Clackamas Subbasin Agricultural Water Quality Management Area Plan

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Developed by the:

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With support from the:

Clackamas Local Advisory Committee

Clackamas Soil and Water Conservation District

oda.direct/AgWQPlans

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Acronyms and Terms Used in this Document

Ag Water Quality Program – Agricultural Water Quality Management Program
Area Plan – Agricultural Water Quality Management Area Plan
Area Rules – Agricultural Water Quality Management Area Rules
CAFO – Confined Animal Feeding Operation
CSWCD - Clackamas Soil and Water Conservation District
CRBC - Clackamas River Basin Council
CRWP - Clackamas River Water Providers
CREP - Conservation Reserve Enhancement Program
CFS - Cubic Feet Per Second
CRP - Conservation Reserve Program
CNPCP – Coastal Nonpoint Pollution Control Program
CSP - Conservation Security Program
CWA – Clean Water Act
DEQ – Oregon Department of Environmental Quality
EPA - U.S. Environmental Protection Agency
EQIP - Environmental Quality Incentives Program
FSA - USDA Farm Services Agency
FOIA - Freedom of Information Act
GWMA – Groundwater Management Area
HUC – Hydrologic Unit Code
IPM - Integrated Pest Management
LAC – Local Advisory Committee
LASAR - Laboratory Analytical Storage and Retrieval Database
LMA - Local Management Agency
Management Area – Agricultural Water Quality Management Area
MOA – Memorandum of Agreement
NPDES – National Pollution Discharge Elimination System
NRCS – Natural Resources Conservation Service
OAR – Oregon Administrative Rules
ODA – Oregon Department of Agriculture
ODFW – Oregon Department of Fish and Wildlife
Oregon Plan - Oregon Plan for Salmon and Watersheds
ORS – Oregon Revised Statute
OWEB – Oregon Watershed Enhancement Board
OWRD - Oregon Water Resources Department
PMP – Pesticides Management Plan
PSP – Pesticides Stewardship Partnership
RUSLE – Revised Universal Soil Loss Equation
SIA – Strategic Implementation Area
SWCD – Soil and Water Conservation District
T – Soil Loss Tolerance Factor
TMDL – Total Maximum Daily Load
USDA – United States Department of Agriculture
US EPA – United States Environmental Protection Agency
WHIP - Wildlife Habitat Incentives Program
WQPMT – Water Quality Pesticides Management Team
WRP - Wetlands Reserve Program
Voluntary Plan - Voluntary Water Quality Farm Plan

Foreword

This Agricultural Water Quality Management Area Plan (Area Plan) provides guidance for addressing water quality related to agricultural activities in the Agricultural Water Quality Management Area (Management Area). The Area Plan identifies strategies to prevent and control water pollution from agricultural lands through a combination of outreach programs, suggested land treatments, management activities, compliance, and monitoring.

The Area Plan is neither regulatory nor enforceable (Oregon Revised Statute (ORS) 568.912(1)). It references associated Agricultural Water Quality Management Area Rules (Area Rules), which are Oregon Administrative Rules (OARs) enforced by the Oregon Department of Agriculture (ODA).

Required Elements of Area Plans

Area Plans must describe a program to achieve the water quality goals and standards necessary to protect designated beneficial uses related to water quality as required by state and federal law (OAR 603-090-0030(1)). At a minimum, an Area Plan must:

- Describe the geographical area and physical setting of the Management Area.
- List water quality issues of concern.
- List impaired beneficial uses.
- State that the goal of the Area Plan is to prevent and control water pollution from agricultural activities and soil erosion and to achieve applicable water quality standards.
- Include water quality objectives.
- Describe pollution prevention and control measures deemed necessary by ODA to achieve the goal.
- Include an implementation schedule for measures needed to meet applicable dates established by law.
- Include guidelines for public participation.
- Describe a strategy for ensuring that the necessary measures are implemented.

Plan Content

Chapter 1: Agricultural Water Quality Management Program Purpose and Background. The purpose is to have consistent and accurate information about the Ag Water Quality Program.

Chapter 2: Local Background. Provides the local geographic, water quality, and agricultural context for the Management Area. Describes the water quality issues, Agricultural Water Quality Management Area Rules (Area Rules), and available practices to address water quality issues.

Chapter 3: Implementation Strategies. Presents goal(s), measurable objectives, timelines and strategies, to achieve these goal(s) and objectives.

Chapter 4: Implementation, Monitoring, and Adaptive Management. Summarizes land condition and water quality status and trends to assess progress toward the goals and objectives in Chapter 3.

Chapter 1: Agricultural Water Quality Management Program Purpose and Background

1.1 Purpose of Agricultural Water Quality Management Program and Applicability of Area Plans

As part of Oregon's Agricultural Water Quality Management Program (Ag Water Quality Program), the Area Plan guides landowners and partners such as Soil and Water Conservation Districts (SWCDs) in addressing local water quality issues related to agricultural activities. The Area Plan identifies strategies to prevent and control water pollution from agricultural activities and soil erosion (ORS 568.909(2)) on agricultural and rural lands within the boundaries of this Management Area (OAR 603-090-0000(3)) and to achieve and maintain water quality standards (ORS 561.191(2)). The Area Plan has been developed and revised by ODA and the LAC, with support and input from the SWCD and the Oregon Department of Environmental Quality (DEQ). The public was invited to participate in the original development and approval of the Area Plans and is invited to participate in the biennial review process. The Area Plan is implemented using a combination of outreach, conservation and management activities, compliance with Area Rules developed to implement the Area Plan, monitoring, evaluation, and adaptive management.

The provisions of the Area Plan do not establish legal requirements or prohibitions (ORS 568.912(1)). Each Area Plan is accompanied by Area Rules that describe local agricultural water quality regulatory requirements. ODA will exercise its regulatory authority for the prevention and control of water pollution from agricultural activities under the Ag Water Quality Program's general regulations (OAR 603-090-0000 to 603-090-0120) and under the Area Rules for this Management Area (OAR 603-095-1300 to 603-095-0120). The Ag Water Quality Program's general rules guide the Ag Water Quality Program, and the Area Rules for the Management Area are the regulations that landowners are required to follow. Landowners will be encouraged through outreach and education to implement conservation management activities.

The Area Plan and Area Rules apply to all agricultural activities on non-federal and non-Tribal Trust land within this Management Area, including:

- Farms and ranches.
- Rural residential properties grazing a few animals or raising crops.
- Agricultural lands that lay idle or on which management has been deferred.
- Agricultural activities in urban areas.
- Agricultural activities on land subject to the Forest Practices Act (ORS 527.610).

Water quality on federal lands in Oregon is regulated by DEQ and on Tribal Trust lands by the respective tribe, with oversight by the United States Environmental Protection Agency (US EPA)

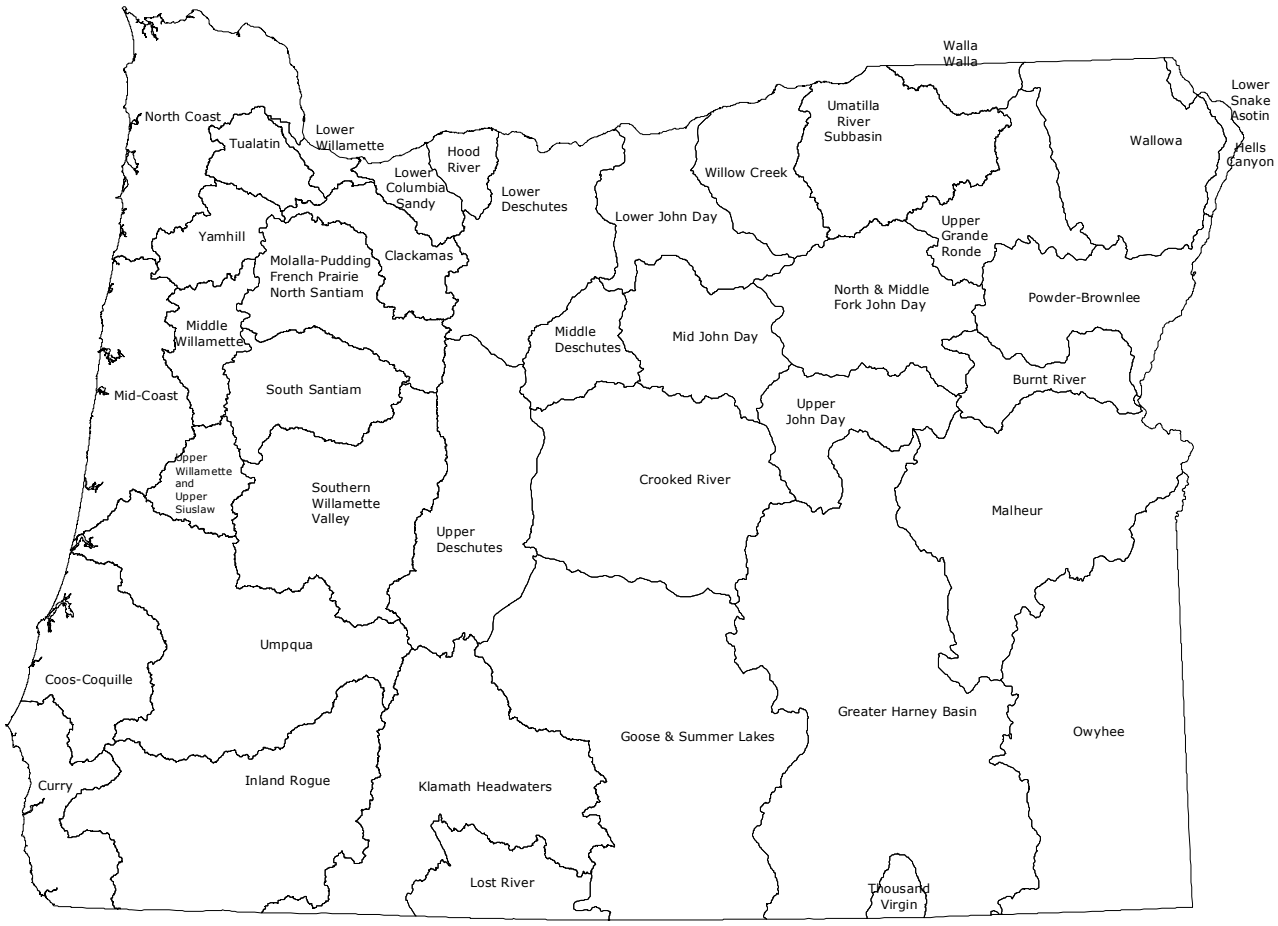
1.2 History of the Ag Water Quality Program

In 1993, the Oregon Legislature passed the Agricultural Water Quality Management Act, directing ODA to develop plans to prevent and control water pollution from agricultural activities and soil erosion, and to achieve water quality standards (ORS 568.900 through ORS 568.933). The Oregon Legislature passed additional legislation in 1995 to clarify that ODA regulates agriculture with respect to water quality (ORS 561.191). This Area Plan and Area Rules were developed and subsequently revised pursuant to these statutes.

Between 1997 and 2004, ODA worked with LACs and SWCDs to develop Area Plans and Area Rules in 38 watershed-based Management Areas across Oregon (Figure 1). Since 2004, ODA, LACs, SWCDs, and other partners have focused on implementation, including:

- Providing education, outreach, and technical assistance to landowners.
- Implementing projects to improve agricultural water quality.
- Investigating complaints of potential violations of Area Rules.
- Conducting biennial reviews of Area Plans and Area Rules.
- Monitoring, evaluation, and adaptive management.
- Developing partnerships with state, federal, and tribal agencies, watershed councils, and others.

Figure 1: Map of 38 Agricultural Water Quality Management Areas



1.3 Roles and Responsibilities

1.3.1 Oregon Department of Agriculture (ODA)

ODA is the agency responsible for implementing the Ag Water Quality Program (ORS 568.900 to 568.933, ORS 561.191, OAR 603-090, and OAR 603-095). The Ag Water Quality Program was established to develop and carry out a water quality management plan for the prevention and control of

water pollution from agricultural activities and soil erosion. State and federal laws that are drivers for establishing an Area Plan include:

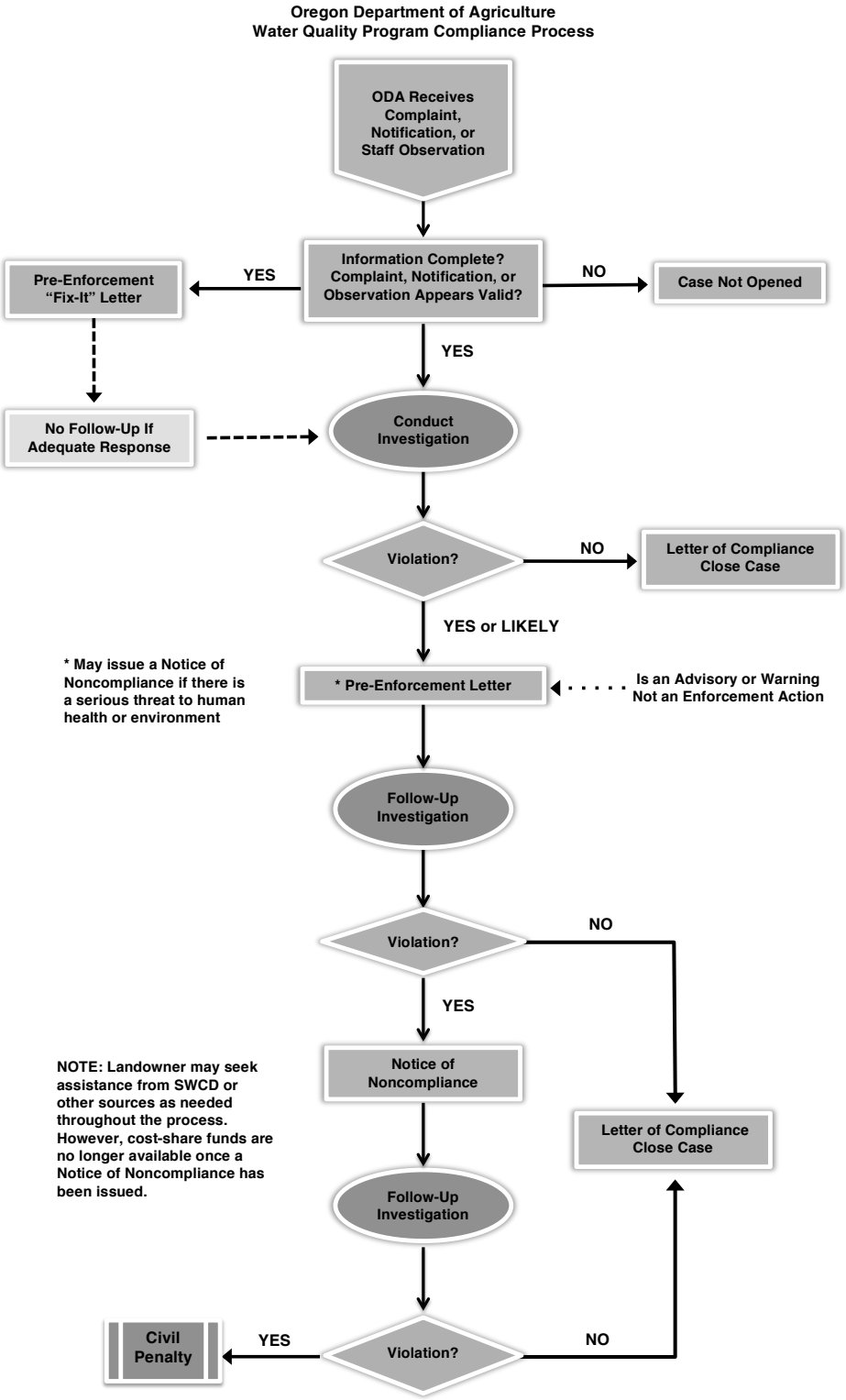
- State water quality standards.
- Load allocations for agricultural nonpoint source pollution assigned under Total Maximum Daily Loads ((Total Maximum Daily Loads) (TMDLs)) issued pursuant to the Clean Water Act (CWA), Section 303(d).
- Approved management measures for Coastal Zone Act Reauthorization Amendments (CZARA).
- Agricultural activities detailed in a Groundwater Management Area (GWMA) Action Plan (if DEQ has established a GWMA and an Action Plan has been developed).

The Oregon Department of Agriculture has the legal authority to develop and implement Area Plans and Area Rules for the prevention and control of water pollution from agricultural activities and soil erosion, where such plans are required by state or federal law (ORS 568.909 and ORS 568.912). ODA bases Area Plans and Area Rules on scientific information (ORS 568.909). ODA works in partnership with SWCDs, LACs, DEQ, and other partners to implement, evaluate, and update the Area Plans and Area Rules. ODA has responsibility for any actions related to enforcement or determination of noncompliance with rules (OAR 603-090-0080 through OAR 603-090-0120). ORS 568.912(1) and ORS 568.912(2) give ODA the authority to adopt rules that require landowners to perform actions necessary to prevent and control pollution from agricultural activities and soil erosion.

The Area Rules are a set of standards that landowners and operators must meet on all agricultural or rural lands ("Landowner" includes any landowner, land occupier, or operator per OAR 603-95-0010(24)). All landowners must comply with the Area Rules. ODA will use enforcement where appropriate and necessary to gain compliance with agricultural water quality Area Rules. Figure 2 outlines ODA's compliance process. ODA will pursue enforcement action only when reasonable attempts at voluntary solutions have failed (OAR 603-090-0000(5)(e)). If a violation is documented, ODA may issue a pre-enforcement notification or an Order such as a Notice of Noncompliance. If a Notice of Noncompliance is issued, ODA will direct the landowner or operator to remedy the condition through required corrective actions (RCAs) under the provisions of the enforcement procedures outlined in OAR 603-090-060 through OAR 603-090-120. If a landowner does not implement the RCAs, ODA may assess civil penalties for continued violation of the Area Rules. If and when other governmental policies, programs, or rules conflict with the Area Plan or associated Area Rules, ODA will consult with the appropriate agency to resolve the conflict in a reasonable manner.

Any member of the public may file a complaint, and any public agency may file a notification of a violation of an Area Rule. As a result, ODA may initiate an investigation (See Figure 2).

Figure 2: Compliance Flow Chart



1.3.2 Local Management Agency

A Local Management Agency (LMA) is an organization that ODA has designated to implement an Area Plan (OAR 603-090-0010). The Oregon legislative intent is for SWCDs to be LMAs, to the fullest extent practical, consistent with the timely and effective implementation of Area Plans (ORS 568.906). SWCDs have a long history of effectively assisting landowners to voluntarily address natural resource concerns. Currently, all LMAs in Oregon are SWCDs.

The day-to-day implementation of the Area Plan is accomplished through an Intergovernmental Grant agreement between ODA and each SWCD. Every two years, each SWCD submits a scope of work to ODA to receive funding to implement the Area Plan. Each SWCD implements the Area Plan by providing outreach and technical assistance to landowners. SWCDs also work with ODA and the LAC to establish implementation priorities, evaluate progress toward meeting Area Plan goals and objectives, and revise the Area Plan and Area Rules as needed.

1.3.3 Local Advisory Committee (LAC)

For each Management Area, the director of ODA appoints an LAC (OAR 603-090-0020) with as many as 12 members. The LAC serves in an advisory role to the director of ODA and to the Board of Agriculture. The role of the LAC is to provide a high level of citizen involvement and support in the development. Implementation, and biennial reviews of the Area Plan and Area Rules. The LAC's primary role is to provide advice and direction to ODA and the LMA on local agricultural water quality issues as well as evaluate the progress toward achieving the goals and objectives of the Area Plan. LACs are composed primarily of agricultural landowners in the Management Area and must reflect a balance of affected persons.

At the time of the biennial review, the LAC is convened, however, they may meet as frequently as necessary to carry out their responsibilities, which include but are not limited to:

- Participate in the development and subsequent revisions of the Area Plan.
- Participate in the development and subsequent revisions of the Area Rules.
- Recommend strategies necessary to achieve the goals and objectives in the Area Plan.
- Participate in biennial reviews of the progress of implementation of the Area Plan and Area Rules.
- Submit written biennial reports to the Board of Agriculture and the ODA director.

