CLACKAMAS
WATER
ENVIRONMENT
SERVICES

WILLAMETTE RIVER WATERSHED
NON-POINT SOURCE TOTAL MAXIMUM DAILY LOAD
ANNUAL REPORT

Clackamas Water Environment Services, Clackamas County, and the City of Happy Valley

July 1, 2021 to June 30, 2022

November 1, 2022

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SECTION A

OVERVIEW

1. Introduction

The federal Clean Water Act, section 303, requires states to develop water quality standards to support uses beneficial of public water bodies. Where water quality standards are not being met, the water body or the appropriate reach is listed on the 303(d) list of water quality limited water bodies for that pollutant. The State of Oregon, through the Oregon Department of Environmental Quality (DEQ), is required to develop Total Maximum Daily Loads (TMDLs) to determine how to meet water quality standards for that pollutant.

The TMDL process begins when a stream, lake, or river does not meet water quality standards and is classified as water quality-limited on the state's 303(d) list. TMDLs identify the maximum amount of a specific pollutant that can be present in a water body without violating water quality standards. This is known as the loading capacity. After extensive water quality monitoring and modeling efforts, TMDLs establish the difference between the loading capacity and the current pollutant load. TMDLs are expressed as numeric standards or percent pollutant reductions that need to be met to bring water bodies into compliance with water quality standards. The difference between the current load and the loading capacity is known as excess load (DEQ, 2004). The excess load is split up between the different sources of pollution according to their contribution to the overall pollution load. Any difference between the waterway's loading capacity and the current pollutant load must be mitigated by pollution reduction activities. DEQ develops wasteload allocations (WLAs) for point sources such as wastewater treatment plants and industrial discharges, and load allocations (LAs) for non-point pollution from agricultural, urban, and forestry lands such as erosion, animal wastes, and stormwater. WLAs are not addressed in this annual report.

The Oregon Administrative Rule (OAR) 340-042-0080 that addresses TMDLs requires local governments and other agencies to develop TMDL Implementation Plans, for their non-point source pollution load allocation.

Responsible parties that are able to implement pollution reduction strategies are classified as Designated Management Agencies (DMAs). In the Willamette Basin, DMAs include federal agencies such as the Bureau of Land Management, state agencies such as the Oregon Department of Forestry and the Oregon Department of Agriculture, counties, cities, and others. According to OAR 340-042-0080, TMDL Implementation Plans must include the following five elements:

1. Management strategies that will be used to achieve load allocations
2. A timeline and schedule to achieve measurable milestones
3. A plan for periodic review and revision of the implementation plan
4. Evidence of compliance with applicable statewide land use requirements
5. Any other analyses or information as specified in the Water Quality Management Plan

The DEQ finalized the Willamette River TMDL document in September 21, 2006, and was approved by the U.S. Environmental Protection Agency (EPA) on September 29, 2006. The mercury TMDL which had originally been approved by EPA in 2006 was recently revised and this revised mercury TMDL was approved by EPA in 2021.

A portion of the Willamette River watershed lies within Clackamas County, and certain County Service Districts, the City of Happy Valley, and many other local governmental entities are regulated by the Willamette TMDLs. This annual report addresses the Load Allocations (LA) that have been allocated to Clackamas County/WES and the City of Happy Valley. This TMDL Annual Report is for Clackamas Water Environment Services, Clackamas County, and the City of Happy Valley and summarizes the progress of implementing management strategies – as described in their DEQ-approved TMDL Implementation Plan – for protecting and improving water quality.

2. Clackamas County Surface Water Overview

2.1 Watersheds

The major watersheds of Clackamas County are shown on Figure 1. A large portion of Clackamas County is drained by the Willamette River and its tributaries including the Clackamas, Molalla, Pudding, and Tualatin Rivers (Table 1). The remaining lands are drained by the Sandy River, which enters the Columbia River near the City of Troutdale.

Table 1. Clackamas County Watersheds

Clackamas County watersheds	Total acres in watershed	Watershed in Clackamas County, acres	Percent of watershed in Clackamas County
Clackamas	602,634	540,456	90
Molalla-Pudding	560,037	305,785	55
Tualatin	453,849	12,587	3
Lower Columbia-Sandy	560,566	235,361	42
Middle Willamette	455,502	73,906	16
Lower Willamette	411,905	33,797	8
Total	*3,044,494*	*1,201,890*	
Sub-watershed of Lower Willamette			
Johnson Creek	32,709	9,902	30

The TMDL Implementation Plan specifically addresses the Willamette TMDL's wasteload, load, and interim allocations, but not in the portions of the Willamette River's watershed in Clackamas County which are drained by the Tualatin, Molalla, and Pudding Rivers.

- *Tualatin River:* Certain private and publicly owned lands in Clackamas County which are drained by the Tualatin River (not including lands in the cities of West Linn, Tualatin, and Lake Oswego) are addressed by a separate TMDL Implementation Plan that was written specifically for WES, Clackamas County, and the City of Rivergrove on August 7, 2003. This Implementation Plan was revised in 2008, 2011, and 2014.
- *Molalla-Pudding Rivers:* Certain private and publicly owned lands in Clackamas County which are drained by the Molalla and Pudding Rivers (not including lands in the cities of Molalla, Canby, and Barlow) are addressed by a separate TMDL Implementation Plan that was written specifically for Clackamas County in February 2012.

2.2 Organizational Summary

Clackamas Water Environment Services (WES), Clackamas County's Business and Community Services Dept. (BCS) and the Department of Transportation and Development (DTD), and the City of Happy Valley all play a role in implementing portions of this Implementation Plan. General responsibilities of each are outlined in Table 2.

Table 2. County, City and Service District Responsibilities

Responsible Party	Jurisdictional area	TMDL Implementation Plan responsibility
WES	Limited to WES' surface water management service area	Administers CCSD #1 and TCSD, both of which along with SWMACC now make up a 190 Partnership that is now Clackamas Water Environment Services (WES). All-purpose stormwater management agency, and riparian area land use[1]
Clackamas County DTD	County-wide	Includes Planning, Roads & Engineering and the Office of Sustainability. Riparian area use and other land uses(including development activities), roads, and all-purpose stormwater management agency; illegal dumping and solid waste nuisances on private property; and administers septic system permitting program
Clackamas County BCS	County-wide	Clackamas County Parks, North Clackamas Parks & Recreation District, Economic Development, County Fair, management of surplus real estate, and Dump Stoppers (an illegal solid waste dumping prevention program)
City of Happy Valley	To City limits only	Roads, erosion control permitting, tree ordinance, and land use. Most other stormwater management functions are provided by WES on behalf of the City[1]

[1] Includes, but is not limited to, public education/involvement, illicit discharge elimination, erosion control, development review of sanitary and storm sewer systems and storm sewer system maintenance programs.

WES provides many services to the community, including sanitary wastewater collection and treatment, and stormwater management.

2.3 Surface Water Responsibilities

As stated above, Clackamas County, WES, and the City of Happy Valley have responsibility as DMAs and have cooperated in the development of this Implementation Plan. Each organization has ongoing programs that provide for overall management of surface water, and water quality that contribute to watershed health in the Willamette watershed.

2.3.1 Wastewater

Discharges of treated wastewater effluent occur at several locations throughout the Willamette watershed. WES owns and operates three of them: the Boring Wastewater Treatment Facility, the Kellogg Creek Water Resource Recovery Facility in Milwaukie, and the Tri-City Water Pollution Control Plant in Oregon City. Figures A-2 and A-3 show the locations of these facilities on pages 11 and 12. WLAs for TMDL pollutants have been assigned to these facilities, but they aren't addressed in this

annual report, which is for non-point sources of TMDL pollution. Compliance with TMDL WLAs is addressed within each facility's NPDES Permit.

2.3.2 Stormwater

Stormwater enters the Willamette River and tributaries in the Willamette TMDL's geographic area from areas regulated by the NPDES Municipal Separate Stormwater System (MS4) program as well as from areas that are not regulated under the NPDES MS4 program. Figures 2 and 3 illustrate the NPDES MS4 permit area in Clackamas County. DEQ considers these NPDES MS4-permitted storm sewer outfalls as point sources and as a result they are not addressed in this annual report for our TMDL Implementation Plan. The NPDES MS4 permit was issued to the City of Happy Valley, Clackamas County, and other co-permittees in December 1995. It was subsequently renewed in March 2004, modified in July 2005 and December 2007, was renewed in March 2012, and was renewed again in October 2021.

