REPORTING WATERSHED IMPROVEMENT

Based on Statistical Evidence of Watershed-wide Improvement (Option 2a)

Watershed Identification

a	Organization	Washington Department of Ecology, Southwest Region
b	Point of Contact	David Rountry, Water Cleanup Lead Phone: 360-407-6276 E-mail: drou461@ECY.WA.GOV
c	Project Title	"Reducing fecal coliform bacteria levels in the Willapa River watershed, Washington"

Description of 2002 Baseline Condition

d Watershed(s)

Four HUC-12 watersheds have improved significantly since being included on the impaired waters list:

171001060307: Lower Willapa River
171001060306: Willapa River
171001060304: Wilson Creek
171001060302: Willapa River, Stringer Creek, Trap Creek

In these four HUC-12 watersheds, more than 40 percent of previously impaired waterbodies now meet water quality standards for fecal coliform bacteria.

e 2002 Impairments

Monitoring in 1998 showed that many segments within the Willapa River watershed failed to meet water quality standards for fecal coliform and were declared impaired (see the Willapa River TMDL Study Data Summary Report [Pickett, 2000]: www.ecy.wa.gov/biblio/0003005.html). The state of Washington did not create an impaired waters list in 2002 (the state had a list in 1998 and 2004). Therefore, the waters declared impaired as of the 2000 TMDL Study Data Summary Report (and consequently listed on the 2004 impaired waters list) are considered valid for this submission. Specific fecal coliform impairments in the four HUC-12 watersheds identified in section d, above, include:

Waterbody Name	Listing ID
Lower Willapa River (HUC 171001060307)	10013 6688 9995 9998
Willapa River (HUC 171001060306)	10000 10001 10002
Riverdale Creek (HUC 171001060306)	9989
Wilson Creek (HUC 171001060304)	10009
Willapa River, includes Stringer and Trap creeks (HUC 171001060302)	10003 10004

	Numerous waterbodies in the Willapa River are also impaired for temperature and dissolved oxygen. See www.ecy.wa.gov/biblio/0403024.html and www.ecy.wa.gov/biblio/0610017.html for more information. For more details on Willapa River listings, see Attachment 1.
f Map (optional)	See Attachment 1

Evidence of Watershed Approach

g Area of Effort	Watershed restoration efforts took place throughout the 260-square-mile Willapa River Basin, which discharges into northeastern Willapa Bay in southwest Washington's Pacific County.
h Stakeholders Involved and Their Roles	• **Willapa Water Quality Workgroup**: Coordinate implementation and restoration actions on a watershed level • **Pacific County**: Manage upgrades and replacements to leaking or failing septic systems. • **City of Raymond**: Monitor to identify potential FC sources & correct. Implement stormwater controls. • **City of South Bend**: Monitor to identify potential FC sources & correct. Implement stormwater controls. • **Pacific Conservation District**: Work with landowners to implement agricultural and riparian BMPs. • **Washington State Department of Health**: Help homeowners maintain their on-site septic systems properly, including local programs for education/outreach, financial assistance, or enforcement. • **Washington Department of Ecology**: Collect data and provide technical assistance. Specific roles for each stakeholder can be found in the watershed plans cited in section j (below).
i Watershed Plan	Partners in the Willapa River watershed have been addressing pollution on a watershed level for almost three decades. Previous watershed-based planning efforts include: **(1) Watershed Planning Documents** • Willapa Bay Water Quality Management Plan (1983) (www.ecy.wa.gov/pubs/834.pdf) • Willapa Bay Watershed Bacterial Evaluation and Preliminary Control Strategy (1993) (www.ecy.wa.gov/biblio/9364.html) • Pacific County (WRIA 24) Strategic Plan for Salmon Recovery (2001)