1.3.4 Agricultural Landowners

The emphasis of the Area Plan is on voluntary action by landowners to control the factors affecting water quality in the Management Area. However, each landowner in the Management Area is required to comply with the Area Rules. To achieve water quality goals or compliance, landowners may need to select and implement a suite of measures to protect water quality. The actions of each landowner will collectively contribute toward achievement of the water quality standards.

Technical assistance, and often financial assistance, is available to landowners who want to work with SWCDs (or with other local partners, such as watershed councils) to achieve land conditions that contribute to good water quality. Landowners also may also choose to improve their land conditions without assistance.

Under the Area Plan and Area Rules, agricultural landowners are not responsible for mitigating or

addressing factors that are caused by non-agricultural activities or sources, such as:

- Conditions resulting from unusual weather events.
- Hot springs, glacial melt water, extreme or unforeseen weather events, and climate change.
- Septic systems and other sources of human waste.
- Public roadways, public culverts, public roadside ditches and shoulders.
- Dams, dam removal, hydroelectric plants, and non-agricultural impoundments.
- Housing and other development in agricultural areas.
- Impacts on water quality and streamside vegetation from wildlife such as waterfowl, elk, and feral horses.
- Other circumstances not within the reasonable control of the landowner.

However, agricultural landowners may be responsible for some of these impacts under other legal authorities.

1.3.5 Public Participation

The public was encouraged to participate when ODA, LACs, and SWCDs initially developed the Area Plans and Area Rules. In each Management Area, ODA and the LAC held public information meetings, formal public comment period, and a formal public hearing. ODA and the LACs modified the Area Plan and Area Rules, Partners, stakeholders, and the general public are invited to participate in the process. as needed, to address comments received. The director of ODA adopted the Area Plans and Area Rules in consultation with the Board of Agriculture.

The Oregon Department of Agriculture, the LACs, and the SWCDs conduct biennial reviews of the Area Plans and Area Rules. Partners, stakeholders, and the general public are invited to participate in the process. Any revisions to the Area Rules will include a formal public comment period and a formal public hearing.

1.4 Agricultural Water Quality

The CWA directs states to designate beneficial uses related to water quality, decide on parameters to measure to determine whether beneficial uses are being met, and set water quality standards based on the beneficial uses and parameters.

1.4.1 Point and Nonpoint Sources of Water Pollution

There are two types of water pollution. Point source water pollution emanates from clearly identifiable discharge points or pipes. Significant point sources are required to obtain permits that specify their pollutant limits. Agricultural operations regulated as point sources include permitted Confined Animal Feeding Operations (CAFOs), and many are regulated under ODA's CAFO Program. Pesticide applications in, over, or within three feet of water also are regulated as point sources. Irrigation water flows from agricultural fields may be at a defined outlet but they do not currently require a permit.

Nonpoint water pollution originates from the general landscape and is difficult to trace to a single source. Nonpoint water pollution sources include runoff from agricultural and forest lands, urban and suburban areas, roads, and natural sources. In addition, groundwater can be polluted by nonpoint sources including agricultural amendments (fertilizers and manure).

1.4.2 Beneficial Uses and Parameters of Concern

Beneficial uses related to water quality are defined by DEQ in OARs for each basin. They may include: public and private domestic water supply, industrial water supply, irrigation, livestock watering, fish and aquatic life, wildlife and hunting, fishing, boating, water contact recreation, aesthetic quality, hydropower, and commercial navigation and transportation. The most sensitive beneficial uses usually are fish and aquatic life, water contact recreation, and public and private domestic water supply. These uses generally are the first to be impaired because they are affected at lower levels of pollution. While there may not be severe impacts on water quality from a single source or sector, the combined effects from all sources can contribute to the impairment of beneficial uses in the Management Area. Beneficial uses that have the potential to be impaired in this Management Area are summarized in Chapter 2.

Many water bodies throughout Oregon do not meet state water quality standards. Many of these waterbodies have established water quality management plans that document needed pollution reductions. The most common water quality concerns related to agricultural activities are temperature, bacteria, biological criteria, sediment and turbidity, phosphorous, algae, pH, dissolved oxygen, harmful algal blooms (HABs), nitrates, pesticides, and mercury. Water quality impairments vary by Management Area and are summarized in Chapter 2.

1.4.3 Impaired Water Bodies and Total Maximum Daily Loads (TMDLs)

Every two years, DEQ is required by the federal CWA to assess water quality in Oregon. CWA Section 303(d) requires DEQ to identify a list of waters that do not meet water quality standards. The resulting list is commonly referred to as the 303(d) list. In accordance with the CWA, DEQ must establish TMDLs for pollutants that led to the placement of a water body on the on the 303(d) list.

A TMDL includes an assessment of water quality data and current conditions and describes a plan to achieve conditions so that waterbodies will meet water quality standards. TMDLs specify the daily amount of pollution that a waterbody can receive and still meet water quality standards. In the TMDL, point sources are allocated pollution limits as “waste load allocations” that are then incorporated in National Discharge Elimination System (NPDES) waste discharge permits, while a “load allocation” is established for nonpoint sources (agriculture, forestry, and urban). The agricultural sector is responsible for helping achieve the pollution limit by achieving the load allocation assigned to agriculture specifically, or to nonpoint sources in general, depending on how the TMDL was written.

Total Maximum Daily Loads generally apply to an entire basin or subbasin and not just to an individual water body on the 303(d) list. Waterbodies will be listed as achieving water quality standards when data show the standards have been attained.

As part of the TMDL process, DEQ identifies the Designated Management Agency (DMA) or parties responsible for submitting TMDL implementation plans. TMDLs designate that the local Area Plan is the implementation plan for the agricultural component of the TMDLs. Biennial reviews and revisions to the Area Plan and Area Rules must address agricultural or nonpoint source load allocations from TMDLs.

The list of impaired water bodies (303(d) list), the TMDLs, and the agricultural load allocations for the TMDLs that apply to this Management Area are summarized in Chapter 2.

1.4.4 Water Pollution Control Law – ORS 468B.025 and ORS 468B.050

In 1995, the Oregon Legislature passed ORS 561.191. This statute states that any program or rules adopted by ODA "shall be designed to assure achievement and maintenance of water quality standards adopted by the Environmental Quality Commission."

To implement the intent of ORS 561.191, ODA incorporated ORS 468B.025 and 468B.050 into all of the Area Rules.

ORS 468B.025 (prohibited activities) states that:
"(1) Except as provided in ORS 468B.050 or 468B.053, no person shall:
(a) Cause pollution of any waters of the state or place or cause to be placed any wastes in a location where such wastes are likely to escape or be carried into the waters of the state by any means.
(b) Discharge any wastes into the waters of the state if the discharge reduces the quality of such waters below the water quality standards established by rule for such waters by the Environmental Quality Commission.
(2) No person shall violate the conditions of any waste discharge permit issued under ORS 468B.050."

ORS 468B.050 identifies the conditions when a permit is required. A permit is required for CAFOs that meet minimum criteria for confinement periods and have large animal numbers or have wastewater facilities. The portions of ORS 468B.050 that apply to the Ag Water Quality Program, state that:

"(1) Except as provided in ORS 468B.053 or 468B.215, without holding a permit from the Director of the Department of Environmental Quality or the State Department of Agriculture, which permit shall specify applicable effluent limitations, a person may not:
(a) Discharge any wastes into the waters of the state from any industrial or commercial establishment or activity or any disposal system."

Definitions used in ORS 468B.025 and 468B.050:

"Pollution or Water Pollution" means such alteration of the physical, chemical, or biological properties of any waters of the state, including change in temperature, taste, color, turbidity, silt or odor of the waters, or such discharge of any liquid, gaseous, solid, radioactive, or other substance into any waters of the state, which will or tends to, either by itself or in connection with any other substance, create a public nuisance or which will or tends to render such waters harmful, detrimental or injurious to public health, safety or welfare, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses or to livestock, wildlife, fish or other aquatic life or the habitat thereof.' (ORS 468B.005(5).

"Water" or "the waters of the state" include lakes, bays, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Pacific Ocean within the territorial limits of the State of Oregon and all other bodies of surface or underground waters, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters which do not combine or affect a junction with natural surface or underground waters), which are wholly or partially within or bordering the state or within its jurisdiction.' (ORS 468B.005(10)

"Wastes" means sewage, industrial wastes, and all other liquid, gaseous, solid, radioactive or other substances, which will or may cause pollution or tend to cause pollution of any waters of the state.' (ORS 468B.005(9). Additionally, the definition of "wastes" given in (OAR 603-095-0010(53) includes but is not limited to commercial fertilizers, soil amendments, composts, animal wastes, vegetative materials, or any other wastes.

1.4.5 Streamside Vegetation and Agricultural Water Quality

Across Oregon, the Ag Water Quality Program emphasizes streamside vegetation protection and enhancement to prevent and control water pollution from agriculture activities and to prevent and control soil erosion. Streamside vegetation can provide three primary water quality functions: shade for cool stream temperatures, streambank stability, and filtration of pollutants. Other water quality functions from streamside vegetation include: water storage in the soil or cooler and later season flows, sediment trapping that can build streambanks and floodplains, narrowing and deepening of channels, and biological uptake of sediment, organic material, nutrients, and pesticides.

Additional reasons for the Ag Water Quality Program's emphasis on streamside vegetation include:

- Streamside vegetation can improve water quality related to multiple pollutants, including: temperature (heat), sediment, bacteria, nutrients, and toxics (e.g. pesticides, heavy metals, etc.).
- Streamside vegetation provides fish and wildlife habitat.
- Landowners can improve streamside vegetation in ways that are compatible with their operation.
- Streamside vegetation condition is measurable and can be used to track progress in achieving desired site conditions.

Site-Capable Vegetation

The Ag Water Quality Program uses the concept of "site-capable vegetation" to describe the vegetation that agricultural streams can provide to protect water quality. Site-capable vegetation is the vegetation that can be expected to grow at a particular site, given natural site factors (e.g., elevation, soils, climate, hydrology, wildlife, fire, floods), and historical and current human influences that are beyond the Program's statutory authority (e.g., channelization, roads, modified flows, previous land management). Site-capable vegetation can be determined for a specific site based on: current streamside vegetation at the site, streamside vegetation at nearby reference sites with similar natural characteristics, Natural Resources Conservation Service (NRCS) soil surveys and ecological site descriptions, and/ or local or regional scientific research.

The goal for Oregon's agricultural landowners is to provide the water quality functions (e.g., shade, streambank stability, and filtration of pollutants) produced by site-capable vegetation along streams on agricultural lands. The Area Rules for each Management Area require that agricultural activities allow for the establishment and growth of vegetation consistent with site capability to provide the water quality functions equivalent to what site-capable vegetation would provide.

Occasionally, mature site-capable vegetation such as tall trees may not be needed for narrow streams. For example, shrubs and grass may provide shade, protect streambanks, and filter pollutants. However, on larger streams, mature site-capable vegetation is needed to provide the water quality functions.

In many cases, invasive, non-native plants, such as introduced varieties of blackberry and reed canary grass, grow in streamside areas. This type of vegetation has established throughout much of Oregon due to historic and human influences and may provide some of the water quality functions of site-capable vegetation. ODA's statutory authority does not require the removal of invasive, non-native plants, however, ODA recognizes removal as a good conservation activity and encourages landowners to remove these plants. Voluntary programs through SWCDs and watershed councils provide technical assistance and financial incentives for weed control and restoration projects. In addition, the Oregon State Weed Board identifies invasive plants that can negatively impact watersheds. Public and private landowners are responsible for eliminating, or intensively controlling noxious weeds as may be provided by state and

local law enacted for that purpose. For further information, visit https://www.oregon.gov/ODA/programs/Weeds/Pages/Default.aspx

1.5 Other Water Quality Programs

The following programs complement the Ag Water Quality Program and are described here to recognize their link to agricultural lands.

1.5.1 Confined Animal Feeding Operation Program

Oregon Department of Agriculture is the lead state agency for the CAFO Program. The CAFO Program was developed to ensure that operators do not contaminate ground or surface water with animal manure or process wastewater. Since the early 1980s, CAFOs in Oregon have been registered to a general Water Pollution Control Facility permit designed to protect water quality. A properly maintained CAFO must implement a site-specific suite of structural and management practices to protect ground and surface water. The 2001 Oregon State Legislature directed ODA to convert the CAFO Program from a WPCF permit program to a federal NPDES CAFO permit. ODA and DEQ jointly issue the NPDES CAFO Permit, which complies with all CWA requirements for CAFOs. In 2015, ODA and DEQ jointly issued a WPCF general CAFO Permit as an alternative for CAFOs that are not subject to federal NPDES CAFO permit requirements. Currently, ODA can register CAFOs to either the WPCF or NPDES CAFO Permit.

Both of the Oregon CAFO permits require the registrant to operate according to a site-specific, ODA-approved, Animal Waste Management Plan that is incorporated into the CAFO permit by reference. For more information about the CAFO program, go to: https://www.oregon.gov/ODA/programs/NaturalResources/Pages/CAFO.aspx

1.5.2 Groundwater Management Areas

Groundwater Management Areas are designated by DEQ where groundwater has elevated contaminant concentrations resulting, at least in part, from nonpoint sources. After the GWMA is declared, a local groundwater management committee comprised of affected and interested parties is formed. The committee works with and advises the state agencies that are required to develop an action plan that will reduce groundwater contamination in the area.

Oregon has designated three GWMAs because of elevated nitrate concentrations in groundwater: Lower Umatilla Basin GWMA, Northern Malheur County, and the Southern Willamette Valley. Each GWMA has a voluntary action plan to reduce nitrates in groundwater. After a scheduled evaluation period, if DEQ determines that voluntary efforts are not effective, mandatory requirements may become necessary.

1.5.3 The Oregon Plan for Salmon and Watersheds

In 1997, Oregonians began implementing the Oregon Plan for Salmon and Watersheds, referred to as the Oregon Plan (https://www.oregon.gov/oweb/resources/Pages/opsw.aspx). The Oregon Plan seeks to restore native fish populations, improve watershed health, and support communities throughout Oregon. The Oregon Plan has a strong focus on salmonids because they have cultural, economic, and recreational importance to Oregonians and because they are important indicators of watershed health. ODA's commitment to the Oregon Plan is to develop and implement Area Plans and associated Area Rules throughout Oregon.

1.5.4 Pesticide Management and Stewardship

The ODA Pesticides Program holds the primary responsibility for registering pesticides and regulating their use in Oregon under the Federal Insecticide Fungicide Rodenticide Act. ODA's Pesticide Program administers rules relating to pesticide sales, use, and distribution, including pesticide operator and applicator licensing as well as proper application of pesticides, pesticide labeling, and registration.

In 2007, the interagency Water Quality Pesticide Management Team (WQPMT) was formed to expand efforts to improve water quality in Oregon related to pesticide use. The WQPMT includes representation from ODA, Oregon Department of Forestry (ODF), DEQ, and Oregon Health Authority (OHA). The WQPMT facilitates and coordinates activities such as monitoring, analysis and interpretation of data, effective response measures, and management solutions. The WQPMT relies on monitoring data from the Pesticides Stewardship Partnership (PSP) program and other monitoring programs to assess the possible impact of pesticides on Oregon's water quality. Pesticide detections in Oregon's streams can be addressed through multiple programs and partners, including the PSP.

Through the PSP, state agencies and local partners work together to monitor pesticides in streams and to improve water quality (https://www.oregon.gov/ODA/programs/Pesticides/Water/Pages/PesticideStewardship.aspx) ODA, Department of Environmental Quality, and Oregon State University Extension Service work with landowners, SWCDs, watershed councils, and other local partners to voluntarily reduce pesticide levels while improving water quality and crop management. Since 2000, the PSPs have made noteworthy progress in reducing pesticide concentrations and detections.

Oregon Department of Agriculture led the development and implementation of a Pesticides Management Plan (PMP) for the state of Oregon (https://www.oregon.gov/ODA/programs/Pesticides/water/pages/AboutWaterPesticides.aspx). The PMP, completed in 2011, strives to protect drinking water supplies and the environment from pesticide contamination, while recognizing the important role that pesticides have in maintaining a strong state economy, managing natural resources, and preventing human disease. By managing the pesticides that are approved for use by the United States Environmental Protection Agency (US EPA) and Oregon in agricultural and non-agricultural settings, the PMP sets forth a process for preventing and responding to pesticide detections in Oregon's ground and surface water resources.

1.5.5 Drinking Water Source Protection

Oregon implements its drinking water protection program through a partnership between DEQ and OHA. The program provides individuals and communities with information on how to protect the quality of Oregon's drinking water. Department of Environmental Quality and OHA encourage preventive management strategies to ensure that all public drinking water resources are kept safe from current and future contamination. For more information, see: https://www.oregon.gov/oha/ph/HealthyEnvironments/DrinkingWater/SourceWater/Pages/swp.aspx

1.6 Partner Agencies and Organizations

1.6.1 Oregon Department of Environmental Quality (DEQ)

The US EPA delegated authority to Oregon to implement the federal CWA in our state. DEQ is the lead state agency with overall authority to implement the CWA in Oregon. DEQ coordinates with other state agencies, including ODA and ODF, to meet the requirements of the CWA. The DEQ sets water quality

standards and develops TMDLs for impaired waterbodies, which ultimately are approved or disapproved by the US EPA. In addition, DEQ develops and coordinates programs to address water quality including NPDES permits for point sources, the CWA Section 319 grant program, Source Water Protection, the CWA Section 401 Water Quality Certification, and GWMAs. DEQ also coordinates with ODA to help ensure successful implementation of Area Plans.

A Memorandum of Agreement (MOA) between DEQ and ODA recognizes that ODA is the state agency responsible for implementing the Ag Water Quality Program. ODA and DEQ updated the MOA in 2012. The MOA includes the following commitments:

- ODA will develop and implement a monitoring strategy, as resources allow, in consultation with DEQ.
- ODA will evaluate the effectiveness of Area Plans and Area Rules in collaboration with DEQ.
    - ODA will determine the percentage of lands achieving compliance with Management Area Rules.
    - ODA will determine whether the target percentages of lands meeting the desired land conditions, as outlined in the goals and objectives of the Area Plans, are being achieved.
- ODA and DEQ will review and evaluate existing information to determine:
    - Whether additional data are needed to conduct an adequate evaluation.
    - Whether existing strategies have been effective in achieving the goals and objectives of the Area Plans.
    - Whether the rate of progress is adequate to achieve the goals of the Area Plans.

The Environmental Quality Commission, which serves as DEQ's policy and rulemaking board, may petition ODA for a review of part or all of any Area Plan or Area Rules. The petition must allege with reasonable specificity that the Area Plan or associated rules are not adequate to achieve applicable state and federal water quality standards (ORS 568.930(3)(a)).

1.6.2 Other Partners

Oregon Department of Agriculture and SWCDs work in close partnership with local, state, and federal agencies and organizations, including: DEQ (as indicated above), the United States Department of Agriculture (USDA) NRCS and Farm Service Agency, watershed councils, Oregon State University Agricultural Experiment Stations and Extension Service, Tribes, livestock and commodity organizations, conservation organizations, and local businesses. As resources allow, SWCDs and local partners provide technical, financial, and educational assistance to individual landowners for the design, installation, and maintenance of effective management strategies to prevent and control agricultural water pollution and to achieve water quality goals.

1.7 Measuring Progress

Agricultural landowners and operators have been implementing effective conservation projects and management activities throughout Oregon to improve water quality for many years. However, it has been challenging for ODA, SWCDs, and LACs to measure progress towards improved water quality. ODA is working with SWCDs, LACs, and other partners to develop and implement strategies that will produce measurable outcomes. ODA also is working with partners to develop monitoring methods to document progress.

1.7.1 Measurable Objectives

A measurable objective is a numeric long-term desired outcome to achieve by a specified date. Milestones are the interim steps needed to make progress toward the measurable objective and consist of numeric short-term targets to reach by specific dates. Together, the milestones define the timeline needed to achieve the measurable objective.
The AgWQ Program is working throughout Oregon with SWCDs and LACs toward establishing long-term measurable objectives to achieve desired conditions. ODA, the LAC, and the SWCD will establish measurable objectives and associated milestones for each Area Plan. Many of these measurable objectives relate to land conditions and primarily are implemented through focused work in small geographic areas (section 1.7.3), with a long-term goal of developing measurable objectives and monitoring methods at the Management Area scale.

