Oregon
Department
of Agriculture

Southern Willamette Valley Agricultural Water Quality Management Area Plan

March 28, 2019

Developed by the

Oregon Department of Agriculture

Southern Willamette Valley Local Advisory Committee

With support from the

Upper Willamette Soil and Water Conservation District

Oregon Department of Agriculture
Water Quality Program
635 Capitol St. NE
Salem, OR 97301
Phone: (503) 986-4700

Upper Willamette SWCD
780 Bailey Hill Road, Suite #5
Eugene, OR 97402
Phone: (541) 650-3052
office@uwswcd.org

https://oda.direct/AgWQPlans

Table of Contents

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
CNPCP – Coastal Nonpoint Pollution Control Program
CWA – Clean Water Act
CZARA – Coastal Zone Act Reauthorization Amendments
DEQ – Oregon Department of Environmental Quality
DMA – Designated Management Agency
GWMA – Groundwater Management Area
HABs – Harmful Algal Blooms
LAC – Local Advisory Committee
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
ODF – Oregon Department of Forestry
OHA – Oregon Health Authority
ORS – Oregon Revised Statute
OWEB – Oregon Watershed Enhancement Board
PMP – Pesticides Management Plan
PSP – Pesticides Stewardship Partnership
RCA – Required Corrective Action
SIA – Strategic Implementation Area
SWCD – Soil and Water Conservation District
TMDL – Total Maximum Daily Load
USDA – United States Department of Agriculture
US EPA – United States Environmental Protection Agency
WPCF – Water Pollution Control Facility
WQPMT – Water Quality Pesticides Management Team

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, Area Rules, and available practices to address water quality issues.

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

Chapter 4: Local Implementation, Monitoring, and Adaptive Management. ODA and the Local Advisory Committee (LAC) will work with knowledgeable sources to summarize 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 water quality issues due 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 603-095-2100 to 603-095-2160). 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 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).

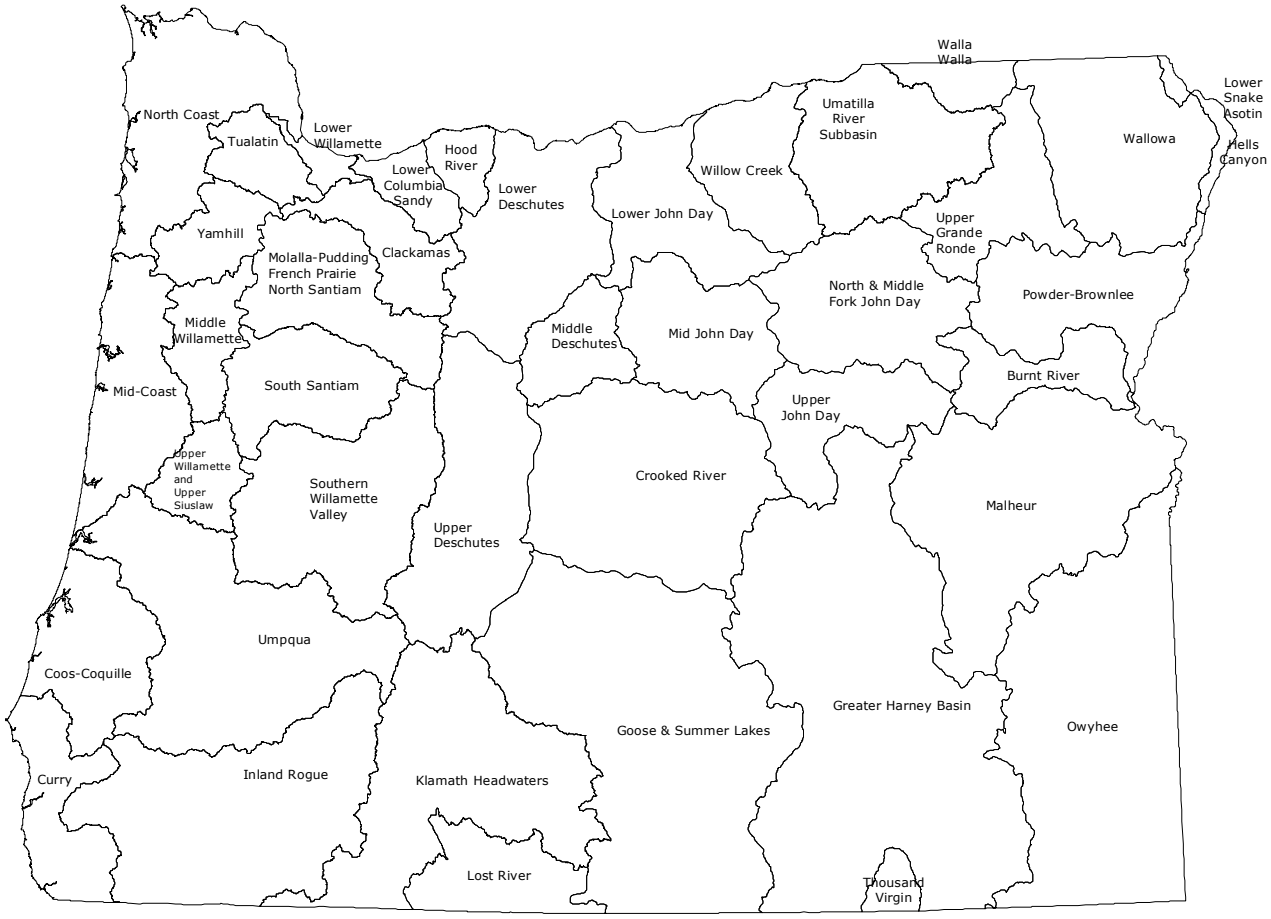
1.2 History of the Ag Water Quality Program

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; to achieve water quality standards; and to adopt rules as necessary (ORS 568.900 through ORS 568.933). Senate Bill 502 was passed in 1995 to clarify that ODA is the lead agency for regulating agriculture with respect to water quality (ORS 561.191). The 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 and federal agencies, tribes, 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

