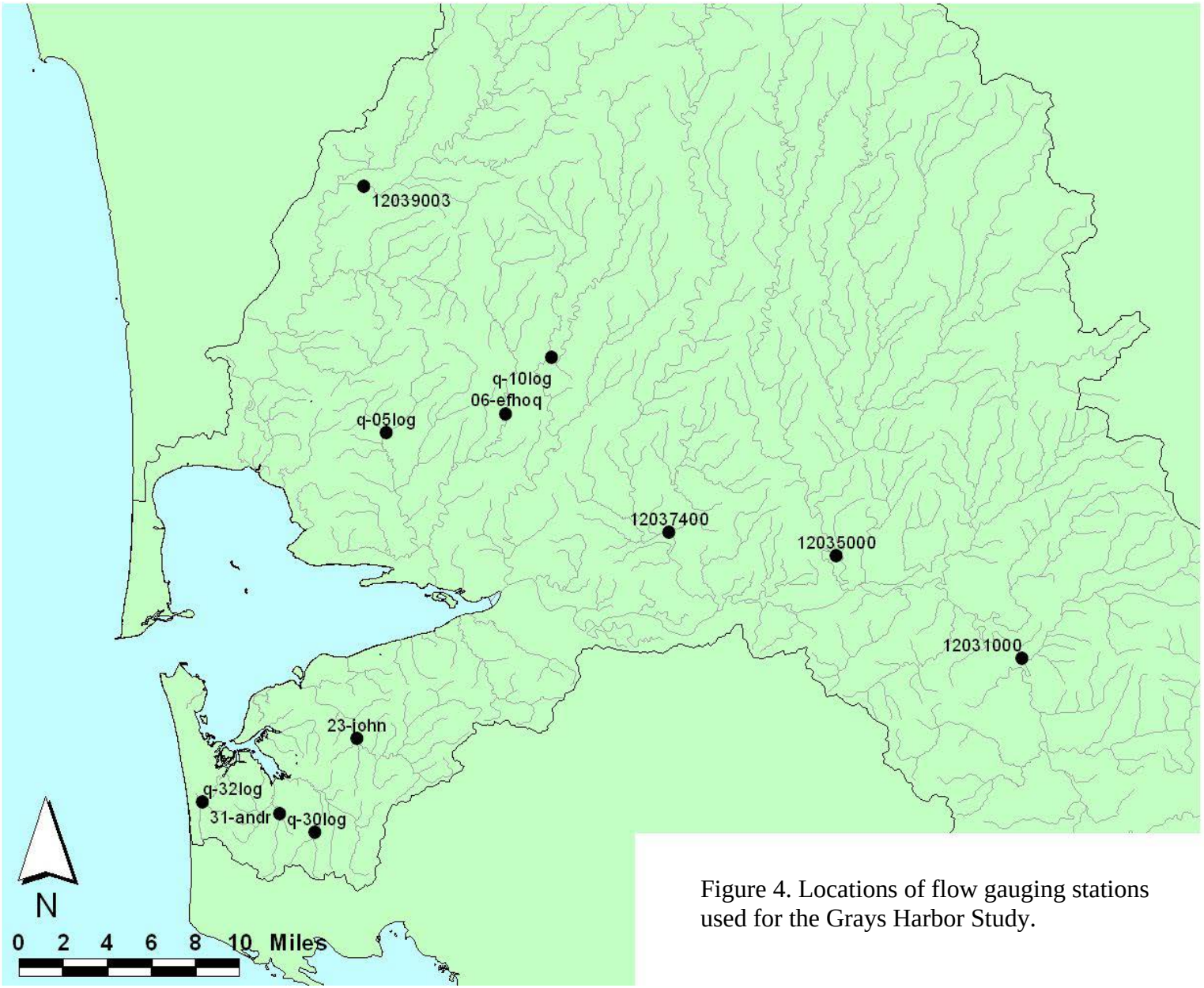

Figure 4. Locations of flow gauging stations used for the Grays Harbor Study.

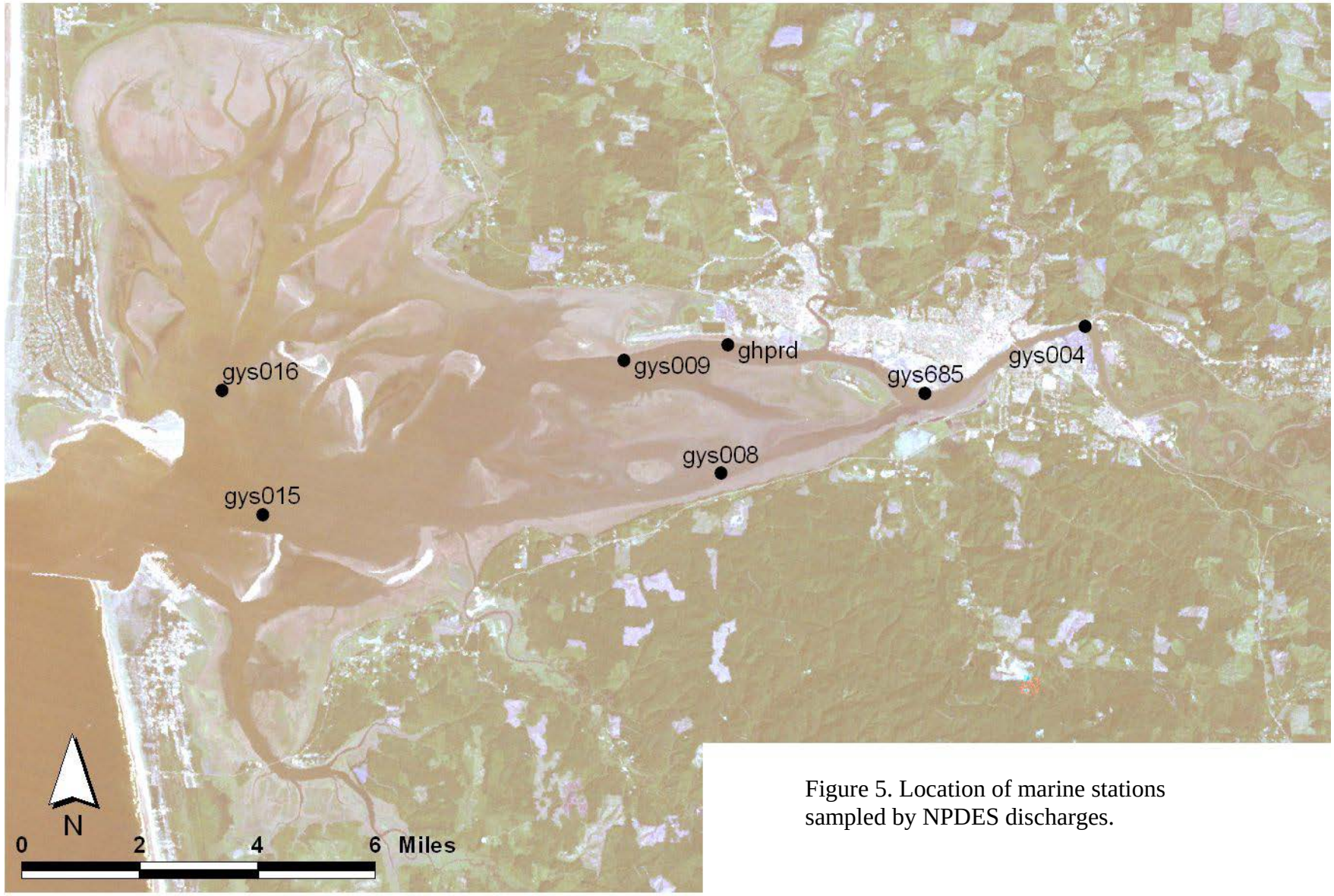

Figure 5. Location of marine stations sampled by NPDES discharges.

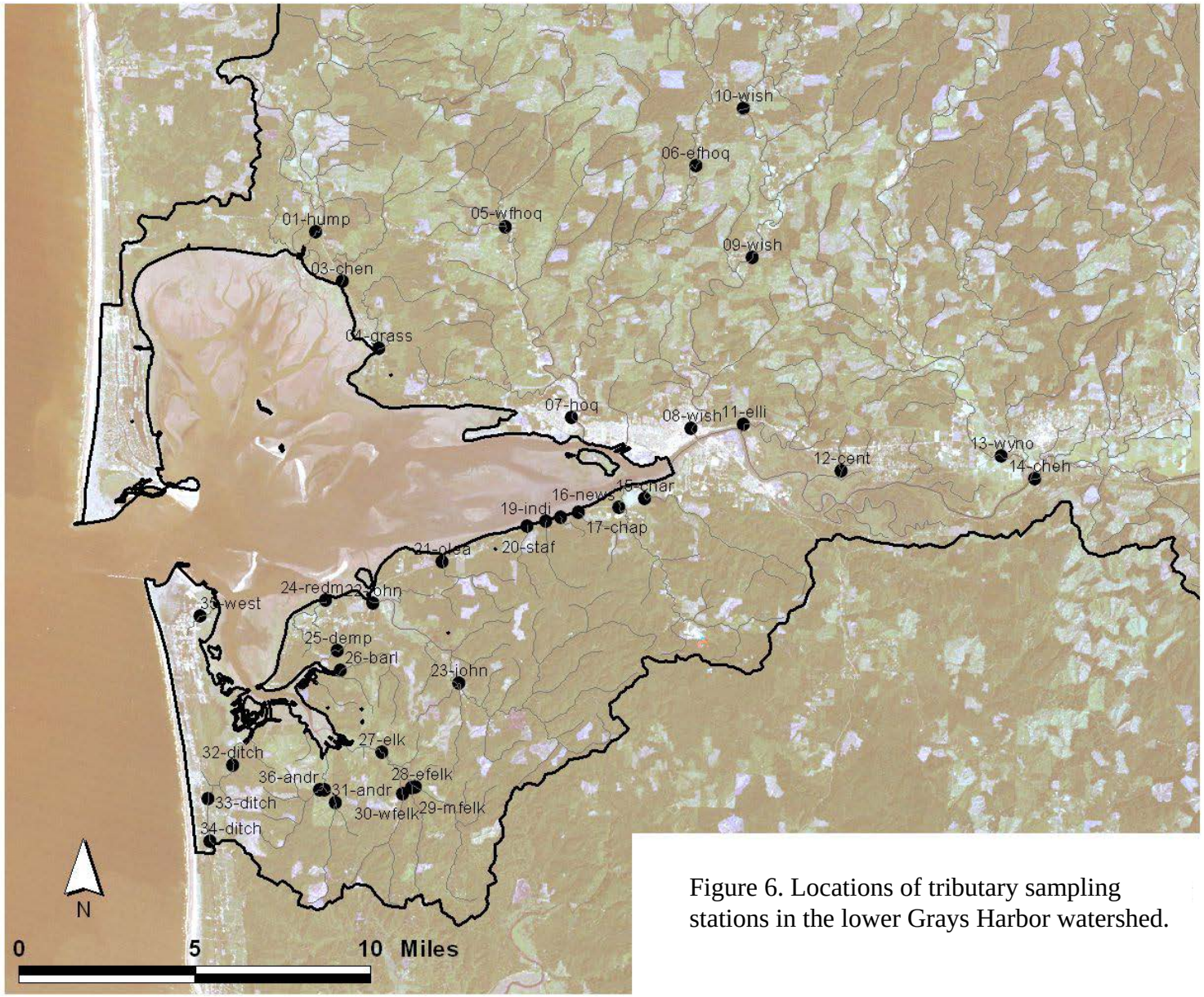

Figure 6. Locations of tributary sampling stations in the lower Grays Harbor watershed.

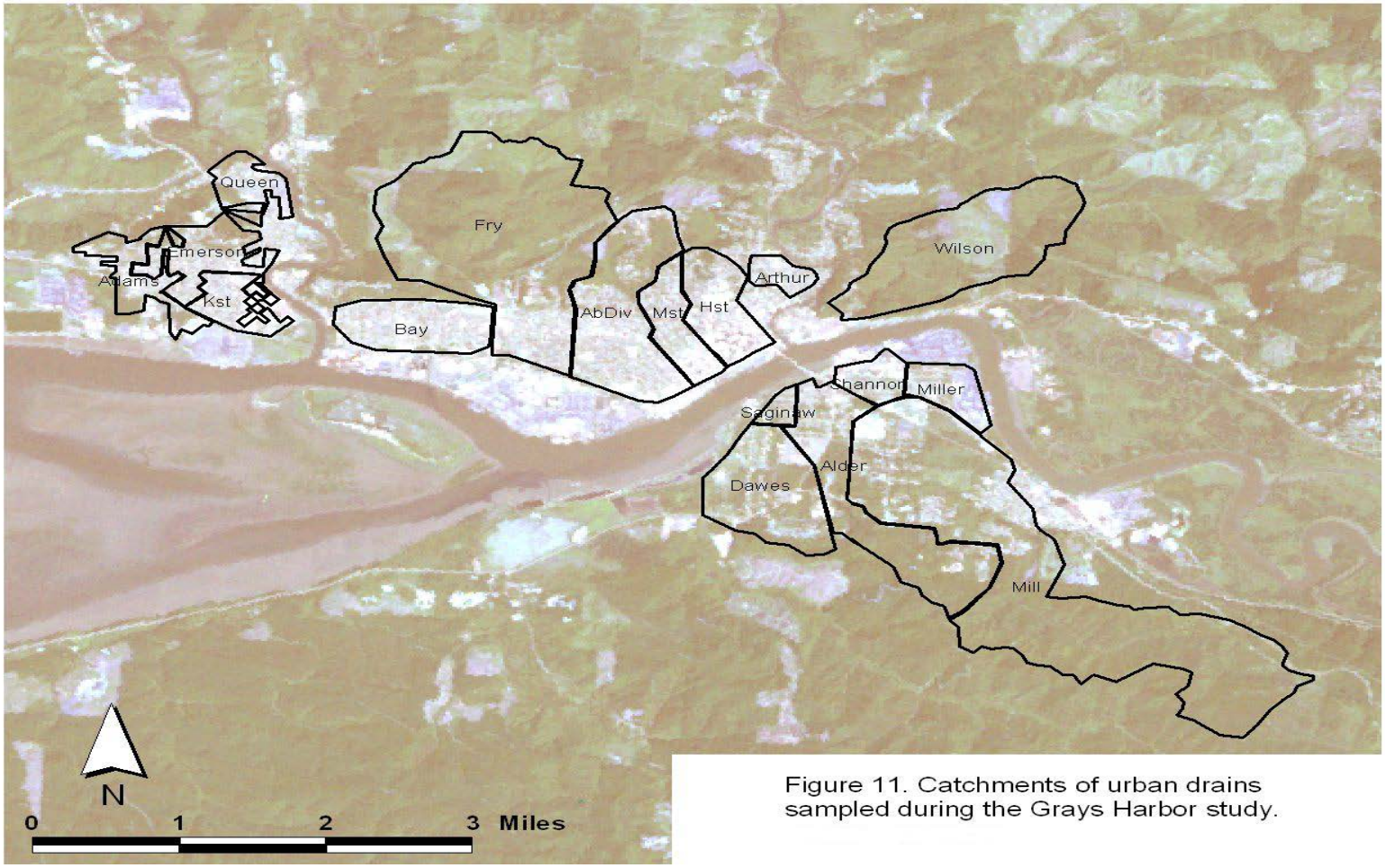

Figure 11. Catchments of urban drains sampled during the Grays Harbor study.

Sampling of representative urban drains in the Aberdeen-Hoquiam-Cosmopolis area was also conducted during the wet season of November 1997 through April 1998. Figure 7 shows the catchment areas of the urban drains that were sampled. Urban drains were sampled for fecal coliform and *E. coli* using the same methods as for surface water stations in the tributaries and estuary.

Monitoring of effluent quality of point sources was conducted by permittees as required under their NPDES permits. Discharge monitoring reports submitted to Ecology by NPDES dischargers were used as the principal data source to characterize point source loads. It was not considered to be necessary to supplement the self-monitoring data because normal loads of fecal coliform from point sources were not suspected of significantly elevating fecal coliform levels in the harbor, provided that the NPDES permittees are operating within the limits contained in their permits. Effluent samples were collected from the NPDES dischargers on five occasions between November 1997 and April 1998 as a check on the NPDES self-monitoring.

Modeling and Analysis of Loading Scenarios

A numerical model of fate and transport of fecal coliform bacteria in Grays Harbor was developed to address the following project objectives:

- Model the distribution of fecal coliform within Grays Harbor as it is affected by loads from point and nonpoint sources, tidal circulation and transport, and the natural process of die-off of bacteria.

- Predict the effect of pollution events on water quality at various locations in the harbor.

- Determine the pollution reductions that are needed so that local communities and agencies and other affected parties can develop and implement appropriate cleanup strategies. This will also provide information for establishing waste load allocations (WLAs) as for point sources and load allocations (LAs) for nonpoint sources for establishing a TMDL as required under section 303(d) of the federal Clean Water Act.

The EPA (1980) model was the best numerical model that had been developed for Grays Harbor prior to this study. The EPA model was a link-node hydrodynamic model combined with a water quality model that simulates fecal coliform, in addition to dissolved oxygen, nutrients, and algae. The EPA model was based on a precursor of EPA's DYNHYD5/WASP5 modeling system and uses similar computational methods (EPA, 1993). The model selected for this study is similar to the EPA model in that it uses a link-node hydrodynamic model combined with a separate model to evaluate transport of fecal coliform. The segmentation of Grays Harbor for the model developed in the present study was based on the EPA model segmentation, with the exception that added detail of the South Bay region was included and the seaward boundary was extended outside of the harbor entrance.

Hydrodynamic simulation was done using the U.S. Army Corps of Engineers link-node WDWBM Model (Walton *et al.*, 1995). The segments for the water quality model are the same as the nodes for the hydrodynamic model. Fecal coliform fate and transport was simulated using the U.S. Environmental Protection Agency's WASP/EUTRO model (EPA, 1993) using a

calculated rate of fecal coliform die-off that accounts for temperature. The die-off rate was estimated as part of the calibration of the model to observed conditions in Grays Harbor.