The State of Oregon continues to improve its ability to use technology to measure current streamside vegetation conditions and compare it to the vegetation needed to meet stream shade targets to keep surface waters cooler. As the State's use of this technology moves forward, ODA will use the information to help LACs and LMAs set measurable objectives for streamside vegetation. These measurable objectives will be achieved through implementing the Area Plan, with an emphasis on incentive programs.

At each biennial review, ODA and its partners will evaluate progress toward the most recent milestone(s) and why they were or were not achieved. ODA, the LAC, and LMA will evaluate whether changes are needed to continue making progress toward achieving the measurable objective(s) and will revise strategies to address obstacles and challenges.

The measurable objectives and associated milestones for the Area Plan are in Chapter 3 and progress toward achieving the measurable objectives and milestones is summarized in Chapter 4.

1.7.2 Land Condition and Water Quality

Land conditions can serve as useful surrogates (indicators) for water quality parameters. For example, streamside vegetation generally is used as a surrogate for water temperature, because shade blocks solar radiation from warming the stream. In addition, sediment can be used as a surrogate for pesticides and phosphorus, because they often adhere to sediment particles.

The Ag Water Quality Program focuses on land conditions, in addition to water quality data, for several reasons:

- Landowners can see land conditions and have direct control over them.
- Improved land conditions can be documented immediately.
- Reductions in water quality from agricultural activities are primarily due to changes in land conditions and management activities.
- It can be difficult to separate agriculture's influence on water quality from other land uses.
- There is generally a lag time between changes on the landscape and the resulting improvements in water quality.
- Extensive monitoring of water quality would be needed to evaluate progress, which would be cost-prohibited and could fail to demonstrate improvements in the short term.

Water quality monitoring data will help ODA and partners to measure progress or identify problem areas in implementing Area Plans. However, as described above, water quality monitoring may be less likely to

document the short-term effects of changing land conditions on water quality parameters such as temperature, bacteria, nutrients, sediment, and pesticides.

1.7.3 Focused Implementation in Small Geographic Areas

Focus Areas

A Focus Area is a small watershed with water quality or concerns associated with agriculture. The Focus Area Process is SWCD-led, with ODA oversight. The SWCD delivers systematic, concentrated outreach and technical assistance in the Focus Area . A key component of this approach is measuring land conditions before and after implementation, to document the progress made with available resources. The Focus Area approach is consistent with other agencies' and organizations' efforts to work proactively in small watersheds and is supported by a large body of scientific research (e.g., Council for Agricultural Science and Technology, 2012. Assessing the Health of Streams in Agricultural Landscapes: Impacts of Land Management Change on Water Quality. Special Publication No.31. Ames, Iowa).

Systematic implementation in Focus Areas provides the following advantages:

- Measuring progress is easier in a small watershed than across an entire Management Area.
- Water quality improvement may be faster since small watersheds generally respond more rapidly.
- A proactive approach can address the most significant water quality concerns.
- Partners can coordinate and align technical and financial resources.
- Partners can coordinate and identify appropriate conservation practices and demonstrate their effectiveness.
- A higher density of projects allows neighbors to learn from neighbors.
- A higher density of projects leads to opportunities for increasing the connectivity of projects.
- Limited resources can be used more effectively and efficiently.
- Work in one Focus Area, followed by other Focus Areas, will eventually cover the entire Management Area.

Soil and Water Conservation Districts select a Focus Area in cooperation with ODA and other partners. The scale of the Focus Area matches the SWCD's capacity to deliver concentrated outreach and technical assistance, and to complete (or initiate) projects. The current Focus Area for this Management Area is described in Chapter 3. The SWCD will also continue to provide outreach and technical assistance to the entire Management Area.

Strategic Implementation Areas

Strategic Implementation Areas (SIAs) are small watersheds selected by ODA, in cooperation with partners based on a statewide review of water quality data and other available information. ODA conducts an evaluation of likely compliance with Area Rules, and contacts landowners with the results and next steps. Landowners have the option of working with the SWCD or other partners to voluntarily address water quality concerns. ODA follows up, as needed, to enforce the Area Rules. Finally, ODA completes a post-evaluation to document progress made in the watershed. Chapter 3 describes any SIAs in this Management Area.

1.8 Monitoring, Evaluation, and Adaptive Management

The Oregon Department of Agriculture, the LAC and the LMA will assess the effectiveness of the Area Plan and Area Rules by evaluating the status and trends in agricultural land conditions and water quality data (Chapter 4). This assessment will include an evaluation of progress toward measurable objectives. ODA will utilize other agencies' and organizations' local monitoring data when available. ODA, DEQ,

SWCDs, and LACs will examine these results during the biennial review and will revise the goal(s), measurable objectives, and strategies in Chapter 3, as needed.

1.8.1 Agricultural Water Quality Monitoring

As part of monitoring water quality status and trends, DEQ regularly collects water samples at over 130 sites on more than 50 rivers and streams across the state. Sites are located across the major land uses (forestry, agriculture, rural residential, and urban/suburban). DEQ collects water quality samples every other month throughout the year to represent a snapshot of water quality conditions. Parameters consistently measured include: alkalinity, biochemical oxygen demand (BOD), chlorophyll a, specific conductance, dissolved oxygen (DO), DO percent saturation, *E. coli*, ammonia, nitrate and nitrite, pH, total phosphorus, total solids, temperature, and turbidity.
At each biennial review, DEQ assesses the status and trends of water quality in relation to water quality standards. Parameters included in the analysis are temperature, pH, and bacteria. DEQ will add additional parameters as the data become available, depending on the water quality concerns of each Management Area. ODA will continue to work with DEQ to cooperatively summarize the data results and how they apply to agricultural activities.

Water quality monitoring is described in Chapter 3, and the data are presented in Chapter 4.

1.8.2 Biennial Reviews and Adaptive Management

All Area Plans and Area Rules around the state undergo biennial reviews by ODA and the LAC. As part of each biennial review, ODA, DEQ, SWCDs, and the LAC discuss and evaluate the progress on implementation of the Area Plan and Area Rules. This evaluation includes discussion of enforcement actions, land condition, water quality monitoring, strategic initiatives, and outreach efforts over the past biennium. ODA and partners evaluate progress toward achieving measurable objectives and milestones, and revise implementation strategies as needed. The LAC submits a report to the Board of Agriculture and the director of ODA describing progress and impediments to implementation, and recommendations for modifications to the Area Plan or Area Rules necessary to achieve the goal of the Area Plan. ODA and partners will use the results of this evaluation to update the measurable objectives and implementation strategies in Chapter 3.

Chapter 2: Introduction and Local Background

2.1 Local Roles and Responsibilities

This document is a plan to prevent and control water pollution from agricultural activities in order for the State to achieve water quality standards for water bodies in the Clackamas Management Area (including the Clackamas River watershed and the neighboring Willamette River mainstem and tributaries to the west). The Clackamas Subbasin Agricultural Water Quality Management Area Plan (Area Plan) was created through the joint efforts of a Local Advisory Committee (LAC) consisting predominantly of affected landowners and operators residing within the Management Area, Oregon Department of Agriculture (ODA), and the Clackamas Soil and Water Conservation District (SWCD).

2.1.1 Local Advisory Committee (LAC)

For each Management Area, the director of ODA appoints a Local Advisory Committee (LAC) (OAR 603-090-0020) with as many as twelve members to assist with the development and subsequent biennial reviews of the local Area Plan and Area Rules. The LAC serves in an advisory role to the director of ODA and to the Board of Agriculture. LACs are composed primarily of agricultural landowners in the Management Area and must reflect a balance of affected persons.

The Clackamas LAC was formed in December 1998 to assist ODA with the development of the Area Plan and Area Rules, and to recommend strategies to achieve the water quality goals and objectives of the Area Plan. The LAC is comprised predominantly of agricultural producers who live within the Management Area. Current LAC members are:

Name	Location	Description
Barry Bushue (Chair)	Boring	Landowner (Berries, nursery, flowers, vegetables)
Paul Staehely (Vice-Chair)	Oregon City	Landowner (Dairy)
Judy Bible	Oregon City	Landowner (Christmas trees)
Jim Calcagno	Oregon City	Landowner (Fresh market vegetables)
Kurt McKnight	Boring	Landowner (Berries, processing plant)
Lydon Scheef	Oregon City	Landowner (Grains)
Jacqueline Tommas	Estacada	Clackamas River Basin Council
Bob Underwood	Boring	Landowner (Berries, hazelnuts, Christmas trees)
Roger Fantz	Eagle Creek	Landowner (Christmas trees), Clackamas SWCD
Sam Doane	Boring	Landowner (Nursery)

Local Advisory Committees (LACs) are described in Oregon Administrative Rule (OAR) 603-090-0020. LAC membership shall reflect a balance of affected persons. Membership shall be composed primarily of landowners in the Clackamas Agricultural Water Quality Management Area (Management Area). Membership may include, but is not limited to:

- State Board of Agriculture representatives,
- Persons serving on local soil and water conservation districts,
- Private landowners,
- Representatives of local, state and federal boards, commissions, and agencies,
- Members of Indian tribes,
- Members of the public,
- Persons associated with industry,
- Members of academic, scientific, and professional communities,

- Public and special interest groups.

2.1.2 Local Management Agency

The implementation of the Area Plan will be accomplished through a Memoranda of Agreement between the LMA and ODA. It is the intent of ODA to negotiate annually with the Clackamas SWCD so that it may continue to serve as the LMA. The SWCD implements the Area Plan by providing voluntary incentive based approaches to water quality management, including outreach and technical assistance to landowners. The SWCD also works with ODA and the LAC to evaluate progress toward meeting Area Plan goals and objectives, and to revise the Area Plan and Area Rules as needed. If Clackamas SWCD chooses not to continue serving as an LMA, another local organization will be selected to serve this role.

Responsibilities as the LMA include:

- Act as ODA's LMA to develop and implement the Clackamas Agricultural Water Quality Management Area Plan.
- Assist ODA in the development and facilitation of the activities and responsibilities of the Local Advisory Committee (LAC) as outlined in the Agriculture Water Quality Management Program, OAR 603-090.
- Coordinate ongoing water quality programs and projects in cooperation with all agencies, groups, and interested parties.
- Carry out the tasks associated with the project work plan.
- Use all grant funds for the purposes approved by ODA.
- Provide the department with progress reports.

2.2 Area Plan and Rules: Development and History

The Director of ODA approved the Area Plan and Area Rules in June of 2001. Since the Area Plan was approved and the Area Rules were adopted, the LAC has convened for several biennial reviews since 2001 to evaluate progress and update the Area Plan. See sections 1.8.3, 3.2.3 and 4.4 for a description of the biennial review process and results from the 2019 Biennial Review. Biennial review years: 2005, 2008, 2010, 2012, 2015, 2017, and 2019

2.3 Geographical and Physical Setting

2.3.1 Location and Land Use

The Clackamas Agricultural Water Quality Management Area (Clackamas MA) is approximately 680,136 acres (1,076 square mile) in size and includes the Clackamas Subbasin a 4th field watershed with Hydrologic Unit Code (HUC) number 17090011 (Figure 3). Most of the Clackamas Subbasin is located in Clackamas County, with a small southern portion in Marion County. The Clackamas MA also encompasses most of the 5th field Abernethy Creek - Willamette River watershed (HUC number 1709000704), located in the northeastern portion of the Middle Willamette 4th field watershed (HUC number 17090007). Elevation in the Clackamas Subbasin ranges from 12 feet at the confluence of the Clackamas and Willamette Rivers to 6,000 feet in the Cascade Range.

The predominant land use in the Management Area is timber, most of it occurring on federal lands in the eastern part of the Management Area. Seventy-eight percent of land in the Management Area is federal and private forestlands (Table 1). In the valley portions of the Management Area, the dominant land use is rural and agriculture, with urban areas quickly expanding. In 2010, the population of Clackamas County was 375,992. (https://www.census.gov/).

Table 1: Land Use in the Clackamas Subbasin Management Area by State Zoning (Acres) *Data: 2017 - Oregon Department of Land Conservation and Development* *See Figure 3: Map of the Clackamas Subbasin Management Area*	
Zones	**Clackamas Management Area (Acres)**
Farm Use	57,427
Mixed Farm Forest	23,961
Forest Private and Federal	528,453
Rural Residential	42,471
Commercial	3,295
Industrial	5,133
Public Use, Parks & Open Space	1,189
Low to Very High Density Residential	14,022
Other	4,185

Portland General Electric operates five hydroelectric facilities in the Management Area. Three facilities are on the mainstem Clackamas River. Rivermill powerhouse is located at river mile 23, Cazadero diversion and the Faraday powerhouse are located at river mile 26 and the North Fork powerhouse is located at river mile 30. The other two facilities, Lake Harriet Dam and Timothy Lake Dam, form Lake Harriet and Timothy Lake. The Timothy Lake facility, on the Oak Grove Fork, is the only large storage facility.

2.3.2 Agriculture

Most of the farmland is located in the western portion of the Management Area, from the cities of Oregon City and Wilsonville and to Sandy and Estacada. See Figure 3. The majority of agricultural lands are located on rolling hills and high terraces with somewhat to well-drained soils. A portion of the agricultural land is artificially drained. The slopes of most of the cultivated land ranges from zero to eight percent, with some cultivated areas having slopes ranging from seven to thirty percent (Gerig, 1985).

The types of crops grown in the Management Area shifted during the 20th century. In the mid-1800s, farming was based on subsistence, so it was common for people to have small dairies. In the late 1800s, Italian prune orchards were common, especially in the Springwater area. Around 1900, a railroad reaching Estacada was built and dams on the Clackamas River were constructed. This helped change the focus of agriculture to grain, berries, and filberts. In the 1920s and 1930s, more people started specializing in dairies and potatoes and began converting grain to grass seed, especially fine fescue. Many of these crops have been converted to Christmas trees and nursery stock, with berries still common in the Sandy/Damascus area. Table 2.

Farming activities have also undergone changes in the Management Area. Cover cropping and field buffer strips are examples of some of the methods being used to minimize erosion. The improvement of equipment has allowed for fewer trips over a field, resulting in decreased compaction of soil. Subsoiling has also helped to reduce runoff and compaction.

Table 2: Agricultural Production in Clackamas County (2012) 2012 US Census of Agriculture: www.agcensus.usda.gov (last accessed 3/15/19) **NOTE**: This data is for discussion purposes only. It is not likely that the census results include all operations that meet the definition of a farm or that all those that do meet the definition of a farm respond to the census inquiry. Information could be missing or inaccurate and is a report for all of Clackamas County not just the Clackamas Management Area. 2017 US Census of Agriculture data will be available February 2019.	
Production	**Clackamas County**
Total Land in Agricultural Production (acres)	162,667
Number of Farms	3,745
Average Size of Farms (acres)	43
Irrigated Land (acres)	22,150
Total Cropland (acres)	2,541
Land in Pasture-All Types (acres)	45,342
# of permitted * Confined Animal Feeding Operations	8
# Farms in the USDA National Organic Program	75
# Farms enrolled in USDA ** Conservation Programs	30
Livestock (# farms with:)	
# farms: with Beef Cows	986
Milk Cows	35
Equine: Horses, Ponies, Mules, and Donkeys	1,005
Layers/ Poultry/ Turkey	683
Goats: Milk/ Angora/ Meat	250
Sheep and Lambs	267
Hogs and Pigs	104
Llamas and Alpacas	165
Bison	7
Total Bee Colonies in Clackamas County	9,365
Crops (acres)	
Field Seeds, Grass Seeds, Hay, Forage, Silage	26,236
Vegetable Row Crops	3,996
Orchards and Berries (acres)	
Land in Orchards	6,234
Land in Christmas Trees	15,951
Land in Berries	3,401
Greenhouse/ Nurseries	
All Greenhouse and Nursery Types (in acres of growing square footage)	401
* Data from Oregon Department of Agriculture, Confined Animal Feeding Operation Program 2018 ** Conservation Reserve, Wetlands Reserve, Farmable Wetlands, and CREP	

2.3.3 Water Resources

The Clackamas River drains 940 square miles (600,700 acres) and flows into the Willamette River in the Gladstone / Oregon City area. This 5th field watershed includes the mainstem Willamette River (river miles 25 to 45) and creeks that flow directly into the Willamette River. The Abernethy Creek and Beaver Creek / Parrot Creek drainages flow into the Willamette River at Oregon City. The remaining creeks are located west of the Willamette River in the Wilsonville area (Newland Creek, Boeckman Creek, Seely Ditch, Coffee Lake Creek, and Corral Creek). There are 14 creeks in total, whose watersheds encompass a total of 136 square miles. The annual rainfall ranges from 46.5 inches in the Willamette Valley to an average of about 51.3 inches at Clackamas Lake (3,400 feet). Annual snowfall averages about 13.5 inches. The ratio for snowfall is ten inches of snow per one inch of rain (Fox 1999).

Table 3: Clackamas River Surface Water Records Period of record from 1908-2018 USGS Gage 14210000: Clackamas River at Estacada Drainage Area = 671 square miles www.waterdata.usgs.gov (last accessed December 2018)		
Winter Monthly Mean Peak Discharge	December at 4,150 cfs.	January at 4,210 cfs.
Summer Monthly Mean Low Discharge	August at 909 cfs.	September at 945 cfs.
Maximum Discharge on Record	December 22, 1994 at 86,900 cfs.	
Minimum Discharge on Record	March 10, 1961 at 50 cfs.	
Highest Annual Average Flow	1974 at 4,407 cfs.	
Lowest Annual Average Flow	1977 at 1,454 cfs.	
2018 Average Annual Flow at 2,592 cfs.		

Water in the Management Area is appropriated and diverted primarily for municipal, fish, industrial, hydropower, and irrigation use. The amount of water appropriated in the Clackamas Subbasin is 716 cubic feet per second (cfs) and 30 cfs from the Willamette for the Wilsonville area. The primary consumptive use for which water rights are issued in the Management Area is municipal. In the Clackamas Subbasin, 58 cfs are allocated for irrigation. An estimated 22,150 acres were irrigated in the Clackamas Subbasin in 2012, according to the USDA National Agricultural Statistics Service. Of this, 67 percent was irrigated with surface water.

Stream flows in the Clackamas Subbasin vary widely between summer and winter. The high and low flows have different impacts on the landscape and resources. The slow release of snowmelt from the Cascades helps keep stream temperatures cool and maintain summer flows. Natural cover increases infiltration and allows a slow release of water. This in turn helps maintain summer flows and low stream temperatures. However, changes in natural cover or land uses can affect flow. With the removal of natural cover, runoff rates increase and stream discharge peaks rise faster and higher with storm events, resulting in higher and sharper peak flows.

During winter high stream flows, soil erosion is a prominent resource concern. Higher stream temperatures associated with low flow in the summertime are a major factor affecting aquatic life, including salmonids. Additionally, flows on some of the Clackamas tributaries, such as Clear Creek, Deep Creek, and Roaring River, do not support all in-stream and out-of-stream uses year-round.

The Clackamas Subbasin includes a number of hot springs. Austin Hot Springs is located along the Upper Clackamas River. Numerous hot springs, including Bagby Hot Springs, are located along the Hot Springs Fork of the Collawash River.

Drinking Water

Several communities obtain domestic drinking water from surface water and groundwater in the Management Area. From the city of Estacada down to Oregon City, the Clackamas River provides drinking water to more than 400,000 people. Groundwater supplies more than 50,000 people in the Clackamas Subbasin. About 40 private domestic surface water intakes also withdraw from streams in the Clackamas Subbasin. See Table 4 for public drinking water sources in the Clackamas MA.

Table 4: Public Drinking Water Supplies					
Sub-Basin	**Watershed**	**Public Water System**	**Drinking Water Source**	**Population**	**System Type**
Clackamas	Lower Clackamas River	City of Estacada	Clackamas River	2,875	C
Clackamas	Lower Clackamas River	Clackamas River Water - Clackamas	Clackamas River	36,900	C
Clackamas	Lower Clackamas River	North Clackamas County Water Commission	Clackamas River	129,215	C
Clackamas	Lower Clackamas River	South Fork Water Board - Oregon City	Clackamas River	138,307	C
Clackamas	Lower Clackamas River	Lake Oswego Municipal Water	Clackamas River	39,193	C
System Type *C - "Community Water System (C)" means a public water system that has 15 or more service connections used by year-round residents, or that regularly serves 25 or more year-round residents.*					

2.3.4 Biological Resources

The diversity and area of natural wildlife habitats in the Management Area has been reduced as land has been converted from natural forest, wetlands, and grasslands to managed forests, pasture, cropland, homesteads, and urban areas. As a result of the changes in land use, some of the ecological functions of wetlands and riparian areas have been impaired. These areas filter contaminants, trap sediment, and provide fish and wildlife habitat. Wetlands and riparian areas also regulate hydrologic fluctuations by retaining water during high flows. This water replenishes groundwater and provides in-stream flows during summer low flows.