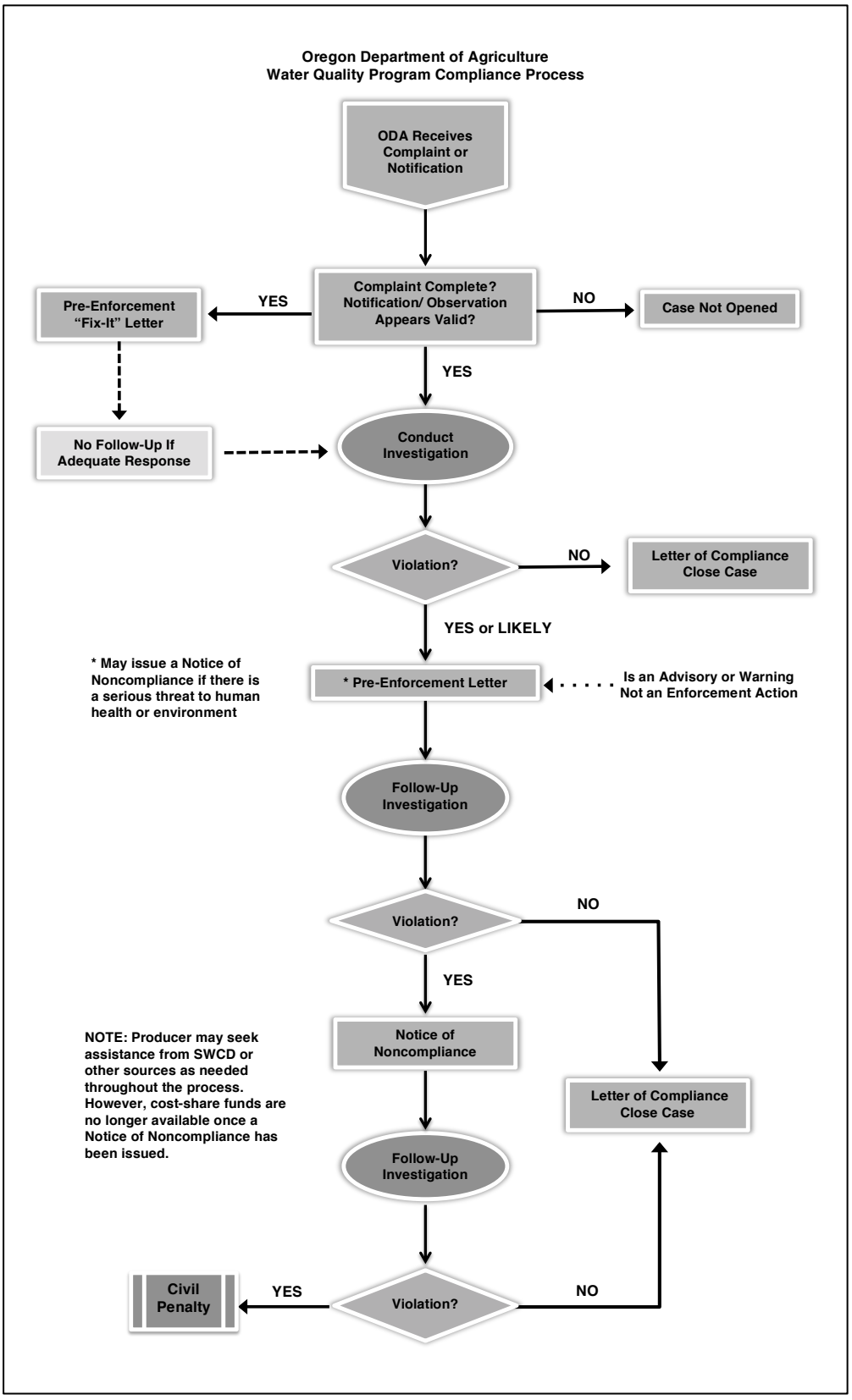
The Oregon Department of Agriculture is the agency responsible for implementing the Ag Water Quality Program (ORS 568.900 to 568.933, ORS 561.191, OAR 603-090, and OAR 603-095). The Ag Water Quality Program was established to develop and carry out a water quality management plan for the prevention and control of water pollution from agricultural activities and soil erosion. State and federal laws drive the establishment of a Ag Water Quality Management Plan, which include:

- State water quality standards.
- Load allocations for agricultural nonpoint source pollution assigned under 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 is responsible for any actions related to enforcement or determination of noncompliance with Area 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 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. The ODA will use enforcement where appropriate and necessary to gain compliance with 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 enforcement Order such as a Notice of Noncompliance. If a Notice of Noncompliance is issued, ODA will direct the landowner 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 rules. If and when other governmental policies, programs, or rules conflict with the Area Plan or Area Rules, ODA will consult with the appropriate agencies to resolve the conflict in a reasonable manner.

Figure 2: Compliance Flow Chart



1.3.2 Local Management Agency

A Local Management Agency (LMA) is an organization that ODA designated to assist with the implementation of an Area Plan (OAR 603-090-0010). The Oregon Legislature's 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 agreement between ODA and each SWCD. 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

For each Management Area, the director of ODA appoints an LAC (OAR 603-090-0020) with as many as 12 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 LAC may meet as frequently as necessary to carry out their responsibilities, which include but are not limited to:

- Participate in the development and ongoing revisions of the Area Plan.
- Participate in the development and 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. Each landowner in the Management Area is required to comply with the Area Rules, In addition, landowners 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 and financial assistance is available to landowners who want to work with SWCDs (or other local partners) to achieve land conditions that contribute to good water quality. Landowners also may 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 do not result from agricultural activities, 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, culverts, roadside ditches and shoulders.
- Dams, dam removal, hydroelectric plants, and non-agricultural impoundments.

- Housing and other development in agricultural areas.
- 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, a formal public comment period, and a formal public hearing. ODA and the LACs modified the Area Plans and Area Rules, 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, LACs, and 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 future 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 for every waterbody, 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 waterbodies throughout Oregon do not meet state water quality standards. Many of these waterbodies have established water quality management plans that document needed pollutant 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. These parameters vary by Management Area and are summarized in Chapter 2.

1.4.3 Impaired Waterbodies and Total Maximum Daily Loads (TMDLs)

Every two years, DEQ is required by the CWA to assess water quality in Oregon. Clean Water Act 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 specific to the pollutants that led to the placement of a waterbody 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 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 NPDES waste discharge permits, while a "load allocation" is attributed to 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, not just to an individual waterbody 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 the local Area Plan as the implementation plan for the agricultural component of this Management Area. Biennial reviews and revisions to the Area Plan and Area Rules must address agricultural or nonpoint source load allocations from relevant TMDLs.

The list of impaired waterbodies (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 Oregon 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 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:

"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. Additionally, OAR 603-095-0010(53) includes but is not limited to commercial fertilizers, soil amendments, composts, animal wastes, vegetative materials, or any other wastes.

"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.

"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.

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 for 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 improves water quality related to multiple pollutants, including: temperature (heat), sediment, bacteria, nutrients, toxics, and pesticides.
- Streamside vegetation provides fish and wildlife habitat.

- Landowners can improve streamside vegetation in ways that are compatible with their operation. Streamside conditions may be improved without the removal of the agricultural activity, such as with managed grazing.
- 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 flowing through agricultural lands. The Area Rules for each Management Area require that agricultural activities 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 canarygrass, 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 www.oregon.gov/ODA/programs/weeds.

1.5 Other Water Quality Programs

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

1.5.1 Confined Animal Feeding Operation Program

The 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 (WPCF) permit designed to protect water quality. A properly maintained CAFO must implement a site-specific suite of structural and management practices to protect ground or surface water. To assure continued protection of ground and surface water, the 2001 Oregon State Legislature directed ODA to convert the CAFO Program from a WPCF permit program to a federal

National Pollutant Discharge Elimination System (NPDES) program. Oregon Department of Agriculture 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 the federal NPDES CAFO permit requirements. Currently, ODA can register CAFOs to either the WPCF or NPDES CAFO permit.

