

# **Chehalis Basin Partnership**

## Fecal Coliform Monitoring in Grays Harbor County: Summary Report of Monitoring Results for 2000-2003 Draft

June 30, 2003

Prepared by



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# FECAL COLIFORM MONITORING IN GRAYS HARBOR COUNTY: SUMMARY REPORT OF MONITORING RESULTS FOR 2000-2003

#### DRAFT

June 30, 2003

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A. Sampling Data for Humptulips, Satsop and Wynoochee Rivers

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#### **1.0 INTRODUCTION**

Grays Harbor Conservation District (GHCD) has been monitoring fecal coliform in the Humptulips River, Satsop River, and Wynoochee River since January, 2001. These rivers are tributaries to Grays Harbor, which is on the 303(d) list for fecal coliform. A TMDL study completed for Grays Harbor indicates that fecal coliform pollution might be coming from the tributaries that feed into the harbor (Ecology, 2000). GHCD has conducted this monitoring to accomplish the following: to quantify the lower Chehalis/estuary Total Maximum Daily Load study, to isolate and identify the contaminant source, and to identify contributing land uses to the extent possible. Monitoring began in January 2001 and ended June 30, 2003. This report summarizes the monitoring data from that time period.

#### SAMPLING LOCATIONS

TABLE 1. HUMPTULIPS RIVER SAMPLING LOCATIONS								
Site Number	Description	Samples obtained from boat, bridge or shore	Stream Reach					
1	Mouth of river	Boat	T18N R11W S21					
2	Highway 109	Bridge	T18N R11W S15					
3	Copalis crossing	Bridge	T19N R11W S33					
4	Highway 101	Bridge	T20N R10W S7					
5	Donkey Cr.	Bridge	T21N R9W S21					

Tables 1, 2, 3 and Figure 1 illustrate the sampling locations on all three rivers.

TABLE 2. SATSOP RIVER SAMPLING LOCATIONS								
Site Number	Description	Samples obtained from boat, bridge or shore	Stream Reach					
1	Mouth of river	Boat	T17N R6W S7					
0	Twin bridges	Bridge	T18N R7W S36					
3	Bluff (east Satsop Rd, below Glicks)	Shore	T18N R7W S23					
4	Below middle fork and west fork confluence	Shore	T18N R7W S23					
5	Middle Fork Rd. bridge over west fork	Bridge	T18N R7W S14					
6	Falco/Webster property	Shore	T18N R7W S12					
7	Schmitz property at county line	Shore	T18N R6W S6					
8	Beckwiths property	Shore	T19N R7W S25					
9	Durbins property	Shore	T19N R7W S12					
10	Cougar Smith Rd., middle fork bridge	Bridge	T20N R7W S35					
11	Cougar Smith Rd., west fork bridge	Bridge	T20N R7W S33					

TABLE 3. WYNOOCHEE RIVER SAMPLING LOCATIONS								
Site Number	Description	Samples obtained from boat, bridge or shore	Stream Reach					
1	Mouth of river	Boat	T17N R7W S18					
2	Devonshire Rd	Bridge	T17N R8W S12					
3	Geissler Rd	Bridge	T18N R8W S35					
4	Wishkah cutoff Rd	Bridge	T18N R8W S5					
5	Old white bridge	Shore	T19N R8W S28					



Figure 1. Map of Sampling Locations

## SAMPLING PROTOCOL

GHCD has developed a quality assurance project plan for this sampling project (GHCD, 2003). Fecal coliform samples were collected once a month at all sampling locations during normal flows. If a high water event occurred, a second sample was taken during that event. Samples were collected on Wednesdays or Thursdays on the 2<sup>nd</sup>, 3<sup>rd</sup>, or 4<sup>th</sup> week of the month unless a high water event occurred during the first week of the month. Samples collected in areas influenced by the tide were collected during the last half of the ebb tide. Samples were collected from a boat, bridge or from the shore, approximately 6 to 8 inches below the water surface. Sampling procedures followed the Washington Department of Ecology (Ecology) procedures listed in the Field Sampling and Measurement Protocols (Ecology, 1993).

Samples were scheduled to be delivered to the lab within 6 to 8 hours of collection. However, Ecology's sampling protocol allows for a maximum holding time of 30 hours if there are logistical constraints. Samples were collected directly into precleaned containers supplied by the lab and were placed on ice immediately after sample collection. Grays Harbor County Environmental Health Lab analyzed all samples using Method SM 16-909C or SM9222D, the membrane filtration technique.