The Management Area hosts a number of vertebrate species that depend on aquatic habitats. Native salmonid and other fish species with a federal or state conservation status are summarized in Table 5.

Additional native Oregon fish species include:

- Northern pikeminnow *(Ptychocheilus oregonenisis),*
- Mountain whitefish *(Prosopium williamsoni),*
- Rainbow trout *(Oncorhynchus mykiss),*
- Bull trout *(Salvelinus confluentus),*
- Resident cutthroat trout *(Oncorhynchus clarki),*
- Peamouth (*Mylocheilus caurinus*),
- Redsided shiners (*Richardsonius balteatus*),
- Three-spine stickleback (*Gasterosteus aculeatus*),
- White sturgeon (*Acipenser transmontanus*),
- Sculpins (Cottus spp.).
- Suckers (Catostomus spp.)
- Dace (Rhinichthys spp.)

Table 5: Clackamas Subbasin Native Fish Species with Federal or State Conservation Status			
Species	**Population**	**Federal Status Endangered Species Act**	**State Status Sensitive Species List or Oregon ESA**
Steelhead Trout – winter run *(Oncorhynchus mykiss)*	Lower Columbia River	Threatened	Critical
	Upper Willamette River	Threatened	Vulnerable
Chinook Salmon – spring runs *(Oncorhynchus tshawytscha)*	Lower Columbia River	Threatened	Critical
	Upper Willamette River	Threatened	Not Listed
Chinook Salmon – fall runs *(Oncorhynchus tshawytscha)*	Upper Willamette River	Threatened	Critical
Coho Salmon *(Oncorhynchus kisutch)*	Lower Columbia River	Threatened	Endangered
Coastal Cutthroat Trout *(Oncorhynchus clarkii clarki)*	Lower Columbia River	Not Listed	Vulnerable
Chum Salmon *(Oncorhynchus keta)*	Columbia River	Threatened	Critical
Pacific Lamprey *(Lampetra tridentata)*	Oregon	Not Listed	Vulnerable
Western Brook Lamprey (*Lampetra richardsoni)*	Oregon	Not Listed	Vulnerable
Oregon Chub *(Oregonichthys crameri)*	Oregon	Not listed	Threatened

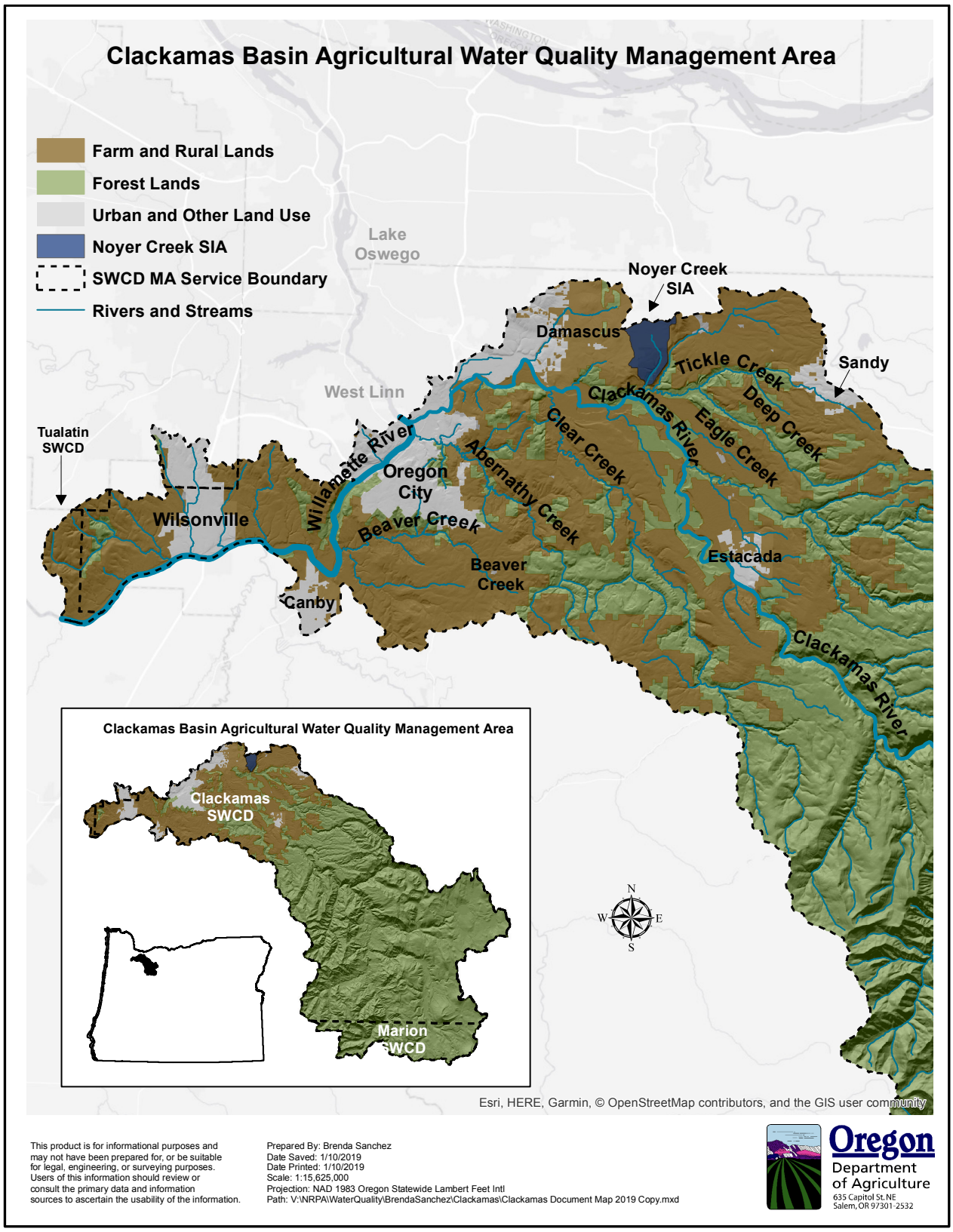
Sources:
1. National Marine Fisheries Service: ESA Status of West Coast Salmon and Steelhead (2011)
2. Oregon Department of Fish and Wildlife: Sensitive Species List (2008)
3. Oregon Department of Fish and Wildlife: Threatened, Endangered, and Candidate Fish and Wildlife Species in Oregon (PDF, no date, accessed 1/23/12)

Aquatic amphibians and reptiles in the subbasin include several at-risk species. (Oregon Department of Fish and Wildlife, 2008):

- Pacific giant salamander *(Dicamptodon ensatus),*
- Oregon spotted frog *(Rana pretiosa)*,
- Coastal tailed frog *(Ascaphus truei,)*
- Western toad *(Anaxyrus boreas),*
- Northern red-legged frog *(Rana aurora),*
- Cascades frog (*Rana cascadae*),
- Western painted turtle *(Chrysemys picta bellii),*
- Western pond turtle (~Actinemys marmorata).

Aquatic mammals in Clackamas County include beavers (*Castor canadensis),* muskrats (*Ondatra zibethica)*, and river otters (*Lutris canadensis)*. Several types of geese, ducks, and other bird species also live and feed in the Management Area's aquatic habitats.

Figure 3 Map of the Management Area



2.4 Water Quality in the Clackamas Subbasin

2.4.1 Water Quality Concerns

Beneficial Uses

Water quality standards are established to protect beneficial uses of the state's waters. Beneficial uses are assigned by basin in the OARs for water quality. Stream temperature, bacteria, and mercury affect the most sensitive beneficial uses of water, which are salmonid production and survival, water contact recreation, and fish consumption. While there may not be severe impacts on water quality from a single source or activity, the combined effects from all sources contribute to the impairment of beneficial uses of the Management Area's water. Most of the beneficial use impairments occur during summer low flow periods. Table 6 summarizes the State of Oregon's designated beneficial uses for the Clackamas Subbasin. See section 1.4.2 for further information.

Water Quality Parameters and 303(d) List of Impaired Water Bodies

A number of waterbodies within the Management Area are impaired (do not meet state water quality standards - Tables 7 and 8) for one or more water quality pollutants. The Oregon DEQ is required to submit a list of impaired waterbodies to the U.S. Environmental Protection Agency (EPA) every two years under section 303(d) of the federal CWA. This list is commonly referred to as the "303(d) list" and is made available online through DEQ's 2012 Integrated Report Assessment Database and 303(d) list.

In December 2018, the EPA approved Oregon's 2012 Clean Water Act Section 303(d) list of impaired waterbodies that need pollution reduction plans. The approved additions and removals are now effective for CWA purposes. For more information on water quality pollutants, see Appendix E. Go online to access the DEQ database: www.deq.state.or.us/wq/assessment/rpt2012/search.asp.

Table 6: State of Oregon Designated Beneficial Uses for the Clackamas Subbasin
Adapted from the 2005 Table 340A Willamette Basin at
https://www.oregon.gov/deq/Rulemaking%20Docs/table340a.pdf

Beneficial Use	Clackamas River	Willamette River Mainstem from Mouth to Newberg
(1) Public Domestic Water Supply	X	X
(1) Private Domestic Water Supply[1]	X	X
Industrial Water Supply	X	X
Irrigation	X	X
Livestock watering	X	X
(2) Fish and Aquatic Life	X	X
Wildlife and Hunting	X	X
Fishing	X	X
Boating	X	X
Water Contact Recreation	X	X[3]
Aesthetic Quality	X	X
Hydro Power	X	X
Commercial Navigation & Transportation		X

(1) With adequate pretreatment (filtration and disinfection) and natural quality to meet drinking water standards
(2) Numeric and narrative water quality standards are designed to protect the most sensitive beneficial uses. Resident fish and aquatic life and salmonid spawning, rearing and migration are the most sensitive temperature-related beneficial uses occurring in the watershed.

Table 7: 303(d) List of * Pollutants and Impaired Waterbodies Clackamas Subbasin Management Area *Updated from the DEQ 2012 Integrated Report (Last Accessed 1/15/19)* https://www.deq.state.or.us/wq/assessment/rpt2012/search.asp **(Cat 5: Water Quality Limited, 303(d) List (TMDLs needed for these water quality pollutants)**
Aquatic Weeds or Algae: Clackamas River
Biological Criteria: North Fork Deep, Deep, Dickey, Eagle, and Lemiti creeks. Hot Springs Fork Collawash River and the Clackamas River.
Chlorpyrifos: North Fork Deep Creek and Noyer Creek
Endosulfan sulfate: Noyer Creek
Dieldrin: North Fork Deep Creek and Noyer Creek
Dissolved Oxygen: North Fork Deep Creek, Noyer Creek, Rock Creek, Clackamas River, and the Sieben Drainage Ditch
Guthion: North Fork Deep Creek
Lead: Clackamas River
Mercury: Clackamas River
* See **Appendix E** for description of pollutants and water quality criteria

Basin TMDLs and Agricultural Load Allocations

The Department of Environmental Quality, in accordance with the federal Clean Water Act, is required to establish TMDLs for pollutants on the list of impaired waterbodies (303(d) list). TMDLs generally apply to an entire basin or subbasin, and not just to an individual water body that was on the 303(d) list. TMDLs specify the daily amount (load) of pollution that a water body can receive and still meet water quality standards. See Table 8 for TMDLs in the Clackamas MA and refer to section 1.4.3 for further information related to TMDLs.

Through the TMDL, nonpoint sources (including agriculture, forestry, and urban) are assigned "load allocations," while point sources are assigned "waste load allocations" in their permits. The agricultural sector is responsible for reducing agricultural nonpoint water pollution to meet the load allocation

Table 8: Pollutants with * TMDLs and Load Allocations for the Clackamas Subbasin Management Area *Updated from the DEQ 2012 Integrated Report (Last Accessed 11/02/18)* **(Cat 4A: Water quality limited, TMDL approved)**
Bacteria (*E. coli*.): Applies to all waterbodies in the Willamette Basin and Clackamas Subbasin ***Load Allocation*:** 78% reduction compared to average loads in 2006 • 83% for Bargfeld Creek • 89% for Delano Creek
Temperature: Applies to all waterbodies in the Willamette Basin and Clackamas Subbasin ***Load Allocation*:** All nonpoint sources collectively (agriculture's allocation is not specified): 0.05°C of the 0.3°C human use allocation (with a surrogate of effective shade)
Mercury: Applies to all waterbodies in the Willamette Basin and Clackamas Subbasin ***Load Allocation*:** 27% is the estimated percent reduction needed to attain the interim water column guidance value. This interim guidance value, when attained, should eventually reduce the concentrations of mercury in fish tissue to levels that no longer pose an unacceptable health risk to consumers of the fish. **Note**: DEQ is currently revising the TMDL for Mercury to account for a more stringent methyl mercury fish tissue criteria that was adopted in 2011. DEQ expects a final TMDL in 2019.
*** TMDL Documents for the Clackamas Subbasin Management Area** **Willamette Basin - Bacteria, Temperature, and Mercury**: Approved 2006 **Willamette Basin: Chapter 6 - Clackamas Subbasin**: Approved 2006 Available Online at: https://www.oregon.gov/deq/wq/tmdls/Pages/TMDLs-Willamette-Basin.aspx

assigned to agriculture. Loading capacity provides a reference for calculating the amount of pollutant reduction needed to bring water into compliance with water quality standards. The load allocation represents the amount of pollutant that can be added to a waterbody and still achieve water quality standards. Non-point source (agricultural) load allocations apply all year-round to all perennial and fish-bearing intermittent waters within the Clackamas Management Area.

While this Area Plan applies to all agricultural water pollution, the objectives and strategies currently emphasize parameters on the 303(d) list with an approved Total Maximum Daily Load (TMDL) for pollutants on the list of impaired water bodies.

It is recognized that, despite the best and most earnest efforts, natural events may interfere with or delay attainment of the TMDL and/or its associated surrogates. Such events could be but are not limited to flood, fire, insect infestations, and drought. Under the prevention and control measures in the Clackamas Management Area Rules (OAR 603-095-1240), landowners and operators are not responsible for mitigating or dealing with factors that do not result from agricultural practices.

2.4.2 Sources of Impairment

The sources of water pollution can be divided into two general categories: point sources and non-point sources. Point sources of pollution within this Management Area consist mainly of municipal wastewater discharge and Confined Animal Feeding Operations (CAFOs). These point sources are required to obtain a permit from DEQ in order to discharge waste.

Point source water pollution can be easy to identify and is often associated with a factory discharge or local sewage treatment overflow pipe. Non-point source pollution can be difficult to pinpoint to a single source. Non-point source pollution is normally considered the result of various activities throughout a watershed. Non-point sources of pollution may include:

- Eroding agricultural and forest lands,
- Eroding stream banks and roadways,
- Erosion from development,
- Lack of riparian shade producing vegetation,
- Contaminated runoff from livestock and other agricultural operations,
- Contaminated runoff from urban uses.

The pollutants from these sources are carried to the surface water or groundwater through the action of rainfall, irrigation runoff, and seepage. While there may not be severe impacts on water quality from a single non-point source or activity, the combined effects from all sources contribute, along with impacts from other land uses and activities, to the impairment of the beneficial uses of the water in the area.

Many of the water pollution sources cited here and in the geographical and physical setting section affect water quality but are beyond the influence of agricultural landowners and operators. Under the prevention and control measures in the Area Rules (OAR 603-095-1200), agricultural landowners and operators are not responsible for mitigating or dealing with factors that do not result from agricultural activities. These factors include but are not limited to:

- Hot springs on the Clackamas River and other bodies of water in the Management Area,
- Septic systems, human waste from water-based recreation, and public sewage disposal,
- Public roadways or rights of way or easements next to streams, rivers, or other bodies of water,
- Public culverts, roadside ditches, drainage, and shoulders,

- Dams, dam removal, hydroelectric plants, and non-agricultural impoundments,
- Housing and other development in agricultural land areas,
- Extreme and/or unforeseen weather events,
- Any other factor that occurs on public or private lands outside the direct control of the landowner/operator.

2.5 Prevention and Control Measures

The emphasis of the Area Plan is to promote voluntary actions by landowners or operators to prevent and control water pollution from agricultural activities and soil erosion on agricultural and rural lands in the Management Area. Prevention and control measures are a set of minimum regulatory standards that must be met on all lands in agricultural use, and are defined in the Area Rules for the Management Area (OAR 603-095-1240). The applicable Area Rules are referenced below for each prevention and control measure for education purposes only.

Agricultural landowners or operators who fail to address these prevention and control measures may be subject to enforcement procedures based upon the Area Rules. Enforcement procedures are undertaken by ODA upon documentation of a violation, as outlined in the Resolution of Complaints and Enforcement Actions section of this Area Plan. See section 1.3 and Figure 2.

In this section, there are two Prevention and Control Measures that appear with a border around the text. These measures are the enforceable Area Rules for the Clackamas Management Area. **Agricultural landowners (commercial and noncommercial) should review the Area Rules--cited in the two boxes--**and evaluate their operations to determine if they are in compliance. Rules were adopted in 2001.

OAR 603-095-1240
(2) Streamside Area Condition. Effective upon rule adoption.
(a)Streamside are conditions shall allow the establishment, growth, and/or maintenance of native or non-native riparian vegetation appropriate to the site capability, that is sufficient to encourage shade and to protect the streamside area during high stream flow events up to and including those expected to occur during or following a 25-year, 24-hour storm event

OAR 603-095-1240
(3) Agricultural waste. Effective upon rule adoption.
(a) No person subject to these rules shall violate any provisions of ORS 468B.025 or ORS 468B.050.

See Appendix C for the language of ORS 468B.025 and 468B.050.

Resolution of Complaints and Enforcement Actions
ODA is informed of apparent occurrences of agricultural pollution through written complaints, its own observations, or through notification by another agency. ODA may conduct an investigation and may take enforcement actions pursuant to OAR 603-090-0060 through 603-090-0120, when reasonable attempts at initiating voluntary landowner involvement have failed. Figure 2.

ODA may investigate complaints from individuals against landowners or operators who are alleged to be out of compliance with the Area Rules. Individual complaints must relate to a specific property being managed under conditions resulting in a potential violation and include a thorough description of the

problem and location. The complaint must be filed with ODA in writing and be signed by the complainant. The complaint form can be found on ODA's website: www.oregon.gov/ODA/programs/NaturalResources/Pages/NRComplaints.aspx

If and where other governmental policies, programs, or regulations conflict with the Area Rules, ODA will consult with the agency(ies) and attempt to resolve the conflict in a reasonable manner.

The prevention and control measures do not apply to conditions resulting from unusual weather events or other exceptional circumstances that could not have been reasonably anticipated, such as fire, natural disaster, or extreme weather conditions.

2.6 Voluntary Measures and Strategies

2.6.1 Streamside Area Management

Adequate streamside vegetation provides three primary water quality functions (Council for Agricultural Science and Technology, 2012; National Council for Air and Stream Improvement, 2000; State of Oregon, 2000):

- Stream temperature moderation (vegetation blocks direct solar radiation),
- Reduced streambank erosion (roots stabilize banks and dissipate stream energy),
- Filtration of pollutants (e.g., bacteria, nutrients, toxics, sediment) from overland flows.

The Ag Water Quality Program uses the concept of "site-capable vegetation" to describe the vegetation that agricultural streamsides need to provide the functions that prevent and control water pollution as described in Section 1.4.5. Site-capable vegetation is the vegetation that can be expected to grow at a particular site, given natural site factors (e.g., elevation, soils, climate, wildlife, fire, floods) and historical and current human influences that are beyond the program's statutory authority (e.g., channelization, roads, invasive species, past land management).

There are many examples of management strategies that may be taken to protect and/or restore ecological functions in riparian and wetland areas to improve watershed health. See Appendix B for more information on streamside management or contact the Clackamas Soil and Water Conservation District for technical assistance.