Either 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. You can view the CAFO program site at
http://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, Northern Malheur County, and 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 (www.oregon-plan.org). 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 of their great 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 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 regulations 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, 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 program.

Through the PSP, state agencies and local partners work together to monitor pesticides in streams and to improve water quality (https://www.oregon.gov/deq/wq/programs/Pages/Pesticide.aspx). ODA,

DEQ, 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 (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 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. The DEQ 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/deq/wq/programs/Pages/dwp.aspx.

1.6 Partner Agencies and Organizations

1.6.1 Oregon Department of Environmental Quality

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 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 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 Area 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.

1.7 Measuring Progress

Agricultural landowners 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

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 define the timeline needed to achieve the measurable objective.
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 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.

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 keep on track for 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 Conditions 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.
- 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 resultant improvements in the water. Extensive monitoring of water quality is needed to evaluate progress, which is expensive and may fail to demonstrate improvements in the short term.
- Improved land conditions can be documented immediately, but there may be significant lag time before water quality improves or water quality impacts due to other sources.
- Reductions in water quality from agricultural activities are primarily through changes in land conditions and management activities.

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 concerns associated with agriculture. Through the Focus Area process, the SWCD delivers systematic, concentrated outreach and technical assistance in a small geographic area. A key component of this approach is measuring 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 geographic areas 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: The 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 Area Rules. Finally, ODA completes a post-assessment 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, LAC, and 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 (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 present across the major land uses (forestry, agriculture, rural residential, and urban/suburban). Sites are visited every other month throughout the year and 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.

Other partners may have water quality data that is described in Chapter 3 and presented in Chapter 4.

1.8.2 Statewide Aerial Photo Monitoring of Streamside Vegetation

Starting in 2003, ODA began evaluating streamside vegetation conditions using aerial photos. Stream segments representing 10 to 15 percent of the agricultural lands in each Management Area were randomly selected for long-term aerial photo monitoring. Stream segments are generally 3-5 miles long. ODA evaluates streamside vegetation at specific points within 30-, 60-, and 90-foot bands along both sides of stream segments from the aerial photos and assigns each segment a score based on streamside vegetation. The score can range from 70 (all trees) to 0 (all bare ground). The same stream segments are re-photographed and re-scored every five years to evaluate changes in streamside vegetation conditions over time. Because site-capable vegetation varies across the state, there is no single "correct" streamside vegetation index score. The purpose of this monitoring is to measure positive or negative change for an individual reach.

1.8.3 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 and water quality monitoring, and outreach efforts over the past biennium. ODA and partners evaluate progress toward achieving measurable objectives, and revise implementation strategies as needed. The LAC submits a report to the Board of Agriculture and the director of ODA

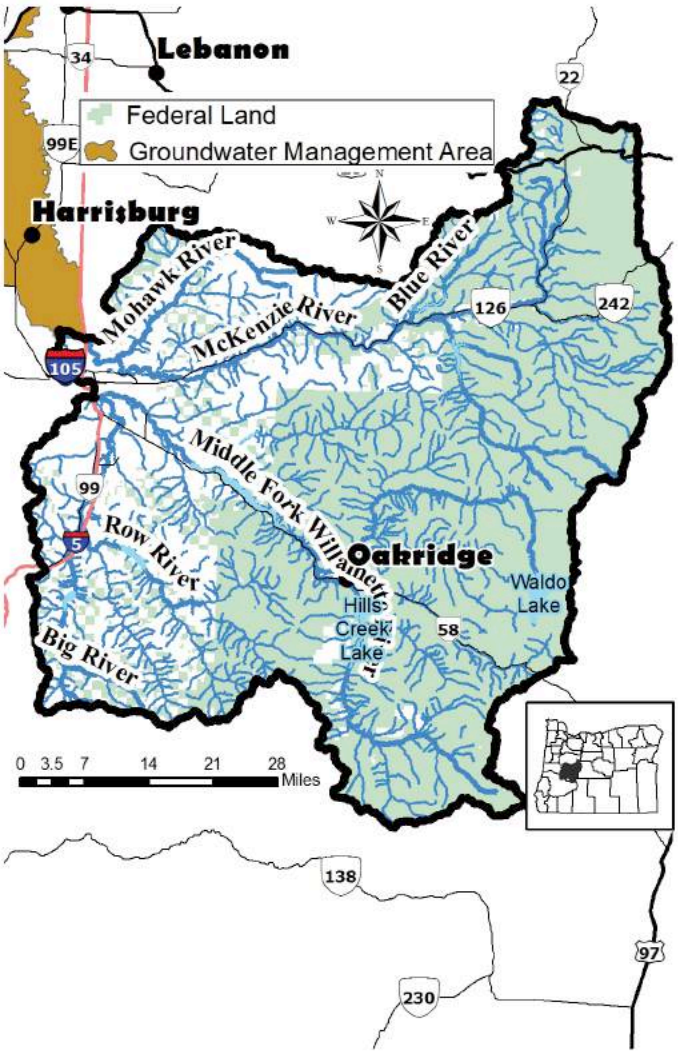
describing progress and impediments to implementation, and recommendations for modifications to the Area Plan or Area Plans necessary to achieve the goal of the Area Plan. ODA and partners will use the results of this evaluation to update the measurable objectives and implementation strategies in Chapter 3.

Chapter 2: Local Background

The Management Area includes the McKenzie, Middle Fork of the Willamette (Middle Fork), and Coast Fork of the Willamette (Coast Fork) watersheds (Figure 3). The watersheds are located primarily in the eastern portion of Lane County in western Oregon. Small portions of the McKenzie and Coast Fork watersheds are also located in Linn and Douglas counties. Communities in the Management Area include the cities of Springfield, Lowell, Oakridge, Westfir, Creswell, and Cottage Grove, as well as several unincorporated communities.

Boundaries of the Management Area are the Cascade Mountains to the east, Calapooya Mountains to the south and west, Long Tom watershed to the west, and the Coburg Hills to the north. The three watersheds cover approximately 3,361 square miles, or 2,156,080 acres. Elevations range from about 350 feet above sea level near the mouth of the McKenzie to 10,354 feet on the North Sister in the Cascades (Oregon Water Resources Board, 1961). The McKenzie's confluence with the Willamette near Coburg is the farthest point downstream in the Management Area.

Figure 3. Southern Willamette Valley Agricultural Water Quality Management Area.



2.1 Local Roles and Responsibilities

2.1.1 Local Advisory Committee

The Area Plan was developed with the assistance of the LAC. The LAC was formed in 2001 to assist with the development of the Area Plan and Area Rules and with subsequent biennial reviews.