A tidally dynamic continuous simulation of the study period from May 1, 1997 through April 30 1998, was developed. Flows were calculated continuously at 30-second intervals and water quality was calculated at 90-second intervals. Hourly predictions of water quality were extracted from the model output for analysis of results. The mathematical model of Grays Harbor was used to estimate the distribution of fecal coliform bacteria continuously for the study period.

Data for development of the mathematical model were compiled from other available sources in addition to the data collected during this study. The bathymetry was estimated from digital data from the Army Corps of Engineers. Flows from tributaries were estimated based on data from this study and from the U.S. Geological Survey. Loading of fecal coliform from tributaries, and concentrations in the harbor for calibration of the model, were estimated based on data from this study in addition to the NPDES dischargers and the Department of Health.

Summary of Model Results for the Study Period

The calibrated water quality model was run for the continuous simulation of tidally dynamic response to existing loading from May 1997 through April 1998. Predicted concentrations at each model segment were saved at hourly intervals. The predicted hourly concentrations were summarized in a variety of ways to display the results of the model and compare predicted fecal coliform with water quality standards.

The results show several problem areas within Grays Harbor where water quality standards would not be met if current rates of fecal coliform loading continue:

- Lower Chehalis River and lower Wishkah River segments.
- Marine segments in the transition from inner harbor to the central region at the division between marine class A and B because of loading from the Chehalis River and tributaries to the inner harbor.
- The northeast part of north harbor region because of loading from the Humptulips River,
- The southern Elk River estuary region because of local tributaries such as the Elk River.Andrews Creek, and Grays Harbor Drainage Ditch.
- Areas adjacent to loading from the Johns River.

Loading Capacity

First-Cut of Loading Reductions Needed to Meet Freshwater Standards

The model was used to predict the water quality that would result in the harbor if the tributary nonpoint and point source loads were reduced. An iterative approach was used to try various amounts of reduction of loading and run the model to determine whether marine water quality standards would be met in Grays Harbor. The first estimate of loading reduction was as follows:

- Tributary nonpoint sources were reduced to meet freshwater standards. This approach maintains a constant coefficient of variation (standard deviation divided by the mean) of the pre-control and post-control loading according to the statistical theory of rollback (Ott, 1995). The rollback method is the approach that Ecology typically uses to determine load allocations for fecal coliform TMDL evaluations (*e.g.* Cusimano and Giglio, 1995; Joy, 2000).

This reduction of loading was predicted to improve water quality significantly in Grays Harbor. However, three problem areas remained after the first-cut of loading reductions, where marine standards for fecal coliform would not be met:

- The northeast part of north harbor region because of loading from the Humptulips River.

- Marine segments in the transition from inner harbor to the central region at the division between marine class A and B because of loading from the Chehalis River and tributaries to the inner harbor.

- The southern Elk River estuary region because of local tributaries such as the Elk River, Andrews Creek, and Grays Harbor Drainage.

Second-Cut of Loading Reductions Needed to Meet Marine Standards

The next step was to estimate further reductions in tributary loading that would result in water quality standards being met in the harbor. The additional reduction needed was estimated as follows:

- Concentrations of fecal coliform in the Wishkah and Hoquiam Rivers were reduced further to comply with marine class B water quality standards for the inner harbor.

- Loading from the Humptulips River was reduced until marine class A standards were met.

- Loading from the Elk River and Andrews Creek was reduced until the marine class A standard was met.

This reduction of loading was predicted to meet water quality standards in all model segments in Grays Harbor. The final recommended reductions in tributary loads to Grays Harbor are presented in Table 2 above.

Large reductions in fecal coliform concentrations are needed to meet water quality standards for tributaries to Grays Harbor. All of the tributaries discharging to Grays Harbor and the lower Chehalis River require some reduction in loading of fecal coliform to meet water quality standards, with the exception of the Wynoochee River. The total reduction in loading needed from all sources combined is approximately 8.5×10^{15} colonies/year, which is an average of about a 65 percent reduction of the current total loading from tributaries.

The Chehalis River is the most important single loading source that requires reduction, followed by the Humptulips, Wishkah, and Hoquiam Rivers. Collectively these tributaries account for approximately 80 percent of the required reduction in loading to meet water quality standards.

Predicted Response to Point Source Loading from Weyco Outfall 1 (Weyco 1), Weyco Outfall 2 (Weyco 2), and Grays Harbor Paper During the Period of Lowest Freshwater Inflows

The period of September 5-14, 1997, represented the lowest total inflows from tributaries to Grays Harbor during the study period. The Chehalis River flows during this period were similar to the lowest 60-90 day averages that occur once every two years, and may be considered representative of seasonal low flows during a typical year. This period was selected to represent a critical condition when potential dilution of point sources would be at a minimum. Water quality during this period of the study was predicted to be significantly better than the water quality standards.

Three scenarios were evaluated during the period of September 5-14, 1997, to test the adequacy of NPDES limits for point sources:

- Weyco 1 was assumed to be discharging at a hypothetical concentration of 5000 colonies per 100 ml (current maximum monthly average limit) on September 5 and September 7-14, 1997. Weyerhaeuser has a second outfall (Weyco 2) that discharges wastewater to the Chehalis River at segment 48. Weyco 2 discharges less loading than Weyco 1, but the NPDES limits for fecal coliform concentration are the same. Weyco 2 was assumed to be discharging at a hypothetical concentration of 5000 colonies per 100 ml (current maximum monthly average limit) on September 5 and September 7-14, 1997; and at 20,000 colonies per 100 ml on September 6-7, 1997 (current daily max limit).

- Grays Harbor Paper was assumed to be discharging at the concentration reported in the daily monitoring report (500 colonies per 100 ml) on September 5 and September 7-14, 1997; and at a hypothetical concentration of 19,200 colonies per 100 ml (current daily maximum limit) on September 6-7, 1997.

All other nonpoint and point source loads were assumed to equal the conditions that would occur following rollback to meet the marine standards in Grays Harbor (model run G13RUN03), and the simulations were run for the entire study period of May 1, 1997 through April 30, 1998.

These model scenarios were predicted to result in meeting the water quality standards in Grays Harbor. This finding suggests that the current discharge limits for Weyerhaeuser's Weyco 1 and Outfall 2 (Weyco 2) and Grays Harbor Paper are adequate for protection of the water quality standard in Grays Harbor. Current permit limits will be protective under the lower flow conditions of September 5-14, 1997, as well as the somewhat higher flow conditions of July 15 through August 31, 1997.

Load and Wasteload Allocations

NPDES permit limits for the point-source facilities were determined to provide necessary protection to achieve water quality standards, so the permit limits are recommended as appropriate wasteload allocations. The following permitted facilities were included in the analysis.

Municipal Permittees: Aberdeen, Elma, Hoquiam, McCleary, Montesano, Ocean Shores, Westport.

Industrial Permittees: Ocean Spray Cranberries, Grays Harbor Paper 001, Grays Harbor Paper 002, Weyerhaeuser 001, Weyerhaeuser 002.

The proposed load allocations (LAs) for nonpoint (presented earlier in Table 2) are based on the reduction in loading that was estimated to result in meeting both the freshwater and marine water quality standards for fecal coliform.

Since the original TMDL analysis was completed, Merino's Seafoods and Washington Crab in outer Grays Harbor have been assigned NPDES permit limits for fecal coliform bacteria. The additional permitted facilities do not significantly change the TMDL. Permit completion followed a formal public review process. The permit limits for the two additional facilities require that the marine water quality standard for fecal coliform (14 colonies per 100 ml. as a monthly geometric mean, with no more than 10% of samples exceeding 43 colonies per 100 ml.) be met at the end of pipe. The NPDES permit limits for Merino's Seafoods and Washington Crab-- as with the other permitted facilities, are protective of water quality and are the recommended wasteload allocations. Table 5 describes the wasteload allocations, (existing permit limits) for the NPDES facilities involved in this TMDL.

Table 5. Summary of NPDES permit effluent limits for Grays Harbor area facilities

Permittees	Monthly average flow (mgd)	Daily Maximum Flow (mgd)	Monthly Average FC (colonies per 100 ml.)	Weekly Average FC (colonies per 100 ml.)	Daily Maximum FC (colonies per 100 ml.)
Aberdeen	8.750	--	200	400	--
Elma	0.480	--	200	400	--
Hoquiam	4.000	--	200	400	--
McCleary	0.250	--	200	400	--
Montesano	0.360	--	200	400	--
Ocean Shores	6.700	--	200	400	--
Westport	0.800	--	200	400	--
Ocean Spray Cranberries	0.315	--	200	400	--
Grays Harbor Paper 001	--	--	5,000	--	19,200
Grays Harbor Paper 002	--	--	--	--	--
Weyerhaeuser 001	--	--	5,000	--	20,000
Weyerhaeuser 002	--	--	5,000	--	20,000
Merinos Seafoods	--	--	14	--	43
Washington Crab	--	--	14	--	43

Margin of Safety

EPA requires consideration of a margin of safety (MOS) when establishing TMDLs. The MOS is supposed to account for the uncertainty about the relationship between the pollutant loads and the quality of the receiving waterbody. The MOS is normally incorporated into the conservative assumptions used to develop TMDLs. Another alternative is to subtract a MOS from the load allocations for additional protection of water quality.

The MOS for the proposed TMDL for fecal coliform loading to Grays Harbor is partly implicit by using conservative assumptions for the analysis. The loading of fecal coliform to Grays Harbor during the study year was probably greater than the typical annual loading due to greater than average tributary inflows. Flows were approximately 17% higher than the average annual flow based on long term data. Also, compliance with the water quality standard was evaluated based on the most limiting month, whereas reductions in loading are proposed for all months.

An additional MOS could be incorporated during the public process for acceptance of the TMDL. For example, an additional MOS may be established by subtracting a portion of the proposed load allocations or including an additional percent reduction in existing tributary loads to Grays Harbor. For example, additional MOS could be included by setting the targets for loading reduction to 75 percent or greater for all tributaries to Grays Harbor, instead of the estimated average of 65 percent reduction that is required. However, the Department of Ecology believes the current MOS is justified.

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Summary Implementation Strategy

Introduction

The purpose of this Summary Implementation Strategy (SIS) is to present a clear, concise, and sequential concept (i.e. vision statement) of how agencies with involvement of citizens and industry will achieve water quality standards in the watershed 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.

This SIS was developed with guidance from an extensive advisory group consisting of citizens, landowners, Tribes, local and state government representatives, health departments, shellfish and industrial interests in Grays Harbor, and others. This group worked to help prepare the following SIS, and also to address their broader purpose:

"To define needed cleanup strategies for protecting the many beneficial uses that clean water provides people and the environment in the Grays Harbor/Chehalis watershed." (Appendix A).

Since approximately 40 percent of the bacteria load to the harbor comes from the upper watershed, this SIS describes cleanup strategies for both the upper and lower watershed. Cleanup targets (load allocations and needed reductions) provided in the accompanying report were calculated for the lower watershed. Numerical load allocations and needed reductions for the upper basin will be determined in the near future and submitted as an addendum to this SIS. In the meantime, cleanup will proceed throughout the watershed.

It is impractical to predict when the entire watershed will meet water quality standards because the Chehalis/Grays Harbor watershed occupies approximately 2700 square miles, water quality is determined by so many sources, and because the needed 65% overall reduction of bacteria loading will require vigilant efforts throughout the watershed. Assuming that best management practices are implemented for animal management and on-site sewage systems, and that urban stormwater controls are implemented, bacteria loading from the non-point sources should steadily decline. In fact, indications are that improved animal management practices or other non-point controls may already be helping reduce bacteria levels in the lower tributaries of the watershed. The current best estimate to achieve water quality standards in this waterbody is October 2005.

The following plan is intended to complement, not duplicate, the work of others already underway. For example the *Chehalis Basin Partnership* formed under the '2514 Watershed Management Act' (HB 2514, RCW 90.82) is considered an umbrella organization with water quality objectives that this plan supports.

Existing Programs Implementing TMDL Recommendations:

The following is a description of the key agencies, and other groups that have influence, regulatory authority, involvement, or other controls that will be incorporated into a coordinated

effort to implement the Water Cleanup Plan. Ecology will lead the coordination effort as needed to affect plan implementation. The plan addresses the following sources of fecal coliform bacteria pollution in particular:

- *Septic Tank Maintenance*
- *Agricultural/livestock waste management*
- *Point-source discharges from NPDES permittees*
- *Urban Stormwater Management*

Reasonable Assurance that Non-Point Source Load Allocations Will be Achieved:

Described in the sections below are steps that responsible organizations will take to implement cleanup strategies. Affected interests will be invited to help develop a Detailed Implementation Plan (DIP). The DIP will be completed approximately one year after EPA approves this conceptual implementation strategy. Organizations will need to commit efforts to solicit financial and other assistance to implement their respective responsibilities. A variety of grant and loan programs, and various forms of community support providing services-in-kind are accessible to the Grays Harbor area. For instance, the Department of Ecology continues to award grants and loans for the kinds of programs and activities described below (e.g., Conservation District technical assistance to landowners, adult and student volunteer monitoring programs for evaluating water quality trends, loans for county managed septic system improvement programs.) Another mechanism in place to help acquire funding is that the Chehalis Basin Partnership is identified as a group to review financial assistance applications for water quality protection projects. The CBP will rank, and recommend the projects for financial assistance by the Department of Ecology.

County Health Departments

The county health departments have the specific requirement to:

"Identify failing septic tank drainfield systems in the normal manner and will use reasonable effort to determine new failures." (RCW 70.118.030)

“The normal manner” implies the use of inspections and responses to citizen complaints. Inspections are to take place in areas where water quality standards have been violated. Ongoing water quality sampling/monitoring by the conservation districts, Ecology, and others will supplement information gathered by the health departments in order to better characterize probable locations of failing septic systems. This will help prioritize sub-basins or other locations for follow-up by the health departments. State regulations (246-272 WAC) also direct local health departments to assure that system operators:

- Are aware of the need for ongoing operation and maintenance;
- Know how to provide the needed operation and maintenance; and
- Have access to professional services.

The health departments have each developed an administrative plan to respond to on-site sewage system failures, including, where appropriate, inspection of these systems. Health departments also must have a process to review their on-site septic program for effectiveness.

The following implementation strategy outlines the steps that health departments will take to control on-site septic sources. Health departments will also pursue development of financial assistance programs. They may specifically request Centennial Grant and State Revolving Fund loans to support local projects.

A. Identify Sources

- Phased Approach
- Develop Complete and Accurate List of Septic Systems in Basin
- Oversee a Septic Maintenance Inspection Program (Statewide Requirement for Homeowners)
- Use Monitoring Results to Focus Efforts

B. Identify Control Measures

- Provide List of Certified/Licensed Inspection Contractors.
- Provide List of Certified Pumpers and Repair Contractors.
- Provide Educational Materials.
- Require Repairs or Replacements if Necessary.

C. Develop/Conduct Community Education, and Broker Financial Assistance Programs

- Prioritize local "pre-emptive" audiences: public officials, banks/lenders, dealers of pre-manufactured homes, and real-estate industry.
- Prioritize system owners/neighborhoods according to monitoring program results.
- Hold educational meetings for communities in various priority subbasins of the Watershed.
- Coordinate grant assistance to OSS operators, advise and advocate for local utility districts in order to develop financial support for effective local OSS protection programs.

Ecology

Ecology has been delegated authority under the Federal Clean Water Act by EPA to establish water quality standards, administer the General NPDES permitting program, and enforce water quality regulations. Ecology will continue to implement its statutory duties. As part of those duties, Ecology inspects dairy farms and manages dairy permits in the Chehalis/Grays Harbor Watershed. In 1998, Washington State passed the Dairy Nutrient Management Act (DNMA).

The act requires all commercial dairies with a milk license from the Washington Department of Agriculture to have a farm plan by July 1, 2002. After receiving a farm plan, dairies must fully implement them by December 31, 2003. All of the dairies in the Chehalis/Grays Harbor basin have been inspected at least once.

The operations with actual or probable pollution problems have received notices of correction and/or enforcement actions as appropriate, along with follow-up inspections when necessary. Additional inspections by the Department of Ecology will be made during both the wet and dry seasons. Over the next two years, these actions should help prevent livestock waste and fecal coliform from entering the streams. Ecology's preference is to achieve water quality compliance from dairies voluntarily. However, enforcement actions and fines have and may be employed under the DNMA, Chapter 90.48 and the Clean Water Act in cases where voluntary actions are not undertaken or are unsuccessful.

For non-dairy livestock properties that manage heifers, beef cattle, pigs, horses, or other animals, Ecology also has responsibility to ensure that these operations do not degrade water quality. On these sites, the requirements of the Dairy Nutrient Management Act do not apply, but Ecology's responsibility to enforce state water quality standards is still in place. For these operations, Ecology typically works in partnership with the landowner and the local conservation district (CD), encouraging voluntary corrective action first, with technical assistance from the CD if the landowner desires, and finally, enforcement by Ecology if corrective action isn't achieved.

Conservation Districts

The Conservation Districts (CD) in Lewis, Thurston, Grays Harbor, and Mason Counties work closely with Ecology and National Resource Conservation Service (NRCS) in developing resource management plans. The CDs also provide education and technical assistance to landowners, as their budgets allow. Ecology will work closely with the CDs and NRCS by identifying and prioritizing referrals for resource management planning.

As part of the Ecology water quality inspection program, dairies and other livestock operations with actual discharges or a potential to pollute will be instructed to correct the problem. The services of the CD will be recommended. The CD will develop or modify an existing farm plan under the guidance of NRCS, to eliminate the potential to pollute. At that point, all three entities (CD, NRCS, and landowner) will then develop a monitoring plan to measure the effectiveness of the BMPs.

When funding is available to them, the CDs administer a cost-share grant program using state and federal money that helps pay for development of farm plans, and landowner implementation of BMPs called for in the farm plans. This includes BMPs such as fencing for livestock exclusion, gutters to keep water away from barnyard areas, composting and storage of manure away from surface runoff areas, etc. Such a government/landowner project (the Platter Demonstration Restoration site on Scatter Creek in the upper Chehalis Basin) was recently awarded $33,000.00 from the state Salmon Recovery Funding Board to implement the BMPs described above. The CDs help landowners implement many conservation improvements that help prevent transport of livestock waste to surface waters and improve watershed health overall.