2.6.2 Agricultural Waste

The aim of agricultural waste prevention and control is to minimize the transport of bacteria, nutrients, pesticides, pathogens, irrigation tailwater, and sediment into waters of the state. Because agricultural waste includes a broad range of substances, there are numerous conservation activities and strategies that may be taken to minimize waste inputs into waters of the state. A discussion of these strategies, broken down by pollutant, follows.

2.6.3 Livestock Waste: Nutrients and Bacteria

Manure is an important nutrient source for crop and pasture production. Proper livestock waste management can decrease nutrient and bacteria contamination of water resulting from agricultural activities. Livestock waste management includes providing for livestock crossing and water access such that livestock do not loiter in streamside areas or waterways. Examples of techniques to achieve this include off-stream watering, seasonal grazing, and exclusion (temporary or permanent).

There are many different conservation strategies a landowner or operator can take to help minimize animal waste reaching waters of the state. Vegetative buffer strips can minimize the effects of runoff, by catching pollutants before they reach a stream. Some examples of waste management systems are clean water diversions; waste collection, storage, and utilization; and facilities operation and maintenance.

If applying manure to cropland, it is important to apply at rates that do not exceed agronomic needs for nitrogen and phosphorus based on soil and/or tissue tests for the crop to be grown. It is also important to ensure that the storage or application of manure does not contaminate drinking water wells. Pasture management and/or prescribed grazing can help maintain the integrity of pastures, thus decreasing waste runoff.

2.6.4 Crop Nutrients

Crop nutrients are elements taken in by a plant that are essential to its growth, which are used by the plant in the production of its food and tissue. These elements include: carbon, hydrogen, oxygen, nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, zinc, iron, manganese, copper, boron, molybdenum, and chlorine. Sources of crop nutrients include, but are not limited to: irrigation water, chemical fertilizers, animal manure, compost, bio-solids, and leguminous and non-leguminous crop residues.

Over-application of crop nutrients may result in nutrients runoff to surface water or leaching into groundwater. This may cause nuisance algal growth, high pH, bacterial contamination, and a decrease in dissolved oxygen. Landowners and operators are encouraged to adopt sound agronomic strategies to guide crop nutrient applications, and to ensure that nutrient applications do not lead to contamination of drinking water wells. Sound agronomic strategies include:

- Using fertilizer at agronomic rates,
- Setting realistic yield goals,
- Regular calibration of fertilizer application equipment,
- Appropriate application timing,
- Use of weather reports and crop growth stage to guide application timing,
- Periodic soil testing and plant tissue analysis,
- Periodic nutrient analysis of manure and/or compost products that are applied,
- Managing irrigation to prevent nutrient loss through leaching and/or surface runoff,
- Carefully managing nutrient applications and accounting for “non-fertilizer” sources of nutrients such as manure, compost bio-solids and leguminous and non-leguminous crop residues.

2.6.5 Pesticide Use

As required by law, always apply chemicals in accordance with the label requirements in order to minimize crop damage, potential runoff, and leaching into groundwater. Read the label, and as required by ORS 634.372(2) and (4), follow label recommendations for both restricted use and general use pesticides. DEQ now requires a permit for pesticide applications in, over, or within three feet of water. This permit provides coverage for pesticide applications to control mosquitoes and other flying insect pests, weeds, algae, nuisance animals, and area-wide pest control. Please visit online for more information. (www.oregon.gov/deq/wq/wqpermits/Pages/Pesticide.aspx)

Calibrate, maintain, and correctly operate application equipment. Spray rigs need to be calibrated each time there is a change in product and/or application rate. Nozzles need to be replaced often, particularly if an abrasive pesticide formulation (such as wettable powders) is used. Sprayers need to be operated in the correct pressure range (dictated by the material and nozzle combination used), to prevent excess drift to non-target areas (e.g. waters of the state).

- Adopt integrated pest management (IPM) strategies. IPM promotes a diverse, multi-faceted approach to pest control. This strategy establishes an economic threshold for control actions, to guide the manager to use a variety of field/orchard sanitation and cultural practices, field scouting, beneficial insects, and other biological controls, and the use of properly selected chemical pesticides. While IPM does not exclude the use of chemical pesticides, it does seek to optimize their use and minimize off-target movement into the environment.
- Establish appropriate vegetative buffer strips. Buffer strips will help to retain soil and stabilize streambanks (many legacy pesticides persist in the environment and adhere to soil particles) and surface runoff (which may have dissolved pesticides) from making contact with waters of the state.
- Control erosion to minimize sediment entry into waterways.
- Store and handle pesticide materials correctly. Storage and handling facilities should be secure and include a leak-proof pad with curbing for mixing and loading. An alternative to a permanent, concrete pad is to always mix pesticides in the field, frequently moving sites to prevent chemical buildup. Wash/rinse water should be directly applied to the appropriate crop. Empty liquid pesticide containers should be triple rinsed, then punctured and disposed of in an approved manner. Dry chemical bags should be emptied completely. Bundle and store paper bags until they can be disposed of in an approved manner.
- Watch for a pesticide waste collection day in your area. These events allow individuals to safely and anonymously drop off unwanted, unused, or out of date agricultural pesticides, along with some empty containers.

2.6.6 Irrigation Tailwater

Over application of irrigation water, resulting in tailwater entering waters of the state, can adversely impact waterbodies by contributing warm water, nutrients, pesticides, and sediment to waters of the state.

Irrigation scheduling decisions based on arbitrary considerations, such as calendar flood irrigation should be avoided. Irrigation scheduling decisions should be based on site-specific factors that influence crop growth, such as:

- Evapotranspiration (crop type, stage of growth, percentage ground shade, weather conditions),
- Soil conditions (moisture, infiltration rate, water holding capacity),
- Irrigation system performance (uniformity, efficiency, application rate),
- Recent applications of crop nutrients and/or farm chemicals and other cultural practices (harvesting, cultivation, etc.).

A landowner or operator can use management strategies to help minimize irrigation tailwater reaching waters of the state include:

- Adopting an irrigation water management plan with irrigation soil moisture monitoring,
- Planting and irrigating crops on a contour,
- Planting sloping field edges to grasses,
- Installing sediment basins at field edges and in swales,
- Using drip irrigation when appropriate to crop type,
- Recycling return flows,
- Using no till or conservation tillage.

2.6.7 Sediment

While soil erosion is a natural process, poorly managed tillage operations and poorly managed streambanks can accelerate erosion rates to unacceptable levels. Erosion that results in sediment entering

waters of the state could lead to excessively turbid water, sediment deposition in the water body, and reduced water quality. If soil is moving off the land and into waters of the state, pesticides, bacteria, mercury, and nutrients will likely accompany it. The sediment will also act to fill and widen streams, resulting in temperature increases and filled-in gravel spawning grounds for fish. Sediment entering waters of the state can disrupt a fish's respiratory process after entering a fish's gills.

Activities and strategies that landowners and operators can use to minimize the mobilization of sediment into waters of the state include:

- Erosion prevention,
- Sediment control,
- Proper construction and maintenance of farm roads,
- Irrigation water management (described above).

Erosion prevention starts at the "top" of the hill by keeping soil particles from detaching and moving with water, wind, ice, or gravity. Sediment control is implemented at the "bottom" of the hill, after the erosion has occurred; for example, by placing straw bales in a swale to catch sediment. Landowners and operators are encouraged to use erosion prevention techniques first and follow up with sediment control techniques if needed. To minimize the mobilization of sediment into waters of the state, growers are encouraged to:

Use Erosion Prevention and Sediment Control Techniques

- Consider switching from conventional tillage to conservation tillage or no till. While soil erosion is a natural process, poorly managed tillage operations have the potential to accelerate erosion rates to unacceptable levels.
- Plant or till perpendicular to slope following elevation contour lines.
- Utilize soil health principles and avoid leaving your soil bare or uncovered. Plant a cover crop. USDA Soil Health Website: www.nrcs.usda.gov/wps/portal/nrcs/main/national/soils/health/.
- Under certain farming conditions, sub-soiling or deep ripping a field can improve water infiltration.
- Control the timing and location of livestock grazing.
- Properly designed and maintained conservation strategies such as strip cropping, catch basins, grass-lined waterways, vegetative filter strips, straw bales and other methods can be very effective in retaining sediment.

Construct and Maintain Agricultural Access Roads

Roads and road-related structures (e.g. stream crossings, bridge abutments, cut slopes, etc.) have been identified in many watersheds as being significant sources of sediment input to streams. Many management methods are available for constructing and maintaining roads to increase their stability and reduce erosion. Some conservation strategies that can be used to minimize runoff from roads and staging areas are to design and construct an appropriate culvert, maintain a grass cover where appropriate, and construct water bars and/or grading roads. Landowners may be held liable for water pollution from any road on their property and should carefully review the wording of any easement agreements.

While agricultural operations do not always have extensive road networks, a single poorly maintained road can comprise the vast majority of one farm's sediment output. Consultation on conservation measures for road construction and maintenance is encouraged, especially for roads built on steeper terrain, and for roads close to or crossing streams. Landowners may be held liable for water pollution from roads constructed on their property and therefore should review the wording of any easement agreements.

2.6.8 Warning Signs That Agricultural Waste May Be Reaching Water

Landowners often want to know what they need to do, or not do, to be in compliance with a rule or law. Some likely potential indicators of non-compliance with the Agricultural Waste Rule (OAR 603-095-1240(3)) include:

- Visible erosion scars in natural stream areas that would discharge soil into waterways,
- Visible sloughing from drainage ways in conjunction with livestock grazing, tillage, or other human destruction of riparian vegetation,
- Eroding road ditches, drainage ways, and field borders,
- Underground drainage tile outlets either improperly installed or maintained, allowing bank erosion to occur,
- Surface runoff from roads and staging areas that pick up contaminants and flow to waters of the state,
- Irrigation application that creates surface runoff entering the waters of the state,
- Nutrients applied to open water,
- Visible trail of manure, compost, ash, or bio-solids to waters of the state,
- Pesticide product applied to open water unless labeled for such use and permitted,
- Chemigated waters flowing into surface waters, or flowing into or ponding around wells, cisterns, or other direct conduits to ground water,
- Runoff flowing through areas of high livestock usage and into waters of the state livestock waste located in drainage ditches or areas of flooding.

2.6.9 Upland Management

Role of Upland Vegetation to Prevent and Control Pollution

Upland areas are the rangelands, forests, and croplands located upslope from streamside areas. Upland areas extend to the ridge-tops of watersheds. With a protective cover of crops and crop residue, grass (herbs), shrubs, or trees, these areas will capture, store, and safely release precipitation, thereby reducing the potential of excessive soil erosion or delivery of soil or pollutants to the receiving stream or other body of water.

Healthy upland areas provide several important ecological functions, including:

- Capture, storage, and moderate release of precipitation reflective of natural conditions,
- Plant health and diversity that support cover and forage for wildlife and livestock,
- Filtration of sediment,
- Filtration of polluted runoff,
- Plant growth that increases root mass, utilizes nutrients, and stabilizes soil to prevent erosion.

Chapter 3: Strategic Initiatives

Goal
The goal of the Clackamas Agricultural Water Quality Management Area Plan is to prevent and control water pollution from agricultural and rural lands within a framework of economic profitability and agricultural viability. The Area Plan is also designed to achieve applicable state water quality standards.

3.1 Measurable Objectives

3.1.1 Management Area

Measurable objectives allow the Ag Water Quality Program to better evaluate progress towards improved water quality. A measurable objective is a numeric long-term desired outcome to achieve by a specified date. Milestones are the interim steps needed to make progress toward the measurable objective and consist of numeric short-term targets to reach by specific dates. Together, the milestones outline the timeline needed to achieve the measurable objective.

The Oregon Department of Agriculture, the LAC, and the LMA are currently working together on a long-term goal of developing measurable objectives at the Management Area scale. Although measurable objectives are not available at this time, the ODA is currently researching and working toward developing measurable objectives for consideration in the Management Area.

3.1.2 Focus Areas

The Deep, Doane, Dolan, and Upper Johnson Creek Focus Area was closed in June of 2015. Currently there is not a Focus Area in the Clackamas MA. The Clackamas SWCD (LMA) has moved their efforts to the Pudding River located in the Molalla-Pudding-French Prairie-North Santiam MA. The Molalla-Pudding-French Prairie-North Santiam is another Management Area within the Clackamas SWCD service boundary. The Clackamas SWCD is committed to working in the Pudding River for some time into the future so there is no current planning of a Focus Area in the Clackamas MA. Refer to the 2017 Clackamas Area Plan for information and results related to the now closed Deep, Doane, Dolan, and Upper Johnson creeks.

3.1.3 Strategic Implementation Areas

ODA is implementing a Strategic Implementation Area (SIA) approach in Oregon to help prevent and control water pollution from agricultural activities by working with agricultural landowners and natural resources partners in small watersheds. SIAs are priority areas where ODA identifies and aids those who may need assistance complying with water quality regulations.

Noyer Creek watershed was chosen in 2013 as an SIA in the Clackamas Management Area. The Noyer Creek SIA work is almost completed. See section 3.1.3.1 for description and Table 10 and section 4.1.3 for evaluations and report for the Noyer Creek SIA.

Noyer Creek SIA (2013-2015)

In 2013, the Noyer Creek watershed was selected as one of two areas to test the Strategic Implementation Area approach. Noyer Creek is a small watershed (approximately 2,500 acres) between Damascus and Boring in Clackamas County. The watershed originates just north of Highway 212 and flows into Deep

Creek just north of Highway 224 and then into the Clackamas River. Agricultural activities in the watershed consist mostly of nurseries and pasture. The other primary land uses are rural residential and forestry. Results are discussed in Section 4.1.3 and Table 10.

3.1.4 Pesticide Stewardship Partnership

The Clackamas River provides drinking water for 300,000 people, recreation for thousands, and safe harbor for endangered fish to spawn, rear and migrate. The Clackamas Basin Pesticide Stewardship Partnership (Clackamas PSP) is a voluntary, collaborative process to protect the river and its tributaries. Local and state organizations offer water quality monitoring, resources and training for landowners and managers to enable more efficient and effective pesticide use that reduces drift and runoff.

Voluntary Steps in a PSP:

1. Monitor water quality to identify pesticides of concern (approaching or above unsafe levels, or found at high frequencies).
2. Share and explain water quality monitoring results with those who are interested in protecting the quality of local streams and rivers.
3. Engage pesticide users and technical assistance providers to identify and implement voluntary solutions to reduce pesticide drift, runoff, and waste.
4. Use long-term water quality monitoring to measure success in reducing pesticides of concern and evaluate the effectiveness of strategies.

Oregon's Pesticide Stewardship Partnerships (PSPs) began in the Hood River basin and have expanded to seven watersheds in the Willamette and Columbia River Basins. Partners have included local landowners, grower groups, watershed councils, soil and water conservation districts, water provides, Department of Environmental Quality, Oregon Department of Agriculture, Oregon State University, tribes, Oregon Environmental Council, and several other nonprofit organizations. Providing technical resources and water testing to local experts, these partnerships have resulted in locally led initiatives that improve pest management efficiency and create measurable environmental improvements. See section 4.1.4 for PSP water quality report and program accomplishments.

3.2 Strategies and Activities

3.2.1 Strategies

- Prevent runoff of agricultural wastes: agricultural activities will not discharge any wastes or place waste where it is likely to run off into waters of the state.
- Prevent and control upland and cropland soil erosion using practical and available methods.
- Control active channel erosion to protect against sediment delivery to streams.
- Prevent bare areas due to livestock overgrazing near streams.
- Establish streamside vegetation along streams on agricultural properties to provide streambank stability, filtration of overland flow, and moderation of solar heating.

3.2.2 Activities

The activities provided in the following sections were determined by the ODA, the LAC, and the LMA as a means to achieving the goal and strategies of the Area Plan. The activities outlined are to be carried out typically by the ODA and the LMA (SWCD). In the Clackamas Management Area, the Clackamas Soil and Water Conservation District is the primary LMA and local expert and they work in collaboration with ODA in achieving the goal and strategies of the Clackamas Area Plan. Agricultural landowners and

operators are highly encouraged to participate in the listed activities on their own farms and or in cooperation with the SWCDs, watershed councils, and Management Area partners or through their different grower groups or agribusiness associations. See Appendix A for contact information.

Every two years, with recommendations from the LAC (provided during biennial reviews) and in consultation with ODA, the LMA will select from the activities outlined below that best suit the capability, priorities, and resources of the LMA (SWCD). The LMA details the specific tasks they will implement in their Scope of Work and Focus Area Action Plan, which are submitted to the ODA every two years to receive funding for Area Plan implementation. It is also important that the ODA, the LMA, and Management Area partners consider working together to implement the activities in the Area Plan as opportunities, funding, and resources allow. See Chapter 4 for accomplishments and progress towards implementing these activities.

Community and Landowner Engagement

A key component to achieving the strategies of the Area Plan is working to engage the agricultural community. It is recommended that the ODA, the LMA, and Management Area partners develop, promote, and conduct events and activities that directly connect with the agricultural community. Activities should include a range of opportunities for agricultural landowners and operators to strengthen their knowledge and capacity to prevent and control water pollution from agricultural activities as well as provide information about specific agricultural water quality issues that are of concern in the Clackamas MA.

The list of recommended activities outlined below are provided for the ODA, the LMA (SWCD), and Management Area partners to consider when putting together a strategy for community and landowner engagement or are planning an event or activity aimed at achieving the goal and strategies of the Area Plan. Engaging the agricultural community should be considered at all levels from small to large-scale growers to family farms, nurseries, equine facilities, and livestock operations. Events and activities should be structured to address the diverse agricultural systems and related water quality concerns found in the Clackamas Management Area (Table 2 - Chapter 2).

Focus of Community and Landowner Engagement Activities

a. The Clackamas Area Plan has identified bacteria, stream temperature, and mercury as priority water quality parameters of concern (Table 8). Events and activities related to agricultural water quality management should have a focus on these water quality concerns whenever possible.

b. The Clackamas Area Rules (PCMs in section 2.5) specify fundamental conditions for streamside areas and the management of agricultural waste. Emphasis, when conducting events and activities related to agricultural water quality management, should include information regarding these management objectives whenever possible.

The following activities are recommended at the local level and should be conducted in a manner that encourages cooperative efforts and promotes voluntary participation.

a. Develop an outreach strategy to inform the agricultural community of issues and events related to agricultural water quality prevention and control. This includes but is not limited to the distribution of informational material, interactions on social media, hosting a web page, creating a quarterly newsletter, and submitting public service announcements to local sources of news and communications.

b. Develop, promote, and conduct events or activities (connect, inform, and engage) that function to:

- Increase awareness of agricultural water quality concerns related to the Clackamas MA.

- Inform agricultural landowners and operators of the availability of technical assistance and farm planning public services available in the Management Area. Appendix A.
- Inform agricultural landowners and operators of the availability of cost-share and programs available in the Management Area. Appendix D.
- Inform agricultural landowners and operators of their responsibilities toward preventing and controlling water pollution and soil erosion from agricultural activities. Sections 2.5 and 2.6.

c. Develop, promote, and conduct events or activities (instruct and educate; see sections 2.5 and 2.6 and Appendix B) that function to strengthen the knowledge and capacity of agricultural landowners and operators to:
- Prevent and control water pollution from agricultural activities.
- Prevent and control soil erosion from agricultural activities.
- Self-evaluate their agricultural operation and their impacts to water quality from agricultural activities.

d. Produce and or distribute informational material such as brochures, videos, and fact sheets related to the prevention and control of water pollution from agricultural activities.

e. Increase awareness of the agricultural community's efforts at water quality management and demonstrate successful and innovative efforts toward preventing and controlling water pollution from agricultural activities such as, but not limited to, conducting farm tours or writing success articles.

Technical Assistance

The ODA can provide technical assistance, however the LMA (SWCD) is a non-regulatory partner and a local source of expert knowledge and are more capable to serve the Management Area's agricultural community in this capacity. The ODA, the LMA, and Management Area partners should work together whenever possible to provide a strong foundation of technical support and site-specific evaluations that work to strengthen the ability and capacity of agricultural landowners and operators to solve water quality management challenges.

Effective water quality management depends on activities and structural measures that are the most effective, practical means of controlling and preventing pollution from agricultural activities. Appropriate management activities for individual farms may vary with the specific cropping, topographical, environmental, and economic conditions at a given site and should fit within a framework of economic profitability and agricultural viability. Technical assistance should also be carried out in a manner that encourages the agricultural landowner or operator to work cooperatively and participate in the voluntary efforts necessary to accomplish the Area Plan's goal.