The Multiple Tube Fermentation method, also referred to as the Most Probable Number (MPN) index, was used in addition to membrane filtration on some of the samples taken at the mouth of all three rivers. GHCD did not describe this analytical method in their Quality Assurance Plan (QAP), however GHCD may have decided to use both methods at these river mouth locations because the MPN method is more acceptable test method for analyzing fecal coliform in water that is higher in salinity, brackish, or turbid, which might have been the case at these sampling locations.

#### SAMPLE RESULTS FOR CHEHALIS BASIN

## Humptulips River

The Grays Harbor Conservation District monitored five sites on the Humptulips River from January 2001 to June 2003 for fecal coliform colonies (See Table 1 and Figure 1 for location of sites). No sampling occurred between July and December 2002.

Table 4 presents a statistical summary of the Fecal Coliform monitoring data collected by the conservation district from 2001 - 2003 (Appendix A). Samples were collected monthly with most sites being sampled on the same day. However, site 1 for all three rivers, was typically sampled during a different day or week due to the need to sample these locations by boat. As shown, there were approximately 23 to 27 samples taken over the 18-month period, with the majority of the samples averaging between 11 and 17 colonies per 100mL. In turn, during the sampling period sites 2, 3, and 5 did record values over 100 colonies per 100mL (the geometric mean based on water quality standards for Class A waters). However, based on the notes provided with the raw data (Appendix A), some of these high values are thought to occur during periods of high precipitation.

TABLE 4. HUMPTULIPS RIVER FECAL COLIFORM MONITORING DATA (Colonies per 100mL)										
Site 1 Site 2 Site 3 Site 4 Site 5										
Average	12	17	16	11	16					
Maximum	44	136	125	76	186					
Minimum	1	1	0	0	0					
Standard Deviation	11	28	25	18	38					
Number of Samples	23	27	27	27	27					

Figure 2 provides a graphical summary of the monitoring data collected from the Humptulips River over the 18-month period. As shown the majority of the samples

were at or below 35 colonies per 100mL. However, there are two peaks in the graph occurring in the months of November 2001 and May 2002. Based on the sampling notes provided with the raw data (Appendix A), it is likely that the November 2001 peak was caused by a significant precipitation event during the month. In turn, the cause of the May 2002 peak is unknown.

### Satsop River

The Grays Harbor Conservation District monitored eleven sites on the Satsop River from January 2001 to June 2003 for fecal coliform colonies (See Table 2 and Figure 1 for location of sites). No sampling occurred between July and December 2002.

Table 5 presents a statistical summary of the Fecal Coliform monitoring data collected by the conservation district from 2001 – 2003 (Appendix A). Samples were collected monthly with most sites being sampled on the same day. However, site 1 for all three rivers, was typically sampled during a different day or week due to the need to sample these locations by boat. As shown, there were approximately 24 to 26 samples taken over the 18-month period, with the majority of the samples averaging between 10 and 14 colonies per 100mL. In turn, sites 10 and 11 collected samples with an average of 5 to 7 fecal coliform colonies per 100mL. Additionally, site 1 (Mouth of the Satsop River) collected, on average, 20 fecal coliform colonies per 100mL over the 18-month period, with site 8 recording the second highest maximum value of 100 colonies per 100mL.

TABLE 5. SATSOP RIVER FECAL COLIFORM MONITORING DATA (COLONIES PER 100ML)											
	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11
Average	20	10	10	11	13	11	13	14	11	7	5
Maximum	160	51	56	52	60	53	59	100	72	30	26
Minimum	0	1	1	0	0	1	1	0	0	0	0
Standard Deviation	33	11	12	13	17	15	17	25	17	9	7
Number of Samples	24	26	26	26	26	25	26	25	26	26	26



Figure 2. Fecal Coliform Results for Sites on the Humtulips River

Figure 3 provides a graphical summary of the monitoring data collected from the Satsop River over the 18-month period. As shown the majority of the samples were at or below 40 colonies per 100mL. However, there are four notable peaks in the graph occurring in the months of July-August 2001, March 2002, May of 2002, and June 2003, respectfully. It is unknown why these spikes occurred at these times.

#### Wynoochee River

The Grays Harbor Conservation District monitored five sites on the Satsop River from January 2001 to June 2003 for fecal coliform colonies (See Table 3 and Figure 1 for location of sites). No sampling occurred between July and December 2002.