		(http://wcssp.org/WCSSP_library/wria24/WRIA_24_Strategy.pdf) • Willapa Watershed Assessment. (Pacific Conservation District, 2006) (http://wcssp.org/WCSSP_library/wria24/Willapa_watershed_assessment.pdf) • Willapa River Watershed Temperature TMDL (Water Cleanup Plan): Submittal Report and Detailed Implementation Plan (2005) (www.ecy.wa.gov/biblio/0510073.html) • Willapa River Dissolved Oxygen TMDL: Water Quality Improvement Report and Implementation Plan (2006) (www.ecy.wa.gov/biblio/0610017.html) • Willapa River Fecal Coliform Bacteria TMDL: Water Quality Implementation Plan (2008) (www.ecy.wa.gov/biblio/0810052.html) • Analytical Framework and Technical Analysis for the Upper Willapa River Fecal Coliform Bacteria TMDL (www.ecy.wa.gov/programs/wq/tmdl/documents/willapa_upper_fc_strmethod062204epa.pdf) **(2) TMDL Documents:** • Willapa River Total Maximum Daily Load Data Summary Report (2000) (www.ecy.wa.gov/biblio/0003005.html) • Willapa River Watershed Temperature TMDL Study (www.ecy.wa.gov/biblio/0403024.html) • Willapa River Fecal Coliform Bacteria TMDL: Water Quality Improvement Report (2007) (www.ecy.wa.gov/biblio/0703021.html) • Lower Willapa River Fecal Coliform Bacteria TMDL Evaluation (www.ecy.wa.gov/programs/wq/tmdl/documents/willapa_fc_lower_wrreport2.pdf) • Willapa River Fecal Coliform Bacteria Verification Study: Water Quality Monitoring Report (www.ecy.wa.gov/biblio/0703039.html) • Willapa River Microbial Source Tracking Study Report/Appendix A (www.ecy.wa.gov/programs/wq/tmdl/willapa/WillapaRiverMonitRpt062405.pdf and www.ecy.wa.gov/programs/wq/tmdl/willapa/AppA.pdf)
j	Restoration Work	Complying with a 1998 statewide law, all nine Willapa River watershed dairy farmers have developed and implemented nutrient management plans. Stakeholders have implemented numerous BMPs throughout the watershed, including planting riparian buffers, adding livestock exclusion fencing and alternative water sources, replacing and repairing septic systems, adopting nutrient management plans, building manure containment structures, removing invasive weeds, restoring wetlands, controlling stormwater runoff, and educating landowners and the general public about water quality issues. See Attachment 1 for more details.

Evidence of Watershed-wide Improvement

k	Impairments Removed (if applicable)	No impairments removed to date. Data indicate that numerous waterbodies would have been eligible for removal from the Washington's 2010 list of impaired waters. However, the state of Washington limited its 2010 water quality assessment to marine waters. Therefore, the earliest that Willapa River waters might be delisted would be 2012.
l	Statistical Results	Ecology's monitoring efforts throughout the Willapa River watershed show that water quality has improved significantly. The original baseline (1998) and subsequent verification sampling (2006) data met the state's highest QA/QC levels (level 5). Each study followed prescribed QA/QC plans and the results are reported in Ecology's online Environmental Information Management database. The baseline data showed, with sufficient confidence, that only 16 percent of 24 sites sampled met standards for bacteria in 1998. By 2006, 62 percent of the sites meet water quality standards watershed-wide. Ecology's 2006 data show that, in four HUC-12 Willapa River basin watersheds, more than 40 percent of previously impaired waters now meet water quality standards for bacteria (HUCs 171001060302, 171001060304, 171001060306 and 171001060307). See Attachment 1 for more information. Please note that because Washington is restricting its 2010 water quality assessment report to marine waters only, the Willapa River watershed segments that now meet standards will not be de-listed until 2012 at the earliest. Although not all HUC-12 watersheds in the Willapa River basin achieved 40 percent of impaired waters restored, all watersheds within the basin with previously impaired segments have at least one waterbody restored. However, for the purposes of this submission, WA is only claiming SP-12 credit for watershed-based restoration of HUCs 171001060302, 171001060304, 171001060306, and 171001060307 where more than 40 percent of previously impaired waters already meet water quality standards.
m	Environmental Significance	Water quality improvements to date indicate that the watershed plans in place are successfully reducing fecal coliform levels throughout the basin. By continuing to implement watershed-based restoration efforts, stakeholders expect to see all Willapa River waterbodies restored by 2012.
n	Photos/Graphics (optional)	See Attachment 1