Water quality monitoring in the lower watershed by the Grays Harbor CD is helping to identify and prioritize the more likely sources of fecal coliform pollution in the tributaries.

All of the CDs support community information programs at different levels according to funding availability. Educational activities include things like classroom and outdoor education with schools, presentations to local landowner meetings, television programming, community events like county fairs, and organizing land restoration programs that reduce and prevent runoff of animal waste to streams. These education programs are effective in influencing behaviors which protect water quality and must continue.

Additional services that the CDs believe should be supplemented to improve watershed health include:

- More monitoring to evaluate water quality trends.
- Focused BMP-effectiveness monitoring.
- Inventory of farms, including "animal census" information.
- New and expanded financial assistance programs for farm planning and BMP implementation.

USDA Natural Resource Conservation Service

The USDA Natural Resource Conservation Service (NRCS) provides the guidance and general standards and specifications used in developing farm plans. NRCS also does research used to develop BMPs used on farms to protect water quality. The NRCS administers cost share money that is frequently used by farmers to do farm improvements. Many of the costly farm improvements required for water quality protection such as lagoons are constructed according to designs approved by NRCS and funded in part by grants administered by NRCS. The NRCS will help Ecology and the CDs evaluate the effectiveness of the BMPs as they are implemented in the Chehalis/Grays Harbor Watershed.

Cities Management of Urban Stormwater

A combination of local programs and emerging requirements are expected to assure control of bacteria loading that the TMDL identified coming from urban stormwater drains in Aberdeen, Cosmopolis, and Hoquiam.

Cosmopolis recently adopted the Puget Sound Stormwater Manual. Additionally, the city adopted in February 2001, a requirement for an additional 15 percent capacity of all stormwater retention/detention systems due to the amount of precipitation it usually receives.

Hoquiam completed a Comprehensive Surface Water Management Plan with several recommendations noted below that when implemented, will help reconcile stormwater bacteria loading discharges: adoption of a stormwater manual; septic system inspection program; public education; and other preventive actions.

Aberdeen is a potential NPDES Phase II permittee. Permittees are required to develop and adopt a Stormwater Management Program required by the federal Clean Water Act. Aberdeen is gearing up for the permit. It has adopted the Stormwater Management Manual for Western Washington (Department of Ecology, Publication 99-11 through 99-15, August, 2001).

Wildlife as a Natural Non-Point Source of Bacteria:

Efforts are focused on reducing bacteria loading from sources that people can influence. The technical study acknowledges that wildlife contribute bacteria to the watershed. In one area for example -- the Elk river drainage, wildlife contributions predominate. Because wildlife loading is considered a natural source and cannot be effectively managed or reduced, efforts must focus on strategies and areas where people can create improvements.

This SIS describes an ongoing process that will occur to identify pollution sources and monitor effectiveness of controls. Information forthcoming from that work will continually help refine strategies and priorities for sub-basins where efforts will be most effective.

As cleanup of human-related sources continues, additional information may also be gathered by the advisory group to help understand the significance of "natural" fecal coliform bacteria sources in the watershed.

A load allocation was not assigned to wildlife because quantitative information was lacking on this source. Should the contribution of wildlife to fecal coliform loads be deemed substantial, wildlife would be considered a natural source and given its own load allocation. This would result in smaller load allocations to human-related fecal coliform sources (e.g. septic systems, livestock management) and require that greater reductions be achieved where the sources are manageable. Such a revision to this TMDL can occur at a future date.

Reasonable Assurance that Point-Source Waste Load Allocations will be Achieved:

Wasteload allocations (WLAs) for point source dischargers will be implemented by the Department of Ecology through its NPDES permitting authority. Current permit limits are appropriate for achievement of state water quality standards. Permit maintenance and renewal schedules provide for ongoing monitoring of facility and discharge conditions to assure that water quality protections remain in place. The NPDES permitting and TMDL processes allow for changes to permit limits and waste load allocations (WLAs). For example, as better predictive models are developed or new information about bacteria die-off rates are proven accurate, that information may be applied to calculate appropriate revisions to NPDES permit limits and WLAs. The WLAs will always align with permit limits. Future changes to WLAs would only occur as an outcome of the formal NPDES permit review and revision process, such that permit limits will always serve as WLAs for this TMDL.

Monitoring of Implementation Activities

Various water quality monitoring plans will continue to be implemented by several groups in different parts of the watershed. Ecology will help organize development of a coordinated monitoring plan with various interests in the Chehalis Basin. Affected interests include those with direct responsibility to implement the TMDL, as well as other groups who serve in a more coordinating role such as the Chehalis Basin Partnership and the local Advisory Workgroup for the TMDL Monitoring will document water quality trends and help indicate effectiveness of cleanup activities.

It should be noted that the sampling data collected in 1997 and 1998 used to determine water quality trends as part of the TMDL assessment, reflected watershed conditions and land uses

during that time. (Longer-term trend information was compiled for a ten-year period from Ecology's sampling station at Porter, to reflect conditions in the upper watershed.) Land-use changes since the study period may have resulted in changes in pollution levels. Implementation of the monitoring strategy should provide a more accurate picture of current water quality conditions in the basin. Ongoing monitoring will help better prioritize areas and strategies for cleanup**.**

Water quality sampling by the Grays Harbor Conservation District occurred during January and February 2001 in the Satsop and Humptulips rivers. Ecology conducts monthly sampling at several sites in the harbor. A new sampling site in the upper Chehalis River will be added to Ecology's ambient monitoring program in October 2001. Grant funding is expected to supplement monitoring by the conservation districts, and local volunteer groups. A water quality education and monitoring project operated by Educational Service District 113 and the Chehalis Basin Education Consortium (CBEC) will continue to involve 4th through 12th grade and community college students. By testing chemical and biological parameters the students will learn scientific methods and develop an understanding and appreciation for their watershed. Data provided by non-Ecology sources will have positive informational value to help document progress being made to meet the TMDL targets. Results will also help to refine and adapt water cleanup strategies of the TMDL.

Monitoring Strategy

If ambient or other monitoring data shows that progress towards targets is not occurring or if targets are not being met, compliance water quality monitoring will occur. Compliance monitoring will be designed to verify preliminary data and then identify the specific source(s) of fecal coliform loading. Sampling over time will be adjusted to locate the source by narrowing the geographic area where contamination is occurring.

Adaptive Management

Ecology will annually evaluate monitoring results from Washington State Department of Health's Commercial Shellfish Growing Area Report for the Grays Harbor Estuary monthly monitoring program, and data from other sources described earlier. Ecology will determine if fecal coliform water quality standards are being met. If water quality standards are not being met, Ecology will determine if the reduction goals listed in this TMDL are being met, and whether adjustments to the load allocations or implementation strategy are necessary.

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

Potential Funding Sources

Grants are available from the Centennial Clean Water Fund, Section 319 non-point water quality improvement program, and SRF loans are available to fund activities by jurisdictions to help implement the water cleanup plan. Non-government organizations can apply to be funded by a

319 grant fund to provide additional assistance. Health departments have access to SRF funds to provide homeowners zero-interest loans for repair of failing septic systems.

The Environmental Quality Incentives Program (EQIP) is a federal cost-share program available to all farms. The state has provided additional cost share assistance through the Washington Conservation Commission for commercial dairies that are required by the Dairy Nutrient Management Act to develop and implement farm plans.

Other funding sources, such as salmon recovery funding and watershed grants, will be pursued as they become available.

Ecology will work with grant/loan applicants to prepare appropriate scopes of work to implement this plan, and to identify and assist with applying for grant opportunities as they arise.

Summary of Public Involvement

The draft *Grays Harbor Fecal Coliform Total Maximum Daily Load Study* report was provided for public comment during March through April 2000. Comments received were reconciled in the final technical report published June 2000.

Numerous presentations were provided to inform primary affected interests, agencies, and citizens about the study results and to invite comment.

A presentation occurred first for primary interests at the Grays Harbor Community College, with a follow-up briefing for the general public at the Montesano City Hall. Other presentations or briefings were given to the Grays Harbor Conservation District Board, managers/staff of the Mason, Thurston, and Lewis CD, Grays Harbor League of Women Voters, Lewis County Board of Health, and Grays Harbor County Health Department. An initial presentation and ongoing project updates were/are provided at the monthly meetings of the Chehalis Basin Partnership (CBP).

Several newspaper stories have reported on the project (*Aberdeen World, The Chronicle*) and a local monthly newsletter with a circulation of approximately 45,000 throughout the basin--*Drops-Of-Water*, has often provided project updates and invited public comment and participation. An Ecology *Focus* sheet was circulated to the mailing list of the Chehalis Basin Partnership (CBP) and others, describing the project and inviting public participation on an advisory workgroup to develop the SIS. Appendix A lists the advisory group members and their common purpose towards watershed protection, and cleanup planning.

The kickoff of the public comment period for the proposed draft TMDL submittal report began with a presentation to the Chehalis Basin Partnership on April 27, 2001.

Invitation for public comment was published as legal advertisements in the *Olympian*, *Aberdeen World*, and *Centralia Chronicle* newspapers beginning May 12, 2001. The Aberdeen World followed the legal notice with a feature story about the TMDL and alerting readers to the opportunity for comment. An article about the draft TMDL and inviting public comment was also published in the May 2001 issue of *Drops-of-Water* (a newspaper insert published by the Chehalis River Council that is delivered to approximately 40,000 newspaper recipients in the Chehalis Basin). Notice of the TMDL comment period was also sent to the mailing list of the Chehalis Basin Partnership (170 individuals). Recipients of these invitations were referred to six

Timberland Regional Library locations throughout the watershed where report copies are located for review.

The official comment period closed June 11, 2001, although additional briefings and discussions occurred later with several key interests in order to understand and address specific concerns that were raised. This submittal report has been revised to reconcile comments provided. Appendix B, "Responsiveness Summary" provides a record of comments and Ecology's response.

Ecology and the Advisory Workgroup who developed the Summary Implementation Strategy for this document will continue to work with affected interests to conduct cleanup planning. The Advisory Workgroup plans to conduct additional public outreach to continue to build understanding of the project throughout the basin. The group will invite others to participate in cleanup planning, and to motivate necessary commitment and action of local government and citizens.

Examples of invitations for public participation, and other communications on this project are included in Appendix C, "Public Notice and Public Involvement".

Acronyms and Abbreviations

BMP	Best Management Practice
CD	Conservation District
CBP	Chehalis Basin Partnership
CBEC	Chehalis Basin Education Consortium
DNMP	Dairy Nutrient Management Plan
Ecology	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
NPDES	National Pollution Discharge Elimination System
NRCS	USDA Natural Resources Conservation Service
OSS	On-Site Sewage System

Appendix A

Cleanup Plan Advisory Group Members and Purpose

"Cleanup Plan Advisory Group Members and Purpose"

Grays Harbor/Chehalis Watershed Protection Advisory Group Purpose

The watershed is impaired by fecal coliform bacteria levels that harm the health and beneficial uses of the watershed. The advisory group set out the following vision, mission, values, and strategies for protection of things important in the watershed.

The Vision Is

A healthy Chehalis Watershed with water quality that supports all biological and human beneficial uses for current and future generations.

The Mission Is

To involve all watershed water quality community members in understanding and improving water quality such that all biological and beneficial uses are met.

We Will Do This By

1. Discovering what community members are currently doing to improve water quality.
2. Inform community members about fecal coliform, and their role in improving this aspect of water quality.
3. Identify and prioritize the most significant pollution sources.
4. Define what causes impacts of human and biological fecal coliform.
5. Develop a detailed road map (SIS) to implement improvement activities and monitor water quality trends.
6. Assess progress and adjust steps to stay on course towards the Vision.
7. Support similar efforts of others to achieve a healthy watershed by serving as a clearinghouse to champion, communicate, and coordinate water quality activities throughout the watershed.

Our Values In This Process Are

We value human beneficial uses of the shellfish, farming, fishing, agriculture, manufacturing, and recreational communities which depend on clean water.

We value the aesthetic character of the watershed which is benefited by the diversity of the fish and wildlife habitat.

We value public health which depends upon clean water for drinking, swimming, and shellfish harvesting.

We value a common sense of stewardship toward the water by all affected people.

Grays Harbor Watershed Cleanup Plan Advisory Workgroup (February, 2001)

Name	Representing
Bob Amrine	Lewis Conservation District
Mark Ballo	Oyster Grower
Brian Blake	Citizen
Scott Brummer	Thurston Conservation District
Randy Cox	Weyerhaeuser-Cosmopolis Mill
Brady Engvall	Oyster Grower
Raman Iyer	Confederated Tribes of the Chehalis
Jeff Nelson and Doug George	Grays Harbor County, Public Services
Melanie Kallas and Mike Madsen	Mason Conservation District
Don Melvin	WA Department of Health
Jim Nichols	City of Chehalis
John Olson	League of Women Voters
Dave Palmer	Chehalis River Council
Sue Patnude and Chad Stussy	WA Department of Fish and Wildlife
Wally Remund	Citizen/Cattleman
Dean and Diane Schwickerath	Wildlife Forever of Grays Harbor and Grays Harbor Audubon Society
Brian Shea	City of Aberdeen
Armen Stepanian	Citizen, Ocean Shores
Gary M. Waltenburg	Citizen
Ron Wisner	Grays Harbor Conservation District
Jeannie Yackley, RS	Lewis County Environmental Services
Craig Zora	WA Department of Natural Resources

Appendix B

Responsiveness Summary

RESPONSIVENESS SUMMARY for the PROPOSED "Grays Harbor/Chehalis Watershed Fecal Coliform Bacteria Total Maximum Daily Load"

The kickoff of the public comment period for the proposed draft TMDL began with a presentation to the Chehalis Basin Partnership on April 27, 2001.

Invitation for public comment was published as legal advertisements in the *Olympian*, *Aberdeen World*, and *Centralia Chronicle* newspapers beginning May 12, 2001. The Aberdeen World followed the legal notice with a feature story about the TMDL and alerting readers to the opportunity for comment. An article about the draft TMDL and inviting public comment was also published in the May 2001 issue of *Drops-of-Water* (a newspaper insert published by the Chehalis River Council that is delivered to approximately 40,000 newspaper recipients in the Chehalis Basin). Notice of the TMDL comment period was also sent to the mailing list of the Chehalis Basin Partnership (170 individuals). Recipients of these invitations were referred to six Timberland Regional Library locations throughout the watershed where report copies are located for review.

The official comment period closed June 11, 2001, although additional briefings and discussions occurred later with several key interests in order to understand and address specific concerns that were raised.

The following organizations provided written comments:

Grays Harbor County Commissioners
Grays Harbor Conservation District Board of Supervisors
Weyerhaeuser Cosmopolis Pulp Mill
City of Hoquiam
U.S. Environmental Protection Agency

Correspondence received during the public comment period is provided later in this section. Following is a summary of their comments, with relevant responses from the Department of Ecology.

Comments Received from Weyerhaeuser

A. General Comments regarding Study and Action Planning for waters impaired by fecal coliform bacteria.

- Weyerhaeuser recommended that the efforts to collect fecal coliform data were good and necessary but did not adequately identify actual pollution sources.

- They also recommended that instead of the extensive technical effort applied to this and other similar bacteria TMDLs, minimal field studies should instead be conducted to confirm the existence and sources of fecal coliform pollution. They believe that the extensive resources needed to develop precise quantified pollution limits are unnecessary because the actions for control of fecal coliform pollution are qualitative and predictable.

- They recommended use of genotyping to better distinguish the actual sources (human, bovine, avian, marine mammals, etc.)

- They believe that the fecal coliform present in their wastewater are not pathogenic and that there is no environmental health benefit to regulate it.

Response:

It was not practical nor an intended objective of the study to identify specific pollution sources. The study objective was to identify the relative contributions of fecal coliform bacteria coming from the various tributaries, point-source discharges and urban storm drains. More than 1,000 data points were used to determine needed load reductions. As stated in various places of the Summary Implementation Strategy, additional, more refined monitoring will help identify specific sources. Cleanup planning and actions will be adjusted, i.e., refined according to monitoring results. The cleanup actions currently proposed are intended as interim measures for water quality improvement. Because of the significance of observed and predicted water quality violations during critical conditions (average of 65% reduction of bacteria is required to achieve water quality standards throughout the watershed), the recommended load allocations are amply supported by the current analysis.

Ecology agrees that cleanup actions for fecal coliform bacteria are qualitative and predictable. However, the Clean Water Act requirements for development of a TMDL still call for establishment of specific load allocations and wasteload allocations. Specific allocations serve as targets, with the intended goal that what gets measured gets done.

There is a lack of scientific agreement on the merits of genotyping for helping guide cleanup decisions. The method is capable of determining which animal species feces are present in the water sample, so test results might help eliminate management requirements for species not found in the system. However, the method does not help quantify the relative contributions from the different species present. In other words, genotyping does not tell us which animals are most contributing to the pollution.

This TMDL submittal report acknowledges various animal sources, including wildlife, contributing to the pollution. The cleanup actions proposed are focused on the common and predictable, and in many tributaries observed sources of bacteria that people can help control. While it is helpful to know which animals are part of the bacteria pollution problem, absence of that quantified information should not stall interventions that we know are needed and that will make a difference.

Shellfish harvest and commerce protections established by the U.S. Food and Drug Administration and administered by the Washington State Department of Health are based on fecal coliform bacteria collectively and do not distinguish or exempt particular fecal coliform bacteria strains from regulation.

Because shellfish production is a characteristic beneficial use deserving protection, fecal coliform bacteria regardless of which genera, will continue to serve as the water quality standard in Grays Harbor.

B. Comments on hydrodynamic and water quality modeling used to establish limits for the Weyerhaeuser Cosmopolis Pulp Mill.

Comments predominantly questioned the technical aspects of the modeling used to predict transport and fate of fecal coliform bacteria from the Weyco mill into the inner and outer harbor. The three page Executive Summary of a "Grays Harbor TMDL Modeling Review" submitted to Ecology by Weyerhaeuser on May 22, 2001, is attached, along with additional comments submitted April 11, 2001.