Table 6 presents a statistical summary of the Fecal Coliform monitoring data collected by the conservation district from 2001 - 2003 (Appendix A). Samples were collected monthly with most sites being sampled on the same day. However, site 1 for all three rivers, was typically sampled during a different day or week due to the need to sample these locations by boat. As shown, there were approximately 19 to 21 samples taken over the 18-month period, with the majority of the samples averaging between 17 and 23 colonies per 100mL. Additionally, site 5, which is the farthest upstream site, collected the highest maximum value of 119 colonies per 100mL over the 18-month period, with site 4 recording the second highest maximum value of 115 colonies per 100mL.

TABLE 6. WYNOOCHEE RIVER FECAL COLIFORM MONITORING DATA (COLONIES PER 100ML)										
Site 1 Site 2 Site 3 Site 4 Site 5										
Average	19	23	21	17	18					
Maximum	46	95	107	115	119					
Minimum	2	0	0	0	0					
Standard Deviation	14	24	27	;	29					
Number of Samples	21	20	20	20	19					

Figure 4 provides a graphical summary of the monitoring data collected from the Wynoochee River over the 18-month period. As shown the majority of the samples were at or below 30 colonies per 100mL. However, there are three notable peaks in the graph occurring in the months of September 2001, October 2001, and March 2003, respectfully. It is unknown why these spikes occurred at these times.



Figure 3. Fecal Coliform Results for Sites on the Satsop River



Figure 4. Fecal Coliform Results for Sites on the Wynoochee River

#### CONCLUSIONS

Ecology's study on fecal coliform pollution in Grays Harbor indicates that 96 percent of fecal coliform in the Grays Harbor watershed is coming from non-point source pollution. Non-point source pollution is pollution that is not necessarily discharged through a pipe or an outfall. Non-point source pollution 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. Nonpoint source pollution typically enters the receiving water during rainfall events and can be better detected through storm water sampling than sampling during ambient conditions. Only two sets of samples during the monitoring period were described as being collected during a rainfall event. Those sets were for the Humptulips River and Wynoochee River, and were collected on November 14, 2001 and November 15, 2001, respectively. The City of Montesano accumulated 3.21 inches of rainfall on November 13 and 2.51 inches of rainfall on November 15. These were also some of the highest fecal coliform monitoring results recorded during the three-year monitoring period for these two rivers.

Overall, bacterial levels are low in all three streams monitored, with no significant pattern detected among the sampling locations within each stream. No significant trends are seen in the data. Some of the higher levels of fecal coliform detected might be attributed to runoff that occurs during rainfall events. Bacteria levels from non-point sources in these rivers may be low because of the best management practices that have been implemented for animal management and on-site sewage systems, as well as urban storm water controls (Ecology, 2000).

#### REFERENCES

Grays Harbor Conservation District. 2003. Quality Assurance Project Plan.

Ecology. 1993. Field Sampling and Measurement Protocols for the Watershed Assessment Section. Publication No. 93-e04. November, 1993.

Ecology. 2000. *Grays Harbor Fecal Coliform Total Maximum Daily Load Study*. Publication No. 00-03-020. June 2000.

## APPENDIX A. SAMPLING DATA FOR HUMPTULIPS, SATSOP AND WYNOOCHEE RIVERS

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Date	Site 1	Site 2	Site 3	Site 4	Site 5
01/24/01		4	8	4	3
01/31/01	16				
02/14/01	5				
02/15/01		1	2	1	5
03/15/01		4	10	9	9
03/21/01	3				
04/18/01	9				
04/19/01		4	2	1	1
05/23/01		15	5	0	2
05/31/01	6				
06/14/01		11	16	12	5
07/16/01	19				
07/19/01		20	22	19	6
08/15/01		11	36	24	42
08/20/01	28				
09/06/01		29	11	12	9
09/10/01	11				
09/18/01		11	23	14	8
09/25/01	21				
10/01/01		10	20	17	26
10/09/01	18				
11/06/01		9	3	7	9
*11/14/01		136	125	57	79
**11/20/01	44				
11/27/01	2				
12/04/01		9	7	2	4
12/10/01	11				
12/18/01	17				
12/26/01		13	7	1	0
01/09/02		12	9	3	8
01/15/02	5				
02/14/02		2	0	0	1
02/19/02	4				
03/11/02		25	34	23	20
03/18/02	1				
04/03/02		4	3	0	0
04/22/02	4				
05/07/02	8				
05/28/02		65	24	76	186
06/04/02		13	2	13	5
06/10/02	3				
01/14/03		1	5	2	2
01/21/03	3				
02/25/03		1	3	0	0
03/25/03		3	1	0	0
03/31/03	4				
04/15/03		2	2	1	1
05/12/03		6	3	0	0
06/10/03	24				
06/17/03		48	36	5	6