Attachment 1

Watershed Restoration Reduces Bacteria Levels and Improves Water Quality in Washington's Willapa River Watershed

SP-12 Submission Option 2a
Supporting Documentation
August 2010

1. Background

The Willapa River drains a basin of about 260 square miles before discharging into northeastern Willapa Bay, Washington. Major sub-basins include numerous sloughs and creeks that are tributaries to the Willapa River. The largest of these are the South Fork Willapa River, and Wilson, Mill, Trap, Fork and Fern Creeks. The Upper Willapa River is mostly freshwater while the lower river is a tidal estuary characterized by a mixture of Willapa Bay marine waters and freshwater from the mainstem river and tributaries.

The primary land cover and activities in the Willapa River watershed are forest (80 percent), agriculture (8 percent), and other (12 percent) that comprise non-forest, developed land, open water or wetlands. The upper, steeper part of the watershed is dominated by commercial forest that is managed by a mixture of private owners, state and federal agencies. Agricultural land use (including nine large dairy operations and numerous other livestock operations) are common along the valley floor at lower elevations.

The population of Pacific County is 20,984 according to the 2000 U.S. Census. With the exception of the cities of Raymond and South Bend on the lower river, the Willapa River basin is largely rural. Timber and seafood (mostly oysters) are the principal industries in these cities, while agricultural land uses dominate the rest of the river valley with silviculture as the main practice.

2. Pollution Problems and Water Quality Impairments as of 2002

A comprehensive monitoring network is in place on the Willapa River (Figure 1). A 2000 Willapa River TMDL Study Data Summary Report (www.ecy.wa.gov/biblio/0003005.html) shows that fecal coliform bacteria levels at multiple water quality monitoring sites exceeded the water quality standards for fecal coliform bacteria. The report shows that only 16 percent of 24 sites sampled in 1998 met standards for bacteria. For a complete list, see www.ecy.wa.gov/pubs/0003005.pdf.