The essence of Weyerhaeuser's technical comments suggest that the TMDL modeling over-estimated the effects of pollution contributed by the pulp mill. Weyerhaeuser recommended alternative modeling approaches to support their claim that the proposed waste load allocation (WLA) for the Cosmopolis Pulp Mill should be withdrawn from the TMDL.

Response:

While Ecology believes that the modeling limitations raised by Weyerhaeuser are overstated, the dispersion value they recommended is valid. Based on the model run presented in the Weyerhaeuser comments using the dispersion rate of 50 m^2/sec., the existing NPDES permit limit is considered to be protective of the water quality standard for fecal coliform in Grays Harbor. Therefore, this submittal report has been revised to indicate that the existing permit limit is the appropriate WLA for the pulp mill outfall 1. The existing permit limit is a monthly average fecal coliform limit of 5,000 colonies per 100 ml and a daily maximum of 20,000 colonies per 100 ml.

The use of the revised dispersion rate has negligible effect on the discharge or transport of non-point source pollutants from the tributaries, so load allocations for the non-point sources are unchanged. A complete response to the detailed technical comments from Weyerhaeuser is provided in the following memorandum from Greg Pelletier to Dave Rountry dated September 19, 2001.

Comments received from Grays Harbor County and Grays Harbor County Conservation District:

Comments are summarized below.

- People affected by the TMDL are not adequately informed and did not have opportunity to participate in development of the summary implementation strategy (i.e. the cleanup plan).

- Water quality data used for TMDL planning are outdated and do not portray current conditions.

- Disappointment that recent data collected from the Satsop and Humptulips Rivers were not factored into the current cleanup plan.

- Request for clarification about how water quality data for individual tributaries were used to determine relative impacts to water quality in the Harbor.

Response:

The Department of Ecology conducted an unprecedented amount of outreach to inform people throughout the watershed about the TMDL study. Invitations for participation in the cleanup planning were extended in public and smaller group briefings, widely distributed newsletters, feature newspaper articles, e-mail list mailings; and meetings of the diversely-represented Chehalis Basin Partnership. County and conservation district personnel participated regularly in cleanup planning workgroup discussions. A "Summary of Public Involvement" (page 29) describes efforts to inform and involve affected people.

After closure of the period for public comment on the draft Summary Implementation Strategy and in direct response to the county's concerns about limited public involvement, Ecology conducted additional outreach. Separate meetings were held with the Grays Harbor Council of Governments, Grays Harbor County Commissioner Bob Beerbower, Grays Harbor Conservation District Board, and additional county officials.

Those discussions raised the need for Ecology to clarify the long-range process for cleanup planning and implementation. The current submittal report is revised to emphasize that the current cleanup plan is a work-in-progress. Enough is currently known about pollution levels, common sources, and cleanup responsibilities so that additional cleanup can proceed. The load allocations serve as targets upon which progress can be measured. Ongoing monitoring of water quality and programs responsible for implementation will be necessary. Water quality data gathered on an ongoing basis by various groups will be useful to inform further cleanup planning. Monitoring data from different groups will likely serve different purposes, depending on the scientific rigor applied to its collection and analysis. Ecology continues to provide financial and technical support for water quality monitoring efforts by various groups in the Chehalis and Grays Harbor watershed. Local and volunteer monitoring programs will be essential to an effective long-range watershed protection program. The report section on "Monitoring Strategy" has been fortified to emphasize the importance of monitoring in measuring effectiveness, and in guiding development of cleanup plan updates as monitoring results indicate that changes are needed.

Ecology will be convening a workgroup to prepare a more "Detailed Implementation Plan" about one year after EPA approves the Summary (or conceptual) Implementation Strategy. Broad public involvement in ongoing planning will continue to be valued.

The dialogue following the public comment period allowed also for more detailed description about how earlier sampling data was used to compute relative pollution loads from tributaries. Numerous other technical questions were answered during the post-comment period discussions.

Comments received from city of Hoquiam:

Numerous suggestions were provided in the margins of a "mark-up" report copy, which were helpful for improving the clarity and readability of the document.

Comments received from U.S. Environmental Protection Agency

Comments from E.P.A. were generally complimentary, yet suggested additional clarification to assure approval of the TMDL by E.P.A.(such as the need for better identification of the locations of "listed" impaired waters covered by the study). Numerous editorial and formatting improvements were also recommended in the EPA comments. This version of the TMDL submittal report reflects revisions that fully reconcile the specific suggestions of E.P.A.

Department of Ecology

September 19, 2001

TO: Dave Rountry, Water Quality Program

FROM: Greg Pelletier, Environmental Assessment Program

SUBJECT: Response to June 11, 2001, Comments on Draft *Chehalis/Grays Harbor Watershed Fecal Coliform Bacteria TMDL, Cleanup Plan Submittal Report.* May 2001

Based on the information submitted in the CH2M-Hill critique, the current NPDES permit limit is recommended as the WLA for fecal coliform for Weyerhaeuser Outfall 1. The current NPDES permit limit for Outfall 1 is a monthly average fecal coliform limit of 5000 colonies per 100 ml and a daily maximum limit of 20000 colonies per 100 ml. Based on the model run presented in the CH2M-Hill critique using a dispersion rate of 50 m^2/sec, the current NPDES permit limit is considered to be protective of the water quality standard for fecal coliform in Grays Harbor. Therefore, the current NPDES permit limit is recommended as the WLA for fecal coliform for Outfall 1.

The following is a response to the list of issues of concern with the hydrodynamic model and its application by Ecology that were summarized in the executive summary of the CH2M-Hill critique:

- Ecology used a one-dimensional model to represent the hydrodynamics of Grays Harbor. The model used by Ecology builds on two previous studies by EPA and Battelle that had also applied similar one-dimensional hydrodynamic models in Grays Harbor to describe the transport of water quality constituents (Battelle, 1974; Cleland, 1978; EPA, 1980). The model grid segmentation used by Ecology increased the spatial resolution of the estuary compared with the previous modeling studies.

- Mass transport in an estuary is generally most significant in the horizontal plane. In shallow systems like Grays Harbor, the transport along the vertical axis is often considered to be of negligible consequence in describing the hydrodynamic behavior and mass transport of water quality constituents. Such estuaries are often described as vertically mixed for modeling purposes. The available data for Grays Harbor also shows that the water column is not stratified during parts of the year. During periods when there is some vertical stratification, the upper mixed layer often extends to depths of five meters and accounts for up to nearly 85 percent of the volume of Grays Harbor.

- The bathymetry and geometry were estimated from available data from NOAA and the U.S. Army Corps of Engineers (ACOE). The NOAA data included the nautical chart (NOAA chart number 18502) as well as digital bathymetry data. ACOE provided digital bathymetry data of current conditions from their dredged navigation projects. A Cartesian grid of digital bathymetry was estimated using Arcview GIS by merging the more recent ACOE data over the more widespread NOAA digital and chart data. The bottom elevations specified in the hydrodynamic model input file correspond to the deepest regions of the model segments. All segments, including those with extensive mudflats, are represented by also estimating the water surface area at low tide, the increase in the water surface area with increase in depth, and the maximum nodal surface area (estimated at mean higher high water from the NOAA data). Areas with extensive mudflats, including the sixteen segments identified in CH2M-Hill's review, are characterized as having very small areas at low tide to account for the estimated area of exposed mudflats and much larger areas at high tide to account for the flooding of the mudflats as the tide increases.

- The tides at the seaward boundary and interior locations in Grays Harbor were estimated based on predicted hourly tides from NOAA data as implemented in Nautical Software (1996). The hydrodynamic model calibration was checked by comparing predicted tides from the model with predicted tides from the NOAA predictions. The hydrodynamic model did an excellent job of reproducing the NOAA predictions at Aberdeen and Montesano. The Corps of Engineers tide data project that was cited in CH2M-Hill's review was started in September 1999, so there are no data available from that project for the study year for Ecology's Grays Harbor project (May 1997 through April 1998).

- Salinity was used in addition to tide levels as a calibration check for the hydrodynamic model. The mean difference between paired samples of observed and predicted salinity was only 1.3 +/- 4.7 parts per thousand. The close agreement between predicted and observed salinity indicates that the transport processes predicted by the model are reasonably accurate. The differences between predicted and observed salinity are reasonably small and are probably influenced mainly by uncertainty in the estimated salinity at the seaward boundary. Predicted salinity was brought into better agreement when the assumed boundary salinity was reduced to 30 parts per thousand, which is still within a reasonable range for estimating the boundary condition. Beverage and Swecker (1969) reported a range in salinity near the entrance to Grays Harbor of between about 27 and 34 parts per thousand and also reported that Grays Harbor is reasonably well-mixed vertically, especially during low-flow periods. Landry and Hickey (1989) also reported a typical range of salinity from about 29 to 32 parts per thousand in nearshore surface coastal waters in the vicinity of Grays Harbor.

- The effect of wind speed was examined during Ecology's modeling analysis. A comparison of predicted and observed fecal coliform at various model segments is presented in the attached Figure 1. Wind data from the Columbia Bar station was included in the hydrodynamic model input file for this model run. The model results, including the wind data, show that the overall goodness-of-fit of the model using the selected calibration value of the fecal coliform die-off rate was not significantly affected by wind speed. The fecal coliform dieoff rate used in the model run, including wind, was the same as the final selected calibration by Ecology (0.4 per day at 20 degrees C).

The following is a response to the list of issues of concern with the water quality model and its application by Ecology that were summarized in the executive summary of the CH2M-Hill critique:

- Modeling of coliform bacteria usually involves the use of a simple first-order decay expression to describe disappearance (Bowie *et al*, 1985. EPA/600/3-85/040). The overall net first-order decay rate is typically used to represent the net effect of several processes such as death rate, net loss or gain due to settling and re-suspension, and after-growth rate (Thomann and Mueller, 1987; Chapra, 1997). Use of a simple first-order decay expression is the most common practice in modeling of fecal coliforms for TMDLs and is the formulation that is usually included in the current state-of-the-art water quality models such as QUAL2E, EFDC, and WASP.

- The rates of disappearance of fecal coliform measured by Cirone-Storm (1983) are representative of disappearance of dredge spoils and are not expected to be comparable to disappearance rates of typical fecal coliform bacteria in the water column of Grays Harbor. Disappearance of fecal coliform in dredge spoils from the water column is expected to be significantly greater than the disappearance of typical fecal coliform. The settling rate of the coarser material in the dredge spoils is likely to be significantly greater than that of suspended bacteria particles typically found in the water column of Grays Harbor.

- Comparison of quantiles of measured and predicted values is a common and recommended practice in judging the performance of water quality models (Reckhow and Chapra, 1983, Reckhow et al 1986). In addition to comparison of quantiles, Ecology also used other recommended methods to judge the calibration of the model including graphical comparison of predicted versus observed fecal coliform and comparison of the time-series of predicted and observed fecal coliform. Since the water quality standard for fecal coliform is for a geometric mean and 90^{th} percentile, comparison of quantiles is also a useful indicator of how well the model represents the standards for the central tendency and variability of the data.

- CH2M-Hill proposed increasing the fecal coliform die-off rate from 0.4 to 0.8 per day at 20 degrees C. Ecology's modeling analysis shows that increasing the dieoff rate to 0.8 per day reduces the overall accuracy of the model and causes the model to under-estimate the fecal coliform level in Grays Harbor. The attached Figure 2 shows a comparison of predicted and observed fecal coliform levels at all stations in Grays Harbor using a dieoff rate of 0.8 per day at 20 degrees C. CH2M-Hill showed only a very small subset of the data in their comparison. The overall bias introduced by increasing the dieoff rate to 0.8 per day is apparent when all of the predicted and observed values are compared.

- Dispersion rates were considered based on recommendations in the CH2M-Hill review. A dispersion rate of 50 m^2/sec is considered acceptable for modeling of point source upsets to Grays Harbor based on the data presented by Beverage and Swecker (1969). The available data or literature does not support typical dispersion rates of greater than 50 m^2/sec in Grays Harbor. The magnitude of dispersion for tidally averaged models will vary greatly from those not tidally averaged (Martin and McCutcheon, 1999). Beverage and Swecker present dispersion rates for two averaging periods: half-tidal cycle and tidally averaged conditions. Dispersion rates reported for tidally averaged conditions are not appropriate for use in a hydrodynamic model with a short time step. The dispersion rates reported for a half-tidal cycle are acceptable for the hydrodynamic model of Grays Harbor. The typical half-tidal dispersion rate reported by Beverage and Swecker was approximately 50 m^2/sec.

- Based on the information submitted in the CH2M-Hill critique, Ecology has changed the recommendations for the waste load allocation (WLA) for fecal coliform from Weyerhaeuser Outfall 1. The current NPDES permit limit for Outfall 1 is a monthly average fecal coliform limit of 5000 colonies per 100 ml and a daily maximum limit of 20000 colonies per 100 ml. Based on the model run presented in the CH2M-Hill critique using a dispersion rate of 50 m^2/sec, the current NPDES permit limit is considered to be protective of the water quality standard for fecal coliform in Grays Harbor. Therefore, the current NPDES permit limit is recommended as the WLA for fecal coliform for Outfall 1.

- The CH2M-Hill critique concluded, "the model developed by Ecology is a good screening model," but that it should not be used to set effluent limits. Ecology is using the model results as a screening tool and has concluded that the current NPDES permit limits would be protective of the fecal coliform levels in Grays Harbor. However, the model results also show that loading from Outfall 1 during upset conditions have the potential to cause fecal coliform levels to exceed the water quality standard for fecal coliform. Therefore, relaxation of the permit limits is not recommended or supported by the present screening analysis.

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GP:cn
Attachments

cc: Darrel Anderson, Water Quality Program
Karol Erickson, Environmental Assessment Program
Will Kendra, Environmental Assessment Program

Figure 1a. Comparison of predicted and observed fecal coliform at WASP segment 3 from 5/1/97 - 4/30/98 using wind speed data from the Columbial Bar.

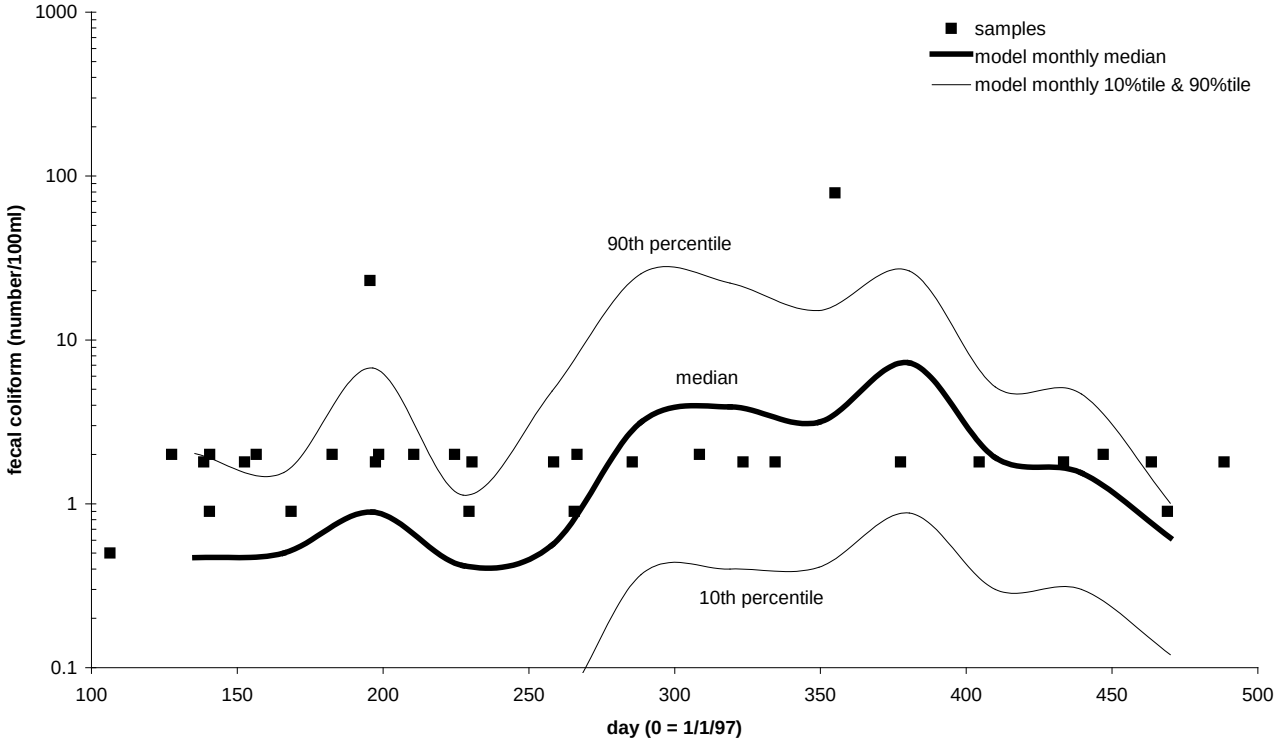


Figure 1b. Comparison of predicted and observed fecal coliform at WASP segment 8 from 5/1/97 - 4/30/98 using wind speed data from the Columbial Bar.