Implementing farming practices that prevent and control water pollution from agricultural activities by the agricultural community is crucial to the success of the Area Plan. Agricultural landowners and operators are encouraged to participate in technical assistance activities by supporting and participating in the activities outlined in the Area Plan as well as providing guidance and direction on local agricultural water quality concerns and solutions to ODA, the LMA, agribusiness associations, and Management Area partners. Serving as a LAC member or on an SWCD or watershed council board and participating in local grower groups and agribusiness associations are ways to contribute. The Clackamas agricultural community is the best resource for local and specialized technical information related to agricultural management practices. Agricultural landowners and operators are encouraged to share their practical working knowledge of farming practices that work toward the prevention and control of water pollution with others who would benefit. Sections 2.5 and 2.6 and Appendix B provide basic guidelines for preventing and controlling water pollution from agricultural activities. Appendix A provides contact information for educational and technical guidance related to natural resources and farm management.

Scope of Technical Assistance
The scope of technical assistance, specifically provided by the LMA, should include a range of information applicable to the local agricultural systems found in the Management Area (Chapter 2 - Table 2) and should be:

- Flexible to provide options for the landowner or operator to choose from or adapt to,
- Tailored and scaled to the agricultural operation or activity,
- Technically sound,
- Planned for operational efficiency,
- Emphasizes long-term solutions,
- Economically feasible to implement successfully, and
- Strengthens the ability for agricultural landowners and operators to self-evaluate their agricultural operation and their impacts to water quality from agricultural activities.

Listed below are recommendations for technical assistance activities:

a. Provide one-on-one technical assistance and consultation to agricultural landowners and operators regarding the prevention and control of water pollution and soil erosion from agricultural activities. Sections 2.5 and 2.6 and Appendix B.

b. Provide on-site evaluations for agricultural landowners and operators to identify potential water quality concerns and recommend solutions that prevent and control water pollution and soil erosion from agricultural activities. Sections 2.5 and 2.6 and Appendix B.

c. Provide assistance to agricultural landowners and operators who would like to develop and implement a conservation farm or ranch plan that may include, but not limited to nutrient management plans, pasture management plans, soil health management, and irrigation water management.

d. Provide technical assistance for the development, implementation, and maintenance of on-the-ground projects that prevent and control water pollution and soil erosion from agricultural activities. Section 2.6 and Appendix B.

e. Assist agricultural landowners and operators by providing information on funding opportunities as well as assistance in applying and enrolling in cost-share programs as needed. Appendix D.

f. Develop, promote, and conduct events or activities (instruct and educate; see sections 2.5 and 2.6 and Appendix B) that function to strengthen the knowledge and capacity of agricultural landowners and operators to:

- Prevent and control water pollution from agricultural activities.
- Prevent and control soil erosion from agricultural activities.
- Self-evaluate their agricultural operation and their impacts to water quality from agricultural activities.

<u>Biennial Review of the Clackamas Area Plan</u>

Every two years the ODA will conduct a review of the progress made toward achieving the Area Plan's mission, goals, and objectives. The ODA will administer the Area Plan, coordinate the LAC, and work with the LMA to conduct the biennial review meeting(s). Biennial review activities:

a. Adapt and modify the Area Plan to accommodate recently identified challenges, new data, new information, and shifting priorities.

b. Convene the LAC members and recruit new members as needed.

c. Compile and report the most recent results of ODA's compliance actions in the Clackamas MA.

d. Review progress and achievements toward the Area Plan's goals and objectives by ODA, the LMA, and Management Area partners by tracking outputs and reporting accomplishments.

e. Analyze available water quality monitoring data and report the status and trends indicated.
f. Evaluate and measure progress toward achieving the Area Plan's goals and objectives by setting and evaluating milestones, describing outcomes, and developing measurable objectives.
g. Deliberate and troubleshoot impediments to achieving the goals and objectives of the Area Plan.

Partnerships

The Area Plan can only achieve its goal through the cooperative and voluntary efforts of the agricultural community, the ODA, the LMA, the LAC, and Management Area partners. An essential activity to achieving the goal of the Area Plan is for ODA and the LMA to work in association with Management Area partners, local agencies, stakeholders, grower groups, and agribusiness associations as well as encourage individual agricultural landowners and operators to engage in local partnerships and efforts that work toward similar goals and objectives described in the Area Plan. There are several benefits to bringing together individuals and groups to participate in common efforts and mutual activities such as collective resources, diverse expertise, and shared funding. It is recommended as time, opportunities, and funding allow, that ODA and the LMA collaborate and participate in partner efforts to improve water quality in agricultural and rural lands of the Clackamas MA.

The LMA and ODA should facilitate and collaborate with Management Area partners to conduct activities such as landowner and community engagement events, provide technical assistance, attend the biennial review of the Area Plan, assist with strategic initiatives, and collaborate in water quality monitoring.

3.3 Monitoring and Evaluation

Monitoring is an essential activity to tracking the status and trend of water quality in the Clackamas as well as understanding the influences landscape conditions have on water quality. Data collected from monitoring efforts can be useful in developing measurable objectives that measure changes in environmental conditions. Data can also be utilized in software applications that model landscape conditions. Additionally, data analysis and results can be informative in determining if goals and strategies of the Area Plan are being achieved.

Water quality monitoring must be performed using quality assurance procedures and specialized equipment that takes funding, time, and resources to accomplish. Monitoring water quality and landscape conditions for the purposes of the Area Plan is recommended as an activity to be carried out and collaborated on by ODA, the LMA, and Management Area partners. Currently, water quality monitoring is occurring throughout the Clackamas MA. Refer to Chapter 4 for a description of monitoring and evaluation efforts and results for the Clackamas Management Area.

Monitoring Activities
Listed below are recommendations for monitoring activities that may be completed as opportunities, funding, and resources allow:

a. Develop a water quality-monitoring plan that works to achieve long-term baseline data collection and allows for ease in sharing data with partners and collaborating with other monitoring efforts.
b. Develop quality control plans to guarantee that data collected can be used for the intended purposes and analysis with confidence.
c. Perform water quality monitoring for a set of selected water quality parameters to establish a baseline of water quality data.
d. Evaluate Light Detection and Ranging (LiDAR) information to understand vegetative conditions along streams in agricultural areas

e. Identify data gaps that are needed to fully understand influences and changes in water quality.
f. Consider applying for grants or partnering with others to fund and implement monitoring efforts.
g. Consider a monitoring project that seeks to innovate or sample new approaches to measuring water quality conditions or generates new technology or software to monitor environmental changes related to water quality.

3.3.1 Status and Trend Monitoring and Evaluation

Status and trend monitoring and evaluation assists DEQ in fulfilling its roles in the biennial review process described in the Memorandum of Agreement between ODA and DEQ. Water quality status and trends reports are created to inform discussions between DEQ Basin Coordinators and ODA Agriculture Water Quality Specialists prior to the biennial review. The discussions between DEQ and ODA prior to the biennial review could include: water quality and what's working and not working, source(s) and solutions, data needs and future monitoring to answer these questions. The status and trend report present an analysis of water quality data readily accessible from public databases and available in sufficient quantity to indicate status and trends.

Water quality data were retrieved from DEQ, EPA and USGS databases. DEQ's volunteer monitoring database was not included, however some volunteer data is queried from EPA's database. Many organizations provided data used in this report. Data collected between January 1, 2000 and October 1, 2018 within the Clackamas Management Area were included in this report. Parameters included in the data query were temperature, pH, dissolved oxygen, total suspended solids, total phosphorus, and bacteria (*E. coli*). Monitoring stations, which had at least two years of recent data and/or at least 8 years of data, fit the criteria to assess status and trends (see section 1.3 in the full report). The report will be updated for future biennial reviews. Their report is summarized in section 4.4 and Table 14 and can be found at https://www.oregon.gov/deq/wq/programs/Pages/wqstatustrends.aspx.

Chapter 4: Implementation, Monitoring, and Adaptive Management

Table 9 provides the framework for measuring and evaluating progress toward achieving the goal and strategies of the Area Plan. The table identifies activities to achieve the goal and strategies, specifies indicators to evaluate progress, and details the sections where tracked and reported accomplishments are located. This framework illustrates the course for discussing implementation, monitoring, and adaptive management of the Area Plan.

Table 9: Framework for Measuring and Evaluating Progress Toward the Goal and Strategies of the Clackamas Subbasin Management Area Plan		
Goal: Prevent and control water pollution from agricultural activities and soil erosion and to achieve applicable water quality standards. **Strategies:** See Section 3.2 for strategies.		
Activities to Achieve the Goal and Strategies of the Area Plan		
Strategic Initiatives	**Clackamas MA Implementation**	**Water Quality Monitoring**
• Section 3.1.1: *Measurable Objectives (MO) • 3.1.2: Focus Areas (FA) • 3.1.3: Strategic Implementation Areas (SIA) • 3.1.4: Pesticide Stewardship Partnership (PSP)	• Section 2.5: Prevention & Control Measures. • Section 2.6: Voluntary Measures and Strategies. • 3.1.1-3.1.4: Strategic Initiatives • 3.2.2.1 - 3.2.2.4 Activities	• Section 3.3: Water Quality Monitoring • 3.3.1: Status & Trend Monitoring & Evaluation • 3.1.4: Pesticide Stewardship Partnership (PSP) • 3.2.2.4: Partnerships
Progress Indicators for:		
Strategic Initiatives	**Clackamas MA Implementation**	**Water Quality Monitoring**
• *(MO) evaluation and results. • (FA) milestone/s, tracked outputs and applied farming practices • (SIA) evaluation and compliance results • (PSP) water quality monitoring data, analysis, & reporting; reduction activities	• Applied farming practices. • Tracked outputs and reporting for activity sections 3.2.2.1 - 3.2.2.4	• Water quality status & trend data, analysis, and reporting. • Partner water quality monitoring data, analysis, & reporting • PSP water quality monitoring data, analysis, & reporting; reduction activities
Activity Accomplishments – Tracking and Reporting Chapter 4 Sections		
Strategic Initiatives	**Clackamas MA Implementation**	**Water Quality Monitoring**
• (*MO) 4.1.1 • (FA) 4.1.2 • (SIA) 4.1.3 & Table 10. • (PSP) 4.1.4 & Tables 11 & 12.	• 4.2, 4.2.1, & 4.3 • Table 13	• 4.1.4, 4.4, 4.4.1, & 4.4.2 • Tables 11, 12 & 14
* Currently measurable objectives are not available for the Management Area. Research and development of MOs is currently in progress.		

4.1 Progress Toward Strategic Initiatives

4.1.1 Management Area

The Oregon Department of Agriculture, LAC, and LMA will establish measurable objectives and associated milestones for each Area Plan. Many of these measurable objectives relate to land conditions and primarily are implemented through the Focus Area work (section 1.7.3) (currently, there is no Focus Area in the Clackamas MA), with a long-term goal of for developing measurable objectives and

Table 10: Summary of Results for the Noyer Creek SIA 2013 to 2015		
Concern Level		**Evaluation Results**
Total Assessed Tax Lots		237
Potential Violation		2
Opportunities for Improvement		16
Limited Opportunities for Improvement		219
Cases Opened	**Closed**	**Open to Date**
7	6	1
Description of Concern Levels Potential Violation: Likely potential for agricultural activities to impair surface or ground water or agricultural activities may be preventing adequate vegetation along streams (field verified) or field verified likely violation such as discharge of agricultural waste into waters of the state or active removal of riparian vegetation. Opportunities for Improvement: Possible potential for agricultural activities to impact surface or ground water or agricultural activities may be preventing adequate vegetation along streams. Limited Opportunities for Improvement: No water quality concerns related to agricultural activities were observed or minimal potential for agricultural activities to impact surface or ground water or vegetation along streams may be inadequate but unable to determine if agricultural activities are limiting vegetation.		
Summary of Compliance Actions		
18 cases were open. 11 properties were determined after speaking with the landowners that they were either Limited Opportunities for Improvement, already working with the SWCD or there were no agricultural activities on site.		
Pre-Enforcement Actions: 7. Water quality concerns were related to manure management, riparian conditions, and soil erosion. 4 Water Quality Advisories (WQA) were given. WQAs required no follow up. 2 Letters of Compliance were sent to 2 landowners after working with ODA and the SWCD to address concerns. Follow up site visits indicated they were in compliance. All cases closed.		
Enforcement Actions: 1. One Notice of Non-Compliance. Landowner is working with ODA and Clackamas SWCD to address concerns. Case is still open.		

monitoring methods at the Management Area scale. Although not available at this time, ODA, the LAC, and the LMAs are working to draft measurable objectives for the Clackamas Management Area.

4.1.2 Focus Areas

Deep, Doane, Dolan, and Upper Johnson Creek Focus Area (2013 to 2015 Closed): The Deep, Doane, Dolan, and Upper Johnson Creek Focus Area was closed in June of 2015.

4.1.3 Strategic Implementation Areas

The Noyer Creek Strategic Implementation Area 2015-2017 work has been completed and has one case still open. Table 10 is a summary of the evaluation. See section 3.1.3 for background information and a description of the Noyer Creek SIA. ODA selects new SIAs annually and the potential to return to the Clackamas MA could be considered in the future. Compliance evaluations were mainly focused on manure management, bare ground, and streamside condition.

4.1.4 Clackamas Pesticide Stewardship Partnership

Excerpted from the Clackamas Pesticide Stewardship Partnership 2015 to 2017 Biennial Summary. For the full report go online at:
https://www.oregon.gov/ODA/shared/Documents/Publications/PesticidesPARC/ClackamasSummary.pdf

Table 11: Water Quality Monitoring Stations 2015 to 2017 Biennium				
Station Number	**Description**	**Predominate Land Use**	**No. Detections**	**BM* Exceedances**
1	North Fork Deep Creek @ Hwy 212	Agriculture	291	21
2	Sieben Creek @ Hwy 212	Urban	75	0
3	Noyer Creek @ Hwy 212, St. Paul Church	Agriculture	211	36
4	Rock Creek @ 172, Stony Brook Ct.	Agriculture	90	1
5	Eagle Creek @ Eagle Fern Park	Mixed	0	0
6	Deep Creek (Crane and Gold Rd)	Agriculture	0	0
*BM = US EPA Aquatic Life Benchmark for Pesticides				

The Clackamas Pesticide Stewardship Partnership (PSP) was initiated in 2005, after the completion of a five-year monitoring study of the watersheds streams and drinking water by U.S. Geological Survey (USGS) which showed the presence of a significant number of current use pesticides in streams and finished drinking water. As part of the PSP program, water quality is monitored for pesticide residues beginning in March and continuing through June and again in September and continuing through mid-October. During the period July 1, 2015 through June 30, 2017, water quality samples were collected from six locations. Results of significant note are the number of detections of the insecticides chlorpyrifos, diazinon, and imidacloprid, which increased in detects from a total of 22 during the 2013 to 2015 monitoring period to 56 during the 2015 to 2017 biennium. Most of the detection increases were at the North Fork of Deep Creek and Noyer Creek monitoring locations. Table 11 summarizes the results.

During the past two biennium's (2013 to 2015 and 2015 to 2017) the Oregon Water Quality Pesticide Management Team (WQPMT) has awarded OSU two technical assistance grants to focus on the implementation of Integrated Pest Management (IPM) practices related to raising Christmas trees. During the 2015 to 2017 biennium, an award of $25,169.97 was made for the development, implementation, and effectiveness monitoring of these practices. In addition, the Clackamas River Basin Council (CRBC) was awarded $6,250.00 to collect in-field water quality samples used to evaluate the status of monitored waterbodies related to pesticide presence.

During the 2015 to 2017 biennium, the WQPMT placed emphasis on adding stream discharge monitoring to all WQ sampling stations, which allows for a more thorough evaluation of WQ data. During the 2017 to 2019 biennium measurements of surface water flow will begin at all WQ monitoring locations except for Rock Creek where flow data is derived via a permanent discharge meter that is installed and operated by the Clackamas County Water Environment Services.

The CRBC has conducted several activities in support of PSP goals within the watershed. Examples of these activities conducted during the 2015 to 2017 biennium are:

- Pesticide collection events.
- Offering producers up to $500 toward sprayer nozzles and other parts that make sprayers more efficient to reduce the need for repeated applications. Conducting sprayer calibration workshop that included pesticide certification credits.
- Worked with regional crop advisors in providing a hands-on workshop on drift-reducing spray nozzles and calibration.
- Conducted educational opportunities to producers regarding beneficial insects as natural enemies of crop pests. Classes, field days, and materials provided assisted in insect identification and habitat creation.
- Conducted focused separate classes for the Christmas tree and nursery industries addressing their specific needs regarding Integrated Pest Management.

- Calibrated windsocks that attach to a tractor or sprayer, providing location-specific information for better decisions.

Table 12: Pesticides of Concern Detected in the Clackamas Pesticide Stewardship Partnership		
Pesticide	**Common Trade Names**	**Pesticide Classification**
Carbaryl	Dicarbam. Seven, Thinsec	Insecticide
Chlorpyrifos	Dursban, Lorsban , Piridane	Insecticide
Diazinon	Diazinon, Knox Out	Insecticide
Dimethenamid	Outlook, Tower	Herbicide
Diuron	Direx, Karmex	Herbicide
Ethoprop	Mocap	Insecticide
Imidacloprid	Amire, Gaucho, Premier, Provado	Insecticide
Oxyfluorfen	Goal, Koltar	Herbicide
Sulfometuron-methyl	Ally, Escort, Oust	Herbicide
Note: Currently, there is not enough information or research to show that detection of these pesticides at low levels or as a mix of chemicals cause a human or ecological health risk or threat. Additional monitoring and research are needed to better understand the risk to human and ecological health. With that stated, the presence of these pesticides in water samples can show that pesticide residues are most likely reaching streams.		

Record of Pesticide Collection Events:
Since 2007, there have been seven pesticide collection events in Clackamas County sponsored by Clackamas SWCD and Clackamas River Water Providers. The CRBC and DEQ each sponsored an event as well. Below is a summary of the amount of unused, old, restricted, or damaged agricultural pesticide waste collected. Clackamas SWCD paid for disposal of chemicals that Clackamas County producers brought to the event.

Pounds of Pesticide	Date Collected
19,500	June 2018
9,150	April 2017
12,427	November 2016
18,627	June 2013
21,166	October 2011
35,184	March 2011
18,351	2009
17,500	2007
151,915 (75.9 tons)	**Total since 2007**

4.2 Activities and Accomplishments

The Area Plan's LMAs (SWCDs) track activities that have been implemented through quarterly reports to ODA. Section 4.2.1 is a summary of the LMAs work during the last biennium and Table 13 is an approximate summary of the LMA's outputs toward implementing the activities lined out in section 3.2. Data is provided by the Clackamas SWCD.

4.2.1 Local Management Agency Activities and Accomplishments

Clackamas Soil and Water Conservation District
Agricultural water quality technical assistance and on-site evaluations most often requested from the Clackamas SWCD was related to soil erosion from fields and streambanks and manure management from

livestock and horse operations. The District found that the most challenging water quality concerns they faced in the last biennium were related to invasive weeds displacing native riparian vegetation and finding contractors to do small projects (install practices) for a reasonable price.

The District's Facebook page is where the District posts information regarding pasture and manure management, workshops, native plant sales, riparian planting information, etc. The District also posts numerous times per month on the District's webpage, which is then wrapped up into a monthly e-newsletter and sent to those who subscribe. Our WeedWise, Conservation Planning, Outreach and Education, and Administration departments also publish regular updates on our website regarding projects and events.

The District partnered with the Clackamas River Water Providers to produce the Field to Faucet brochure. The publication reminds folks that their streams may feed into a river that provides drinking water to many people. It outlines a number of practices that will protect water quality and includes links to additional information. The District also published Conservation on Steep Slopes, which explains how to evaluate your slope, provides best management practice for living on a slope, signs of soil movement, and when to call a specialist. The District's partnerships with the watershed council, water providers, and other local organizations and government have all been valuable to implement our tasks and activities.