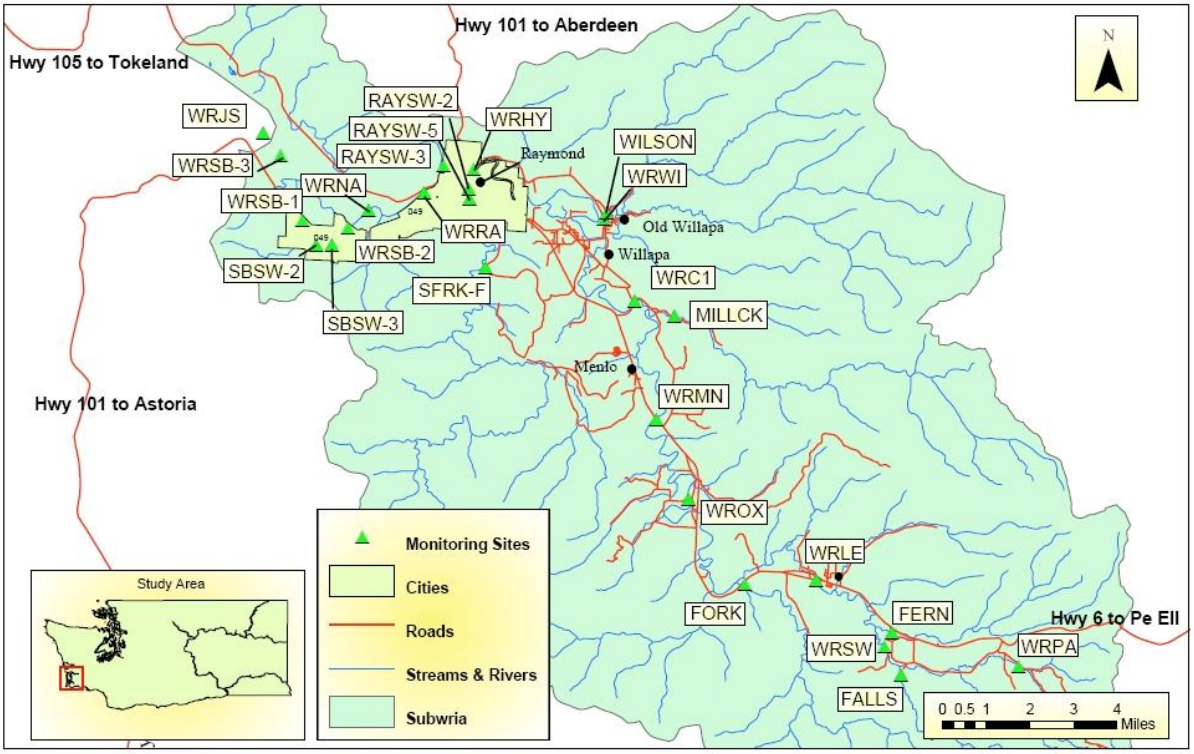

Figure 1. A comprehensive monitoring network exists on the Willapa River watershed, and includes stations on both the mainstem and tributary waterbodies.

Based on the results of the 2000 TMDL study report, Washington added 15 waterbodies within the Willapa River watershed to the impaired waters list in 2004 for fecal coliform (see Table 1). Figure 2 shows the location of the Willapa River's HUC-12 watersheds. Numerous waterbodies in the Willapa River watershed are also impaired for temperature and dissolved oxygen. See www.ecy.wa.gov/biblio/0403024.html and www.ecy.wa.gov/biblio/0610017.html for more details.

Table 1. Segments on Washington's 2004 impaired waters list for fecal coliform bacteria (*Note: Washington did not have an impaired waters list in 2002)

Waterbody Name	Listing ID
Lower Willapa River (HUC 171001060307)	10013 6688 9995 9998
Willapa River (HUC 171001060306) Riverdale Creek (HUC 171001060306)	10000 10001 10002 9989
Wilson Creek (HUC 171001060304)	10009
Willapa River, HUC includes Stringer and Trap creeks (HUC 171001060302)	10003 10004
Willapa River, includes Half Moon, Falls and Fern creeks (HUC 171001060301)	10006 10007 9983 9984

Figure 2. The Willapa River watershed includes 7 HUC-12 level watersheds.

Sources of fecal coliform bacteria in the watershed are both point and nonpoint in nature. Known point sources with permit effluent limits for coliform bacteria are City of Raymond wastewater treatment plant (WWTP) at RM 7.0, South Bend WWTP at RM 3.5, Coast Seafood at RM 3.1, East Point Seafood at RM 4.1 and South Bend Packers at RM 3.5. In general, nonpoint sources of fecal coliform bacteria are failing on-site sewage systems, livestock operations, hobby farms, urban areas, wildlife and recreational uses. The fecal coliform loading from point sources was previously determined to be an insignificant portion of the total bacteria loading to the lower Willapa River.

3. Restoration Efforts Led to Declines in Bacteria Levels

Data collected by Ecology in 2006 show that water quality has significantly improved throughout the Willapa River watershed since 1998. The original baseline (1998) and subsequent verification sampling (2006) data met the state's highest QA/QC levels (level 5). Each study followed prescribed QA/QC plans and the results are reported in Ecology's online Environmental Information Management database. The baseline data showed, with sufficient confidence, that only 16 percent of 24 sites sampled (see map in Figure 1) met bacteria standards in 1998. Follow-up sampling in 2006 showed that 62 percent of the sites meet water quality standards for bacteria. Of the 15 waterbodies originally listed in 2004, nine now meet water quality standards, as seen in Table 2.

Table 2. Within Willapa River HUC-12 watersheds, the percentage of waterbodies added to the 2004 impaired waters list that now meet water quality standards (WQS)

Waterbody Name	Listing ID (2004 list)	Met WQS in 2006?	Percent of Impaired Waterbodies Improved
Lower Willapa River (HUC 171001060307)	10013 6688 9995 9998	N Y N Y	**2/4=50%**
Willapa River (HUC 171001060306) Riverdale Creek (HUC 171001060306)	10000 10001 10002 9989	Y N Y Y	**3/4=75%**
Wilson Creek (HUC 171001060304)	10009	Y	**1/1=100%**
Willapa River, HUC includes Stringer and Trap creeks (HUC 171001060302)	10003 10004	Y Y	**2/2=100%**
Willapa River, includes Half Moon, Falls and Fern creeks (HUC 171001060301)	10006 10007 9983 9984	N N Y N	1/4=25%