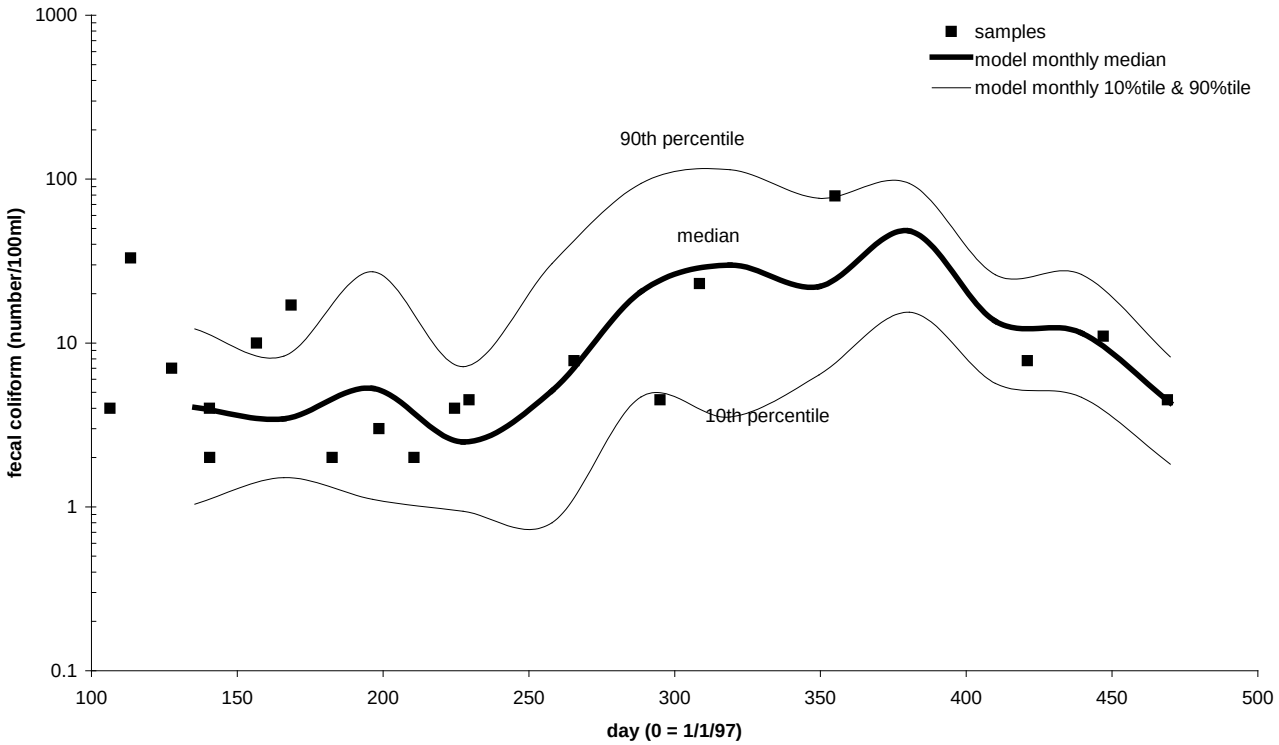


Figure 2a. Comparison of predicted and observed fecal coliform in Grays Harbor at all stations, 5/1/97 - 4/30/98 using a fecal coliform dieoff rate of 0.8 degrees at 20 deg C.

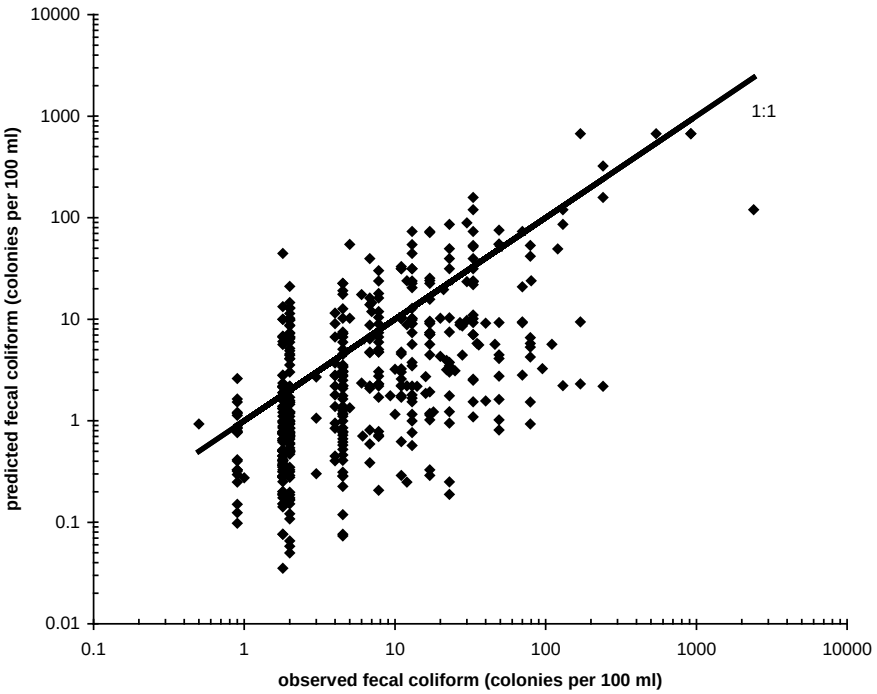
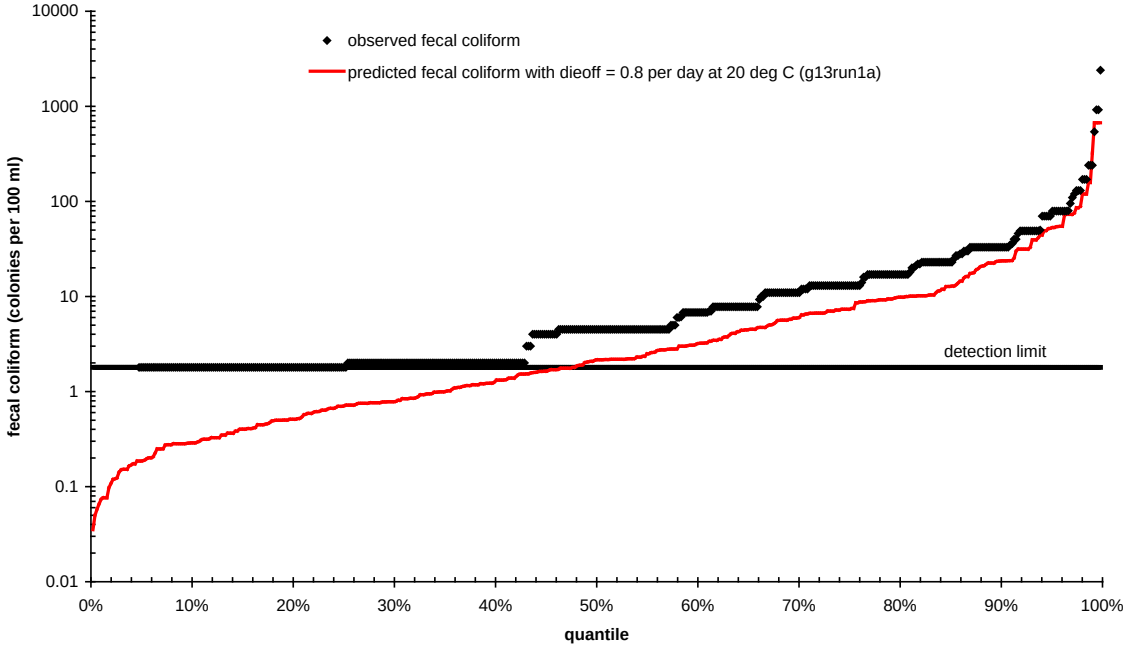


Figure 2b. Comparison of quantiles of observed and predicted fecal coliform at all stations in Grays Harbor, 5/1/97 - 4/30/98 using a fecal coliform dieoff rate of 0.8 degrees at 20 deg C.



Environment, Health and Safety

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May 22, 2001

Mr. David Rountry
Southwest Regional Water Quality Program
Washington Department of Ecology
P.O. Box 47600
Olympia, WA 98504-7600

Dear Mr. Rountry:

In February 2000 the Washington State Department of Ecology issued a report entitled, "Grays Harbor Fecal Coliform Total Maximum Daily Load Study". The report summarizes the development and application of a numerical model to represent the fate and transport of fecal coliform bacteria in Grays Harbor. The WDOE model application indicates the fecal wasteload allocation for the Weyerhaeuser outfall should be reduced from 20,000 to 14,000 per 100 ml.

Weyerhaeuser Company had Dr. Steve Costa and Dr. Kyle Winslow, with CH2M HILL, complete a detailed evaluation of the WDOE Grays Harbor modeling. Their critique surfaced many very significant concerns regarding: 1) the model selected to represent the hydraulics of Grays Harbor, 2) the calibration and verification of the modeling hydraulics and water quality and 3) the application of this model for fecal coliform wasteload allocations.

I have enclosed two copies of CH2M HILL's modeling critique for your review. We look forward to meeting with you on May 30, 2001, at 10:00 A.M. at Ecology Headquarters. If you have any questions please call me at 253-924-6946.

Regards,

Barry K. Firth
Senior Scientist

Enclosures: 2

cc: Dave Wilson - CH2M HILL, Bellevue, WA.
Randy Cox - Cosmopolis Sort 24
Chuck Gibson - WTC 2H2
Ken Johnson - CH 1K29
Firth/Chron

GRAYS HARBOR TMDL MODELING REVIEW

PREPARED FOR: Randy Cox, Weyerhaeuser
Ken Johnson, Weyerhaeuser
Barry Firth, Weyerhaeuser

PREPARED BY: Kyle Winslow, CH2M HILL
Steve Costa, CH2M HILL
David Wilson, CH2M HILL
Brad Paulson, CH2M HILL

DATE: **21 May 2001**

Executive Summary

This report summarizes an extensive review of the Grays Harbor Fecal Coliform Total Maximum Daily Load (TMDL) Study performed by the Washington State Department of Ecology (Ecology, 2000). Grays Harbor is a complex estuarine system characterized by extensive mudflats and seasonal freshwater flows. The circulation patterns in Grays Harbor are complex flows driven by freshwater inflows, ocean tides, meteorological influences, and local bathymetry. The ability to predict these complex patterns depends on the understanding of the physical forcing functions and their relative importance throughout the year. The TMDL Study focuses on the Cosmopolis mill discharge as a periodic dominant source of fecal coliform to the Grays Harbor system. The study is based on the results of predictive numerical models applied by Ecology. This report provides a critical evaluation of Ecology's modeling.

Several issues of concern were identified during the review process. These issues have been categorized according to the two components of the model (hydrodynamics and water quality). A brief description of each issue follows. Detailed explanations of each issue are presented in the main body of this report.

The following is a list of issues of concern associated with the hydrodynamic model and its application by Ecology:

- Ecology chose a one-dimensional, depth-averaged, link node model to represent the hydrodynamics in Grays Harbor. Since Grays Harbor is significantly stratified during portions of the year, a depth-averaged model cannot accurately represent the system.

- The boundary conditions used to drive the hydrodynamic model may not accurately reflect actual conditions, particularly during periods of large freshwater inflow into Grays Harbor. The Model calibration for water levels relies on NOAH tidal predictions, which are generated for average flow conditions and astronomical tides and do not account for short term fluctuations caused by meteorological influences. Elevated freshwater inflows can produce water surface elevations significantly different than those predicted by NOAA tide tables.

- The water quality model's lack of ability to reproduce measured salinity patterns may indicate that the freshwater inflows have not been correctly identified as input to the hydrodynamic model, or may reflect poor specification of advective and diffusive transport processes by the hydrodynamic model, or both.

- The calibration of the hydrodynamic model included matching model predicted water surface elevations to NOAA predicted water surface elevations. Reproduction of water surface elevations in a hydrodynamic model does not constitute a full calibration. The issue of matching water velocities and circulation patterns throughout Grays Harbor was not mentioned by Ecology (2000). This could be a substantial flaw in the hydrodynamic model. The water velocities control the transport of fecal coliform bacteria in the harbor. The velocities predicted by the model are often 25% of measured velocities in Grays Harbor.

- Model results do not reflect observed tidal attenuation times. The inability of the model to accurately predict the travel of the tidal wave up the estuary is indicative of problems with the model formulation or. the specified bathymetry and geometry, or both. For example, the input file specifying the depth of each model segment in the hydrodynamic model assigns a depth of 1.5 meters (below MLLW) to over 16 segments characterized by extensive mud flats. These mud flats are generally 0.5 meters above MLLW. Ecology's characterization overestimates the volume of water in the harbor at low tides, and thus underestimates the flushing in the harbor. This could lead to an overestimation of the coliform concentrations in Grays Harbor.

- The model grid used in the hydrodynamic model appears to be insufficient to represent the complicated flow dynamics in Grays Harbor:
  - The sizing of the model segments, particularly in the North Bay is too large to accurately represent the physical processes in the system,
  - The western end of the model grid cannot correctly account for the reflux of water into the harbor on incoming tides, and
  - The channels used in the model grid, particularly those representing flow in the areas of the harbor dominated by mudflats, do not physically represent the system.

The following is a list of issues of concern with the water quality model and its application by Ecology:

- Ecology chose to use a one-dimensional water quality model to predict the fate and transport of fecal coliform in Grays Harbor. As mentioned above for the hydrodynamic model, the water column in Grays Harbor is seasonally stratified. This is particularly true near the eastern confluence of North Channel and South Channel.

- The water quality model was calibrated by adjusting fecal coliform die-off rates until a satisfactory match was obtained between predicted and measured concentrations of bacteria throughout Grays Harbor. There are several problems with this method:
  - The die-off rate used does not agree with field studies,
  - The calibration compared quantiles of predicted and measured values to ascertain the quality of the predictions which is an inappropriate and potentially misleading approach, and
  - The die-off rate was used as the primary and only calibration parameter applied for the water quality model and as such must account for dispersion, settling, and any other

factors governing the fate of coliform in the harbor, which is not an accepted or appropriate calibration approach.

- The Ecology model uses questionable die-off rates for fecal coliform. Cirone-Storm (1983), referenced by Ecology, report measured rates for coliform die-off specific to Grays Harbor that are 4 to 6 times larger than the rates used in the Ecology model. The model is extremely sensitive to changes in the coliform die-off rate, in part because of the calibration approach described above.

- The Ecology model does not include dispersion. Dispersion is a primary process governing the fate and transport of pollutants in an estuarine system. Failure to include this process may considerably overestimate pollutant concentrations in Grays Harbor. As indicated above, dispersion was not used for calibration, but it is generally accepted that this should be the primary calibration parameter for the water quality model.

- The Ecology model does not include the settling of particulate matter. Settling may provide an additional mechanism for the removal of coliform bacteria from the water column. Failure to include this process may overestimate pollutant concentrations in Grays Harbor.

- The Ecology model does not include a representation or consideration of the sediment layer. Bacteria that reach shellfish closure zones near the western end of South Channel may not be prone to settling due to their particle size. The bacteria concentrations in the sediments may be significantly different than the concentrations in the water column.

The model developed by Ecology, as currently implemented, is considered inadequate for use as a planning level or management level tool to establish a TMDL, WLAs, or set effluent limitations for the Cosmopolis mill. The unknown cumulative effect of the issues listed above casts considerable doubt on the predictions made by the Ecology model on fecal coliform concentrations in Grays Harbor. These issues should be addressed and evaluated before the results of the Ecology model are used in management applications.

Grays Harbor Conservation District
330 Pioneer Ave. West - Montesano, WA 98563 - (360) 249-5980 - FAX (360) 249-6961

June 6, 2001

Dept. of Ecology
Attn: Dave Rountry
P.O. Box 47775
Olympia, WA 98504-7775

RE: Grays Harbor/Chehalis Fecal Coliform Bacteria TMDL Study/Clean Up Plan

Dear Mr. Rountry,

At this time, the majority of the Supervisors of the Grays Harbor Conservation District find they can neither support nor endorse the Grays Harbor/Chehalis Fecal Coliform TMDL Study/Clean Up Plan prepared and released by Dept. of Ecology in June 2000.

The majority of the Supervisors of the GHCD need clarification and additional information on the supporting data used to develop the study and the subsequent Summary Implementation Strategy. This information would give us a better understanding of the process utilized to complete both the study and the clean up plan.

Sincerely,

Grays Harbor Conservation District
Board of Supervisors

Weyerhaeuser

June 11, 2001

Dave Rountry
Department of Ecology
Southwest Regional Office
P.O. Box 47775
Olympia, WA 98504-7775

Dear Mr. Rountry:

Subject: Comments on draft "Chehalis/Grays Harbor Watershed Fecal Coliform Bacteria TMDL, Cleanup Plan Submittal Report," May 2001

Thank you for providing yet another opportunity to offer comments on the water cleanup plan addressing fecal coliform in Grays Harbor. Once again we wish to acknowledge the Department of Ecology's significant efforts to develop information on the nature and source of the problem, educate and involve the public, and devise bacteria reduction strategies.

It is in Weyerhaeuser's interest to participate in and support actions which will improve water quality in Grays Harbor to ensure that appropriate characteristic uses are realized. These actions should rely upon good scientific methods to develop relevant information, which then can be used to support efficient and effective regulatory and voluntary outcomes. We appreciate that the framework of the TMDL regulation demands a certain process and packaging of information. We will also acknowledge the difficult nature of addressing a pollutant like fecal coliform.

Weyerhaeuser has been an active participant in this process. By way of reference, it should be noted that we previously offered extensive comments on Ecology's draft technical study, *"Grays Harbor Fecal Coliform Total Maximum Daily Load Study,"* February 2000 (Weyerhaeuser letters dated April 21 and June 8, 2000). Most recently, we have sponsored and shared the results of a critique of the technical basis for the draft TMDL *("Grays Harbor TMDL Modeling Review,"* CH2M-Hill, May 21, 2001). Our primary interest is derived from the regulated discharges of fecal coliform from the Cosmopolis pulp mill, and the presumed impact on water quality and the shellfish resource in Grays Harbor.

The comments which follow fall into two categories: those addressing specific aspects of the TMDL as it relates to the Cosmopolis Pulp Mill discharges, and those comments which more generally relate to TMDL planning actions for fecal coliform impaired waters.

Cosmopolis Mill Effluent Specific Comments

Available data is ambiguous as to the nature of water quality violations in Grays Harbor

- While Ecology's technical study and Cleanup Plan Submittal Report suggests widespread violations of fecal coliform water quality standards and presumably an inability to realize the full set of characteristic uses of the waterbody, other fact-based information suggests differently.

    - The agency's field study to characterize water quality did not evidence violations of the Class B freshwater or marine criteria (the "Inner Harbor" waterbody). This is recognized on page 29 and in Table 7 of the draft technical report (WDOE, February 2000). Data-based violations of the Class A water quality criteria (the "Outer Harbor") were limited, marginal and very localized. We believe these results are consistent with collected data from the decades-long ambient water monitoring efforts by WDOE, DOH, Weyerhaeuser and ITT Rayonier.

    - Reliance by Ecology on predicted fecal coliform concentrations from the fate and transport model or those which result from the statistical manipulation of a very limited data set, should not be the basis for regulatory decision-making. The attempt to produce very detailed and precise source allocations is not supported by the available information. There are many problems with the evaluation of information and summary conclusions in Ecology's technical report. These could be presented if it would be useful to the agency. A critique of the Ecology model is presented later in these comments.