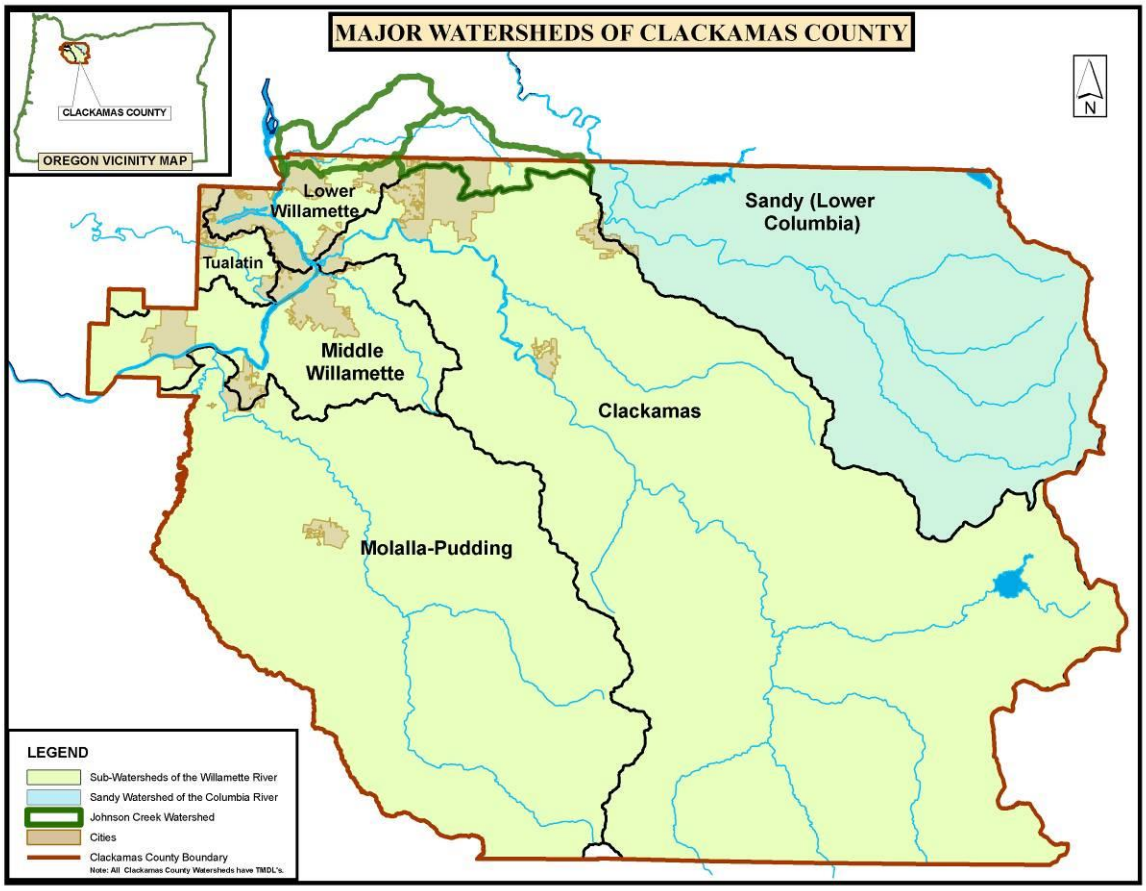

Figure 1. Major Watersheds of Clackamas County

3. TMDL Parameters and Allocations

TMDLs have been developed in the Willamette watershed for *E. coli*, DDT/dieldrin (Johnson Creek only), mercury, and in-stream water temperature. Table 3 summarizes each TMDL parameter, load allocation, measurement, and DMA.

3.1 *E. coli*

The Load Allocations (LAs) in the Willamette TMDL specify that a 78 percent reduction in in-stream *E. coli* loads is needed in all streams and tributaries in the portion of the Lower Willamette Subbasin that is in Clackamas County, including the Clackamas

River watershed. The only exceptions are Bargfield and Delano Creeks in the Clackamas River watershed where the LAs call for 83 percent and 89 percent reductions, respectively.

Table 3. TMDL Parameters and Load Allocations

Affected waters in CC's part of Willamette River watershed	Parameters	Measurement method	Allocation type (and NPDES permit type)	Load Allocation (LA)	Designated Management Agencies
All[1]	In-stream temperature	Surrogate: shade	Load Allocation (LA)	Attaining "system potential vegetation" conditions	CC, WES, Happy Valley
Mainstream Willamette River (RM 50 to RM 0)	Cold water refugia	Direct	None	Identify, when present, and restore where feasible	CC
All[1]	*E. coli*	Direct	LA	78 percent reduction (83 percent and 89 percent in Bargfield and Delano Creeks)	CC, WES, Happy Valley
Johnson Creek	DDT/ Dieldrin	Surrogate: TSS	LA	94 percent reduction in DDT (<15 mg/L TSS)	CC, WES, Happy Valley
All	Mercury	Direct	LA	97 percent reduction from "General Non-Point Sources" (from Feb. 2021 final revised TMDL)	CC, WES, Happy Valley

3.2 DDT and Dieldrin

The DDT and Dieldrin TMDL is specific to the Johnson Creek watershed, which drains a portion of Clackamas County in and near the cities of Milwaukie and Happy Valley, and in the area which is East of Happy Valley. About 30% of the watershed is in Clackamas County (the other 70% or so is in Multnomah County). Less than 1,000 acres (less than 3 percent) out of a total watershed area of about 55 square miles of the entire Johnson Creek watershed is within WES' surface water management service area and/or the City of Happy Valley.

The TMDL has assigned a LA for all non-point sources in the watershed of a 94 percent reduction over time from current DDT levels. DEQ has assumed that reducing DDT levels will also yield sufficient reductions in the level of Dieldrin (and breakdown products) within Johnson Creek.

Dieldrin and DDT, when they are present in stormwater or creek water, may be attached to or associated with small, suspended solid particles. As part of the Willamette TMDL development, DEQ has established reduction of total suspended solids (TSS) as a measurement of overall DDT reduction. The TMDL's TSS target is 15 milligrams per liter (mg/L) for non-point sources, thus if stormwater runoff by this Implementation Plan contain 15 mg/L or less TSS it is assumed that the level of DDT has been reduced by 94 percent or more. Complying with the DDT LA constitutes compliance with the Dieldrin TMDL as well.

3.3 Mercury

The 2021 revised final mercury TMDL established new required percentage reductions over time from all sources (point and non-point sources) of mercury compared to the TMDL's "baseline" loading levels. The required percentage reduction for "General Non-Point Sources" is 97%; this category is the one which applies to discharges which are addressed by this TMDL Implementation Plan (IP). This new TMDL LA was incorporated into our updated non-point source TMDL IP which we submitted to DEQ for approval on Sept. 2, 2022.

Although the water quality criteria for mercury in the Willamette River's water column is currently being met at all times or nearly all times, excessive levels of mercury have accumulated in certain species of the watershed's fish.

The stated objective of the mercury TMDL is to reduce average fish tissue mercury concentrations in the Willamette River and its tributaries so that all fish species are safe for human consumption. The multiple fish consumption advisories for mercury in the Willamette Basin indicate that this beneficial use is not currently being met. DEQ acknowledges that it may take many years, perhaps even decades, to ultimately achieve the desired reduction in fish tissue concentrations of mercury. In establishing interim water quality guidance values, DEQ considered the criteria and thresholds utilized when fish consumption advisories are issued. DEQ recently revised this TMDL and the final revised draft TMDL contains updated LAs and WLAs. After this revised draft TMDL is the updated TMDL's LA will be incorporated into non-point source TMDL programs when Implementation Plans are revised.

3.4 Temperature

Numerous stream and river reaches in Clackamas County are part of the Willamette temperature TMDL including, but not limited to, the Willamette and Clackamas Rivers and Johnson and Abernethy Creeks. DEQ has established Percent Effective Shade (PES), a measurement of the shade-yielding capacity of a riparian area, is the TMDL's surrogate for in stream heat load. "System potential vegetation" conditions represent riparian areas with a high PES value. "System potential vegetation" conditions are considered by DEQ to be necessary to achieve "system potential effective shade," which is defined by DEQ as "the potential near-stream vegetation that can grow and reproduce on a site, given the climate, elevation, soil properties, plant biology, and hydrologic processes." Shade curves, developed by DEQ for the Willamette basin based on potential vegetation growth under different soil conditions, display the shade coverage that could potentially be present at given locations.

3.5 Cold Water Refugia (CWR)

As a requirement of the 2006 Willamette River TMDL, DMAs located along the mainstream Willamette River from river mile 50 downstream to the confluence with the Columbia River need to address CWR within their TMDL Implementation Plans. This reach of the river has been designated as a migration corridor for salmonids. CWR are needed along this reach to offer migrating salmonids relief from the warmer river temperatures found in the summer months. The TMDL requests that Implementation Plans look at identifying existing CWR and provide options for protecting or enhancing such areas. Wherever localized CWR have been altered through channel modification or by other means, consideration should be given to exploring options for restoring or enhancing these areas of CWR where feasible.

In March 2020, DEQ submitted the following study to NOAA's National Marine Fisheries Service: "Lower Willamette River Cold-Water Refuge Narrative Criterion Interpretation Study." This study, for the first time, provided maps and other information about the known or suspected CWR in these 50 river miles to DMAs and the public. In future years, Clackamas County may use this report's findings to support its decision-making processes to better protect and enhance these CWRs. See Management Strategy #14 in Appendix A of this annual report for more information about our work to identify, protect, and enhance CWR.

SECTION B

4. TMDL Implementation Responsibilities

Responsibility for implementing the TMDLs has been distributed among a variety of designated management agencies (DMAs). For the area of Clackamas County's and the City of Happy Valley's jurisdiction, these DMAS include:

- Clackamas WES', a Clackamas County Department, Surface Water Management (SWM) service area
- Clackamas County
    - Department of Transportation & Development
        - Planning
        - Roads & Engineering
        - Code Enforcement
        - Septic system/cesspool management
    - North Clackamas Parks & Recreation District
    - Facilities Division of the Finance Dept.
    - Public and Government Affairs Dept.
    - Business & Community Services
        - Clackamas County Parks
        - Economic Development
        - County Fair
- City of Happy Valley
    - Economic and Community Development
    - Public Works
    - Public Safety and Community Services

TMDL-based water quality programs are being implemented by state and federal agencies for state and federally-owned and managed lands. TMDLs for private lands in timber management areas are being implemented through the Oregon Department of Forestry (ODF), and the TMDLs for private lands in agricultural areas are being implemented through the Oregon Department of Agriculture (ODA). TMDLs are being implemented through the NPDES permitting process for point sources of pollutants, such as wastewater treatment plant discharges, and MS4-permitted stormwater discharges.

This TMDL Implementation Plan focuses on management strategies that address non-point sources of pollution in Clackamas County and the City of Happy Valley, including surface discharges of stormwater runoff from areas that are not regulated by the MS4 Permit. Stormwater runoff directed to subsurface discharge through injection systems (drywells, for example) is not addressed by this Implementation Plan. Privately owned storm sewer system outfalls in the Oak Lodge Water Services District (OLWSD) are also addressed in OLWSD's Willamette TMDL Implementation Plan; see this IP for more information. Lands subject to ODF and ODA jurisdiction are also not included in this Implementation Plan. In addition, this Implementation Plan does not address runoff from lands owned by the state or federal government. See Sections 1 and 2 for previous discussion on jurisdictional authority and responsibility coverage.

This Implementation Plan addresses TMDL pollutants that are discharged by these types of stormwater drainage systems:

- Clackamas County and WES-owned/operated storm sewer system outfalls that are not subject to the MS4 permit requirements.