Table 1: Current LAC members

Name	Location	Description
Alan Petersen, Chair	Springfield, McKenzie	Cattle, hay, timber
Dave Daniel	Pleasant Hill, Middle Fork Willamette	Nursery
Donald Hansen	Creswell, Coast Fork Willamette	Grass seed, strawberries, hazelnuts
Steve Houston	Eugene, Coast Fork Willamette	Wine grapes, seed crops, peppermint
Polly Kohl	Springfield, McKenzie	Rural resident, Mohawk Watershed Partnership
Glenn Miller	Eugene, Willamette	Hazelnuts
Karl Morgenstern	Management Area	Eugene Water and Electric Board
Gary Rodakowski	Vida, McKenzie	Hazelnuts
Jim Sly	Creswell, Coast Fork Willamette	Cattle, hay
Jim Goodpasture, Alternate	Vida, McKenzie	Hazelnuts, cattle, hay, timber

2.1.2 Local Management Agency

The implementation of the Area Plan is accomplished through an Intergovernmental Grant Agreement between ODA and the Upper Willamette SWCD. This Intergovernmental Grant Agreement defines the SWCD as the LMA for implementation of the Area Plan. The SWCD was also involved in development of the Area Plan and Area Rules.

2.2 Area Plan and Rules: Development and History

The director of ODA approved the Area Plan and Area Rules in June 2002. The LAC has met every two years since the Plan has been approved.

2.3 Geographical and Physical Setting

Location, Water Resources, Land Use, Land Ownership, Agriculture

Physical Features

The headwaters of the McKenzie River and Middle Fork Willamette River are in the Cascade Mountains. The Coast Fork Willamette River originates in the Calapooya Mountains. The Coast Fork and Middle Fork meet near Goshen to form the Willamette River mainstem. The Willamette River's confluence with the McKenzie River is approximately 15 miles farther downstream near Coburg.

The McKenzie River originates from Clear Lake and flows westward through a narrow valley down a steep gradient. It has eight main tributaries: Lost Creek, Horse Creek, McKenzie South Fork, Quartz Creek, Smith River, Blue River, Gate Creek, and Mohawk River. The Mohawk River has the flattest gradient of the tributaries and there is some relatively level land along it. Level land also extends along the main stem of the McKenzie River.

The Middle Fork Willamette River begins at Timpanogas Lake and flows northwest down a steep gradient until it reaches the Willamette Valley floor. Most of its tributaries, including Hills Creek, Salt Creek, Salmon Creek, North Fork, Fall Creek, and Little Fall Creek, flow into the mainstem from the north. Lost Creek flows into the Middle Fork from the south.

The Coast Fork Willamette River begins in the Calapooya Mountains, as do several of its tributaries, Brice Creek, Row River, Sharps Creek, Layng Creek, and Mosby Creek. Layng, Sharps, and Brice creeks have relatively steep gradients from headwaters to confluence with the Coast Fork, while Mosby Creek, Row River, and the mainstem Coast Fork have relatively flat gradients. The gradient of the Coast Fork flattens further after it reaches the Willamette Valley floor. Several tributaries, including Camas Swale Creek and Silk Creek, flow into the Coast Fork as it flows north through the valley.

Geology and Soils

Western and High Cascade Mountains

The Cascade Mountains consist of two adjacent mountain ranges, the Western and High cascades. Both ranges are predominantly composed of basaltic lava flows, with lesser amounts of andesite and rhyodacite (Orr et al, 1992). Depending on the hardness of the underlying material, the mainstem and tributaries of the upper Middle Fork and McKenzie rivers have created both steep gorges and gently sloping plateaus. The upper reaches of the McKenzie River have been glaciated, at least as far west as Blue River Reservoir (Boer, personal communication, 2000).

Calapooya Mountains

The Calapooya Mountains are a mixture of sedimentary and older volcanic rocks. They have been deeply dissected by the Coast Fork and its tributaries. Soils are deep, well-drained silty clay loams and clay loams from sandstone, sediment, and igneous rock (Patching, 1987).

Willamette Valley

Much of the lowlands in the Willamette Valley are alluvium, or material deposited by the rivers and their tributaries. Alluvial materials include sands, gravels, and silts transported from the Calapooya and Cascade mountains. Depending on the composition of the deposited material, soils in bottomlands and terraces range from excessively drained gravelly sandy loam to poorly drained silty clay loam and silty clay (Patching, 1987).

Climate

The McKenzie, Middle Fork, and Coast Fork watersheds experience the same general climate with wet winters and dry summers. Precipitation generally increases with elevation in the watersheds, ranging from an average of 40 to 50 inches per year on the valley floor to 70 to 80 inches at the summit of the Calapooya Mountains, 80 inches at the headwaters of Little Fall Creek in the Middle Fork watershed, and 110 inches at the headwaters of Blue River in the McKenzie watershed (University of Oregon Department of Geography, 1999). In the upper portions of the watersheds, above 4,000 to 5,000 feet, snow is a significant portion of the precipitation.

Agriculture and Forestry

The predominant land use in the Management Area is forestry. Forestlands comprise approximately 86 percent of the land within the three watersheds (Figure 4 and Table 1). Most forestland is in the upper portions of the three watersheds in the Cascade and Calapooya Mountain ranges and extends down the eastern side of the valley floor. The U.S. Forest Service, the Bureau of Land Management, and private industrial landowners are major forestland holders in the watersheds (Table 2).

Agricultural and rural residential land uses in the Management Area are found in the lower valley regions of the three watersheds. These lands account for approximately four percent of the Management Area (Table 4). In the McKenzie watershed, most agricultural lands are in the floodplain, where well-drained sandy loam soils have accumulated by fluvial (rivers and streams) processes. Hazelnuts are a major crop in the watershed, with over 1,200 acres in orchards (Penhallegon, personal communication, 2000). Other commercial crops include blueberries, Christmas trees, peppermint, and row crops. Livestock and pasturelands are the major land use on the Mohawk tributary.

Most of the agricultural land in the Middle Fork watershed is located in the lower portion adjacent to the Willamette River. There is very little land in agricultural use above Dexter Reservoir. The dominant agricultural land use is pasture and hayland. There are some row crops near Jasper, Lowell, and Pleasant Hill. There are also several nurseries, Christmas tree farms, and orchards in that area.

The Coast Fork watershed supports agricultural lands from the confluence of the Coast Fork and Middle Fork upstream beyond Cottage Grove. Grass seed, pasture, and hayland are the predominant commodities in the watershed. Other agricultural land uses include nurseries, small grains, orchards, vineyards, and field crops.

Table 2. Land uses and land cover in the three watersheds.