    - Epidemiological information on the history of illness attributed to water exposure or consumption of shellfish from Grays Harbor suggests that Class A and B characteristic uses associated with fecal coliform are being attained in Grays Harbor. That is, no information exists to indicate that Fish and Shellfish or Recreation uses (or any other characteristic uses) are compromised by current fecal coliform levels. The executive summary of an interim report supporting this conclusion is enclosed ("Survey of the Available Epidemiological Data Regarding Waterborne and Food Borne Illnesses with Potential Linkage to Water Quality of the Grays Harbor," Mansour Samadpour, Ph.D., June 2001 - attachment 2). A complete report is being prepared and will be submitted to Ecology when completed.

The Cosmopolis mill wastewater (Outfall 001) contains "fecal coliform," but apparently not pathogens typically associated with a human disease-causing potential. This finding is consistent with literature information. This information should alleviate the need for the assignment of a TMDL-waste load allocation to the Cosmopolis mill.

- Mill wastewater is routinely sampled and analyzed for the presence of indicator bacteria, parasites, and viruses typically associated with feces-contaminated water. While bacteria classified as "fecal coliform" are present in the wastewater, no organisms typically associated with fecal material have been detected. A summary report of these findings is enclosed (reference a June 11, 2001 letter and data table from Dr. Mansour Samadpour to Ken Johnson - attachment 3). A complete technical report is under development and will be sent to the Department of Ecology and Department of Health under separate cover.

- Studies of pulp and paper industry wastewater treatment systems have shown that in systems known to be free of fecal input, the "fecal" coliform present are typically non-toxigenic strains of harmless serotypes (see "The Ecology of 'Fecal Indicator' Bacteria Commonly Found In Pulp And Paper Water Systems," Gauthier and Archibald, Water Resources, Vol. 35, No. 9, pp. 2207-2218, 2001 - copy enclosed as attachment 4)

- Fecal coliform serves as a convenient indicator group to represent the possible presence of fecal waste. The bacteria, viruses and parasites present in feces are recognized as human pathogens. The Cosmopolis mill routinely produces a direct measure of these pathogens. Since these pathogens are not present in the mill wastewater, regulation on the basis of fecal coliform is superfluous and there is no compelling reason to develop a WLA for this TMDL. The mill can commit to very routine assays for pathogens to demonstrate this reality.

The fate and transport computer model utilized by Ecology as the basis for setting a waste load allocation is not credible

- The specific concern to the Company has been the promotion of a waste load allocation (WLA) of 14,000 colonies per 100 ml as an end-of-pipe daily maximum effluent limit. This outcome is derived solely from the modeling work presented in the *"Grays Harbor Fecal Coliform Total Maximum Daily Load Study."* It is the WLA deemed necessary to achieve the 14 colony per 100 ml Class A water quality criterion as a geometric mean "exceeding the 90th percentile standard no greater than 10 percent of the time during a 24-hour period." Left unchallenged, this WLA would be advanced to EPA as a component of the TMDL and undoubtably approved. Consistent with the TMDL regulation, this WLA would eventually be placed in the Cosmopolis mill NPDES permit as an enforceable requirement.

Our conclusion is that the model developed by Ecology has no technical credibility for the purpose of establishing a WLA for the Cosmopolis mill. The basis for this conclusion is set out in the critique prepared by CH2M-Hill titled *"Grays Harbor TMDL Modeling Review,"* May

2001 (copy enclosed). To be efficient in our comments we would simply reference you to the report, in particular the individual bulleted points in the Executive Summary. At the conclusion of our presentation of this review to Ecology staff on May 30, several questions were asked. These questions have been paraphrased and answered in a document titled "Response to Department of Ecology Comments During the May 30, 2001 Weyerhaeuser Presentation" (see attachment 5).

Ecology should withdraw the proposed Cosmopolis Pulp Mill WLA from the TMDL.

- The Cosmopolis mill will be sponsoring a wastewater bacteria die-off study in the latter half of 2001 to empirically assess the multiple variables controlling this process. The Departments of Ecology and Health have been participating in the scoping of this study. The information from the study would have direct relevance to the establishment of any WLA for the Cosmopolis mill.

General Learnings and Observations

- The efforts to collect fecal coliform data on tributaries, point sources, and in open water across all seasons was a good and necessary effort. In retrospect, however, the enormous effort to model the fate and transport of bacteria around Grays Harbor would seem to have minimal value. A more useful tool might be to utilize techniques to determine the actual source contributions of fecal coliform (human, bovine, avian, marine mammals, etc.). Dr. Mansour Samadpour's Microbial Source Tracking technique could be used to more effectively and efficiently target available regulatory programs to the demonstrated causes of elevated fecal coliform levels.

- The agency should look to accelerate and streamline the TMDL development process for other fecal coliform-impaired waterbodies. The basic reality is that the outcome of every fecal coliform TMDL activity will be the same. The Summary Implementation Strategy will inevitably call upon the effective application of regulatory programs addressing septic tank maintenance, agricultural/livestock waste management, municipal and industrial point source discharges, and urban/industrial/construction stormwater discharges. A public education campaign is also important. The work for Ecology should be to conduct minimal field studies to confirm the existence and source(s) of feces-related coliform, aggressively implement (or collaborate with local government on) the available regulatory programs to reduce discharges, and then monitor progress over time. A significant expenditure of resources to develop precise quantified WLAs and LAs will be a mismatch with the qualitative nature of available control actions.

In summary, numerous technical issues will need to be resolved if a highly quantified TMDL is needed. We are prepared to work with the agency to define and address the relevant issues to yield appropriate regulatory oversight of the Cosmopolis mill bacteria discharges.

Sincerely,

Ken Johnson
Washington Regulatory Affairs Manager

cc Darrel Anderson - WDOE
Kahle Jennings - WDOE
Don Nelson - WDOE
Frank Meriwether - WDOH

June 11, 2001

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

RE: Chehalis/Grays Harbor Fecal Coliform Bacteria TMDL Cleanup Plan

Dear Mr. Rountry:

Thank you for the opportunity to comment on the proposed cleanup plan for the Chehalis/Grays Harbor watershed. Grays Harbor County recognizes the significance of meeting state water quality standards and appreciates efforts to insure that the Grays Harbor/Chehalis watershed comply with the standards. Grays Harbor County does question the effectiveness of the proposed cleanup plan. The concerns began with the presentation of the Grays *Harbor Fecal Coliform TMDL Study*, June 2000. Ecology's outreach to present the study findings did not adequately reach all effected audiences/stakeholders in a timely manner. The TMDL process is new to the Grays Harbor area and most stakeholders are experiencing a learning curve that did not coincide with Ecology's comment periods, therefore, most in Grays Harbor County felt they were uninformed and found it difficult to comment on the TMDL study. Those who did provide comments were not well received. Specifically the county's Environmental Health Director questioned the data and requested an interpretation or at least an explanation that the average person could understand. Ecology disregarded this request. Grays Harbor Conservation District (District) also questioned the data and provided data, but again this input was disregarded. At the request of stakeholders, and as a minimum effort by Ecology, Greg Pelletier should have met with interested stakeholders and answered their questions.

Following the TMDL study, Ecology requested a working group develop a cleanup plan. The stated purpose of the Summary Implementation Strategy (SIS) is to present a clear, concise, and sequential concept of how agencies, citizens and industry will achieve water quality standards in the watershed. After reviewing the SIS, it appears as though Ecology missed the mark. The following summarizes Grays Harbor County's concerns and we encourage Ecology to continue discussions about these concerns with local stakeholders.

- How can Ecology collectively evaluate and summarize rivers with varying constraints and total loadings? This is an area where a lack of data interpretation makes it difficult to access the effectiveness of a cleanup plan.
- Non-point discharge closure only affected the Elk River shellfish industries, a point not reflected in the documentation.

- How can the stakeholders reduce fecal coliform by 29% when the observed data, even at the highest point, does not exceed 80 colonies per 100m1?
- The cleanup plan should focus efforts on tributaries that are contributing to the fecal coliform problem. Many local entities are willing to work towards cleanup once someone identifies the sources. Some local entities (Conservation Districts and agricultural stakeholders) are actively working to identify the sources, but so far, the process only determined who is not contributing to the problem. Ecology discounted this information, provided by the stakeholders, without an explanation.
- The SIS acknowledges that the District is working to identify the source(s) of fecal coliform pollution in the tributaries; however, Ecology ignores the requests for information and the fact that current data that are more accurate is available from the District.
- The District's sampling, that indicate positive results, are totally discounted due to a declared drought year, which appears to indicate that Ecology is not interested in local governments efforts to resolve and/or determine the factual fecal coliform source(s). Sampling from January through May 2001 indicate that fecal coliform counts are well within the water quality standards (average high is 9 per 100 ml and average low is 2-3 per 100 ml).
- The statement that the water quality monitoring work by the Chehalis Basin Education Consortium is not adequate to confirm compliance with water quality standards further supports this attitude by Ecology. Furthermore, statements such as that are insulting to the efforts of local teachers and students.
- The SIS acknowledges changing land use practices since the sampling data was collected. The SIS needs to reflect and strategize using current land use conditions; otherwise, the efforts are futile because Ecology is resolving problems that no longer exist.

Through the Watershed Management Planning effort in the Chehalis, Ecology and local governments are working together towards a common goal, it is disappointing that this same effort is not apparent in the TMDL process. We look forward to working through our differences with Ecology and look forward to your response to our local government concerns.

Respectfully yours,
Grays Harbor County Board of Commissioners

Bob Beerbower, Chairman Dennis Morrisette, Commissioner Dan Wood, Commissioner

CITY OF HOQUIAM
DEPARTMENT OF PUBLIC WORKS
POST OFFICE BOX 300
609 EIGHTH SREET
HOQUIAM, WASHINGTON 98550-0300
TELEPHONE 360/532-5700 FAX 360/539-0938
E-Mail: cityhoq @ techline. com

May 22, 2001

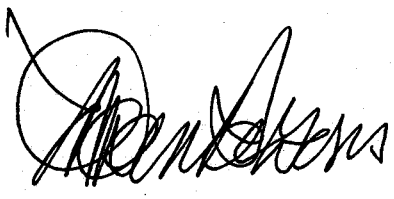
Mr. Dave Rountree
Washington State Department of Ecology
Post Office Box 47775
Olympia, Washington 98504-7775

SUBJECT: Chehalis/Grays Harbor Watershed Fecal Coliform Bacteria TMDL; (Cleanup Plan) Submittal Report

Dear Mr. Rountree:

Enclosed is the rough draft of your Publication Number 01-10-025 WQ with some comments noted. Hopefully others will provide some additional input to enable your office to polish this document. It does need some work to make it a believable document.

Very truly yours,



M. Dean Parsons, P.E.
Director of Public Works

Comments from U.S. Environmental Protection Agency

Mr. Dave Rountry
Department of Ecology
P.O. Box 47775
Olympia, Washington 98504-7775

Dear Mr. Rountry,

We have reviewed the draft Chehalis/Grays Harbor Watershed Fecal Coliform Bacteria TMDL (Cleanup Plan) Submittal Report and commend you on presenting a lot of information clearly. The Submittal Report is well organized, well written, and easy to follow. Our comments are written from the perspective of what information is necessary for the TMDL to be approved.

Identification of waters

There should be a section at the beginning of the submittal report clearly identifying the waters for which TMDLs are being submitted. Table 1 shows the waters that are currently on the 303(d) list, and the reader could assume that those are the waters for which the TMDL is being submitted. However, a number of the waters on the 303(d) list are in the Upper watershed of the Chehalis River and are not being assigned load allocations in this TMDL. (Please see comment on Tributaries without Load Allocations below.) Many other tributaries to the Chehalis River appear to not currently be meeting water quality standards and should be identified as waters for which this TMDL is being completed. (Please see comment on Table 3)

Table 1, pages 2-3

Table 1 lists the waters on the 1996 and 1998 303(d) lists for fecal coliform. However, I could not find the waters listed below on the 1998 303(d) list.

Coal Creek	WA-23-1024
Bunker Creek	WA-23-1104
Chehalis River South Fork	WA-23-1106
Chehalis River	WA-23-1110

Tributaries without Load Allocations

The majority of waters on Table 1 (showing waters on the 1996 and 1998 303(d) lists) are marked with an asterisk indicating that the waters are in the upper Chehalis watershed and that load allocations will be submitted at a later time. We strongly encourage Ecology to calculate the load allocations for the upper Chehalis watershed and submit them at the same time as the Chehalis/Grays Harbor TMDL. We are glad to hear that the cleanup of the upper watershed is occurring now and believe that the load allocations for the upper watershed could help guide that cleanup. We also believe it would be the most efficient way for the TMDL to be done. It is not clear that the load allocations for the upper watershed could be later included as an addendum to this TMDL, since this TMDL will already have been approved, and it is possible that another TMDL would need to be submitted when those load allocations are completed.

Table 3, pages 21-23

The final column in Table 3 is titled "monthly percent reduction needed to meet the freshwater class A standard". Many of the tributaries to the Chehalis River and Grays Harbor are listed on this table. These waters are not currently on the 303(d) list, but it appears from the final column title that they are not currently meeting water quality standards. These waters should be on the next 303(d) list unless they are clearly identified as being covered under this TMDL. Please see comment on identification of waters. If these waters are not water quality limited, the column title should be changed and the situation should be better explained in the text.

Wasteload Allocations

The submittal report states under the Loading Capacity section that "Point sources were reduced to comply with existing NPDES permit limits." (Emphasis added.) However, pages 86-94 of the TMDL study state that water quality standards will not be met at the current permit levels. Modeling showed that in order for water quality standards to be met, the Weyco 1 point source should have a daily maximum limit of 14000 fecal coliform colonies/100 ml rather than the current permit limit of 20,000 colonies/100 ml. Wasteload Allocations are currently included in the submittal report under the Load Allocation section which states that the wasteload allocations are given in Table 5. However, Table 5 only shows the maximum monthly average concentration limit. As described above, the proposed daily maximum concentration limit of 14000 colonies/100 ml for Weyco 1 is necessary for the harbor to meet water quality standards, but it is not clear if this limit is included in the wasteload allocation for this source for this TMDL. All permit limits necessary for waters to comply with water quality standards must be clearly identified and included in the wasteload allocations of the TMDL. (Please also see comment on Wasteload Allocations in editorial section.)

Reasonable Assurance

EPA Region 10 established an Interim Reasonable Assurance Policy on August 2, 1999 that is used to guide development and approval of mixed point and nonpoint source TMDLs which states:

"Reasonable assurance is provided when all of the following elements are fulfilled:

1. Existing implementation commitments within the watershed are documented, such as currently funded BMPs and other restoration projects, letters of commitment from landowners, local ordinances, etc., and

2. Commitment is provided to:

   - develop an implementation plan within a specified period of time, and
   - include a monitoring program in the implementation plan which evaluates both 1) implementation of BMPs and other needed control actions, and 2) trends in relevant water quality parameters, and
   - seek funding for the implementation plan, and

~ The process for revising the TMDL is explained."

The current section on reasonable assurance fulfills element a, but does not clearly address element b. The current section is titled "Existing Programs Implementing TMDL Recommendations" and describes the current programs that are in place. However, I did not see

any commitment to develop an implementation plan specific to this TMDL within a specified period of time or a commitment to seek funding for the implementation plan. Though there is a section titled "Monitoring Strategy" this section does not describe what monitoring will be done to evaluate water quality trends or implementation of BMPs. The section seems to say that only monitoring done by Ecology will be used to determine compliance with water quality trends but in describing Ecology monitoring it states only that "Ecology conducts monthly sampling at several sites in the harbor. A new sampling site in the upper Chehalis river will be added to Ecology's ambient monitoring program in October, 2001." How will compliance of the numerous tributaries receiving allocations be determined? I also did not find a clear description of the process for revising the TMDL.

Editorial Comments

Critical Conditions and Wasteload Allocations

The submittal report is well organized with sections on many of the elements of a TMDL (seasonal variation, margin of safety, load capacity etc.) This organization makes it easy for the reader to get the big picture of a complex TMDL fairly quickly and clearly identifies most of the necessary elements of a TMDL. However, there are not currently sections on Critical Conditions or Wasteload Allocations. Including individual sections on each of these elements would help complete the picture.

Critical Conditions are currently discussed in terms of point sources under a section titled "Predicted response to point source loading...." A section on critical conditions in which the relationship between pollution concentration, flow rates, and season for this watershed were briefly described and critical conditions were discussed in terms of both point and nonpoint sources would be very helpful..

The reader is currently directed to Table 6, showing the wasteload allocations by a sentence under the Load Allocation section. The document would be more clear if a section on wasteload allocations were added and the issues raised in the Wasteload Allocation comment above were addressed.

Map

A map showing the Chehalis River, Grays Harbor and the major tributaries and point sources should be provided at the beginning of the document. Such a map would be very helpful in giving the reader a better big picture sense of the TMDL.

Individual Pages

All pages - The subtitle states "Upper Chehalis River Basin Temperature TMDL", while this is the Chehalis/Grays Harbor Bacteria TMDL.

Page 21 - Line nine for Wishkah R nr mouth is to meet the Class B standard. However, the 'monthly percent reduction needed to meet the freshwater class A standard" percentages are filled in. It appears that these percentages should be on the next line (Wishkah R nr mouth hypothetical class A)

Page 22 - On the 2nd line of the table on this page for the Hoquim R nr mouth (hypothetical class A), the fourth column should be A, not B. Also see previous comment for Wishkah River.

Page 26 - 2nd and 3rd column titles are cut off.

Thank you for the opportunity to comment on this draft TMDL. If you have any questions or concerns with these comments please call Laurie Mann at 206/553-1583 or myself at 206/364-2455.