- Privately-owned storm sewer system outfalls if they do not drain agricultural and timber management areas. These outfalls, unless they are permitted by an NPDES permit such as a 1200Z, are non-point sources of pollution

- Overland sheet flow or channelized flows that do not flow through MS4-permitted or privately owned storm sewer system outfalls. These drainage systems are non-point sources of pollution. They are found on lands with every type of land use. Those drainage systems that are not in agricultural and timber management areas are addressed in this Implementation Plan

Clackamas County's, WES', and the City of Happy Valley's authority to control sources of pollution from privately owned storm sewer system outfalls, overland sheet flow and channelized flows is limited. If Clackamas County, WES, and/or the City of Happy Valley are aware of a privately owned conveyance system that is a significant source of TMDL pollution, the matter will be referred to DEQ if public education and/or technical assistance fail to yield the necessary water quality improvement.

This TMDL IP also addresses the Willamette temperature TMDL. The IP contains Management Strategies which:

- Protect existing riparian area shade in some instances. Local ordinances protect existing riparian area shade when the City of Happy Valley, Clackamas County and Clackamas WES administer ordinances which contain buffer setback requirements that are implemented during the land use and construction process for permitted developments.
- Increase riparian area shade on some properties through the planting of trees on properties where the full system potential shade has not yet been attained.

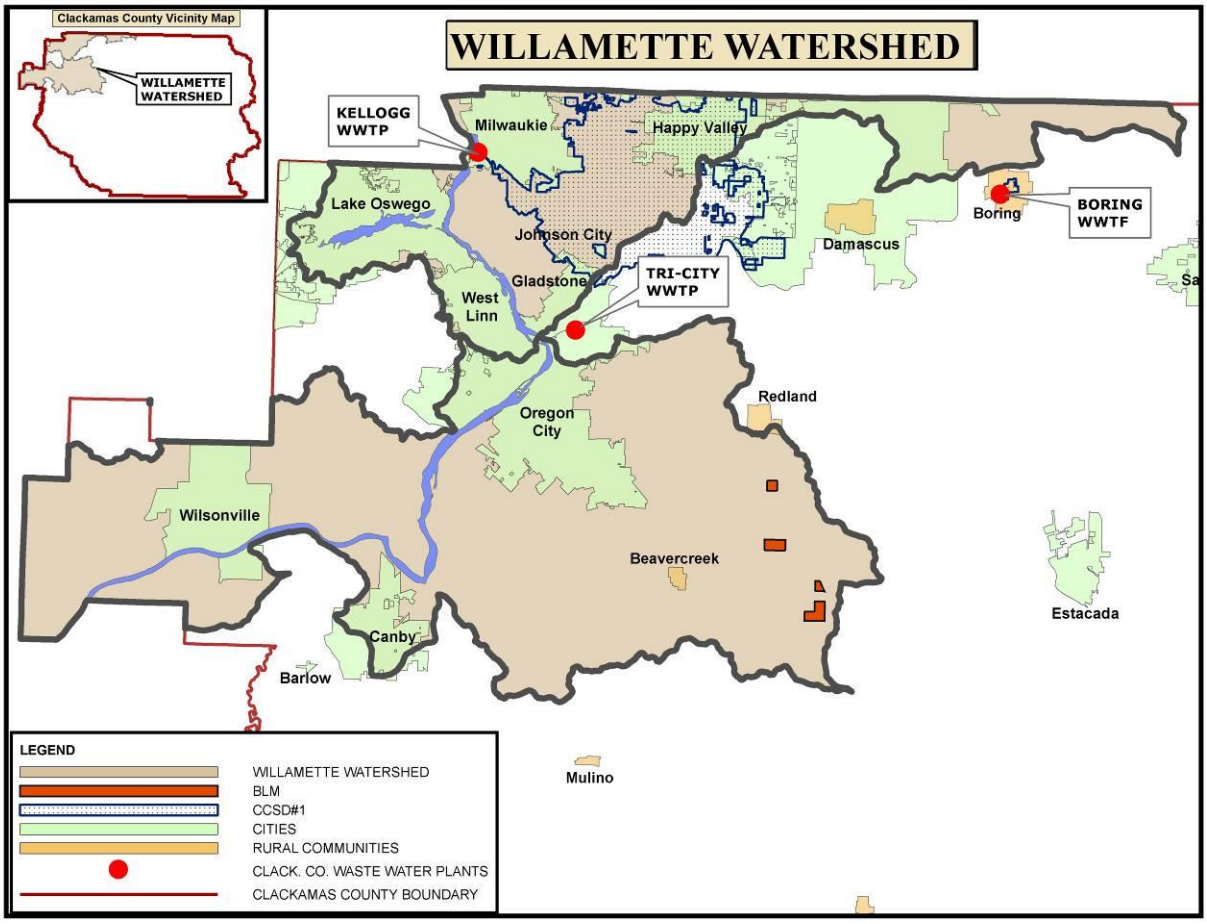

Figure 2. Jurisdictional Areas of Willamette TMDL Implementation Plan (Clackamas River watershed is not shown)

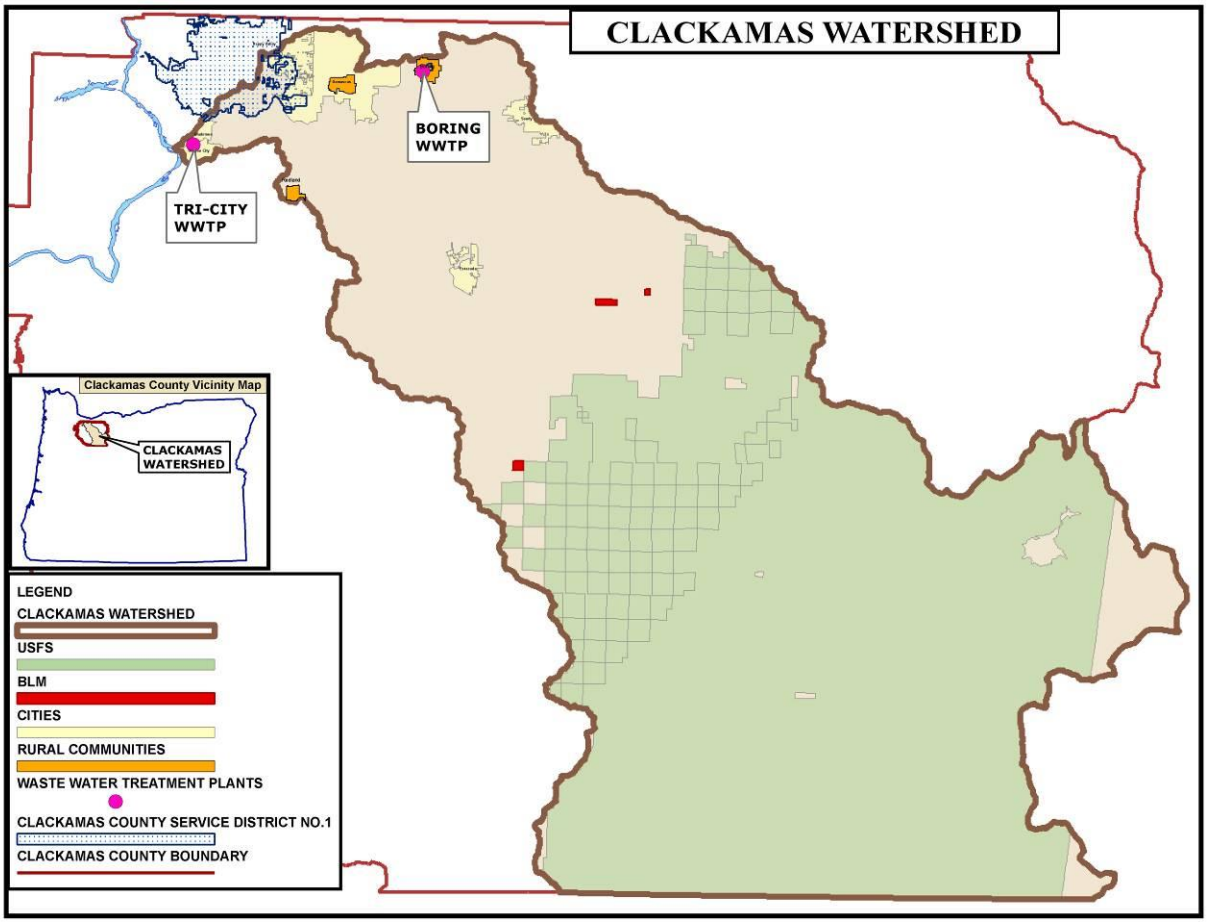

Figure 3. Jurisdictional Areas of the Clackamas Watershed

5. Management Strategies for Water Quality Programs and Activities

Clackamas County, WES and the City of Happy Valley employ Management Strategies to improve and protect water quality and overall watershed health. Management Strategies that are implemented or planned for implementation to address non-point sources of TMDL pollutants in the area covered by this Implementation Plan (IP) include:

7.1 Watershed Action Plans (WAPs). Note that the current version of the IP was updated most recently in 2011, and this management strategy is expected to be removed when the IP is updated again in the future.
7.2 Stormwater Regulations
7.3 Water quality monitoring
7.4 Industrial/Commercial stormwater maintenance program
7.5 Other development-related and watershed protection regulations
7.6 Erosion prevention and sediment control
7.7 Public involvement and education
7.8 Pet waste management
7.9 Septic system management
7.10 Illegal dumping management
7.11 Dead animal management
7.12 Spill response and Illicit Discharge, Detection, and Elimination Program (IDDE)
7.13 Riparian assessment and management
7.14 Cold Water Refugia assessment and management

See Appendix A for data and information about the implementation of these Management Strategies in 2021-22.

7. Review and Revision of Plan

According to OAR 340-042-0080(4)(a)(C), Clackamas County, the City of Happy Valley, and WES shall "Provide for… periodic review and revision of the implementation plan." We will review and revise the Implementation Plan on an as-needed basis. This Implementation Plan may be reviewed and, if we deem it necessary, revised at other times if we learn that one or more cost-effective modifications to the Implementation Plan can be made which, if implemented, will result in attainment, or significant progress towards attainment, of one or more LA.