Land Use/ Land Cover Category	Acres	Percent of Land Use by Category
Agriculture	82,000	4
Forestry	1,858,000	86
Urban/Residential/Other	216,100	10
TOTAL	2,156,100	100

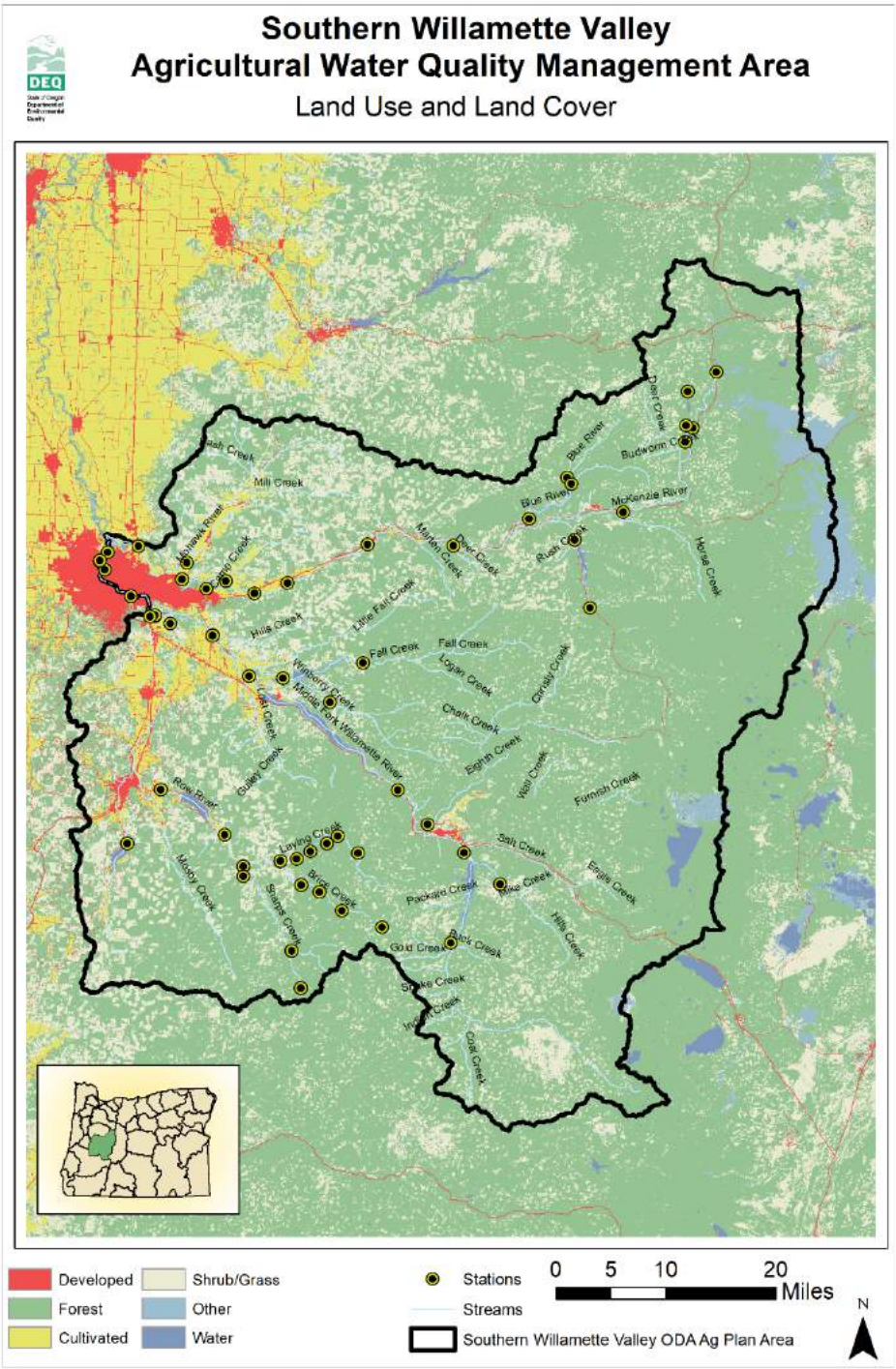
Table 3. Land ownership in the three watersheds.

Landowner/Manager	Acres	Percent of Land
U.S. Forest Service	1,044,600	48
Private Landowners	690,200	32
Forest Service Wilderness Area	255,300	11.80
Bureau of Land Management	142,660	6.60
U.S. Army Corps of Engineers	17,600	0.80
Lane County	2,200	0.10
State of Oregon	2,130	0.10
State Scenic Waterway	1,120	0.10
Joint Corps of Engineers/Lane County	160	0.01
State Parks and Recreation	130	0.01
TOTAL	2,156,100	100

Table 4. Agricultural Lands in the McKenzie, Middle Fork, and Coast Fork.

Watershed	Agricultural Land (acres)	Agricultural Land (percent of all land)
McKenzie	34,000	3.9
Middle Fork	14,000	1.6
Coast Fork	34,000	7.9
TOTAL	82,000	4.0

Figure 4. Land Use and Land Cover Within the Southern Willamette Valley Agricultural Water Quality Management Area



Cities/Urban

There is one major metropolitan area in the Management Area, as well as smaller cities and rural communities. Most cities are located along the mainstems of the Middle Fork, Coast Fork, and McKenzie rivers. Rural communities co-exist with agricultural areas and are situated on or near the rivers or their tributaries. Both the Willamette and McKenzie flow through the Eugene/Springfield area and their

confluence is just north of Eugene. The 2018 population of the Eugene/Springfield area is over 231,269 with growth percentages higher than the state average over the past ten years. Rural communities include Marcola in the Mohawk watershed; and Blue River, Walterville, Leaburg, Vida, Nimrod, Finn Rock, and McKenzie Bridge along the McKenzie River. Most of these communities have populations below 500. Two incorporated cities exist along the Coast Fork watershed: Cottage Grove, with 10,169 residents, and Creswell, with 5,375 residents. Rural communities in the Coast Fork watershed include Disston, Culp Creek, Dorena, London, Latham, Saginaw, Walker, Delight Valley, Cloverdale, and Goshen. Along Highway 58, the cities of Oakridge (pop. 3,294), Lowell (pop. 1,115) and Westfir (pop. 263) are located centrally in the Middle Fork watershed (Population Research Center, 2011). Rural communities in the Middle Fork watershed include Dexter, Fall Creek, and Jasper.

Roads

There is an extensive network of public and private roads within the three watersheds. Heavily traveled public roads include Interstate 5, which runs north-south through Eugene-Springfield, Creswell, and Cottage Grove; Highway 126, the main route through the McKenzie watershed over the Cascade Mountains; and Highway 58, which begins near Goshen and travels southeast over the Cascades.

Recreation

Recreation within the Management Area relates closely to the scenic landscape. Activities such as camping, hiking, fishing, hunting, skiing, and boating draw thousands of visitors to the three watersheds every year. Several reservoirs provide recreational opportunities in the summer months, including Dorena Reservoir on the Row River, Dexter Lake on the Middle Fork, and Cougar Reservoir on the McKenzie. Table 6 provides a complete list of recreational reservoirs in the Management Area.

Watershed Functions

Other functions of land in the watersheds include retention and slow release of rainwater, flood control, groundwater recharge, and filtration of pollutants. All watersheds provide these functions to some degree depending on local conditions and the amount and types of developments.

Water Resources

Water Availability

Both rainwater and snowmelt contribute to water supplies in the three watersheds. More surface water is supplied by snowmelt in the McKenzie and Middle Fork watersheds than in the Coast Fork because their headwaters are in the High Cascades. Flows in the McKenzie and Middle Fork are less variable than in the Coast Fork. Coast Fork seasonal flow patterns are more similar to streams originating in the Coast Range, with flows in the winter greatly exceeding summer flows even with human-caused changes to the flow regime. Summary flow data for the McKenzie, Middle Fork, and Coast Fork are listed in Table 5.