January 2017- December 2018 Events:

- Mud and Manure Management – 2017
- Pasture Management – 2018
- Using Beneficial Insects to Control Crop Pests March 2017
- Beneficial Insect Field Day – June 2017 and 2018
- Lavender Festival - June 2018

Table 13: Clackamas Subbasin Agriculture Water Quality Management Area's Reporting of Activities and Accomplishments January 1, 2017 to December 31, 2018
Accomplishments completed by Clackamas SWCD

Community and Landowner Engagement Events and Activities	**July 2015 to December 2016**	**January 2017 to December 2018**	**Cumulative Total 2015 to 2018**
Community and Landowner Events and Activities	**16**	**8**	**24**
Total Attendees to all Events and Activities	**1,526**	**249**	**1,775**
Fact Sheets/ Brochures Developed	**4**	**2**	**6**
Newsletters	**2017 to 2018:** 24 monthly newsletters generated on web posts and sent electronically. 158 people subscribe.		
Technical Assistance	**July 2015 to December 2017**	**January 2017 to August 2018**	**Cumulative Total 2015 to 2018**
Landowners Provided with Technical Assistance	**52**	**76**	**128**
On-Site Evaluations	**31**	**46**	**77**
Cost Share/ Funding Applications Submitted	**17**	**3**	**20**
Voluntary Conservation Plans Prepared	**10**	**12**	**22**
Total Acres in Conservation Plans	**509.3**	**714.9**	**1,224.2**

2017-2018 Applied Farming Practices	**Units**	**Watershed**
Fencing	800 ft.	Clackamas
Roof Runoff Structure	2 ea.	Clackamas
Tree and Shrub Establishment/ Riparian Plantings	6 ac.	Clackamas
Watering Facility	2 ea.	Clackamas
Irrigation System -Tailwater Recovery	22 ac.	Clackamas

4.3 Partnership Activities and Programs

Clackamas Soil and Water Conservation District and the Clackamas River Water Providers
Field to Faucet: The Field to Faucet outreach campaign is the product of the Clackamas SWCD and the Clackamas River Water Providers. They have come together to form a partnership focusing on clean drinking water in the Clackamas River Watershed. The outreach works to engage the agricultural community in improving farming practices by providing information and contacts that can assist them with technical and financial assistance. The focus of the outreach is on pesticide management, groundwater awareness, soil health, manure management, septic care, invasive plants, and integrated pest management. 4,100 Field to Faucet brochures were mailed to agricultural parcels in the Clackamas River Water Providers database in 2018.

Clackamas River Basin Council Shade Our Streams
Shade Our Streams is a multi-year community tree-planting project to improve water quality in the Clackamas River basin. The project will plant more than 300,000 native trees along 30 stream miles, restoring streamside habitat at no cost to property owners. Shade Our Streams will focus on planting along the streams that need the most help; those areas that lack healthy habitats and are overrun with invasive weeds. Native trees improve water quality and create better habitat for plants, animals, and fish. As of January 2017, over 100 landowners are currently enrolled in the program and 350,000 natives have been planted along 21.6 stream miles, covering 133.25 acres, and spread over 127 tax lots.

Box 1: Clackamas Cotton Brief Challenge – Partnership Project Highlight
by the Clackamas Soil and Water Conservation District

Clackamas SWCD had one promotion that gained a lot of traction regarding healthy soil and the benefits, including improved infiltration, reduced erosion, and healthier crops. Soil Your Undies – the Clackamas Cotton Brief Challenge was taken on by a number of producers in our county. This program asked producers and home gardeners to bury a pair of 100% cotton briefs in a hole 6-8 inches deep. After two months we asked them to dig up their briefs. If the cotton was mostly decomposed, then the soil is healthy because there is a good population of microbes present. If the briefs were just dirty, but mostly intact, then we recommended they did some work on improving their soil health. We used cotton briefs because if there was a good microbe community then after two months you might not find your underwear, *Except* for the elastic band which the microbes will not touch.

We had a number of participants. They produced Christmas trees, hazelnuts (two producers), blueberries, nursery stock, cattle, sheep, plus two home gardeners. In addition, we buried four pair at our Conservation District farm. I also wrote a three part series of articles on the program and many of the local newspapers reported on it. The Wilsonville/West Linn newspaper interviewed me for 20 minutes, wrote a great article, and it was picked up by KOIN 6 TV. They came out and filmed me digging up underwear. They aired the story on the 4 p.m. and 5 p.m. evening news and again on the 6 a.m. newscast. We also made the front page header on the Oregon City News/Clackamas Review with a larger than life photo on the next page.

Our fair booth also caused a stir with a size 50 pair of briefs flying above our booth asking folks to "Ask us about Soil Health." We also had five pairs of underwear in various stages of decomposition strung inside the booth from farms in Clackamas County. We are working on a soil health workshop for this fall or winter.

If you live on, or know of a streamside area overrun with invasive weeds and/or lacking shade, we want to hear from you! Please contact Suzi Cloutier at suzi@clackamasriver.org or at 503-303-4372, x105.

They work in Boring, Damascus, Happy Valley, Sandy, Estacada, Eagle Creek, Redland, Viola, and parts of Gladstone and Oregon City.

Oregon Watershed Enhancement Board
The Oregon Watershed Enhancement Board (OWEB) is a state agency that provides grants to help Oregonians take care of local streams, rivers, wetlands, and natural areas. Community members and landowners use scientific criteria to decide jointly what needs to be done to conserve and improve rivers and natural habitat in the places where they live. OWEB grants are funded from the Oregon Lottery, federal dollars, and salmon license plate revenue. The agency is led by a 17-member citizen board from the public at large, tribes, and federal and state natural resource agency boards and commissions. Since 1995, OWEB has funded approximately 51 water quality and aquatic habitat improvement projects on agricultural and rural lands in the Clackamas MA. Projects: culvert replacements, bridge installations, fish passage improvements, fish screens on diversions and pumps, large woody debris, nutrient management, invasive plant removal, manure storage facility, and heavy use areas. Project information is from the Oregon Watershed Restoration Inventory available online at: https://www.oregon.gov/OWEB/data-reporting/Pages/owri.aspx

4.4 Monitoring—Status and Trends

4.4.1 Water Quality

At each biennial review, DEQ assesses the status and trends of water quality in relation to water quality standards. DEQ has provided a status and trend report to ODA for the Clackamas Subbasin. Analysts retrieved data from DEQ, EPA, and USGS databases. Seven stations in the Clackamas MA contained sufficient data to evaluate water quality status and trends. Of those, five stations were selected to summarize based on their correlation and or proximity to agricultural lands. The time period for the query was from January 2000 to 2018. Refer to Table 14 for a summary of the status and trends report. See Appendix E for information related to the water quality pollutants. Figure 4 illustrates location of water quality monitoring sites summarized in Table 14. For the full report go online to: https://www.oregon.gov/deq/wq/programs/Pages/wqstatustrends.aspx.

Sections 4.1.4, 4.4.2, and Tables 11 and 12 provide water quality monitoring results from partner efforts. Partners involved in water quality monitoring in the basin include:

- The Clackamas River Basin Council: water quality monitoring,
- The Clackamas Soil and Water Conservation District: Pesticide Stewardship Partnership monitoring,
- The Clackamas Water Providers: macroinvertebrate,
- Water Environment Services: water quality and flow monitoring,
- US Geological Survey: water quality and flow monitoring.

Table 14: Water Quality Status and Trends at Monitoring Locations in the Clackamas Management Area

(See Figure 4, page 51 for locations)

ODEQ's 2017 and 2019 Clackamas Water Quality Status and Trends Analysis. Data generally collected 2000 – 2018. See full report online at: https://www.oregon.gov/deq/wq/programs/Pages/wqstatustrends.aspx

Status

(1) ODEQ (individual samples) and (2) USGS (continuous data)

Reported: Number of times the sample exceeded the water quality standard expressed over total number of observations. (-) Data Not Available

Upstream → **Downstream (Best Fit)**

Monitoring Locations	(2) Clackamas River @ Estacada		(1) Clackamas River @ McIver Park		(1) Clackamas River @ High Rocks (old HWY 213)		(2) Clackamas River near Oregon City		(1) Willamette River @ Canby Ferry	
Pollutants	**2017**	**2018**	**2017**	**2018**	**2017**	**2018**	**2017**	**2018**	**2017**	**2018**
+ Temperature Total Observations and Summer (Rearing)	1348/ 5284 (25.5%)	1524/ 5779 (26.4%)	-	-	-	-	2246/ 5234 (43%)	1437/ 5862 (24.5%)	-	-
	Summer	Summer					Summer	Summer		
	-	904/ 1305 (69.3%)					-	1304/ 2494 (52.3%)		
Bacteria: *E. coli*	-	-	0/39 (0%)	0/113 (0%)	1/23 (4.3%)	1/113 (0.9%)	-	-	0/18 (0%)	2/133 (1.5%)
pH	0/ 153704 (0%)	0/3841 (0%)	0/69 (0%)	0/115 (0%)	0/26 (0%)	0//114 (0%)	3786/ 237817 (1.6%)	352/3974 (8.9%)	0/20 (0%)	0/141 (0%)
Dissolved Oxygen	32378/ 152155 (21.3%)	748/3806 (19.7%)	25/173 (14%)	7/115 (6.1%)	11/102 (10.8%)	8/114 (7%)	17857/ 233101 (7.7%)	21/3909 (0.5%)	0/133 (0%)	0/141 (0%)
∝ Total Phosphorous	-	-	-	0/115 (0%)	-	0/114 (0%)	-	-	-	0/135 (0%)
± Total Suspended Solids (TSS)	-	-	-	0/108 (0%)	-	0/108 (0%)	-	-	-	0/136 (0%)

Trending Status

Trend: ↑ - Improving ↓ - Declining **ST** – Steady **NT** – No Significant Trend **(-)** – Data Not Available

	(2) Clackamas River @ Estacada		(1) Clackamas River @ McIver Park		(1) Clackamas River @ High Rocks (old HWY 213)		(2) Clackamas River near Oregon City		(1) Willamette River @ Canby Ferry	
Pollutants	**2017**	**2018**	**2017**	**2018**	**2017**	**2018**	**2017**	**2018**	**2017**	**2018**
Temperature	NT	↓	-	-	-	-	NT	↓	-	-
Bacteria: *E. coli*	-	-	-	NT	-	NT	-	-	-	↓
pH	-	ST	-	↓	-	↓	-	NT	-	↓
Dissolved Oxygen	-	↓	-	NT	-	↑	-	↓	-	↑
Total Phosphorous	-	-		ST	-	ST	-	-	-	↑
Total Suspended Solids	-	-		ST	-	NT	-	-	-	NT

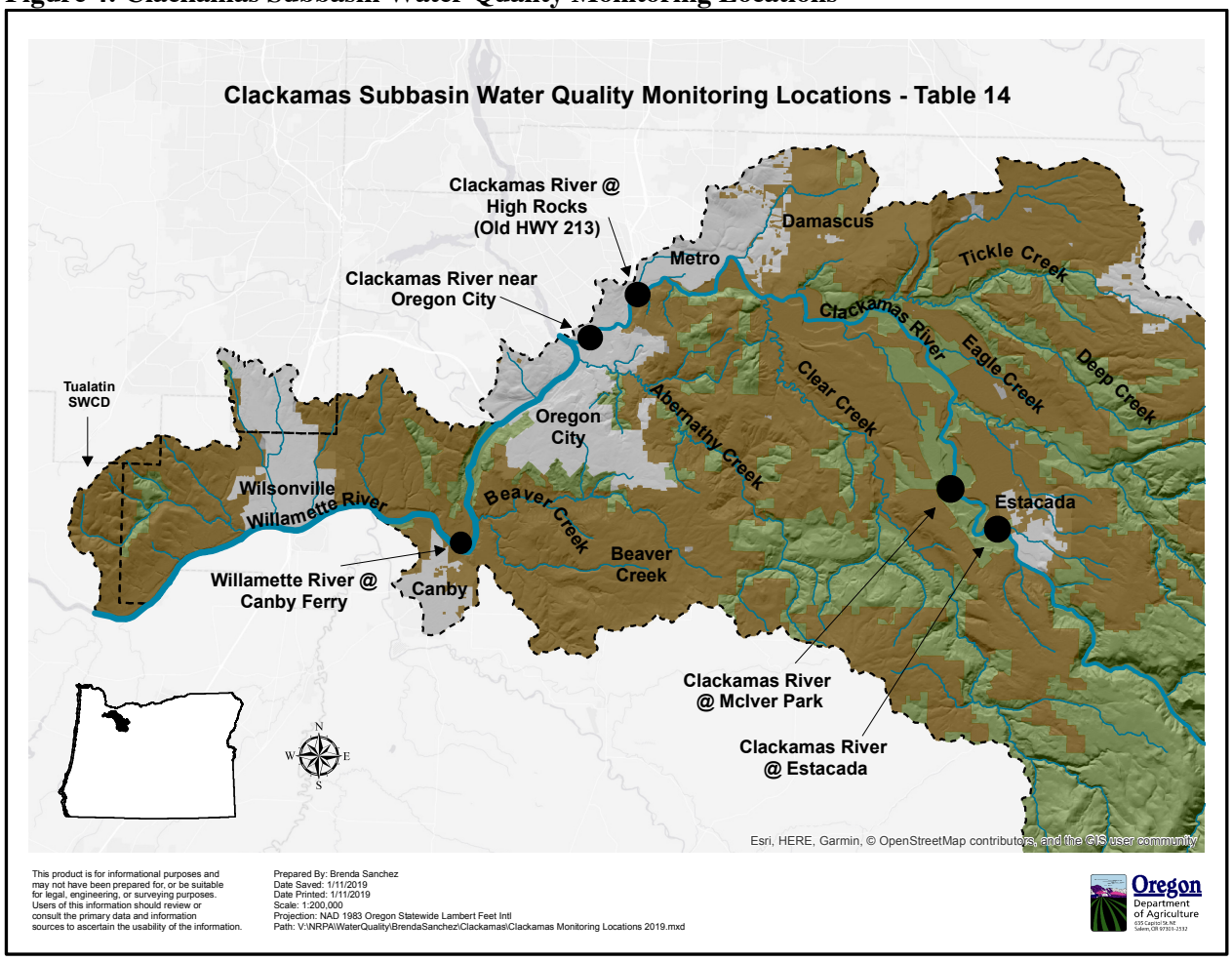
+ Temperature: Data collected is continuous over time. Exceedance represents the number of seven day average daily max values above the criteria within the associated time period. The number of observations is all samples taken throughout the data collection timeframe.

± TSS: Total Suspended Solids is the dry-weight of suspended particles, that are not dissolved, in a sample of water that can be trapped by a filter that is analyzed using a filtration apparatus.

∝ Total Phosphorous: The parameter total phosphorus (TP) defines the sum of all phosphorus compounds that occur in various forms.

Note: This report is best used as a summary and statistical analysis of the status and trends in water quality data collected throughout the Clackamas AgWQ Management Area. Interpretation of results will require knowledge of local conditions known to affect the observed water quality conditions at individual sites.

Figure 4: Clackamas Subbasin Water Quality Monitoring Locations



4.4.2 Oregon Water Quality Toxics Monitoring in the Clackamas Subbasin

In April of 2015, DEQ released its first Statewide Water Quality Toxics Assessment Report. The data was evaluated where appropriate as part of the Integrated Report 303(d) listing process. Between April 2008 and May 2010, DEQ laboratory staff collected seasonal water samples at three locations within the Lower Willamette including the Clackamas River at Hwy 99E (Gladstone) site.

At the 2017 biennial review of the Area Plan, the Clackamas LAC acknowledged with certainty that the Area Plan addresses concerns related to the toxic assessment report. Section 2.6 and Appendix B includes a standard list of prevention and control strategies that, when carried out, would minimize the possibility of pesticides entering water bodies. The LAC is committed to addressing new listings on the 303(d) list as they are approved by the EPA. Furthermore, the Clackamas Subbasin partnerships have been collaborating through the Pesticide Stewardship Partnership program and are actively working to remove toxics from the Subbasin through pesticide collection events, preventing pesticide spray drift through the Clackamas SWCD Windsock Program and Sprayer Efficiency Program and by establishing vegetation along streams through programs such as Shade Our Streams (see sections 4.1.4 and 4.3). The Area Plan also recommends ways to prevent and minimize soil erosion, which can transport metals and pesticide residues into waterways (see sections 2.6.2, 2.6.7 and Appendix B). Go online and see the full toxic report. https://www.oregon.gov/deq/FilterDocs/2015-TMP_FinalReport.pdf.

4.5 Biennial Reviews and Adaptive Management

Two years after the adoption of the Clackamas Area Rules/OARs and approximately every two years following, ODA, in cooperation with the Clackamas LMAs, the LAC, and DEQ will assess the progress of the Area Plan implementation toward achievement of Area Plan goals and objectives through the biennial review process. These assessments will include:

- A review of projects, demonstrations, and tours used to showcase successful management practices and systems;
- An evaluation of outreach and education programs designed to provide public awareness and understanding of water quality issues;
- An evaluation of the effectiveness of technical and financial assistance sources available to the agricultural community;
- Documentation of violations of the prevention and control measures and subsequent corrections;
- An evaluation of available current water quality monitoring data and sources of pollution in the Clackamas; and
- A review of load allocations as found in any completed Clackamas TMDL and the anticipated effectiveness of this Plan in meeting the load allocations as described in the TMDLs for the Clackamas.

Based on these assessments, ODA, the Clackamas LMAs, the LAC, and the State Board of Agriculture will consider making appropriate modifications to the Clackamas Area Plan and the associated Area Rules.

January 1, 2017 to January 31, 2019 Compliance Actions

Pre-Enforcement Actions: 9

- Two cases (19-0001 and 18-0024) were non-issues. Both cases closed.
- Five Letters of Compliance were issued for cases 18-0013 (livestock), 18-0005 (manure mgmt.), 17-0099 (sediment), 17-0079 (manure mgmt.), and 17-0071 (streamside vegetation) after working to address concerns. All five cases are closed.
- Case 17-0011 was issued a Water Quality Advisory. Follow-Up inspection issued and In-Field Determination – In compliance.
- Case 18-0007 (manure mgmt.) was issued two Water Quality Advisories, case open and producer is working with ODA.

Enforcement Actions: 0

2019 Summary of impediments

The Clackamas LAC did not distinguish any new impediments. They recognized that the Clackamas still needs continued outreach regarding Area Rules. A discussion resulted around the lack of water quality monitoring in agricultural lands which was highlighted by the Status and Trend report. The LAC would like to see a water quality monitoring effort in the Clackamas.

2019 Recommendations for modifications

The Clackamas LAC expressed they were satisfied with the revisions of the Area Plan as well as the progress achieved over the last biennium. A discussion about including climate change impacts into the Area Plan ensued but all felt that the Area Plan addresses these potential impacts and the committee re-enforced that the Area Plan's purpose is to address TMDLs. No modifications were requested.