The revised mercury TMDL was finalized in Feb. 2021, and our updated IP, which incorporates the appropriate elements such as the new LA from this revised TMDL, was submitted to DEQ on Sept. 2, 2022.

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APPENDIX A

2021-22 WILLAMETTE RIVER BASIN TMDL IMPLEMENTATION OF MANAGEMENT STRATEGIES

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2021-22 Willamette River Watershed TMDL Annual Report

Row No.	Watershed	Pollutant	Management Strategy No.	Management Strategy	Jurisdiction	Geog. Area	Management Strategy Description	Measureable Milestone	2021-22 Progress Update
1	Willamette	Bacteria Temperature Mercury DDT/Dieldrin (apply to Johnson Creek only)	1	Watershed Action Plans	WES	Urbanized, unincorporated areas within the CCSD#1 and the City of Happy Valley	Address improvements through implementation of existing Johnson Creek WAP and through the Johnson Creek Watershed Council Assess / improve watershed health using the existing WAPs for Rock Creek and Kellogg-Mt. Scott Creek Coordinate with Clackamas County and City of Happy Valley Develop capital projects and programmatic measures to improve overall watershed health Identify limiting factors and prioritize recommendations for watershed health and stormwater management activities	Use WAP to develop prioritized watershed health recommendations, capital projects and programmatic and policy measures	WES is implementing surface water management activities described in the TMDL Implementation Plan (IP) and in our MS4 Permit SWMPs. Note that the current version of the IP was updated most recently in 2011. This management strategy was removed from the revised TMDL IP we submitted to DEQ on Sept. 2, 2022 WES works with, supports financially, and provides resources to the **Johnson Creek Watershed Council, the North Clackamas Watershed Council, and the Clackamas River Basin Council**. WES funds councils through RiverHealth Stewardship Program grants to remove invasive plants, restore riparian areas with planting, and conduct watershed health education with grant funds.
2	Willamette	Bacteria Mercury DDT/Dieldrin (apply to Johnson Creek only)	2	Stormwater Regulations	DTD Happy Valley WES	Outside of CCSD#1 and UGB Within City of Happy Valley Within CCSD#1 and UGB	This Management Strategy includes the planning procedures for developing, implementing, and enforcing controls to reduce the discharge of TMDL parameters from storm sewers, which collect stormwater runoff from areas that have been significantly developed or redeveloped. These post-construction controls are applied to: a) development on private property, and b) Clackamas County and WES--funded capital improvement projects (CIPs), including road and building construction projects. Specifically, all new / redevelopment construction projects must infiltrate runoff. This affects projects that apply stormwater treatment technologies (WES Stormwater Rules and City of Happy Valley codes) and projects for Right of Way maintenance (Clackamas County Roadway Standards).	• # of permit applications for new / redevelopment sites • Types of stormwater management measures implemented for development sites in three geographic areas	**DTD** Maintenance and capital projects are performed in compliance with the most recent version of the ODOT Routine Road Maintenance Water Quality and Habitat Guide in addition to other environmental permits, regulations and codes. The Clackamas County Roadway Standards adopt by reference, with minor provisions, the WES Rules and Stormwater Standards that are being updated and expected to be adopted in 2023. DTD's Development Review group issued 48 development permits in the Willamette Basin. **City of Happy Valley** • Happy Valley issued no Environmental Review Permits. • None of them encroached into a Habitat Conservation Area or included HCA mitigation. • Happy Valley permitted 368 new/redevelopment sites in the City. **WES** 223 Permits within CCSD#1 and UGB included flow control, water quality & infiltration stormwater management measures. These storm sewer systems mostly discharge directly into the MS4 storm system and WES does not track the point of discharge for each project. Therefore, we cannot divide the permits into non-point source and point source categories. Upon DEQ's request, WES will provide the number of non-point source permits if feasible. **Types of stormwater management measures implemented for development sites in the three geographic areas:** Where Stormwater Standards, Roadway Standards and/or County Code dictates, the new and redevelopment sites, that DTD approve, employ flow control, water quality, and water filtration stormwater management measures.

Row No.	Watershed	Pollutant	Management Strategy No.	Management Strategy	Jurisdiction	Geog. Area	Management Strategy Description	Measureable Milestone	2021-22 Progress Update
3	Willamette	Bacteria Temperature Mercury DDT/Dieldrin (apply to Johnson Creek only)	3	Water Quality Monitoring	WES	NA	WES conducts water quality monitoring WES supports USGS-owned and WES-owned continuous surface / stormwater monitoring stations	Not applicable	For **E. coli** and **water temperature**, creek water quality monitoring results from 8 monitoring locations in the Willamette NPS TMDL area are in the WES-Happy Valley-Rivergrove MS4 Permit Annual Report for 2021-22. Please see this report to view this data. For **mercury**, samples of non-point source stormwater runoff from WES' SWM service area and from other locations in Clackamas County in this TMDL's geographic area have not been analyzed for mercury, to the best of our knowledge. However, one MS4-permitted storm sewer system outfall in the portion of the WES SWM service area in the Willamette TMDL area was monitored for mercury by WES during storms on April 9, 2014, September 23, 2014, and March 11, 2015. This water quality data was submitted to DEQ. For **continuous surface water monitoring stations**, WES: 1) contributes money towards the operation of the USGS-owned network of continuous surface water monitoring stations in the Johnson Creek and Clackamas River watersheds, and water temperature is a pollutant which is measured by this network; this USGS data can be viewed on USGS' website, and 2) owns four continuous creek water monitoring stations in the Clackamas (97015)-Happy Valley-Milwaukie area which measure water temperature; this data is available for review upon request. For **DDT/dieldrin in Johnson Creek's watershed**, the MS4 permit issued to Clackamas County, the City of Happy Valley, and WES in 2012 included a requirement to conduct or contribute to a stormwater characterization monitoring or instream pesticide monitoring project/task during the term of the permit. The monitoring work, which was funded and implemented through a partnership between Clackamas County MS4 Permit holders and the USGS, has been completed. The study's scientific journal article was published in May 2016. During this study, samples of water were collected from fifteen creeks and five storm sewer system outfalls during storms in September 2013. The water samples were analyzed for the presence of selected pesticides. Creek bed sediment samples were also collected from the same 15 streams during low flow conditions in August and September 2013. These sediment samples were then analyzed for the presence of selected pesticides. In total, samples were tested for 86 pesticide compounds in water and 118 pesticide compounds in sediment. Although none of this study's monitoring sites are within the Johnson Creek watershed, DDD and DDE (DDT break-down products) were detected in water and sediments at some of the sites which were monitored. It is possible that this newly collected DDD/DDE data can be used to inform the efforts to reduce the levels of DDT and dieldrin in the waters of Johnson Creek. The MS4 Permit was renewed in Oct. 2021, but this permit's pesticide monitoring requirements are expected to be modified in the near future by DEQ, which is why we mention the previous permit's pesticide monitoring work here.
4	Willamette	Bacteria Mercury DDT/Dieldrin apply to Johnson Creek Only	4	Industrial/Commercial Stormwater Maintenance Program	WES DTD	Within the WES SWM Service Area Outside the WES SWM Service Area	WES has written maintenance agreement with many owners of properties that have been developed or significantly redeveloped since 1997 for multi-family residential, commercial, industrial, and religious purposes. These agreements obligate the property's owners to clean and maintain their storm sewer system. While most of these properties discharge stormwater to the MS4 or drywells, some properties with these maintenance agreements discharge stormwater directly to Waters of the State through private	• # of annual letters sent to property owners in NSFRMAP program • # of annual reports received from NSFRMAP property owners	**Inside the WES SWM Service Area:** WES sent over 150 letters (some were duplicates due to shared sites and multiple agreements) and emails to property owners in NSFRMAP program and received 59 annual reports in calendar year 2021. Note that this is a total for WES' SWM service area and only some of these properties are non-point sources of pollution; many of these properties discharge to an MS4 or to stormwater injection systems (i.e. drywells). **(John)** **Outside the WES SWM Service Area:** Clackamas County did not receive complaints that required the County to contact DEQ requesting their support for impaired stormwater quality or become aware of impaired stormwater flow. **(Andrew)**

Row No.	Watershed	Pollutant	Management Strategy No.	Management Strategy	Jurisdiction	Geog. Area	Management Strategy Description	Measureable Milestone	2021-22 Progress Update
							storm sewer systems; these are the only properties enrolled in the Non-single Family Residential Maintenance Agreement Program (NSFRMAP) which are addressed by our Willamette TMDL Implementation Plan. Agreements under the NSFRMAP are exceptional, for they provide WES with some authority to compel owners of properties with agreements to provide some maintenance and cleaning work in privately-owned storm sewer systems that discharge directly to Waters of the State. Letters which are sent inform the property's owner that, according to their agreement: 1) storm sewer system maintenance and cleaning work may need to be performed soon, and 2) annual reports summarizing this work need to be submitted to WES. For facilities that are not within CCSD #1 UGB and which do not discharge into Clackamas County's MS4, Clackamas County staff will contact the DEQ and request their support if a complaint is received about impaired stormwater quality, or if in some other manner, Clackamas County becomes aware of impaired stormwater flowing off of one of these facilities.		
5	Willamette	Temperature	5	Other Development-Related & Watershed Protection Regulations	DTD Happy Valley WES	Unincorporated land inside UGB including OLSD, and unincorporated land outside UGB City of Happy Valley CCSD#1	This management strategy is a compilation of many watershed protection regulations, which protect rivers, creeks, wetlands, and their riparian areas. They include the following: **DTD** • Habitat Conservation Dist., Metro Title 13 (Goal 5) / ZDO 706 • Streamside Buffer Area, Metro Title 3 • Streamside Buffer Area, ZDO 1002 (Wetland) • Streamside Buffer Area, ZDO 709 (Wetland)	**DTD** • # of approved Building/Development Permits with riparian area buffers or setbacks • # of acreage of HCAs protected, mitigated or restored • # of approved Building Permits with ZDO 703 review • # of approved Building Permits with wetland riparian buffers • Qualitative assessment through interviews with staff	**DTD** DTD approved **53** Building/Development Permits with riparian area buffers or setbacks for new / redevelopment sites **outside of CCSD#1 and UGB.** They included: • No Metro Title 3 (Streamside Buffer Area) land use actions were allowed under ZDO 709 • **21** land use actions approved, protecting or requiring mitigation in 13.93 acres of Habitat Conservation Areas under Metro Title 13 (Goal 5) • **14** land use actions approved under Willamette River Greenway (ZDO 705) • Under River and Stream Conservation Area (ZDO 704), **4** land use actions approved • **14** land use actions approved under Floodplain Management District (ZDO 703) • DTD did not approve any land use action under Wetland Provisions of ZDO 1002 and 709 • No proposals came before the Board of County Commissioners to protect riparian areas with a tree ordinance for urban areas of Clackamas County