Table 5. Average annual, summer, and winter flows in cubic feet per second (cfs) for the McKenzie, Middle Fork and Coast Fork (U.S. Geological Survey, 2000).

Watershed	Average Annual Flow (cfs)	Average Summer Flow (cfs)	Average Winter Flow (cfs)
Coast Fork at Goshen	1,611	416	3,342
McKenzie at Coburg	5,897	3,183	9,582
Middle Fork at Jasper	4,154	2,318	6,433

Groundwater is most plentiful in the three watersheds in areas with alluvial deposits and porous lava flows. The High Cascades store a great deal of water from snowmelt, and the release of this water during the summer helps keep flows relatively constant in the McKenzie and Middle Fork watersheds. Alluvial

deposits from the mouth of the Middle Fork to Dexter Dam, at the mouth of the McKenzie, along the McKenzie to Belknap Springs, and along the Coast Fork on the Willamette Valley floor, store large quantities of groundwater.

Dams and Reservoirs

Thirteen dams and reservoirs in the three watersheds are used for flood control in the winter and flow augmentation in the summer. They also provide recreation, irrigation, and power generation. Table 6 summarizes the uses of each dam and reservoir, storage capacities, and priority for augmentation of summer flows in the Willamette River.

The reservoirs influence seasonal water availability and flow patterns in the three watersheds. Summer water releases boost flows in the McKenzie to one-third higher than normal (Lane Council of Governments, 1996). The Coast Fork, once an ephemeral river, now flows year-round because of summer water releases from Dorena and Cottage Grove reservoirs.

Table 6. Uses, Capacities, and Drawdown Priority for Reservoirs in the Management Area

Watershed	Project	Uses of Water	Summer Reservoir Storage Capacity (acre feet)	Summer Drawdown Priority
Coast Fork	Cottage Grove	Recreation, flood control	28,700	5
Coast Fork	Dorena	Recreation, flood control	65,000	5
McKenzie	Blue River	Recreation, summer flow augmentation, flood control	78,800	3
McKenzie	Carmen	Hydropower	261	N/A
McKenzie	Cougar	Hydropower, recreation, summer flow augmentation, flood control	143,900	2
McKenzie	Leaburg	Hydropower, recreation	345	N/A
McKenzie	Smith	Hydropower	15,000	N/A
McKenzie	Trail Bridge	Hydropower	2,263	N/A
McKenzie	Walterville	Hydropower	100 (Intake) 345 (S. Pond)	N/A
Middle Fork	Dexter	Re-regulate flow from Lookout Point Reservoir, recreation	N/A	N/A
Middle Fork	Fall Creek	Recreation	108,200	5
Middle Fork	Hills Creek	Recreation	194,600	4
Middle Fork	Lookout Point	Flood control, hydropower	324,200	1

(U.S. Army Corps of Engineers, 2000; Oregon Water Resources Department, 2000)

Water Use

Consumptive uses of water in the three watersheds include irrigation, municipal use, and commercial use. Irrigation is the primary consumptive use for which water rights are issued. Municipal water rights supply drinking water to several hundred thousand people in Lane County. Non-consumptive uses include recreation, power generation, and fish and wildlife habitat. Sources of appropriated water are reservoirs, surface water, and groundwater. Table 7 summarizes water allocations in the three watersheds. Actual water use is typically lower than water appropriated.

Table 7. Appropriations of surface water, groundwater, and reservoir water in the three watersheds

Water Use	McKenzie		Middle Fork		Coast Fork	
	cfs	af	cfs	af	cfs	af
Irrigation	274	49,000	52	10,173	110	21,507
Fish and Wildlife	292	45	93	47	6	35
Agriculture	1	3	1	11	4	11
Industrial	10,078	18,493	30	620	45	793
Municipal	338	0	50	0	40	1
TOTALS	10,983	67,541	226	10,851	205	22,347

(Oregon Water Resources Department, 2000). Appropriations are in cubic feet per second (cfs) and acre-feet (af).

In the McKenzie, over 9,975 cubic feet per second of industrial water rights are appropriated for hydropower, a non-consumptive use.

2.4 Agricultural Water Quality

2.4.1 Water Quality Issues

DEQ evaluates data from its own monitoring program, the Watershed Councils, the U.S. Geological Survey, the BLM, and other partners to determine the listing status of stream segments in the Management Area. There are several waterbodies within the Management Area that are impaired for one or more pollutants, including but not limited to temperature, dissolved oxygen, *E. coli*, pH, and mercury.

The water quality of streams and groundwater directly impacts drinking water users. Nitrate above the Oregon Health Authority alert level of 7 ppm, has been detected in both public and private drinking water sources in the Management Area.

Beneficial Uses

Water quality refers to the general health of the water and to its ability to sustain beneficial uses. The beneficial uses of surface water and ground water include but are not limited to water supply, salmonid spawning, salmon and trout rearing and migration, aquatic life, and water contact recreation. Beneficial uses have varying levels of sensitivity and are affected by different factors. For example, temperature crtieria were set to protect cold water aquatic life, which is the most sensitive beneficial use affected by stream temperature. Water quality impaired waterbodies do not support applicable beneficial uses.

WQ Parameters and 303(d) list

Every two years, DEQ is required to assess water quality and report to the U.S. EPA on the condition of Oregon's waters. DEQ prepares an Integrated Report in accordance with Clean Water Action (CWA) Sections 303(d), 305(b), and 314. The Integrated Report includes an assessment of each water body where data are available, the list of waters identified under Section 303(d) as water quality limited and needing a TMDL, as well as waters with established TMDLs that are expected to improve water quality. The current 2012 Integrated Report can be accessed at http://www.oregon.gov/deq/wq/Pages/2012-Integrated-Report.aspx

The 2012 Integrated report identifies 13 waterbodies as impaired and needing a TMDL for dissolved oxygen. Within the McKenzie watershed, there are also waterbodies impaired and needing a TMDL for biological criteria, lead, mercury, aquatic weeds, and algae. There are more than 80 waterbodies in the Management Area that have a temperature TMDL. In addition, the Coast Fork Willamette and the Willamette mainstem also have TMDLs for pH and *E. coli*, respectively. The Willamette mainstem is also listed for several toxins, iron, and dioxin, but these are beyond the scope of this Area Plan. If a Willamette Basin TMDL is developed in the future for any of the toxins, it may include agricultural load allocations that apply to the entire Management Area.

While this Area Plan applies to all agricultural water pollution, it focuses specifically on parameters on the 303(d) list and TMDLs in the Management Area including temperature, bacteria (*E. coli)*, and mercury.