Of the five HUC-12 Willapa River watersheds that has segments listed as impaired in 2004, four now have more than 40 percent of waters restored (HUCs 171001060302, 171001060304, 171001060306, and 171001060307). Table 3 (following page) presents a summary of the 2006 data showing that these four HUC-12 watersheds in the Willapa River basin now meet water quality standards for bacteria. Because Washington is restricting its 2010 water quality assessment report to marine waters only, the Willapa River watershed segments that now meet standards will not be removed from the impaired waters list until 2012 at the earliest.

Please note that although not all HUC-12 watersheds within the larger Willapa River basin achieved 40 percent or more impaired waters restored, all watersheds within the basin with previously impaired segments have at least one waterbody that now meets water quality standards, as seen in Table 2. Plus, bacteria levels are declining throughout the basin overall. However, for the purposes of this submission, WA is only claiming SP-12 credit for watershed-based restoration of four HUCs (171001060302, 171001060304, 171001060306 and 1710060307), where more than 40 percent of previously impaired waters already meet water quality standards.

Table 3. Fecal coliform data summary (January - December 2006) for restored Willapa River HUC-12 watershed segments [in colony forming units per 100 milliliters (col/100 mL)]

Willapa River HUC-12	Main-stem River Mile	Trib RM	Sampling Station	Monitoring Site Code	Associated Impaired Waters Listing ID in 2004	90th Percentile		Geometric Mean		Met WQS in 2006?
						Fecal Coliform (col/100 mL)	WQS*	Fecal Coliform (col/100 mL)	WQS	
171001060302	25.20		Willapa at Oxbow Rd	WROX	10004	121	200	31	100	YES
171001060302	21.40		Willapa at SR 6 near Menlo	WRMN	10003	157	200	37	100	YES
171001060304	12.00	0.10	Wilson Cr near Willapa	WILSON	10009	99	200	16	100	YES
171001060306	17.50		Willapa at Camp One Rd	WRC1	10002	154	200	39	100	YES
171001060306	13.70		Willapa at Willapa Rd	WRWI	10001	352	200	48	100	NO
171001060306	7.70		Willapa at Hwy 101 Br	WRHY	10000	127	200	19	100	YES
171001060306	7.20	0.40	Riverdale Cr at Lions Club Pk	RAYSW-3	9989	108	200	25	100	YES
171001060307	6.4		Willapa River at Raymond Central St.	WRRA-AR1	9998	59	200	14	100	YES
171001060307	3.1		Drain at Coast Seafoods (stormwater)	SBSW-2	9995	272	200	49	100	NO
171001060307	3.0		Willapa at Potters Slough	WRSB-1	6688	64	200	12	100	YES
171001060307	0.4		Willapa River at Johnson Slough	WRJS	10013	50	43	8	14	NO

* WQS: Water quality standard — The fecal coliform water quality standard requires that fecal coliform organism levels shall both not exceed a geometric mean value of 100 col/100 mL, and not have more than 10 percent of all samples obtained for calculating the geometric mean value exceeding 200 col/100 mL when salinity is below 10 parts per thousand (ppt). When salinity is above 10 ppt, standards require that the geometric mean be less than 14 col/100 mL and no more than 10 percent of samples may exceed 43 col/100 mL.

4. Evidence of Watershed Approach and Widespread Restoration Efforts

Local jurisdictions, the Pacific Conservation District, the Natural Resource Conservation Service (NRCS), landowners and citizens groups have been working together across the watershed to protect and restore the Willapa River watershed for many years. See http://wcssp.org/WCSSP_library/wria24/wria24.htm and www.ecy.wa.gov/programs/wq/tmdl/willapa/WillapaRiverTMDLSummary.html for links to numerous

planning efforts that have been underway since the early 1990s. These efforts prompted numerous stakeholders to install best management practices (BMPs), restore riparian areas, promote education/outreach efforts and conduct water quality monitoring throughout the basin.

Actions of the Pacific County Community Department of Community Development have helped guide a variety of water quality improvement actions such as making low-interest loans available for septic system repair. Actions such as converting the Ecklund Park residential area to sanitary sewers in the late 1990s reduced bacteria loads in the lower Willapa River.