Row No.	Watershed	Pollutant	Management Strategy No.	Management Strategy	Jurisdiction	Geog. Area	Management Strategy Description	Measureable Milestone	2021-22 Progress Update
							• Streamside Buffer Area, ZDO 703 (Floodplain Management District) • Streamside Buffer Area, ZDO 704 (River and Stream Conservation) • Streamside Buffer Area, ZDO 1002 (Wetland) • Streamside Buffer Area, ZDO 709 (Wetland) • Streamside Buffer Area, Metro Title 3 • Streamside Buffer Area, ZDO 705 (Willa. River Greenway) **Happy Valley** • Habitat Conservation Dist., Metro Title 13 (Goal 5) • Tree Ordinance, Happy Valley's 16.20.090(F) • Streamside Buffer Area, Metro Title 3	**Happy Valley** • #/acreage of HCAs protected, mitigated or restored under Habitat Conservation Dist., Metro Title 13 (Goal 5) • # of trees removed / planted under Tree Ordinance, Happy Valley's 16.20.090(F) • # of approved Building/Development Permits through Streamside Buffer Area, Metro Title 3 **WES** • # of approved Building/Development Permits	**Happy Valley** • 0 acres of HCA protected, mitigated or restored in Habitat Conservation Districts, Metro Title 13 (Goal 5) • 1,855 trees removed / 2,079 trees planted under Tree Ordinance, Happy Valley's 16.20.090(F) • There were no Environmental Review Permits issued for encroachments into the Habitat Conservation Area • There were 13 violations to Happy Valley's HCA's and Tree Ordinance that required code enforcement • There were no approved Building/Development Permits through Streamside Buffer Area, Metro Title 3 **WES** • 223 Permits
6	Willamette	Mercury DDT/Dieldrin (apply to Johnson Creek only)	6	Erosion prevention and sediment control	DTD	Outside CCSD#1 within UGB (not Gladstone) Unincorporated Outside CCSD#1 / UGB	Non 1200-C Permit Construction Sites 1200-CA Permit for County-funded Construction Projects ODOT Road Maintenance (1200-CA) / WQ / Habitat Guide	• # of permits issued • # of erosion/sediment control inspections performed • # of erosion/sediment control enforcement actions taken • # of erosion/sediment control educ./outreach activities provided	**DTD - Non 1200-C Permit Construction Sites** • 45 erosion control permits issued • 112 erosion control inspections performed • 14 enforcement actions taken In the past, DTD's reporting on ERCO was Grading Permit information (permits, inspections, et-cetera). In addition, every project, which requires a Construction Management Plan from the Planning Division, receives an Erosion Control review by Development Engineering. Development Engineering will then issue a Driveway Permit and the inspector will keep an eye out for any egregious ESC issues/violations. In the case of an egregious violation and/or a complaint from a citizen, if the permittee will not bring ESC into compliance, Development Engineering staff will shut the project down and require that an SC Erosion Control permit be acquired with subsequent plan review and inspections.

Row No.	Watershed	Pollutant	Management Strategy No.	Management Strategy	Jurisdiction	Geog. Area	Management Strategy Description	Measureable Milestone	2021-22 Progress Update
					Happy Valley	Within City of Happy Valley	**City of Happy Valley** 1200-C Permit Construction Site Permit for > = 800 Sq. Ft.		DTD's comprehensive and county-wide ESC permitting, inspection and enforcement program will be implemented, as required, by 2025. **DTD - 1200-CA Permit for County-funded Construction Projects** Five (5) DTD projects were 1200-CA permitted construction projects. All five projects had full time inspectors assigned to them and erosion control was part of daily, routine inspection performed by certified inspection staff throughout the life of the project(s). To ensure proper monitoring of the 1200-CA permit-approved projects, DTD CIP and Development inspection staff maintain certifications in one or both of the ODOT Environmental Construction Inspector and the NWETC Certified Erosion and Sediment Control Lead Training and receive ongoing training in APWA trainings and seminars where erosion control courses are offered. **DTD - ODOT Road Maintenance (1200-CA) / WQ / Habitat Guide** This management strategy's measurable milestones do not apply to the soil-disturbing work which DTD's Transportation Maintenance Division conducts. Transportation Maintenance Division staff install, maintain, and inspect erosion control materials as part of their daily maintenance activities and have credentials covering erosion control. - - - - **City of Happy Valley** • 368 erosion/sediment control inspections permits issued • 1,322 erosion/sediment control inspections performed • Ten erosion/sediment control enforcement actions performed. Three resulted in fines. • No erosion/sediment control outreach activities provided outside WES - - - -
					WES	Outside CCSD#1 within UGB (not Gladstone) Within CCSD#1 (Gladstone too, not Happy Valley)	**WES** 1200-C Permit Construction Sites NPDES 1200-C Permit for > one acre Permit for > = 800 Sq. Ft. Tech. assistance for Projects with Soil Disturbance waivers		- - - - **WES - 1200-C Permit Construction Sites** WES no longer issues 1200-C permits **WES (including Gladstone), NPDES 1200-C Permit for projects great than one acre, Permits for projects greater than or equal to 800 Sq. Ft., and Tech. assistance for Permits with Soil Disturbance Waivers** • 1 erosion/sediment control permits issued under ERCO program administered for Gladstone • 223 erosion / sediment permits issued • 1,742 erosion control inspection performed • Staff educates property owners/developers on ERCO requirements and addresses questions during planning and inspection stages and provides ERCO materials at planning/inspections as needed • 1 erosion control corrective actions (aka. enforcement) without fines imposed • No technical assistance provided for projects exempt from soil disturbance requirements
7	Willamette	Bacteria	7	Public Involvement and Education	DTD Happy Valley County Parks	Dog Services Parks in City of Happy Valley Barton, Hebb, Eagle Fern, Carver Boat Ramp, Metzler Parks	**DTD, Happy Valley, and County Parks** Pet Waste Disposal	• # of CED referrals for improper pet waste disposal • # of attendees at WES sponsored / project-related events • # of brochures printed / distributed per year	**Number of Code Enforcement Referrals for Improper Pet Waste Disposal** Neither **DTD** nor **County Parks** referred any incidents to Code Enforcement relating to improper pet waste. - - - -

Row No.	Watershed	Pollutant	Management Strategy No.	Management Strategy	Jurisdiction	Geog. Area	Management Strategy Description	Measureable Milestone	2021-22 Progress Update
						and Stone Creek Golf Club		• # of pet waste bags taken from dispensers each year • # of requests for speakers or surveys taken, give-away requests or for more info • Erosion control educ. / outreach implemented each year	**Number of Attendees at WES-sponsored Project-related Events, Erosion Control Education and Outreach Implemented, and Educational Opportunities to School-age Children** WES managed, funded and sponsored riparian events that stabilized banks to prevent erosion, widening and protect property, that provided shade to prevent streams from heating, that provided large wood recruitment in the future, that removed pollutants (including bacteria) from runoff that flows across the surface before it reaches the stream, that provided wildlife habitat, and that provided food for insects, birds, and others. **WES provided watershed health education for school-age children, as well as pre-school age and adults** WES provided **watershed health education** for school-age children, as well as pre-school age and adults, through contracts with the Lower Columbia Estuary Partnership and with the Clackamas Community College Environmental Learning Center. **The Lower Columbia Estuary Partnership and Clackamas River Basin Council** • Provided elementary school watershed health education lessons and field trips to 231 students in 30 classes. Topics included trout dissection, detritovores, native plants, watersheds floor map, and a service learning field trip to remove invasive vegetation • Provided high school level watershed health education lessons and field trips to 138 students in six classes. Topics included macroinvertebrates and their collection, invasive species removal, using iNaturalist, and the Clackamas 360 Virtual Tour. • Included links to STEM career videos produced previously and updated set of learning questions to accompany the career videos • Funded canoe paddles for 231 4th and 5th grade NCSD students in 10 elementary school classrooms **Lower Columbia Estuary Partnership** • The Estuary Partnership developed a new assessment protocol working with an Associate Professor of Psychology at Pacific University, surveyed 8 classrooms (112 students) and assessed student knowledge before and after the lessons. • The Estuary Partnership also employed a North Clackamas School District teacher who was on leave. This teacher's work created new, district level partnerships that will benefit our upcoming Watershed Health Education Support work, including embedding the Watershed Health lessons into the 4th grade curriculum. Any 4th grade teacher in the district can now access the lessons electronically. **Clackamas Community College's Environmental Learning Center** • Implemented field trips to elementary age students • Provided livestream sessions to pre-school age children • Rolled out a water industry career exploration program for high school students, a community Wildlife & Water Friendly Gardens workshop series • Developed and implemented vegetated stormwater facility maintenance program to landscape & public works professionals Together the three partnerships and their programs served 450 students on field trips, generated over 2,000 livestreams of career sessions that 99 students attended and over 800 views of workshops of a vegetated stormwater facility maintenance class that 29 students had attended the class. - - - -
					WES	CCSD#1	**WES** Provide educational opportunities to school-age children Website updates to pick up dog waste Media campaigns Watershed signs Report septic system failures / how to report failures; Clack CO Quarterly and County Fair Presentations Partnership with Clackamas County Soil and Water Conservation District		