Sincerely,

Donna Walsh
Watershed Restoration Unit

Appendix C

Public Notice and Involvement

4152

FORM A 19 (Rev. 4/92)

STATE OF WASHINGTON

INVOICE VOUCHER

PROJECT NO.	P.R. OR AUTH. NO.	INV. VOUCHER

AGENCY NAME

DEPARTMENT OF ECOLOGY

INSTRUCTIONS:

SUBMIT THIS FORM IN QUADRUPLICATE TO:
DEPARTMENT OF GENERAL ADMINISTRATION
Division of Engineering and Architectural Services
206 General Administration Bldg., P.O. Box 41012
Olympia, WA 98504-1012

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AFFIDAVIT OF PUBLICATION

STATE OF WASHINGTON, County of THURSTON, SS

Legal #4152
Department of Ecology Seeks Comments
On Draft Water Cleanup Plan For Bacteria In
The Chehalis/Grays Harbor Watershed

An advisory group working with the state Department of Ecology has drafted a Water Cleanup Plan for fecal coliform bacteria in the Chehalis watershed including Grays Harbor. The plan recommends actions to reduce bacteria to meet state water quality standards and protect shellfish harvesting in the harbor.

Fecal coliform bacteria occur in the waste of warm blooded animals including humans, livestock, pets, and wildlife. These bacteria are a human health concern in the river and shellfish because they indicate that other harmful bacteria and viruses may be present. Common sources include failing septic systems and inadequate animal management practices. Urban stormwater and industrial discharges also have contributed bacteria pollution to the harbor.

You are invited to comment on the draft Chehalis/Grays Harbor Watershed Fecal Coliform Bacteria TMDL (Cleanup Plan) Submittal Report. It is located on the internet at:
http://www/ecy.wa.gov/biblio/0110025.html
There are also hard copies available for review at the Timberland Libraries in Elma, Montesano, Aberdeen, Hoquiam, McCleary, Oakville, Centralia, and Chehalis.

If you have special accommodation needs, please call (360) 407-6300 or (360) 407-6306 (TDD).

Publish: May 13, 2001

Talauna Reed being first duly sworn says that he is the PUBLISHER'S REPRESENTATIVE of the newspaper published and issued DAILY (Publisher or Manager) OLYMPIA (Weekly or Daily) in THURSTON County, a regular State of Washington and is of general circulation in said county and state, that the Legal Notice Water Cleanup Plan (Describe Notice) of which one hereto attached is a true and correct copy, was published in said newspaper once a week for one weeks, being published one consecutive times, first publication being on the 13th day of May 2001 and the last on the _____ day of _____ 19__

That said notice was published in the regular and entire issue of every number of said newspaper during said period and time of publication, that said notice was published in the newspaper proper and not in a supplement; that the charges herein made are the regular rates charged for such advertising, and that the same or any part thereof has not been paid.

Talauna Reed

Subscribed and sworn to before me this 13th day of May 2001

MARTHA L. HOGAN NOTARY PUBLIC STATE OF WASHINGTON COMMISSION EXPIRES MARCH 18, 2002

Martha L. Hogan
Notary Public in and for the State of Washington
Residing at Thurston County

TOTAL AMOUNT PAYABLE THIS VOUCHER $171.30

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APPROVED FOR PAYMENT BY _____ DATE _____ WARRANT TOTAL _____ WARRANT NUMBER _____

AFFIDAVIT OF PUBLICATION

STATE OF WASHINGTON }ss
COUNTY OF LEWIS

Jeanne Rudeen, says that she is the legal clerk of

The Chronicle

a daily newspaper, which has been established, published in the English language, and circulated continuously as a daily newspaper in the City of Centralia, and in said County and State, and of general circulation in said county for more than six (6) months prior to the date of the first publication of the Notice hereto attached, and that the said Chronicle was on the 7th day of July 1941, approved as a legal newspaper by the Superior Court of said Lewis County.

And that the attached is a true copy and was published in regular issues (and not in supplement form) of said newspaper as Legal # 0557,

once each day for a period of 1

~~consecutive~~ days,

commencing on the

12th day of May, 2001

and ending on the

12th day of May, 2001, and both dates inclusive, and that such newspaper was regularly distributed to its subscribers during all of said period. That the full amount of the fee charged for the foregoing publication is the sum of

$ 60.80.

Jeanne Rudeen

Subscribed and sworn to before me this

14 day of May, 2001.

Notary Public in and for the State of Washington, residing at

Centralia

Department of Ecology seeks comments on
Draft Water Cleanup Plan for bacteria in the Chehalis/Grays Harbor Watershed

An advisory group working with the state Department of Ecology has drafted a Water Cleanup Plan for fecal coliform bacteria in the Chehalis watershed including Grays Harbor. The plan recommends actions to reduce bacteria to meet state water quality standards and protect shellfish harvesting in the harbor.

Fecal coliform bacteria occur in the waste of warm blooded animals including humans, livestock, pets, and wildlife. These bacteria are a human health concern in the river and shellfish because they indicate that other harmful bacteria and viruses may be present. Common sources include failing septic systems and inadequate animal management practices. Urban stormwater and industrial discharges also have contributed bacteria pollution to the harbor.

You are invited to comment on the draft *Chehalis/Grays Harbor Watershed Fecal Coliform Bacteria TMDL (Cleanup Plan) Submittal Report*. It is located on the internet at http://www.ecy.wa.gov/biblio/0110025.html. There are also hard copies available for review at the Timberland Libraries in Elma, Montesano, Aberdeen, Hoquiam, McCleary, Oakville, Centralia, and Chehalis.

You can also review the complete technical report of the draft *Grays Harbor Fecal Coliform TMDL Study* with appendices and time-lapsed animations of bacteria transport through Grays Harbor, on the internet at http://www.ecy.wa.gov/programs/eap/wrias/tmdl/ghfc/results.html.

Please send written comments by June 11th to: Dave Rountry, Department of Ecology, PO Box 47775, Olympia, WA 98504-7775, or by e-mail drou461@ecy.wa.gov.

If you have special accommodation needs, please call (360) 407-6300 or (360) 407-6306 (TDD).

L#0557 May 12, 2001

The Daily World

Account No. 20688

P.O. Box 269, 315 S. Michigan Street, Aberdeen, WA 98520
(360) 532-4000

AFFIDAVIT OF PUBLICATION

STATE OF WASHINGTON
County of Grays Harbor ss

The undersigned being first duly sworn on oath deposed and says: That he/she is the Principal Clerk of The Daily World, which is a legal newspaper printed and published in the City of Aberdeen Grays Harbor County, Washington: of general circulation in said city, County and State that the

Department of Ecology

#079482

of which the attached is a printed Copy, was published in said newspaper on the

14 day of May 2001

_____ day of _____ 2001

_____ of _____ 2001

_____ of _____ 2001

_____ of _____ 2001

_____ of _____ 2001

_____ of _____ 2001

_____ of _____ 2001

_____ of _____ 2001

_____ of _____ 2001

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RECEIVED
MAY 22 2001
Washington State
Department of Ecology

DEPARTMENT OF ECOLOGY SEEKS COMMENTS ON
Draft Water Cleanup Plan for Bacteria
in the Chehalis/Grays Harbor Watershed

An advisory group working with the state Department of Ecology has drafted a Water Cleanup Plan for fecal coliform bacteria in the Chehalis watershed including Grays Harbor. The plan recommends actions to reduce bacteria to meet state water quality standards and protect shellfish harvesting in the harbor.

Fecal coliform bacteria occur in the waste of warm blooded animals including humans, livestock, pets, and wildlife. These bacteria are a human health concern in the river and shellfish because they indicate that other harmful bacteria and viruses may be present. Common sources include failing septic systems and inadequate animal management practices. Urban stormwater and industrial discharges also have contributed bacteria pollution to the harbor.

You are invited to comment on the draft *Chehalis/Grays Harbor Watershed Fecal Coliform Bacteria TMDL (Cleanup Plan) Submittal Report*. It is located on the internet at http://www.ecy.wa.gov/biblio/0110025.html. There are also hard copies available for review at the Timberland Libraries in Elma, Montesano, Aberdeen, Hoquiam, McCleary, Oakville, Centralia, and Chehalis.

You can also review the complete technical report of the draft *Grays Harbor Fecal Coliform TMDL Study* with appendices and time-lapsed animations of bacteria transport through Grays Harbor, on the internet at http://www.ecy.wa.gov/programs/eap/wrias/tmdl/ghfc/results.html

Please send written comments by June 11th to Dave Roberts, Department of Ecology, PO Box 47775, Olympia, WA 98504-7775, or by e-mail dhou461@ecy.wa.gov

If you have special accommodation needs, please call (360) 407-6300 or (360) 407-6306 (TDD).

publish: May 14, 2001. The Daily World 079482

NANCY M. BARNETT
NOTARY PUBLIC
STATE OF WASHINGTON
My Commission Expires Oct. 9, 2002

PO Number #_____

Gina Bildeback
Principal Clerk

Subscribed and sworn to me this 15 day of May 2001

Nancy M. Barnett
Notary Public for the State of Washington Grays Harbor County Washington

Focus

Grays Harbor watershed cleanup planning

Background

The Washington Department of Ecology (Ecology) is seeking assistance from citizens, industry and local government to help solve water-quality problems in the Grays Harbor watershed. It will take voluntary help from many who live and work in the community to clean up these waters for current and future generations.

Parts of the Grays Harbor watershed have a long history of pollution problems with fecal coliform bacteria, dissolved oxygen, temperature, and toxic pollutants. Although Ecology has done considerable work in the Grays Harbor watershed, most of the work has focused on toxic contaminants, salmon survival, and on the major industrial dischargers in the area.

Ecology is now turning its attention to fecal coliform problems in the watershed in light of its just-released study that reveals significant fecal coliform pollution in Grays Harbor and tributaries to the upper and lower harbor. The tributaries include the Chehalis River from Porter downstream, the Wishkah, Humptulips, Satsop, and the Elk and Johns rivers in the south harbor area.

The fecal coliform bacteria problem

The presence of fecal coliform bacteria in water threatens public health. Health risks can be caused by exposure to the harmful bacteria through contact with the water while fishing, swimming or wading. In addition, consumption of shellfish contaminated with fecal coliform can cause health problems.

Shellfish growers in the outer harbor have had to deal with repeated temporary closures of harvest beds due to high levels of fecal coliform bacteria released in industrial wastewater. Ecology takes a strong interest in these kinds of industrial discharges because they violate permits, impair water quality and can lead to penalties. The shellfish closures caused by the discharges disrupt the commerce in the shellfish industry, impair the local image and local economy. Many residents believe that bacteria concentrations also degrade recreational and aesthetic values of the waters.

The good news is that industrial sources of this type of pollution are small, according to Ecology's study. The study indicates that 96 percent of fecal coliform in the Grays Harbor watershed is coming from "non-point" pollution. "Non-point" pollution comes mostly from people and their activities. It is pollution that is not necessarily discharged through a pipe or an outfall (called "point-source" pollution). Non-point pollution is sometimes invisible. It can result from failing pumping stations of sewage collection systems, failing home septic systems, flooding, animal-waste run-off from agricultural operations or areas used by wildlife.

All of this non-point pollution is earned downstream to Grays Harbor via eight tributaries, two urban drains and the mainstem Chehalis River.

July 2000

Ecology is an equal opportunity agency.

Focus Number 00-10-050

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Federal law requires cleanup of polluted waters

Federal law requires states to identify sources of pollution in waters that fall short of water quality standards, and to determine how much pollution the waters can receive and still remains healthy. This "allocation," based on sampling data and computer modeling, is called a Total Maximum Daily Load (TMDL), or water cleanup plan.

Ecology is in the process of developing a water cleanup plan for the Grays Harbor watershed. The watershed is listed, along with more than 600 other polluted waters across Washington, for cleanup planning.

After broad participation by local authorities and citizens, Ecology will submit a water cleanup plan for the Grays Harbor watershed to the U.S. Environmental Protection Agency.

What happens because of poor water quality

Clean, cool water is important for people. It is also important for fish, wildlife and shellfish, which provide an irreplaceable recreational, tourist and economic activity to our state. That's why it's so important that we work together to make sure the water is clean. Federal Endangered Species Act listings are another big reason to clean up the river and harbor. If not, local communities could face greater restrictions posed by the federal government.

How you can get involved

Ecology will be working with local interests – including government, industries, interest groups and neighboring residents -–to develop a water cleanup plan that works for everybody. For it to be successful, Ecology needs to involve all affected groups in developing the plan.

Ecology is forming a broad-based work group representing these interests to help identify actions that local residents, land and livestock managers, and public entities can take to improve water quality in the Grays Harbor watershed.

For more information

If you're interested in serving on the work group, would like more information, or would like to receive mailings about this effort, contact Dave Rountry, Department of Ecology, P.O. Box 4775, Olympia, WA 98504-7775. Phone 360-407-6276. Email: drou461@ecy.wa.gov.

To see a copy of Ecology's Grays Harbor Fecal Coliform Total Maximum Daily Load Study, go to:
http://www.wa.gov/ecology/biblio/0003020.html

To see a copy of appendices and animations, go to:
http://www.wa.gov/ecology/eils/wrias/tmdl/ghfc/results.html

Hard copies of the Grays Harbor Fecal Coliform Total Maximum Daily Load Study are also available at Timberland libraries in Elma, Montesano, Aberdeen, Hoquiam, McCleary, Oakville, Centralia, and Chehalis.

For general information about the Department of Ecology, visit our website at:
http://www.wa.gov/ecology/

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July 14, 2000

Mr. Mike Daniels
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Dear Mr. Daniels:

Enclosed is your copy of the Grays Harbor Fecal Coliform Total Maximum Daily Load Study. The Department of Ecology has posted this document for viewing at our website. Also at this site, you can view results of the study translated into an animated time-lapsed picture-series of http://www.wa.gov/ecology/eils/wrias/tmdl/ghfc/results.htm.

The enclosed report presents data collected during water quality sampling in 1997 and 1998. It includes calculations for how much pollution is entering the Grays Harbor watershed and how much pollution should be reduced for the tributaries, estuary and harbor to meet state water quality standards. This is a revised version of a similar DRAFT report submitted to "primary interests" in late March, 2000.

Comments received from the primary interests are addressed in the report you are receiving. The data, assumptions, modeling methods, findings and conclusions, and recommendations for pollution load reductions remain the same as in the March 2000 DRAFT report.

Pollution Effects of Wildlife.
Based on several comments, additional work was conducted to estimate the effects (called predictive modeling) of wildlife (i.e., seals) waste in the harbor. The results show that the load of fecal coliform from seals and other marine wildlife in the harbor are not significant compared to loading from the tributaries. The additional modeling shows that the model calibration presented in the report adequately represents marine wildlife sources.

Wildlife contributions may be significant in some rivers (i.e., Elk River). While it would be helpful to have more quantitative data about how wildlife and human-related sources compare, we know that fecal coliform bacteria exceed safe levels at many places in the watershed. That alone is a call for action—to protect the health of the rivers, the people, and their way of life. Ecology intends to help people focus on reducing the human-related sources in order to preserve the beneficial uses of the watershed.

Other Pollution Sources
Besides wildlife, there are many sources of fecal coliform bacteria causing pollution in the watershed. Municipal sewage systems and industrial activities (pulp-paper) are the primary point sources. The tributaries are contributing more than 90 percent of the fecal coliform load to the harbor. Whether it's a leaky septic system, livestock getting into the creek, or stored manure running off-site into nearby surface waters, non-point pollution is coming from many human-related – perhaps small sources. Individually, problem sites may seem insignificant. But collectively, there's a problem that we need to work together to solve. The solutions need to involve many people.

Translating Data Into Workable Cleanup Actions
The report provides scientific background information for discussions with community representatives and citizens, to help us make informed decisions about how to cleanup the Grays Harbor watershed. Ecology will be working with local interests – including government, industries, interest groups and neighboring residents – to develop a water cleanup plan that works for everybody.

Ecology is forming a broad-based workgroup representing these interests to help identify actions that local residents, land and livestock managers, and public entities can take to improve water quality in the Grays Harbor watershed. Our first step will be to learn what the watershed means to the workgroup members, and why it's important to work together to preserve the beneficial uses of the natural resources in the watershed.

How You Can Participate
If you're interested in serving on the workgroup, want more information, or wish to be placed on Ecology's mailing list to receive information about water cleanup planning in the Grays Harbor watershed, contact Dave Rountry, Department of Ecology, PO BOX 47775, Olympia, WA 98504-7775. Phone 360-407-6276. E-mail drou461@ecy.wa.gov

with participation from local people like you I am confident that we will end up with a plan for cleanup that protects the environment, and also preserves other beneficial uses of the watershed.

Sincerely,

Dave Rountry
Water Cleanup Coordinator

Enclosure

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CH2M Hill
777 108th Avenue NE
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Bellevue WA 98009-2050

Mr. Ron Lauzon
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Ms. Florence Wells
429 St Rt 109
Hoquiam WA 98550

Ms. Shirley Erickson
1401 A St
Hoquiam WA 98550-2601

Mr. Fred Colvin
Conservation Dist. Alliance
2400 Bristol Ct. SW, Suite 100
Olympia WA 98502

Mr. Ken Johnson
Weyerhaeuser Environmental Programs
PO Box 2999
Tacoma WA 98477-2999

Mr. Jack McKenzie
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PO Box 909
Ocean Shore WA. 98569

Mr. Randy Lewis
City Administrator
City of Westport
PO Box 505
Westport WA 98595

Mr. Brian Shea
Planning Dept. Director
City of Aberdeen
200 East Market
Aberdeen WA 98520

Mr. Frances Harmon
PO Box 505
Cosmopolis WA 98537

Ms. Martha Hill
212 1st Ave
Aberdeen WA 98520

Ms. Jean Bunch
525 – 8th St #304
Hoquiam WA 98550

Ms. Sue Patnude
Wash. State Dept. of Fish and Wildlife
48 Devonshire Road
Montesano WA 98563-9618

Mr. Dennis Davies
Weyerhaeuser
PO Box 1000
Cosmopolis WA 98537

Mr. Randy Cox
Weyerhaeuser
PO Box 1000
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Mr. Mark Ziminski
Chief of Environmental Resources
U.S. Army Corps of Engineers
PO Box 3755
Seattle WA 98124-3755

Mr. Brian Hatfield
226 Fir
Raymond WA 98577

Ms. Lilllian Luark
PO Box 257
Cosmopolis WA 98537

Ms. Diane Muir
1727 S Boone #103
Aberdeen WA 98520-7536

Ms. Twila Lewis
312 J St
Hoquiam WA 98550

Process for a typical water cleanup plan

A water body fails to meet water quality standards, triggering a federal requirement that the Washington Department of

Ecology works with local government or planning councils, tribes and others to plan and conduct a water quality technical study. The study identifies pollution sources and determines how much the pollution

Local interests, with Ecology's assistance, figure out how they can achieve the needed pollution reduction. Often this builds on local

First, Ecology and local interests develop a summary implementation strategy or SIS. This is a concise, conceptual description of activities planned or underway to achieve water quality standards. This summary plan is submitted, with the report on the

From the SIS, Ecology and local interests then develop a detailed implementation plan. This plan describes strategies for meeting water quality standards:

- what actions
- when

Cleaning up the water means many people doing

~ ~

Cool, clean water is important for people, fish, and local economies

~ ~

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

P.O. Box 47600 • Olympia, Washington 98504-7600
(360) 407-6000 • TDD Only (Hearing Impaired) (360) 407-6006

August 4, 2000

The Honorable Mike Wilson
City of Aberdeen
200 E Market
Aberdeen WA 98520

Dear Mayor Wilson:

This letter and the enclosed FOCUS sheet are being sent to inform you about the results of a Washington State Department of Ecology study of water quality in the Chehalis and Grays Harbor watersheds. The study outlines fecal coliform bacteria pollution problems in many areas of the watershed. Fecal coliform bacteria indicates biological waste is getting into the rivers and Grays Harbor. In many locations of the study area, bacteria concentrations are higher than water quality standards set for protecting human and environmental health.