#### Humptulips River Data (Fecal Coliform Colonies per 100mL)

\*11/13/01 Montesano received 3.29 inches of rain in 24 hours \*11/14/01 Montesano received 2.51 inches of rain in 24 hours

\*\*11/19/01 Montesano received 1.16 inches of rain in 24 hours

Satsop River Data (Fecal Coliform Colonies per 100mL)

Date	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10	Site 11
01/25/01		2	2	2	1	2	1	1	3	1	1
01/31/01	9										
02/14/01	2										
02/22/01		1	2	1	1	1	1	1	1	1	1
03/14/01		2	4	2	1	1	2	2	1	2	0
03/21/01	6										
04/14/01		2	2	2	2	2	2	2	46	2	2
04/18/01	5										
05/21/01		7	6	3	4	3	5	3	2	1	1
05/31/01	8										
06/25/01		51	56	52	60	37	59	49	26	23	26
06/25/01	31										
07/12/01		23	15	21	26	13	44	46	29	17	16
07/16/01	12										
08/01/01		11	12	16	13	9	36	100	16	18	7
08/20/01	29										
09/04/01		32	23	25	39	13	31	19	21	30	20
09/10/01	16										
09/20/01		20	21	18	28	47	30	24	14	7	8
09/25/01	20										
10/04/01		14	16	21	18	32	23		9	6	7
10/09/01	19										
11/08/01		12	7	10	10	6	11	8	5	12	2
11/20/01	23										
11/27/01	19										
12/10/01	6										
12/12/01		5	7	4	5	11	4	6	6	7	3
12/18/01	8										
12/27/01		5	5	4	1	1	2	2	3	1	1
01/15/02	0										
01/16/02		2	3	0	4		4	3	4	3	1
02/13/02		2	1	5	0	1	1	1	2	1	1
02/19/02	8										
03/18/02	64										
03/27/02		2	2	1	3	5	2	0	1	1	0
04/17/02		4	6	12	1	4	2	2	2	0	0
04/22/02	9										
05/07/02	2										
05/22/02		11	27	39	60	5	2	1	0	0	0
06/10/02	5										
06/12/02		16	15	12	13	8	5	8	7	26	3
01/08/03		6	3	4	2	5	3	1	0	3	3
01/21/03	3										
02/11/03		3	2	2	2	3	5	4	4	0	0
03/04/03		3	3	3	8	5	2	1	0	0	0
03/31/03	21										
04/14/03		10	2	6	0	3	5	2	2	0	4
05/05/03		6	9	9	9	4	8	4	5	1	6
06/04/03		10	16	11	14	53	47	61	72	11	8
06/10/03	160										

Date	Site 1	Site 2	Site 3	Site 4	Site 5
07/16/01	32				
07/19/01		23	6	4	7
08/16/01		24	22	21	24
08/20/01	26				
09/10/01	34				
09/13/01		29	32	27	19
09/25/01	42				
09/27/01		45	35	115	119
10/09/01	31				
10/10/01		26	36	49	
*11/15/01		95	107	46	59
11/20/01	18				
11/27/01	6				
12/10/01	14				
12/13/01		68	0	31	41
12/18/01	19				
12/20/01		6	11	6	12
01/07/02		0	0	0	0
01/15/02	3				
02/19/02	46				
02/27/02		1	4	0	3
03/18/02	2				
03/20/02		0	5	0	0
04/22/02	19				
04/24/02		5	2	0	1
05/07/02	13				
05/09/02		13	8	3	1
06/10/02	13				
06/18/02		16	30	11	28
01/15/03		10	5	3	7
01/21/03	2				
02/18/03	2	7	7	2	1
02/24/03	2				
03/26/03		37	71	5	4
03/31/03	13				
04/22/03		16	13	1	0
04/28/03	7				
05/19/03		4	5	2	3
05/27/03	13				
06/10/03	35				
06/11/03		27	20	15	13
*11/10/01	Montes	ano re	ceived	3.29 in	ches of

Wynoochee	River	Data	(Fecal	Coliform	Colonies	per 100mL	)
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\*11/13/01 Wontesano received 0.11
rain in 24 hours
\*11/14/01 Montesano received 2.51 inches of rain in 24 hours