The Washington State Dairy Nutrient Management Act (DNMA) legislation was enacted and implemented in April 1998. All nine dairies in the Willapa watershed are now fully implementing farm management plans—these new plans have significantly reduced bacteria discharges to water. The NRCS used federal Environmental Quality Incentive Program (EQIP) funds to help dairy farmers with initial costs of implementing the DNMA requirements. Grants paid for capital improvements like manure containment and dry-stacking that allows nutrients to be captured and used instead of wasted in runoff to surface water. Carefully-timed and controlled rates of livestock nutrient applications have improved forage quality and quantity, improved land/soil health and reduced the need for commercial fertilizer purchases. EQIP Program participants were initially very skeptical of the potential value of the activities brought by the DNMP, but many have effectively applied the program on their farms for financial and ecological profit.

The following list of the Pacific Conservation District's (PCD's) accomplishments in 2005 alone provides offers insight into the scope of its ongoing implementation efforts:

- Replanted 5.5 miles of stream in a TMDL area.
- Worked with Pacific County Weed management to assess and control 16.5 miles of Japanese Knotweed infestation in the lower Willapa River basin (eradicated 188 acres of the weed).
- Assisted 6 small forest landowners through the Family Forest and Fish Passage Program (FFFPP). Conducted culvert assessments.
- Assisted NRCS with efforts implemented through EQIP. Helped fund and assist with improvements in cranberry irrigation systems.
- Provided project assistance for the funding of five projects that restored 110 acres of habitat, opened up almost 15 miles of salmonid habitat, and helped prioritize projects with Willapa Bay estuary.
- Installed 5.5 miles of fence to keep 250 head of livestock from entering the stream. Provided technical assistance to 82 cooperators and/or groups.
- Created 85 acres of riparian buffer.
- Planted approximately 46,395 trees in the watershed through a variety of conservation programs.
- Held 11 Willapa Bay Water Resource Coordinating Council Meetings through the year to keep local community involved with and informed of water quality issues.

Other examples of previous implementation efforts in the watershed include:

A Centennial Clean Water grant was awarded to the PCD in 2003 for farm management planning services and to help finance landowner projects that directly support TMDL implementation.

The grant supported implementing livestock exclusion fencing and riparian planting on approximately 9,300 feet of shoreline on three land parcels in important Willapa River watershed segments, among other efforts.

The PCD also implements the federal Conservation Reserve Enhancement Program (CREP). Two Willapa Valley landowners have participated in this program since 1998. Landowners have installed fencing and alternative watering equipment and have planted riparian areas. The farmers have placed these areas in an easement in exchange for a multi-year lease payment. Those two agreements protect more than 6,000 feet of shoreline and provide a buffer of approximately 10 acres of land. Plus, producers have found that using different grazing rotations helps promote a more healthy plant cover, improves forage quantity and quality, and stabilizes the soils better than an uncontrolled animal access situation. Riparian planting further reduces soil loss from erosion and river washout.

Multiple landowners and agencies (NRCS, Ducks Unlimited, Washington Department of Fish and Wildlife, Washington State Department of Transportation) partnered on an eight-year effort (2000 to 2008) to restore 300 acres of estuary wetlands at Potter Slough in the lower Willapa River (Figure 3). This area had been diked for almost 100 years. Ecology believes that this restoration work correlates to bacteria reductions seen in 2006 at monitoring station WRSB-1. For this project, six adjacent private landowners applied for the Wetland Reserve Program (WRP) and were granted conservation easements. The landowners sold the fee title on the property to Washington Department of Fish and Wildlife. The WRP funded studies and designs, and then construction activities to restore the estuary and freshwater wetlands. The project required that a portion of a highway be raised—this was funded through the Washington State Department of Transportation. This project area now provides wildlife habitat and has improved water quality by removing pollutant sources. For example, one of the landowners participating in the project kept up to 200 cows on a tideland pasture in Potter Slough until selling the land in 2005.

Figure 3. Numerous stakeholders partnered on the Potter Slough Estuary restoration project, seen here after completion.