What the findings are leading to is the formation of a local workgroup to discuss reasons to protect the beneficial uses of the water, and to develop a plan for cleanup. Federal law requires cleanup of polluted waters, and Ecology is responsible for working with the affected communities to develop a cleanup plan. It is very important that people who may be causing the pollution or will be affected by the decisions for cleanup, have a chance to participate in cleanup discussions and decisions. Please read the enclosed FOCUS sheet about the water quality study and find out how you can get involved in the cleanup planning discussions.

Most of the fecal coliform pollution in the study area is coming from many varied sources; for example, runoff of farm animal waste, wildlife, or failing home septic systems. Because the study indicates that most of the pollution is coming from many small, diffuse sources, successful solutions will involve many people.

If you are interested in serving on the workgroup or want more information about the project, please contact me using the information provided on the enclosed FOCUS sheet.

Sincerely,

Dave Rountry
Water Cleanup Coordinator
SWRO Water Quality Program

DR:jr

Enclosure

LEWIS COUNTY BOARD OF HEALTH
AGENDA

September 11, 2000

A meeting of the Lewis County BOARD OF HEALTH will be held on Monday, September 11, 2000 in the Commissioner's Meeting Room 1, MAIN FLOOR of the Lewis County Courthouse Annex, 345 W. Main St., Chehalis from 9:00 to 9:45 AM.

1. CALL TO ORDER by Dennis Hadaller, Chairman of the Board of Health
- **A. Minutes of August 14, 2000**
- **B. Agenda Additions and Changes**
- **C. Correspondence**

2. OTHER BUSINESS
- **A. FINDINGS OF FACT/CONCLUSION OF LAW**
  Re: Larry Howard/ Status of License Certification

B. ECOLOGY/TMDL POLLUTION STUDY (Presentation by David Roundtree)

- **C. CONTRACTS (report/review)**
  Amendment 3 to Consolidated Contract (L. Burkhalter)

- **D. FOR SIGNATURE:**
  Resolution 11 05 00 Re: Signatory Authority

- **E. PRESENTATION ON 2000 FLU SHOTS (If time permits)**
  By Kathleen Eussen & Dr. Diana Yu

3. CURRENT ISSUES IN PUBLIC HEALTH (If time permits)
- **A. Interim Director – Kathleen Eussen**

- **B. Environmental Services – Kathleen Eussen**

- **C. Health Officer – Dr. Diana Yu**

4. ADJOURNMENT

Grays Harbor Water Quality Study and Cleanup Plan Process
March 31st, Grays Harbor Community College, Room 222, Music Hall

Discussion Outline

WHY ARE WE HERE?	Introductions Overview of Workshop Purpose The cleanup planning process (TMDL) for identifying. problems and solutions: How can you get involved? Discussion, Q and A
WHAT DO WE KNOW ABOUT GRAYS HARBOR WATER QUALITY?	Overview of technical study: objectives, methods, findings, conclusions. Water Quality and Shellfish Protection Discussion, Q and A
NEXT STEPS	Opportunity for participation by primary interests, general public, landowners and community. Technical/scientific comment period for draft technical report. General project schedule. Discussion, Q and A

Chehalis Basin Partnership

Meeting Summary-Apri1 27, 2001

TMDL Updates

Grays Harbor Fecal Coliform Bacteria:

Representatives of the advisory group Ecology established for this TMDL presented an overview of the draft Summary Implementation Strategy to the Partnership for discussion prior to formal release of the TMDL for public review and comment. A technical review of this TMDL was presented at a previous Partnership meeting. The Partnership is not being asked to endorse the TMDL or the Summary Implementation Strategy today.

Originally, this TMDL focused on the Grays Harbor estuary, an area of approximately 90 square miles. The results of the study showed that more than 80 percent of the total fecal coliform bacteria load to Grays Harbor comes from the rivers entering into the harbor. Approximately 50 percent of this loading is from the upper Chehalis River drainage (upstream of Porter). So in reality, the actions needed to reduce the loading of fecal coliform bacteria to the harbor have to be implemented to some extent throughout the 2700 square mile basin. A 65 percent reduction in fecal coliform bacteria loading from the rivers must be achieved to ensure that Grays Harbor meets state water quality standards for fecal coliform bacteria. Failure to ensure that Grays Harbor meets the water quality standards will affect all the people who make a living off of the crab, clams and oysters grown and harvested in Grays Harbor because shellfish growers are heavily regulated. When there is a violation of fecal coliform bacteria standards in the Harbor, the response is immediate and dramatic - shellfish growers are not allowed to harvest or market their product.

The strategy for controlling sources of fecal coliform bacteria to Grays Harbor includes a lot of things that are being done already by private landowners, conservation districts, cities, towns and County governments. However, in some areas more needs to be done to ensure that the water quality in Grays Harbor is protected.

The presentation resulted in a general discussion of issues related to the Grays Harbor Fecal Coliform TMDL. The issues people raised include:

- The list of the advisory group members includes some that sit on the Partnership, and might be seen by some as a full endorsement of the results and the process used to get there. Local governments still have much to learn about this study and the outcome. Since many of the actions identified as necessary to control fecal coliform bacteria in the basin will fall to local government, more work needs to be done to explain it to them and to obtain their endorsement.

- There are some concerns that the data used as the basis for the study is several years old. In some of the sub-basins identified in the study landowners have implemented many projects to control sources of pollution. It is important to recognize these actions when establishing pollution reduction goals for various sub-basins; some of them may have been achieved already.

The members of the advisory group were recognized for the months of effort they put into this implementation strategy. A thorough public review process is needed to ensure that the interests of communities throughout the basin are considered.

Ecology's goal is to release the draft for formal public review and comment in May and prepare for a formal submittal to the U.S. EPA by the end of June 2001. An announcement of the public comment period for this TMDL is enclosed with this packet.

Chehalis Basin Partnership Meeting Notice and Agenda

DATE: **Friday May 25, 2001**
TIME: **9:00 to 11:30 AM**
LOCATION: **Bingo Room, Chehalis Tribe "Lucky Eagle" Casino (Direction on Back)**

A. General Partnership Business		9:00 a.m.
1. Welcome, introduce members and new visitors	(5)	Chair
2. Identify special issues of concern and adjust agenda	(5)	Members/Chair
3. Committee Reports		
➢ Citizens' Advisory Committee Chair	(5)	Committee
4. Other Business		
➢ Annual Plan of Work - Status	(15)	Kahle
Jennings		
Distribute draft By-laws/operating procedures		
Record of Decisions		
➢ Other Updates	(10)	Members

ACTIONS TO BE TAKEN AT THIS MEETING: None Noted

B. Special Project Status Reports, Budget Updates and Committee Reports		9:40 a.m.
1. Watershed Planning Project (RCW 90.82)	(30)	Lead Agency
➢ Update on Phase 3 Plan scope/outline consultant selection		and Consultant
2. Salmon Recovery Project (RCW 77.85)	(5)	Lead Entity
➢ Status of Limiting Factors Analysis		
3. Flood Control Projects	(5)	
➢ Centralia/Chehalis Flood Damage Reduction Project		Lewis County
➢ Basin-wide Flood Project		Grays Harbor County

4. TMDL Updates

➢	**Coliform Bacteria Jennings**	**Grays Harbor Fecal (5)**	**Kahle**
➢	Upper Chehalis Temperature		
➢	Humptulips Temperature		

ACTIONS TO BE TAKEN AT THIS MEETING: Consensus for Grays Harbor County to enter into contract with Triangle Associates for development of an scope/outline for the RCW90.82 Phase 3 Watershed Management Plan.

C. Special Presentation		10:30 a.m.
AMEC Earth & Environmental (Greater detail is provided in attachment)	(45)	Neil Amondson
D. Open Comment		11:15 a.m.
Any remaining issues identified in agenda item A2	(15)	Audience
E. Chair Adjourns meeting		11:30 a.m.

Water Cleanup Plans

Invitation for public comment on Chehalis/ Grays Harbor watershed cleanup planning

Background

The Department of Ecology (Ecology) and a local advisory group are working together to find solutions to the fecal coliform problems in the Chehalis/Grays Harbor watershed. An Ecology study has shown fecal coliform pollution in Grays Harbor and in the tributaries to the upper and lower harbor.

The tributaries include the Chehalis, Wishkah, Hoquiam, Humptulips, Wynoochee, and Satsop rivers, and the Elk and Johns rivers in the south harbor area. The technical study determined that bacteria levels must be reduced approximately 65 percent for the tributaries and harbor to meet state water quality standards.

The good news is that industrial sources of the bacteria pollution are small, according to Ecology's study. The study indicates that 96 percent of fecal coliform in the Grays Harbor watershed is coming from "nonpoint" pollution. Nonpoint pollution comes mostly from people and their activities. It is pollution that is not necessarily discharged through a pipe or an outfall (called "point source" pollution). Nonpoint pollution is sometimes invisible. It can result from failing home septic systems, urban storm drain discharges, animal-waste run-off from agricultural operations, or areas used by wildlife.

The fecal coliform bacteria problem

Fecal coliform bacteria in water is a threat to public health. People can be exposed to harmful bacteria through contact with the water while fishing, swimming or wading. In addition, consumption of shellfish contaminated with fecal coliform can cause health problems.

Shellfish growers in the outer harbor have had to deal with repeated temporary closures of harvest beds due to high levels of fecal coliform bacteria released in industrial wastewater. Ecology takes a strong interest in these kinds of industrial discharges and keeps track of permit violations that can lead to penalties. The shellfish closures caused by the discharges disrupt the commerce in the shellfish industry, impair the local image and local economy. Many residents believe that bacteria concentrations also degrade recreational and aesthetic values of the waters.

Federal law requires cleanup of polluted waters

The Clean Water Act requires states to identify waters that do not meet state standards, and to develop a cleanup plan targeted at pollution sources. Water cleanup plans, also called total maximum daily load (TMDL) studies, include an analysis of water quality sampling data and a strategy to limit pollution to meet state water quality standards.

The draft water cleanup plan, also called a summary implementation strategy (SIS), was recently completed for the Chehalis/Grays Harbor watershed. Since approximately 40

May 2001

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percent of the bacteria going into the harbor comes from the upper watershed; the SIS describes cleanup strategies for both the upper and lower watershed. The SIS is intended to complement, not duplicate, the work of others already underway. For example, the *Chehalis Basin Partnership* is a key umbrella organization with water quality objectives that the cleanup plan supports.

Cleaning up the watershed

The cleanup plan recommends an increased commitment to best management practices for livestock management and on-site sewage systems, and calls for urban stormwater controls by the cities of Aberdeen, Cosmopolis, and Hoquiam. The plan also calls for a 30 percent reduction of bacteria discharge in wastewater from the Weyerhaeuser pulp mill at Cosmopolis.

Improvements have already been made in reducing bacterial levels in the lower tributaries and harbor. This is happening through animal management practices, other non-point controls, and lower industrial discharges. The SIS also calls for an ongoing monitoring strategy to provide a more accurate picture of water quality conditions in the basin over time The results garnered in the monitoring strategy will help better prioritize areas and strategies for cleanup.

It will take voluntary help from many who live and work in the community to clean up these waters for current and future generations.

Public comment invited

You are invited to comment on the draft study and cleanup plan. Comments will be taken until **June 11.**

You can review the complete draft Grays Harbor/Chehalis Fecal Coliform Bacteria TMDL Study, with appendices and time-lapsed animations of bacteria transport through Grays Harbor, on the Internet at http://www.ecy.wa.gov/programs/eap/wrias/tmdl/ghfc/results.html

To view just the cleanup plan and synopsis of the TMDL report, go to:
http://www.ecy.wa.gov/biblio/0110025.html

There are also hard copies available for review at the Timberland Libraries in Elma, Montesano, Aberdeen, Hoquiam, McCleary, Oakville, Centralia, and Chehalis.

Please submit written comments by June 11 to:

Dave Rountry, Department of Ecology
PO Box 47775, Olympia, WA 98504-7775

You can email Rountry at drou461@ecy.wa.gov or phone him at (360) 407-6276.

Ecology is an equal opportunity agency. If you have special accommodation needs, please call Donna Lynch at (360) 407-7529 (Voice) or (306) 407-6006 (TDD). Email may be sent to dlyn461@ecy.wa.gov

6-25-01- The Daily World, Aberdeen

Ecology calls for cooperative effort to clean up rivers

By Terry Loney - Daily world writer

The state Department of Ecology is asking for help, lots of help, to clean up rivers flowing into Grays Harbor.

A new study shows there are high levels of fecal coliform bacteria in most of the rivers, especially the Chehalis, which is listed as one of the state's most polluted rivers.

The state Department of Ecology suspects the biggest cause is farms along the banks of the Chehalis in Lewis and Thurston counties and southeastern Grays Harbor County.

Most of the rest of the bacteria is coming from failing septic tanks, pet wastes and storm drains in Aberdeen, Hoquiam and Cosmopolis, the study says.

"On a general scale, what we found is that 90 percent of the problem is coming from (those) sources," said Dave Rountry, Ecology's water cleanup coordinator. "The findings are based on how high the levels (of bacteria) are above the state water quality standards."

The study is titled the Chehalis/Grays Harbor Watershed Fecal Coliform Bacteria Total Maximum Daily Load. A draft was released in May.

E. coli comprises the largest portion of fecal coliform in sewage and animal waste.

The bacteria can cause intestinal problems such as diarrhea, gas and other maladies. One virulent strain can cause death, especially in infants and elderly persons with weakened immune systems.

The department gathered the information for the study from several dozen monitoring sites in the harbor and along the Chehalis, Wishkah, Hoquiam, Humptulips, Elk rivers and their tributaries.

As well as being a human health hazard, the bacteria can be detrimental to the shellfish industry.

Rountry said that when fecal coliform bacteria levels exceed limitations set for the protection of health, oysters and other shellfish cannot be harvested.

He added that high levels of bacteria also can be detrimental to the harbor's aquatic health in general.

"The oysters are the most affected," said Sandy Howard, a spokeswoman for the Department of Ecology.

"We are encouraging people to get involved and look at their land and see if there is anything they can do to help block these sources of pollution," said Howard.

She said there's not much room for finger pointing.

"In many cases, everybody is contributing to this. It does not matter who is the biggest contributor, everyone must do what they can to reduce the amount coming from their own property."

The department believes residents living along the rivers can help reduce the amount of bacteria in all of the rivers except the Elk River.

Rountry said in that case wildlife appears to be the biggest contributor of fecal coliform bacteria into the river. He said that was easy to determine because there are few people living along its banks. The river has 90 percent more colonies of bacteria than is deemed acceptable.

But "there is not much we can do to manage that or reduce that," Howard said.

So the department is seeking to focus its efforts on the other rivers that have high levels of bacteria.

Another of the most polluted rivers is the Wishkah, according to the study. "It had some of the highest levels in it," Rountry said.

While the upper portions of the Wishkah are predominately undeveloped, "the lower one - third is heavily populated," he said, noting that is where most of the bacteria originates.

Ecology is looking for cooperative efforts with the public and local government agencies to reduce the bacteria in the rivers.

Rountry said there are a lot of local agencies that can aid Harbor residents to clean up sources on their properties.

For failing septic tanks, they can call the County Health Department, and for help in cleaning up manure on farms, the Grays Harbor Conservation District.

If volunteer efforts fail, Ecology may resort to stronger enforcement policies.

"There is the fall - back of enforcement, but we would rather see this go through at a voluntary level," Rountry said.

The Grays Harbor Health Department can be reached at 532 - 8665, and the conservation district at 249 - 5944.

Terry Loney, a Daily World writer covering East County, can be reached at (360) 532 - 4000, ext. 137, or at tloney@thedailyworld. com

GRAYS HARBOR CONSERVATION DISTRICT
AGENDA
JULY 10, 2001, 1:00 P.M.
MEETING LOCATION:
GHCD OFFICE
330 PIONEER AVE. WEST
MONTESANO, WA 98563

CALL TO ORDER

READING OF MINUTES

FINANCE STATEMENT

INFORMATION
Dave Rountry – DOE – Chehalis Fecal Coliform TMDL Study

APPROVE APPLICATIONS AND AGREEMENT

AGENCY REPORT – Carl Boyd

COMMITTEE/TECHNICIAN REPORTS
GHCD Technician Report – Ron Wisner
DW Technician Report – Donna Boyer

OLD BUSINESS
Election Issue
Co-Pac RC&D Dues and Council Representation

FUNDING
Pre-Authorized for New Grants – But No Money Yet

PERSONNEL
Job Review for Donna Boyer

NEW BUSINESS
General Correspondence

PLAN FOR NEXT MEETING

SUMMARY

ADJOURN

Appendix D

Grays Harbor Fecal Coliform Total Maximum Daily Load Study

June 2000

Publication No. 00-03-020

Paper Copy Available On Request or at

http://www.ecy.wa.gov/biblio/0003020.html