Row No.	Watershed	Pollutant	Management Strategy No.	Management Strategy	Jurisdiction	Geog. Area	Management Strategy Description	Measureable Milestone	2021-22 Progress Update
									No additional Pet Waste Brochures Printed / brochures distributed in addition to book markers and pet waste bags at WES-sponsored events At WES-sponsored events held throughout the stormwater management service area, **WES** distributed hundreds of the 4000 book markers printed in 2021 to prevent pet waste from reaching rivers and streams, including hundreds of pet waste bags and *There Is No Poop Fairy* and *Please Clean Up After Your Pet* brochures. DTD's media and printed materials relating to **septage system failures** are addressed in Septic System Management. - - - - **More than 6,000 Pet Waste Bags Taken From Dispensers** • **County Parks** dispensed 6,000 pet-waste bags: 1,500 at Barton Area including Carver Park, 500 at Hebb Park, 1,000 at Feyrer Area, 1,800 at Metzler Area including Eagle Fern Park, and 1,200 at Stone Creek Golf Club • **City of Happy Valley** provides pet waste bags at several locations throughout its parks as well as partnering with home owner associations to provide pet waste bags at private neighborhood parks. However, the City does not currently track the number of pet waste bags dispensed at City parks or within private neighborhood parks. - - - - **Website Hits** **WES** received a total of 207 web hits addressing pet waste and disposal. WES' **educational web page** includes **"reasons to scoop"** with explanations about animal waste containing harmful organisms that can hard wildlife and humans and the environment. Included the article "**Clean up after your pets**." **3 Pet-Waste Facebook articles** • **April 24, 2022**: Pick up pet waste to prevent it from reaching waterways in stormwater runoff. **3,189 impressions and 51 engagements** • **Nov. 23, 2021**: Clean up after pets prevents pet waste from reaching river and streams in runoff and protects environment and aquatic life. **4,281 impressions and 163 engagements** • **Sept. 5, 2021**: Picking up Pet Waste to prevent it from being carried by stormwater runoff into local waterways. **6,223 impressions and 173 engagements.** - - - - **Watershed signs** are located in Johnson Creek, Clackamas River, and the Kellogg Creek watershed in places where County-owned/maintained roads cross creeks and rivers. WES is working with the **City of Happy Valley Department of Public Works** to update and replace signage in the Clackamas River watershed within the City limits; new signs were designed and will be installed in 2022-23.
8	Willamette	Mercury DDT/Dieldrin apply to Johnson Creek Only	7	Public Involvement and Education	DTD	Clack CO Quarterly Within Willamette River Watershed excluding WES and Happy Valley	**DTD** Report septic system failures / how to report failures; Clack CO Quarterly	• # of attendees at WES sponsored / project-related events • # of brochures printed / distributed per year • # of pet waste bags taken from dispensers each year	**DTD** DTD's soil scientists distribute these brochures at the County's Permit lobby: • 5 Things You Should Ask Before Buying a Home With a Septic System (2,000 printed in February 2015) • Septic System Maintenance: A Clackamas County guide to the proper care and maintenance of your onsite wastewater treatment system (3,000 printed in May 2015) • Do your Part – Be Septic Smart: A Clackamas County Homeowner's Guide to Septic Systems (new print run in 2020)

Row No.	Watershed	Pollutant	Management Strategy No.	Management Strategy	Jurisdiction	Geog. Area	Management Strategy Description	Measureable Milestone	2021-22 Progress Update
								• # of requests for speakers or surveys taken, give-away requests or for more info • Erosion control educ. / outreach implemented each year	• Financial Assistance For Septic System Owners in the Clackamas Watershed: A properly functioning septic system can save you money and help protect our water quality (no new print run) • "Why Do Septic Systems Fail?": A 2-page informative article, published by the Oregon State University Extension Service (unspecified quantity printed in 2022) - - - - **City of Happy Valley** There were no requests speakers for surveys taken, give-away requests or for more information. - - - - **WES** The **RiverHealth Stewardship Program** provided grant of $29,831 to Johnson Creek Watershed Council to engage volunteers and students in stewardship and educational activities, including a watershed-wide planting event, a creek cleanup, a Science in the Park event, and a hybrid service learning/nature walk for students. The hybrid event included a guided tour of the Luther Road restoration project and trash pickup at the site. They also conducted weed control and planting on eight private properties through their CreekCare program. - - - - **Watershed signs** are located in Johnson Creek, Clackamas River, and the Kellogg Creek watershed in places where County-owned/maintained roads cross creeks and rivers. WES is working with the **City of Happy Valley Department of Public Works** to update and replace signage in the Clackamas River watershed within the City limits; new signs were designed and will be installed in 2022-23. - - - - **Number of Attendees at WES-sponsored Project-related Events, Erosion Control Education and Outreach Implemented, and Educational Opportunities to School-age Children** See Public Education and Outreach response for Bacteria in Row 7. - - - - **Encouraged Citizens to Take Unused Amounts of Hazardous Wastes including Pesticide Products for Disposal** • While there were no requests for speakers or surveys taken specific to WES' service area of the Willamette basin, WES provided information on social media and printed medium that had great readership county-wide and engaged the readers to share and like the articles. The information encouraged citizens to take unused amounts of hazardous wastes including pesticide products for disposal. In addition, WES distributed brochures on proper disposal of mercury to dental offices within our district. **Outreach for avoidance of pesticide, fertilizer and other use of harmful chemicals** • Teamed with regional partners to put messaging on KPTV regarding avoidance of pesticide, fertilizer and other use of harmful chemicals under the campaign titled ***Clean Water: It's Our Future***. • Campaign results include 13,305,998 total impressions, which are the number of times content was displayed:
					Happy Valley	Within City of Happy Valley	**City of Happy Valley** Metro Household Hazardous Waste Facility		
					WES	CCSD#1	**WES** Provide educational opportunities to school-age children Website updates to naturescape yard to increase infiltration Watershed signs River Health Advisory Board (RHAB) Metro Household Hazardous Waste Facility Fact Sheet on Mercury/DDT/Dieldrin Partnership with Clackamas County Soil and Water Conservation District Clackamas County Fair Presentations		

Row No.	Watershed	Pollutant	Management Strategy No.	Management Strategy	Jurisdiction	Geog. Area	Management Strategy Description	Measureable Milestone	2021-22 Progress Update
									<table><tr><td>Total TV Messages</td><td>583</td></tr><tr><td>TV impressions</td><td>10,812,080</td></tr><tr><td>KPTV.com banner ad impressions</td><td>2,400,513</td></tr><tr><td>KPTV.com banner ad clicks</td><td>2,163</td></tr><tr><td>KPTV.com Water page views</td><td>3,191</td></tr><tr><td>Facebook impressions</td><td>93,405</td></tr><tr><td>Facebook clicks</td><td>1,464</td></tr><tr><td>Facebook video views</td><td>5,856</td></tr></table> **Facebook, WES Newsletter and MyClackCo Magazine Articles** • **Facebook article, June 2022:** Pesticide Tips (proper use tips to prevent discharges of pesticides, herbicides and fertilizer when doing yard work). **863 views** • **Facebook article, February 2022 -** How to prevent spills and leaks (including pesticides and fertilizers**) 2,089 views** • **WES Newsletter article, January 2022 -** How to Prevent Spills (including pesticides, herbicides, fertilizer) **1,086 views** • **WES Newsletter article, July 2021** Preventing and Cleaning up Spills and Leaks to protect our water ((including pesticides, herbicides, fertilizer) **994 views** • **MyClackCo Magazine article, Spring 2022 -** You Can Prevent Water Pollution (addresses pesticides, herbicides, fertilizers**) Circulation 180,000** **Website updates addressing watershed health including soil erosion** • **Website article**: Spills and Leaks (Pesticides, Fertilizers - how to prevent contaminating waterways) **93 Views** • **Website article**: Looking to Hire a Landscape Maintenance Service? (Addresses tips to prevent misuse of fertilizer, pesticides, herbicides) **51 Views** • **Website article:** Lawn Care Tips to Help Protect Our Water (includes extensive information about pesticides. Also includes insecticides and fertilizer) **161 Views** • Parting with Pesticides Pledge Program for the Clackamas Watershed, **987 views** • Landscape Maintenance tips to prevent pollutants, **51 views** • Backyard Habitat Certification Program, **101 views** • Education page, **302 views** • Erosion Education, **555 views** • Watershed health, **1,039 views**
9	Willamette	Temperature	7	Public Involvement and Education	WES	CCSD#1	Provide educ. Opportunities to school-age children Website updates to reduce Non-Point Source Pollution Watershed signs River Health Advisory Board (RHAB) Clack CO Quarterly Clackamas County Fair Presentations Partnerships with JCWC, SOLV, Overland Neighborhood Association	• # of attendees at WES sponsored / project-related events • # of brochures printed / distributed per year • # of pet waste bags taken from dispensers each year • # of requests for speakers or surveys taken, give-away requests or for more info • Erosion control educ. / outreach implemented each year	**Number of Attendees at WES-sponsored Project-related Events, Riparian Education and Outreach Implemented, and Educational Opportunities for School-age Children** WES provided **watershed health education** for school-age children, as well as pre-school age and adults, through contracts with the Lower Columbia Estuary Partnership and with the Clackamas Community College Environmental Learning Center. For more detail, see Public Education and Outreach for Bacteria in Row 7. **Managed, Funded or Sponsored Volunteer Events** Planted trees to stabilize banks to prevent erosion, widen and protect property, and provide shade. Planting also prevents streams from heating, removes pollutants (including bacteria) from runoff that flows across the surface before it reaches the stream, protects wildlife habitat and provides food for insects, birds, and others. Results include the following: 1. Eleven of the total **35 WES Riparian planting events** included 600 volunteers who worked 1,935 hours. Volunteers planted trees, shrubs, and herbaceous vegetation; removed invasive vegetation, and learned about native and invasive plants.