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Appendix A: Educational/Technical Services

Soil and Water Conservation Districts (Local Management Agency for Area Plan/ SWCDs)
Assist landowners in identifying and implementing land management activities and coordinate with other technical experts in natural resources.
Clackamas SWCD: 503-210-6000/ Oregon City
Tualatin SWCD (Serves far NW section of the Clackamas MA. Figure 3): 503-334-2288/ Hillsboro

Oregon Department of Agriculture (ODA)
Oversees the Agricultural Water Quality Management Program. ODA issue permits, helps producers comply with confined animal feeding water management programs, and provides support to SWCDs.
Natural Resources Division: 503/ 986-4700/ Salem
ODA Clackamas Subbasin Water Quality Specialist: 503/ 986-5141/ Salem
Livestock Water Quality Specialist: 503/ 986-4780/ Salem
Link to Area Plan: **oda.direct/AgWQPlans**

Clackamas Subbasin Management Area Local Advisory Committee (LAC)
Voluntary committee composed of twelve agricultural producers, landowners, and other stakeholders in the Management Area. The LAC assists ODA with developing and reviewing the Agricultural Water Quality Management Area Plan and Area Rules.
Oregon Department of Agriculture: 503-986-4700

Oregon Department of Environmental Quality (DEQ)
Responsible for protecting and enhancing Oregon's water and air quality, cleaning up spills and releases of hazardous materials, and managing the proper disposal of solid and hazardous wastes. Maintains a list of water quality limited streams (303(d) list), sets TMDL allocations.
Northwest Region Portland Office: 503-229-5263
Clackamas Basin Coordinator: 503-229-6254

Oregon Department of Fish and Wildlife (ODFW)
Works with landowners to balance protection of fish and wildlife with economic, social, and recreational needs. Advises on habitat protection. Offers technical and educational assistance for habitat and restoration projects. Provides plan review for special property tax assessment for wildlife habitat projects.
North Willamette Watershed District (Clackamas): 971-673-6000 / www.dfw.state.or.us

Oregon Department of Forestry (ODF)
Technical assistance with State and Federal cost sharing, Oregon property tax programs, Forest Resource Trust, forestry practices, and forest management plans.
Molalla Office: 503-829-2216 / www.oregon.gov/ODF

Oregon Department of State Lands (DSL)
Administers state removal/fill law and provides technical assistance.
Salem: 503-986-5200 / www.oregon.gov/DSL

Oregon State University Extension Service
Offers educational programs, seminars, classes, tours, and publications to guide landowners in managing their resources.
Clackamas County: 503-655-8631 / www.extension.oregonstate.edu/clackamas

Oregon Water Resources Department (OWRD)
Provides technical and educational assistance and water rights permits and information.
Salem: 503-986-0900 / www.oregon.gov/OWRD

Oregon Watershed Enhancement Board (OWEB)
Provides grants to help Oregonians take care of local streams, rivers, wetlands, and natural areas. Provides financial support for watershed council operations and projects.
Salem: 503-986-0178 / www.oregon.gov/OWEB

Federal Agencies

USDA – Natural Resources Conservation Service (NRCS)
Provides information on soil types, soils mapping, and interpretation. Administers and provides assistance in developing plans for CRP, EQIP, WRP, and other cost share programs. Makes technical determinations on wetlands and highly erodible land.
Clackamas County (Oregon City): 503-655-3144 / www.or.nrcs.usda.gov/contact

USDA – Farm Service Agency (FSA)
Maintains agricultural program records and administers various cost share programs. Their offices also provide up-to-date aerial photography of farm and forestland.
Clackamas/Multnomah County: 503-655-3144 / www.fsa.usda.gov/or

Clackamas County – Water Environment Services (WES)
Provides wastewater collection and treatment and bio-solids reuse for seven cities and several unincorporated areas in Clackamas County. Coordinates storm water management, onsite sewage disposal, and water quality and stream enhancement projects.
Oregon City: 503-742-4567 / www.co.clackamas.or.us/wes

Clackamas River Basin Council (CRBC)
Fosters partnerships for clean water and to improve fish and wildlife habitat and the quality of life for those who live, work, and recreate in the watershed.
Clackamas: 503-303-4372 / www.clackamasriver.org

Clackamas River Water Providers (CRWP)
Coalition of municipal water providers who are working together on water resource issues. Collectively funds and coordinates efforts regarding water resource planning, management, and water conservation.
Oregon City: 503-723-3510 / www.clackamasproviders.org

Greater Oregon City Watershed Council
A non-regulatory, non-governmental group consisting of a balance of watershed interests. Seeks information, makes recommendations, and provides advice concerning the natural resources of the watershed and its restoration.
Oregon City: 503-427-0439 / www.gocwc.org

Appendix B: Voluntary Conservation Land Management

The purpose of this appendix is to provide examples of voluntary activities and strategies landowners and operators can use to prevent and control water pollution and soil erosion from their land. It is emphasized that the strategies lined out below are not compliance measures. Conservation plans and management systems are additional tools that landowners and operators may find helpful. Please see Appendix A for a list of partner agencies and organizations that can provide technical and/or financial assistance for implementing these activities and strategies.

Riparian Areas and Streams			
Activity	**Resource Concerns Addressed**	**Potential Benefits of Activity to Producer**	**Potential Costs of Activity to Producer**
a. Rotational grazing in riparian area; timed when growth is palatable to animals and when riparian areas are not saturated.	Helps promote desirable riparian vegetation; promotes streambank integrity; helps filter nutrients and sediment from runoff; may help narrow channel and reduce erosion in channel.	May lessen streambank erosion and loss of pastures; allows limited use of riparian area for grazing when grass is most nutritious, controls weeds and improves wildlife habitat.	May require time and financial investment for livestock control and off-stream watering facilities.
b. Livestock exclusion from riparian area Establishing off-stream watering facilities.		May lessen streambank erosion and loss of pastures; less time involved in managing livestock grazing in riparian area, improves wildlife habitat.	May require higher weed control costs than seasonal riparian grazing. May require financial investment for livestock control and off-stream watering facilities.
c. Planting perennial vegetation in riparian area.		May lessen streambank erosion and loss of pastures. I Some alternative perennial agricultural products may be harvested from riparian areas.	Costs of vegetation and weed control. May require financial investment for riparian fencing and off-stream watering facilities while vegetation establishes.
Nutrient and Manure Management			
Activity	**Resource Concerns Addressed**	**Potential Benefits of Activity to Producer**	**Potential Costs of Activity to Producer**
a. Apply nutrients according to soil test results.	Helps prevent nutrient runoff into waters of the state.	May help reduce fertilizer costs; ensures that plants receive needed nutrients for growth; makes plants more competitive against weeds.	Costs of soil testing; time associated with taking soil samples.
b. Establish sacrifice areas. Sacrifice areas are small pastures where animals are confined during the winter to protect other pastures from trampling and compaction. Limit livestock access to pastures when soils are saturated; cover sacrifice areas with rock, hog fuel, and/or geotextile.	Helps prevent sediment, nutrient, and bacteria runoff into waters of the state. Helps protect streamside areas.	Protects pastures from compaction during the winter, improving growth. May improve animal health by covering sacrifice areas with material so animals are not wading in mud.	Cost of fencing sacrifice area; cost of feeding hay during the winter; cost of materials for protecting sacrifice area.

c. Site barns and sacrifice areas away from streams.	Helps prevent sediment, nutrient, and bacteria runoff into waters of the state. Helps protect streamside areas.	Helps prevent flooding in barns and sacrifice areas.	Need either off-stream watering facility or other source of water for livestock.
d. Prevent silage leaching and/or store and manage leachate from silage and other vegetative materials.	Helps prevent nutrient runoff into waters of the state.	Preventing leaching maintains higher nutrient content of ensiled feed material.	May require cost of facility development and purchase of moisture-absorbing materials.
e. Installing gutters and downspouts in areas with high livestock use.	Helps prevent sediment, nutrient, and bacteria runoff into waters of the state. Helps protect streamside areas.	May improve animal health by lessening mud during the winter, so animals are not wading in mud.	Cost of installation and maintenance of gutters and downspouts.
f. Cover manure storage piles.	Helps prevent sediment, nutrient, and bacteria runoff into WOS	Do not lose the nutrients in manure that can be spread on pastures or crops.	Cost of installation and maintenance of cover.
Soil Erosion and Sediment Control			
Activity	**Resource Concerns Addressed**	**Potential Benefits of Activity to Producer**	**Potential Costs of Activity to Producer**
a. Grazing management: graze pasture plants to appropriate heights, rotate animals between several pastures; provide access to water in each pasture.	Helps prevent sediment, nutrient, and bacteria runoff into waters of the state. Helps protect streamside areas.	May improve pasture production; easy access to water may increase livestock production as well. May improve composition of pasture plants and help prevent weed problems.	Cost of installing fencing, watering facilities for rotational grazing system; time involved in moving animals through pastures.
b. Farm road construction: construct stream crossings appropriately, install water bars to divert runoff to roadside ditches and catch-basins	Helps prevent sediment runoff to waters of the state.	May help prevent water damage on farm roads.	Cost of installation and maintenance.
c. Plant appropriate vegetation along drainage ditches; seed ditches following construction.	Helps prevent sediment runoff into waters of the state.	May help prevent ditch bank erosion and slumping.	Costs of establishing vegetation.
d. Plant cover crops on erosion-sensitive areas.	Helps prevent sediment runoff into waters of the state; helps filter nutrients and slow runoff.	May reduce weed problems; prevents loss of applied nutrients.	Costs of establishing cover crops; cover crops may compromise primary crop.
e. Irrigate pasture or crops according to soil moisture and plant water needs.	Helps prevent irrigation return flow and associated nutrients and sediment to waters of the state.	May reduce costs of irrigation; may help crop or pasture production.	Installation/ maintenance cost. Monitoring time.
f. Install/maintain diversions or French drains to prevent unwanted drainage.	Helps prevent nutrient runoff into waters of the state.	Decreases muddiness and shortens saturation period in protected areas.	Cost of installation.
g. Implement contour farming.	Farm sloped land in such a way that planting, and cultivating are done on the contour.	Reduced runoff and erosion. Increased infiltration to soil profile. Reduced sediment transport.	Cost of a new cropping system.

Appendix C: ORS 468B.025 and 468B.050 - Oregon Water Pollution Control Law

468B.025 Prohibited activities.

(1) Except as provided in ORS 468B.050 or 468B.053, no person shall:

(a) Cause pollution of any waters of the state or place or cause to be placed any wastes in a location where such wastes are likely to escape or be carried into the waters of the state by any means.

(b) Discharge any wastes into the waters of the state if the discharge reduces the quality of such waters below the water quality standards established by rule for such waters by the Environmental Quality Commission.

(2) No person shall violate the conditions of any waste discharge permit issued under ORS 468B.050.

(3) Violation of subsection (1) or (2) of this section is a public nuisance. [Formerly 449.079 and then 468.720; 1997 c.286 §5]

468B.050 Water quality permit; issuance by rule or order; rules.

(1) Except as provided in ORS 468B.053 or 468B.215, without holding a permit from the Director of the Department of Environmental Quality or the State Department of Agriculture, which permit shall specify applicable effluent limitations, a person may not:

(a) Discharge any wastes into the waters of the state from any industrial or commercial establishment or activity or any disposal system.

(b) Construct, install, modify or operate any disposal system or part thereof or any extension or addition thereto.

(c) Increase in volume or strength any wastes in excess of the permissive discharges specified under an existing permit.

(d) Construct, install, operate or conduct any industrial, commercial, confined animal feeding operation or other establishment or activity or any extension or modification thereof or addition thereto, the operation or conduct of which would cause an increase in the discharge of wastes into the waters of the state or which would otherwise alter the physical, chemical or biological properties of any waters of the state in any manner not already lawfully authorized.

(e) Construct or use any new outlet for the discharge of any wastes into the waters of the state.

(2) The Department of Environmental Quality or the State Department of Agriculture may issue a permit under this section as an individual, general or watershed permit. A permit may be issued to a class of persons using the procedures for issuance of an order or for the adoption of a rule. Notwithstanding the definition of "order" or "rule" provided in ORS 183.310, in issuing a general or watershed permit by order pursuant to this section, the State Department of Agriculture or Department of Environmental Quality:

(a) Is not required to direct the order to a named person or named persons; and

(b) May include in the order agency directives, standards, regulations and statements of general applicability that implement, interpret or prescribe law or policy.

(3) The State Department of Agriculture or the Department of Environmental Quality may define "confined animal feeding operation" by rule for purposes of implementing this section. [Formerly 449.083 and then 468.740; 1997 c.286 §6; 2001 c.248 §4; 2005 c.523 §4]

Appendix D: Programs, Cost-Share and Funding Opportunities

The following is a list of additional water quality and conservation funding programs available to landowners and organizations in Oregon. For the most current information please contact the organizations listed below (Appendix A).

Oregon Department of Agriculture

Pesticide Management Plan: The ODA Pesticides and Fertilizer Program holds the primary responsibility for pesticide registration and use regulation within the state of Oregon under the Federal Insecticide Fungicide Rodenticide Act. As the EPA designated the state as the lead agency for pesticides, ODA is responsible for overseeing the development and implementation of a Pesticide Management Plan (PMP) for the state of Oregon as stipulated in the annual EPA/ODA Consolidated Pesticide Cooperative Agreement. The PMP sets forth a process for preventing and responding to pesticide detections in Oregon's ground and surface water resources by managing the pesticides that are currently approved for use by EPA in both the agricultural and non-agricultural settings. Pesticides that are no longer marketed, also called "legacy" pesticides, are regulated through a separate process under the Clean Water Act. The PMP strives to protect drinking water supplies and the environment from pesticide contamination while recognizing the important role that pesticides has in maintaining a strong state economy, managing natural resources, and preventing human disease.

Confined Animal Feeding Operation Program (CAFO); The Oregon Department of Agriculture issues a Confined Animal Feeding Operation (CAFO) permit to livestock owners so manure does not pollute ground and surface water. There are three main factors that determine if your farm needs a CAFO permit:

- How many animals you have;
- How long the animals are confined in a prepared area (e.g. in a barn, lot, pen);
- How the manure and wastewater generated by the farm is stored (e.g. do you collect your manure in a tank or do you stack it in a pile);
- Go online for more information: https://www.oregon.gov/ODA/programs/NaturalResources/Pages/CAFO.aspx

Clackamas Soil and Water Conservation District Programs

Sprayer Efficiency Program: The Clackamas Soil and Water Conservation District offers reimbursement up to $500 to replace worn out sprayer tips, pressure regulators, pressure gauges, hoses, valves, and check-valve nozzle bodies. Replacing worn parts will reduce the amount of pesticides used, improve pesticide coverage, and reduce spray drift. For more information, visit the CSWCD website at: https://conservationdistrict.org/

Equipment Rental Program: CSWCD currently offers an Equipment Rental Program, which makes a variety of agricultural equipment available at reasonable prices to Clackamas County residents. This program was originally created to provide hard-to-find equipment to help farmers and land managers conserve soil and water. This equipment is typically not available through other rental agencies and is often too large an investment for farmers who may only use it once or twice a year. The Conservation District recognizes that our agricultural producers have the ability to be our very best conservationists by keeping their land in production using good stewardship practices. For more information, visit the CSWCD website at: https://conservationdistrict.org/

Windsocks Program: The program was created to help agricultural producers apply pesticides without losing chemicals to drift from wind; Clackamas County Soil and Water Conservation District in partnership with Clackamas River Water Providers, is offering calibrated windsocks. These windsocks are calibrated to indicate wind speed from 2 to 12 miles per hour. Windsocks attach directly to the tractor for

real time information to make quick, more accurate spraying decisions in the field for reducing drift. For more information, visit the CSWCD website at: https://conservationdistrict.org/

Oregon Watershed Enhancement Board (OWEB): Provides grants for a variety of restoration, assessment, monitoring, and education projects, as well as watershed council staff support. There is normally a 25% local match requirement on all grants.
Contact: Soil and Water Conservation Districts, Watershed Councils, Oregon Watershed Enhancement Board

Oregon Department of Fish and Wildlife State Tax Credit for Fish Habitat Improvements: Provides tax credit for part of the costs of voluntary fish habitat improvements and required fish screening devices.
Contact: Oregon Department of Fish and Wildlife

Oregon Department of Forestry State Forestation Tax Credit: Provides for reforestation of under-productive forestland not covered under the Oregon Forest Practices Act. Situations include brush and pasture conversions, fire damage areas, and insect and disease areas.
Contact: Oregon Department of Forestry

Natural Resources Conservation Service Programs (Farm Bill Programs)
Contact: Natural Resources Conservation Service, Soil and Water Conservation Districts

Agricultural Conservation Easement Program (ACEP): NRCS provides financial assistance to eligible partners for purchasing agricultural land easements that protect the agricultural use and conservation values of eligible land.

Conservation Reserve Enhancement Program (CREP): Provides annual rent to landowners who enroll agricultural lands along streams. Also cost-shares conservation practices such as riparian tree planting, livestock watering facilities, and riparian fencing.

Conservation Reserve Program (CRP): Competitive CRP provides annual rent to landowners who enroll highly erodible lands. Continuous CRP provides annual rent to landowners who enroll agricultural lands along seasonal or perennial streams. Also cost-shares conservation practices such as riparian plantings.

Environmental Quality Incentives Program (EQIP): Cost-shares water quality and wildlife habitat improvement activities, including conservation tillage, nutrient and manure management, fish habitat improvements, and riparian plantings.

Public Law 566 Watershed Program: Program available to state agencies and other eligible organizations for planning and implementing watershed improvement and management projects. Projects should reduce erosion, siltation, and flooding; provide for agricultural water management; or improve fish and wildlife resources.

Appendix E: Water Quality Parameters

Stream Water Temperature Criteria:
The seven-day-average maximum temperature of a stream identified as having salmon and trout rearing and migration use may not exceed numeric criteria.

Use	Numeric Criteria (7-Day Statistic)
Salmon and Steelhead Spawning	13.0 ° C/ 55.4 ° F
Core Cold water Habitat	16.0 ° C/ 60.8 ° F
Salmon and Trout Rearing and Migration	18.0 ° C/ 64.4 ° F
Salmon and Steelhead Migration Corridors	20.0 ° C/ 68.0 ° F
Bull Trout Spawning and Juvenile Rearing	12.0 ° C/ 53.6 ° F

Bacteria: *Escherichia coli (E. coli)* is measured in streams to determine the risk of infection and disease to people. Coliform bacteria live in soil or vegetation and in the gastrointestinal tract of animals. Coliforms enter water supplies from the direct disposal of waste into streams or lakes, or from runoff from wooded areas, pastures, feedlots, septic tanks, dog runs, and sewage plants into streams or groundwater. Bacteria sources include humans, wildlife, and livestock. Runoff and soil erosion can also carry bacteria into waterways.

Target criteria for bacteria states organisms of the coliform group associated with fecal sources may not exceed a 90-day log mean of 126 *E. coli* organisms per 100ml based on a minimum of five samples and no single sample shall exceed 406 *E. coli* organisms per 100ml.

Mercury: Mercury is a heavy, silvery-white liquid metal element. Sources of mercury in the Clackamas Subbasin include: legacy mines, industrial and municipal point sources, sediment re-suspension, native soil erosion, storm water runoff, and atmospheric deposition from point, mobile and global sources. These sources have contributed to a number of fish consumption advisories in the Clackamas. Mercury has an aquatic life acute criterion of 2.4 ug/L and a chronic criteria of 0.012 ug/L.

Dissolved Oxygen (DO): Dissolved Oxygen is the amount of gaseous oxygen (O2) dissolved in water. Oxygen enters the water by direct absorption from the atmosphere, by rapid movement, or as a waste product of plant photosynthesis. Water temperature and the volume of flowing water can affect dissolved oxygen levels. Target criteria for DO states there must not be less than 6.5 mg/L except during spawning. During spawning, DO must not be less that 11 mg/L unless conditions of barometric pressure, altitude, and temperature preclude attainment of the 11 mg/L. In such cases, DO levels shall not be less than 95 percent of saturation. For streams providing for cold-water aquatic life, DO must not be less than 8 mg/L, unless conditions of barometric pressure, altitude, and temperature preclude attainment of the 8 mg/L. In such cases, DO shall not be less than 90 percent of saturation.

Lead: Lead is a chemical element. Sources of lead include, municipal and industrial storm water, industrial discharges, combined sewer overflows, contaminated sites, contaminated sediment, and air emissions.

Dieldrin: Dieldrin is a toxic organochlorinated pesticide that was commonly used as agricultural insecticides and to control disease-causing insects, such as mosquitoes. Both pesticides tend to bind to soil, rather than dissolve in water. Although these pesticides have since been banned in the U.S., they can still be found in the environment. The criteria for the protection of human health:

- Dieldrin criterion 0.0000053 ng/L

Aquatic Weeds and Algae: Harmful algal blooms are caused by over-production of naturally occurring cyanobacteria (blue-green algae). Some species release toxins that are harmful to humans, livestock, pets, and wildlife. When levels of nutrients, temperature, pH, and light are optimal, cyanobacteria grow rapidly, resulting in blooms where cyanobacteria are the dominant form of life in their environment. Cyanobacteria can cause negative impacts to water quality, including: taste and odor problems in drinking water, unpalatable fish, elevated pH levels, and low dissolved oxygen levels. The North Fork Reservoir (where a harmful algal bloom occurred) has little if any surrounding agricultural use. However, nutrients entering lower in the watershed from agricultural activities could fuel an algae bloom that starts in a reservoir and moves downstream. Low stream flows and high water temperatures downstream could also make conditions favorable for an algal bloom. To date, there is no evidence that agriculture has contributed to any harmful algal bloom in the Management Area.

Biological Criteria: EPA's proposed additions to the 303(d) list for the Management Area include biological criteria, which measure the aquatic macroinvertebrates community (aquatic bugs) that are sensitive to water quality. These proposed listings do not specify which water pollutant(s) may be affecting the macroinvertebrates.