2.4.2 Basin TMDLs and Agricultural Load Allocations

Temperature
DEQ developed the temperature TMDL to protect salmon spawning, rearing, and migration as the most sensitive beneficial uses in the Willamette Basin. Oregon's native cold-water aquatic communities, including salmonids, need cold water to support all stages of life. On agricultural lands, absence of streamside vegetation, water withdrawals, and land management that leads to widened stream channels contribute to elevated stream temperatures. DEQ has identified that solar heating of the Area's waterways, due to a lack of riparian vegetation from forestry, agriculture, rural residential, and urban activities, contributes to warm stream temperatures.

Bacteria
DEQ developed the bacteria TMDL to protect human water contact recreation, as the most sensitive beneficial use. There is a risk of infection and disease to people who come in contact with fresh water while fishing, swimming, or boating when bacteria levels exceed the water quality standard for bacteria. On agricultural lands, *E. coli* generally comes from livestock waste, either deposited directly into waterways or carried to waterways via runoff and soil erosion. Runoff and soil erosion from agricultural lands may also carry bacteria from other sources. There are numerous sources of bacteria in streams, including humans (from recreation or failing septic systems) and wildlife.

Mercury
DEQ developed the mercury TMDL to protect human fish consumption as the most sensitive beneficial use. Primary sources of mercury include erosion of soils containing mercury, air deposition from national and international sources, and discharge from specific legacy mining sites. On agricultural lands, mercury is contributed through eroded soils.

Following a Court decision, the Willamette mercury TMDL was suspended and is being re-developed by DEQ (https://law.lclark.edu/live/files/23881-hernandez-ruling-april-13-2017). DEQ and EPA are revising the TMDL to meet Oregon's current water quality criterion for methylmercury, which is eight times more stringent than the criterion in effect in 2006. EPA approved Oregon's revisions to its methylmercury fish tissue concentration criterion for the protection of human health in October 2011. In April 2017, the US District Court issued a ruling requiring EPA to revise the TMDL by April 2019 and allowing the 2006 TMDL to remain in effect until EPA issues or approves the revised TMDL. In April 2017, the US District Court issued a ruling requiring EPA to revise the TMDL by April 2019 and allowing the 2006 TMDL to remain in effect until EPA issues or approves the revised TMDL. Mercury Category 4 TMDL listings, however, have been revised to reflect Category 5 303(d) water quality limited. For additional information see http://www.oregon.gov/deq/wq/tmdls/Pages/willhgtmdlac2018.aspx.

Other Parameters of Concern:

Sediment
A TMDL has not been set for sediment but it can be of concern related to agricultural lands. Sediment carried in streams can adversely affect aquatic life by increasing water temperature through thermal absorption, reducing light penetration and visibility, reducing water infiltration through stream substrate (harming incubating fish eggs), and irritating gill filaments. Sediment deposition can also change the width:depth ratio of a stream, which directly influences stream temperature. Potential sources of sediment include streambank erosion, home building or construction sites, and runoff from agricultural lands.

Nutrients
A TMDL has not been set for nutrients, but it can be of concern related to agricultural lands. Fertilizers and manure are the main agricultural sources of nutrients. Improper storage or application can result in discharge of nutrients into either surface or ground water. Fertilizer run-off has been identified as one of the major contributing factors to algae blooms, including harmful algae blooms containing toxin-producing cyanobacteria species. In the last four years, Oregon Health Authority has issued algae bloom advisories for Walterville Pond, Dorena Reservoir, and Dexter Reservoir. Nutrients can also come from waste discharge, runoff, or seepage from urban areas, industrial and wastewater treatment plants, and septic systems, sediment runoff from forestlands, and background sources.

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. Some species of cyanobacteria can produce toxins that can cause serious illness or death in pets, livestock, wildlife, and humans. Detailed information on bloom advisories, health impacts, and strategies to reduce or prevent exposure are provided by OHA at:
http://public.health.oregon.gov/HealthyEnvironments/Recreation/HarmfulAlgaeBlooms/Pages/index.aspx
Cyanobacteria can also cause other negative impacts to water quality, including: taste and odor problems in drinking water, unpalatable fish, elevated pH levels, and low dissolved oxygen levels. Nutrients entering the watershed from agricultural activities can accumulate in reservoirs or lakes and may fuel algal blooms and move downstream. Low stream flows and high-water temperatures downstream could also make conditions favorable for an algal bloom.

Biological Criteria
To assess a stream's ecological health, the community of benthic macroinvertebrates is sampled and compared to a reference community (community of organisms expected to be present in a healthy stream). If there is a significant difference, the stream is listed as water quality limited. These organisms are important as the basis of the food chain and are very sensitive to changes in water quality. This designation does not always identify the specific limiting factor (e.g., sediment, nutrients, or temperature).

Dissolved Oxygen
Dissolved oxygen criteria apply to specific designated uses (such as fish spawning), and are applied in the time periods when the designated use is present and in the segment that is designated for that use. The dissolved oxygen spawning criteria are applied in the waters and in the time periods when salmon, steelhead, bull trout, or resident trout spawning uses are present. The dissolved oxygen criteria applicable to other designated fish uses are applied year-round. During non-spawning periods, the dissolved oxygen criteria depends on a stream's designation as providing for cold, cool, or warm water aquatic life, each defined in OAR 340 Division 41.

In addition to the Willamette Basin TMDLs, TMDLs for phosphorus and ammonia were developed for the Coast Fork watershed in 1996 to address low dissolved oxygen and high pH levels.

Table 8: Agricultural Load Allocations that Apply to the Management Area

Geographic Scope in Management Area	TMDL	Load Allocation for Agriculture
Parameter: Temperature		
Mainstem Willamette	Willamette TMDL (2006), Chapter 4	Basin-wide attainment and preservation of effective shade levels on smaller tributaries associated with system potential vegetation will eliminate most anthropogenic nonpoint source heat loads, including agriculture. Surrogate measure is percent effective shade targets and a heat load equivalent of 0.05 ºC of the Human Use Allowance. Other important measures— preserving and restoring cool water refuges where salmonids rear and migrate to when the river warms up in the summer; restore instream flow quantity.
McKenzie Subbasin	Willamette TMDL (2006), Chapter 11	
Middle Fork Willamette Subbasin	Willamette TMDL (2006), Chapter 12	
Coast Fork Willamette Subbasin	Willamette TMDL (2006), Chapter 13	
Parameter: Bacteria		
Mainstem Willamette	Willamette TMDL (2006), Chapter 4	66 to 83% reduction from agricultural areas compared to average loads in 2006
Parameter: Mercury		
Entire Management Area	Willamette TMDL (2006), Chapter 3	Agriculture: 27% reduction for agricultural land use
Parameter: Dioxin		
Entire Management Area	Columbia River Basin TMDL (1991)	Only pulp and paper mills have been assigned an allocation; agriculture is a potential source, but load allocation has not been assigned due to lack of data

2.4.3 Sources of Impairment

Many factors may affect surface water quality in the Management Area. Sources impacting temperature include wastewater treatment plants, industrial operations, removal and/or lack of riparian vegetation, seasonal reductions in stream flow, and stream channel and floodplain alteration. Contributors to bacteria and nutrient concerns include wastewater treatment plant overflows during heavy rains, legal and illegal waste dumping sites, leaching from septic systems, runoff from residential areas, runoff and leaching from agricultural lands, and natural sources such as wildlife. Mercury can enter waterbodies from industrial and municipal wastewater discharges, erosion of soils that naturally contain mercury, runoff of atmospherically deposited mercury, and runoff from abandoned mines.