Row No.	Watershed	Pollutant	Management Strategy No.	Management Strategy	Jurisdiction	Geog. Area	Management Strategy Description	Measureable Milestone	2021-22 Progress Update
							Restore riparian habitats Partnership with Clackamas County Soil and Water Conservation District		2. WES funded 67 **SOLVE cleanup events** along waterways, 54 of which were in WES' service area, that included 1,481 volunteers, 214 of whom were children under 18. SOLVE volunteers removed 11,373 lbs. of trash, including 21 tires. 3. The **WES RiverHealth Stewardship Program** awarded a total of $300,000 to manage natural areas, including managing invasive vegetation and planting riparian trees; and to engage volunteers, expand outreach to increase participation in future site restoration of erosion, and engage youth through hands-on environmental education experiences. Accomplishments include: 2021-22 RiverHealth Stewardship Program Riparian Restoration Projects No. of riparian projects: 35 Removed invasives 53.7 acres; Planted trees 1,395 Worked on riparian area 41.6 acres; Planted shrubs 11,619 Worked on streams 8,851 LF; Planted herbaceous 1,850 Recruited volunteers 602; Volunteer-hours 1,935 4. The **Coalition for Clean Rivers and Streams,** of which WES is a member, supported a video contest for middle and high school students focused on water bacteria, pollution and ways to protect rivers and streams. Video submissions were viewed over 776 times and received 64 likes and 15 comments. The Coalition's annual report contains statistics related to website analytics and social media reach. Social media activity includes posts on the Coalition's accounts (Facebook, Instagram, Twitter, Snapchat, and a YouTube account) and ads on Facebook and Instagram. 5. **North Clackamas Parks & Recreation District and its volunteers** planted 1,395 trees, 11,619 shrubs, and 1,960 herbaceous plants at 11 different locations to enhance riparian areas within the Clackamas and Willamette River basins with funding from WES. Planting occurred at the following sites: • SE 84th Ave site • Echo Valley Meadows • Hearthwood easement Last Road site • Mt Scott Creek Oak Bluff Reach • North Clackamas Park riparian area • Rock Creek Verizon site • Rose Creek Trail site • 3-Creeks Natural Area • 3-Creeks south tax lot • Rock Creek Confluence site NCPRD also implements activities to manage and establish the newly planted vegetation at these riparian sites each year. - - - - **Three website updates to reduce Non-Point Source Pollution, maintain healthy riparian areas, and implement practices that attribute to watershed health** The County's Public & Government Affairs department maintains and updates WES and DTD

Row No.	Watershed	Pollutant	Management Strategy No.	Management Strategy	Jurisdiction	Geog. Area	Management Strategy Description	Measureable Milestone	2021-22 Progress Update
									websites. Stormwater articles/brochures included the following: • **Website article: Spills and Leaks** (Pesticides, Fertilizers - how to prevent contaminating waterways) **93 Views** • **Website article: Looking to Hire a Landscape Maintenance Service?** (Addresses tips to prevent misuse of fertilizer, pesticides, herbicides) **51 Views** • **Website article: Lawn Care Tips to Help Protect Our Water** (includes extensive information about pesticides. Also includes insecticides and fertilizer) **161 Views** - - - - **Watershed signs** are located in Johnson Creek, Clackamas River, and the Kellogg Creek watershed in places where County-owned/maintained roads cross creeks and rivers. WES is working with the **City of Happy Valley Department of Public Works** to update and replace signage in the Clackamas River watershed within the City limits; new signs were designed and will be installed in 2022-23.
10	Willamette	Bacteria	8	Pet Waste Management	DTD including Dog Services WES SWM service area	Within Willamette River Watershed	There are two main elements to the pet waste management strategy: <u>Public involvement and education</u>: Under Public Involvement and Education, see Bacteria Management Strategy description for more information on this element. <u>Technical assistance and enforcement</u>: This management strategy is implemented when reports of improper pet waste management are submitted to Clackamas County's Code Enforcement department. Code Enforcement staff are the County's solid waste management experts, and they serve complainants and pet owners to find solutions which prevent the discharge of pet waste to the waterways. The County does not address all types of solid waste that animals generate (e.g., agricultural activities that generate manure). If reports of improper pet waste management in CCSD #1 UGB are submitted to WES, WES will respond and refer incidents to Code Enforcement as needed. If reports of improper pet waste management in the City of Happy Valley are submitted to the City, the City or WES will contact Code Enforcement if necessary.	• # of brochures printed / distributed per year • # of pet waste bags taken from dispensers each year • # of website hits per year	**DTD** did not refer any incidents to Code Enforcement that related to improper pet waste. ----- **Willamette Dump Stoppers Program** distributed 500 pet waste bags. ----- **<u>Pet-Waste Brochures / Book markers</u>** At WES-sponsored events held throughout the stormwater management service area, **WES** distributed hundreds of the 4000 book markers printed in 2021 to prevent pet waste from reaching rivers and streams, including hundreds of pet waste bags and *There Is No Poop Fairy* and *Please Clean Up After Your Pet* brochures. **<u>3 Pet-Waste Facebook articles</u>** • **Sept. 5, 2021**: Picking up Pet Waste to prevent it from being carried by stormwater runoff into local waterways. **6,223 impressions and 173 engagements** • **Nov. 23, 2021**: Clean up after pets prevents pet waste from reaching river and streams in runoff and protects environment and aquatic life. **4,281 impressions and 163 engagements** • **April 24, 2022**: Pick up pet waste to prevent it from reaching waterways in stormwater runoff. **3,189 impressions and 51 engagements** ----- **<u>Web Hits</u>** The County's Public & Government Affairs department, which administers the County websites, does not break down website statistics based on geographic area, it makes materials available on social media. **WES** received a total of **207 website hits** on pet waste and disposal. WES' **educational web page** includes **"reasons to scoop"** with explanations about animal waste containing harmful organisms that can hard wildlife and humans and the environment in the article "**Clean up after your pets**." Another **1,530 views** covered related activities such as pressure/car washing (210 views), storm drain cleanings (93 views), and the Water pollution-property managers guide of an erosion-sediment control training (559 views), and storm drains (668 views).

Row No.	Watershed	Pollutant	Management Strategy No.	Management Strategy	Jurisdiction	Geog. Area	Management Strategy Description	Measureable Milestone	2021-22 Progress Update
11	Willamette	Bacteria	9	Septic System Management	DTD	Wherever septic systems are located in the County	Septic systems and cesspools are a potential source of bacteria in the waters regulated by the Willamette TMDL. A system that is failing or has failed can discharge improperly treated or untreated wastewater into a surface water body. A properly functioning system discharges all of its wastewater into the earth's uppermost, unsaturated soil layers after treatment; the water then percolates down into groundwater. In addition, setback requirements are administered for subsurface sewage disposal drainfields to minimize potential impacts to surface waters.	**DTD** • # of reports of failed septic systems • Outcome of inspections (failed or not) • Date of follow-up confirming that repairs were made • # of Safety Net Loans made	**DTD** • One (1) failed septic system reported to Code Enforcement. Abated. Connected to sewer. • Connection passed inspection on 1/22/2022 • 260 septic repair permits in the Willamette Watershed (390 inspections) • 179 permits for new septic tanks in the Willamette Watershed (269 inspections) • No Safety Net Loans were granted DTD's Soils/Septic team assures all repairs have been completed prior to deeming the permit as "final" or signing off on the repair permit. DTD can provide a list of "final" dates upon DEQ request.
					WES Stormwater Service Area	NCRA	Homes with failing septic systems in the North Clackamas Revitalization Area are required to connect to WES' sanitary sewer system.	**WES** • # of septic systems that are eliminated with sanitary sewer hookup • Analysis of potential bacteria load reduction with system repair or elimination	**WES** • 18 existing residential homes located in the North Clackamas Revitalization Area were connected to WES' sanitary sewer system. • During the past 17 years, sanitary sewer service has eliminated 558 septic systems in the North Clackamas Revitalization Area. Although some of these septic systems could have potentially discharged some E. coli into a surface water body, an analysis of the potential instream E. coli load reduction which was realized by decommissioning these systems has not been conducted; upon request, however, this analysis can be conducted. Before the NCRA launched, WES estimated a 78 percent reduction based on a scenario where all NCRA properties convert.
12	Willamette	Bacteria, mercury, and DDT/Dieldrin (apply to Johnson Creek only)	10	Illegal Dumping Management	DTD	Rural Areas Community Enforcement in developed, unincorporated urbanized areas	Illegal dumping of solid waste can allow stormwater to move pollutants from the waste and into the waterways regulated by the Willamette Basin TMDL. Solid waste that may contain E. coli includes but is not limited to diapers and other waste containing fecal matter. Solid waste that may contain DDT and dieldrin includes unused quantities of these insecticides and equipment or other items contaminated with residuals of these insecticides. Solid waste that may contain mercury includes but is not limited to fluorescent light bulbs, batteries, thermometers, and electronics. County Dump Stoppers Program addresses illegal dumping of solid waste in rural areas, including the edges of road ways in these areas. County staff respond to reports of illegally dumped waste. Crews of	**DTD** • Amount of waste removed • # of enforcement actions taken for solid waste dumping • # of persons who complete the CED mediation process for solid waste dumping	**Business and Community Services' Dump Stoppers Program (**County Parks**)** removed 56,621 lbs. of solid waste throughout Clackamas County without any enforcement action and without anyone having to complete the Code Enforcement Division Mediation Process. Note that Dump Stoppers Program shuts down from January through March due to snow blocking access to higher elevation roads. In the Willamette River Watershed, no enforcement actions were taken and 1,390 lbs. of waste was removed.

Row No.	Watershed	Pollutant	Management Strategy No.	Management Strategy	Jurisdiction	Geog. Area	Management Strategy Description	Measureable Milestone	2021-22 Progress Update
							people who have been ordered to perform community service remove the garbage and properly dispose of or recycle it. County employees install “no dumping” signs, with the program’s hotline prominently displayed, in places where dumping has occurred. County employees aggressively sift through the trash in search of clues that can identify the persons who illegally dumped the waste. A Sheriff Deputy who is assigned to this program uses these clues to confirm identities of dumpers, and then tracks down, and if appropriate, cites those persons. The Clackamas County District Attorney’s office has assigned a prosecutor to this program, and it pursues the most egregious cases.		
					Happy Valley	Within the City of Happy Valley Metro Waste Facility	The City of Happy Valley uses City ordinance and DTD’s Code Enforcement uses county ordinance to curb illegal dumping. Code Enforcement and the City administer a solid waste nuisance ordinances which pertains to illegal dumping on public and private property. The ordinances are administered on a priority-rated basis, and illegal dumping that involves household garbage is a high priority for enforcement and resolution. Mediation is an additional tool that Code Enforcement and the City use to resolve certain types of solid waste issues that cause a condition of unsightliness on private property.	**City of Happy Valley** • # of enforcement actions taken for solid waste dumping • # of persons who complete the City's mediation process for solid waste dumping • Amount of waste removed	**City of Happy Valley** • One enforcement action for solid waste dumping • One person completed the City's mediation process for solid waste dumping • Waste removed is unavailable (Metro tracks this number)
13	Willamette	Bacteria	11	Dead Animal Management	DTD	County Roads	**DTD** Warm-blooded animals carry E. coli in their gastrointestinal tract. Stormwater runoff could carry E. coli from a dead, warm-blooded animals’ (deer, for example) gastrointestinal tract into surface water bodies if its carcass was laying on or adjacent to a roadway or drainage way. ODOT Road Maintenance / WQ / Habitat Guide	# of dead animals removed	**DTD** • 150 dead deer were picked up (County-wide) and hauled to a Metro landfill. 46 of the 150 deer hauled to a Metro landfill were within the Willamette drainage. Information about the removal of dead animals from other warm-blooded species is not available. • Dead animal management is performed in compliance with the current version of the ODOT Routine Road Maintenance Water Quality and Habitat Guide in addition to other environmental permits, regulations and codes.

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					Happy Valley	Within the City of Happy Valley	**City of Happy Valley** Public Works Disposes of Dead Animals at Metro South Station		**City of Happy Valley** Removed and properly disposed of 16 dead animals
14	Willamette	Bacteria Mercury DDT/Dieldrin apply to Johnson Creek Only	12	Spill Response & Illicit Discharge Elimination Programs	DTD WES	Non-MS4-regulated County Roads eligible for full County maintenance Privately owned sewer lines WES' SWM Service Area	The spillage or illicit discharge of certain substances containing TMDL parameters such as E. coli, DDT, dieldrin, and mercury can cause watershed health impairment. Potential sources of E. coli include untreated sewage releases from a privately owned sanitary sewer line due to pipe failures or improper connections. If unused quantities of DDT or dieldrin are spilled or illicitly discharged, these insecticides could flow directly (or indirectly via stormwater) into the waters of Johnson Creek. Spills and illicit discharges of DDT and dieldrin are unlikely given that their use has been banned for many years. If liquid or sludge-like materials that contain mercury are spilled or illicitly discharged, mercury could flow directly (or indirectly via stormwater) into a creek that discharges to or is a tributary of the Willamette River.	# of illicit discharges (spills are a type of illicit discharge)	**DTD** DTD responded to four (4) spills within the Willamette Watershed. The remainder of reported spills were responded to and/or cleaned up by others (Fire Department, private vendor, City employees, WES, OLWS, and others). Notifications of spills generally come from OERS and/or citizens. **WES** Responded to one illicit discharge within the Willamette Watershed that was outside the MS4 service area involving an oil spill. Resident of a Mobile Estates park reported an oil spill occurring on Nov. 4, 2021 that affected the private storm system in the park that directly discharges to the Clackamas River. Assisted the park maintenance person in investigating the system, but informed them WES had no authority to assist in cleanup. Urged them to contact the garbage truck's owners and request them to revisit the site to properly finish cleanup activities. OERS Case No. 2021-2876. Although this oil did not contain any Willamette TMDL pollutants, this was provided here to inform the reader about this type of work, which does occasionally contain TMDL pollutants (E. coli in a sewage spill, for example).

15	Willamette	Temperature	13	Riparian Area Assessment and Management	DTD
					
					County Parks
					
					WES
						Unincorporated lands in the County, but not those lands which are owned by the U.S. govt. or the State or Oregon and not those lands overseen and managed by ODF
						
						WES' SWM Service Area
							Protection and restoration of system potential vegetation and effective shade in riparian areas are the primary mechanisms for achieving load allocations for temperature.
							
							GIS-based Riparian Tree Canopy Assessment
							
							Biological surveys
							
							Assess Riparian Shade
								• Identifying and prioritizing riparian areas for restoration or protection actions
								• Work with landowners directly and via partnerships to develop on-the-ground projects to enhance/protect riparian areas
									WES -- Work with Landowners Directly and Via Partnerships to Develop On-the-ground Projects to Enhance / Protect Riparian Areas
									• Riparian restoration projects by nonprofit partners is funded with the **WES RiverHealth Stewardship Program** grants. Grantee results included:
									  ○ Riparian planting on 25 sites
									  ○ Removed 53 acres of invasive vegetation
									  ○ Planted 1,395 trees, 11,619 shrubs and 1,850 herbaceous plants in over 41 acres and 8,850 linear feet of streams
									  ○ 600 volunteers worked 1,900 hours
									• RHSP grantees also provided online watershed science lessons or field trips to 866 students and 20 public events to 168 residents. Many of these were online workshops.
									• For information on riparian partnership detail, please, refer to Public Involvement and Education in Row 9
									
									--- 	
									
									WES - Identifying and Prioritizing Riparian Areas for Restoration or Protection Actions
									Much of our riparian restoration work is accomplished through the **RiverHealth Stewardship Program,** where grantees establish a healthy riparian canopy in attempt to protect streams from temperature increases; the program consistently directs funding to organizations for riparian restoration in our portion of the Willamette River Watershed. In addition, we do some riparian restoration on our own projects, when we do stream restoration.
									
									On sites that we own, WES worked in 12 sites where we primarily managed invasive species.

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									 Business and Community Services and NCPRD - Identifying and Prioritizing Riparian Areas for Restoration or Protection Actions
									 County Parks did not implement any riparian planting projects during the reporting period in parks in the Willamette River TMDL area.
									
									 The **North Clackamas Parks & Recreation District and its volunteers** planted 1,395 trees, 11,619 shrubs, and 1,960 herbaceous plants at 11 different locations to enhance riparian areas within the Clackamas and Willamette River basins with funding from WES. Planting occurred at the following sites:
									• SE 84th Ave site
									• Echo Valley Meadows
									• Hearthwood easement Last Road site
									• Mt Scott Creek Oak Bluff Reach
									• North Clackamas Park riparian area
									• Rock Creek Verizon site
									• Rose Creek Trail site
									• 3-Creeks Natural Area
									• 3-Creeks south tax lot
									• Rock Creek Confluence site
									
									 NCPRD also implements activities to manage and establish the newly planted vegetation at these riparian sites each year.
									 ----- 	
									
									 DTD - Identifying and Prioritizing Riparian Areas for Restoration or Protection Actions
									 One project included the planting of trees and vegetation in the Willamette Basin. DTD's Boardman Creek Scour Repair Project in the Oak Lodge Water Services area removed invasives, installed 25 Willow stakes, and planted 30 Dogwood stakes.
									
									 DTD has two fish-friendly culvert replacement project planned in 2022-2023, both of which will replace undersized, failed culverts with new, fish-friendly culvert structures. Both projects will include removal of invasive species and/or planting of native riparian trees, shrubs and grasses.
									
									 ----- 	
									
									 City of Happy Valley planted over 2,000 trees and bushes
									• **Friends of Trees** planted 725 trees at Happy Valley Park (Wetlands) and **Mosaic** planted 300 trees and 1,100 bushes at Hidden Falls Nature Park
									• Removed invasive species at four locations:
									  ○ Hidden Falls Nature Park
									  ○ Happy Valley Park
									  ○ Happy Valley Library
									  ○ Mt. Scott Nature Park
									• Included 375 contracted staff hours and 10 City staff hours

16	Willamette	Temperature	14	Cold Water Refugia Assessment and Management	DTD	Main stem of Willamette River in unincorporated	Cold Water Refugia (CWR) are areas within the Willamette River that maintain cooler temperatures in late Spring, Summer, and early Autumn	Completion of a report which identifies CWR and provides options for enhancement and	In March 2020, Oregon DEQ submitted a report to the National Marine Fisheries Service which identifies cold-water refuges (CWR) for adult and juvenile salmon and steelhead migration in the lower 50 miles of the Willamette River.

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						portions of Clackamas County	when water temperature elsewhere in the river are elevated. CWR offer migrating salmonids, other native fish, and other aquatic species relief from the warmer river temperatures. Alteration to river channel structure including removal or lack of large woody debris and modifications to deep pools and overhanging bank areas can reduce the presence of CWR. Reductions in the infiltration of stormwater from some urbanized areas, which can reduce the amount of spring-fed flow in streams, can also yield increased tributary stream temperature, since a smaller water body will heat up further and faster on a hot, sunny day. Removal of trees from the riparian area of tributary streams also increases stream temperature, since less shade is thus present on hot, sunny days. Since many CWR are created at the confluence of a tributary creek with the Willamette River, these impacts can diminish the quality and size of the CWR. For this Management Strategy, Clackamas County is willing to protect and enhance cold-water refugia through voluntary actions.	protection of CWR, if appropriate.	The report satisfies a reasonable and prudent alternative to address a "jeopardy decision" from the 2015 NMFS Biological Opinion on the U.S. EPA approval of Oregon's 2003 water temperature standard to interpret the CWR narrative provision in Oregon's temperature standards for the protection of the threatened and endangered salmon and steelhead trout populations. Oregon DEQ agreed to develop the cold-water refuge report, with oversight from the U.S. EPA and NMFS, for the Willamette River's lowest 50 miles. The report also recommends that the existing cold-water refuge habitat within these 50 river miles be protected through regulatory or voluntary actions. During 2021-22, the City of Happy Valley, WES, and Clackamas County continued to support efforts to plant and maintain (i.e. control weeds) riparian area trees along creeks and rivers. When the trees grow taller, this will yield cooler water when the creek or river reaches its confluence with the lower Willamette River. These confluences are CWR. The riparian area enhancement work done by Happy Valley and WES cools the water in these water bodies: Johnson Creek, Kellogg Creek, and the Clackamas River; An example is the riparian area tree planting and tree maintenance work completed on WES-owned land along Carli Creek in the Clackamas River's watershed.