2.5 Voluntary and Regulatory Measures

Characteristic to Achieve for Waste

Issue: Animal and human wastes are a potential source for many diseases (Terrell and Perfetti, 1989). The most commonly used indicator of biologic pollution in a waterbody, the organism *Escherichia coli* (*E. coli*), is a member of a group of fecal coliform bacteria. These bacteria reside in the intestines of warm-blooded animals, including humans, livestock, and wild birds and mammals. The presence of *E. coli* alone does not confirm the contamination of waters by pathogens but it can indicate contamination by sewage or animal manure and the potential for health risks.

Sources of *E. coli* include discharge from wastewater treatment plants, leakage from failing septic systems, runoff of domestic animal manure from agricultural lands, yards, and other facilities, and runoff

of manure from wild animals such as geese and elk. Daily bacteria production estimates have been calculated for several sources, including domestic and wild animals, and are summarized in Appendix D.

Numerous factors influence the nature and amount of bacteria that reach waterways. Some of these factors are climate, topography, soil types and infiltration rates, animal species, and animal health.

When bacteria reach a waterway, they may settle into sediments in a streambed and can live there for an extended period of time. If sediments are disturbed by increased stream turbulence following a runoff event (human or animal traffic or other means), sediment-bound bacteria may be re-suspended into the water column (Sherer et al 1992). Sediment disturbance likely accounts for erratic bacteria levels typically measured in water quality monitoring programs.

Oregon's water quality standard for bacteria was established to protect the most sensitive beneficial use affected by bacteria levels, which is water contact recreation. Appendix B includes detailed information about the bacteria standard. Within the Management Area, the Calapooia River and the mainstem Willamette exceeds state water quality standards for bacteria during the fall, winter, and spring.

Livestock manure is a potential source of bacteria and is also a potential source of nutrients and vegetative material. If stored properly and applied at agronomic rates, manure can be a beneficial source of nitrogen and phosphorus, as well as organic matter (Mikkelsen and Gilliam, 1995). Nothing in this Prevention and Control Measure is intended to discourage the use of manure or other amendments; rather, it seeks to ensure that they are applied correctly. Also, this Prevention and Control Measure is not intended to hold landowners responsible for water quality problems beyond their control, such as runoff of wildlife or wildfowl manure from agricultural lands into waterways.

This Prevention and Control Measure does not prohibit grazing in riparian areas. As long as grazing is conducted at appropriate times of year, stocking rates, duration, and intensity, and in compliance with the riparian Prevention and Control Measure, it should not violate this Prevention and Control Measure. However, unlimited, or concentrated livestock access to streams resulting in waste accumulation may lead to violations.

Landowners with livestock should be aware that rules for Confined Animal Feeding Operations (CAFOs) might apply to their facilities if they confine animals for part of the year. For more information, please contact the ODA.

Characteristic to Achieve

OAR 603-095-2140
(1)(a) Waste. Effective upon rule adoption, no person subject to these rules shall violate any provision of ORS 468B.025 or ORS 468B.050.

Parameters Addressed by this Characteristic to Achieve:

- Bacteria, toxics, and mercury

2.5.1 Riparian/Streamside Area Management

Characteristic to Achieve for Riparian Areas Issue: The intent of this measure is to maintain and protect riparian vegetation, minimize erosion of streambanks due to agricultural activities, allow water percolation into the soil, and encourage shading of streams, thus providing proper function of the riparian area.

Landowners are not responsible for streambank erosion resulting from natural channel migration and meander formation (OAR 603-095-2140(1)).

Please consult Appendix J for more background information on this Characteristic to Achieve and Chapter 1.4.5 for a description of the role of streamside vegetation.

Characteristic to Achieve

OAR 603-095-2140
(1)(b) Riparian areas. By January 1, 2004, agricultural management shall allow establishment and maintenance of vegetation along perennial streams consistent with the capability of the site to provide riparian functions necessary to help moderate solar heating and for streambanks to withstand flows resulting from a 25-year, 24-hour storm event.

Parameters Addressed by this Characteristic to Achieve:

- Temperature

2.5.2 Soil Erosion Prevention and Control

Characteristics to Achieve for Erosion/Nutrients

Issue: The intent of these measures is to prevent water from carrying sediment and nutrients into waters of the state.

Characteristics to Achieve

OAR 603-095-2140
(1)(c) Erosion and Nutrients:
(A) By January 1, 2004, soil erosion from agricultural activities shall not exceed the tolerable soil loss T.
(B) By January 1, 2004, landowners or operators shall prevent pollution from irrigation surface water return flow to waters of the state.

Parameters Addressed by this Measure:

- Phosphorus, toxics, and mercury

For more information on erosion and the tolerable soil loss T, please consult Appendix G.

2.5.3 Pesticides

Issue: The intent of this condition is to prevent introduction of pesticides, which include herbicides and fungicides, into waters of the state. Pesticide users should always read the label prior to storing, mixing, or applying pesticides. ORS 634.372 (2) and (4) require users to follow label recommendations for all pesticides. Please consult Appendix H for the text of ORS 634.372.4.5.

2.5.4 Mercury

Issue: Mercury is a metal, liquid at room temperature, commonly used in the recent past for thermometers. It continues to have many dental, medical, and industrial uses. It is found naturally in the soils of the Willamette Valley. It is also found in fossil fuels and is released into the air upon combustion. In the air, mercury can travel over continents and oceans to be deposited on land, added to naturally

occurring mercury, and carried by storm water and erosion into Oregon's waterways. Fish consumption is the most common way humans are exposed to elevated levels of mercury (Oregon Department of Environmental Quality, 2007).

Mercury is also a severe poison. According to the DEQ (2007), small children and fetuses are most sensitive to mercury's toxic effects.

Mercury from point and non-point sources is bio-accumulating in fish tissue to levels that adversely affect public health. Mercury binds to particles; and there are both higher levels of total suspended solids as well as higher mercury levels in the wet season. In setting the TMDL for mercury, DEQ has found that erosion of native soil makes up almost 48 percent of the mercury in the Willamette Basin. Some industrial facilities and domestic wastewater treatment facilities also discharge mercury, but at low levels.

Existing Area Rules help control mercury from agricultural sources by limiting erosion, filtering sediment, and controlling pollution. No specific rule to control mercury from agricultural activities is necessary at this time. Refer to the characteristics to achieve for waste, riparian area, and erosion/nutrients for the Area Rules that address mercury in this area.

2.5.5 Optional Issues: Upland, Irrigation, and Livestock 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.

2.5.6 Menu of Optional Management Practices

Landowners are neither required to cease a specific practice nor implement a particular practice by the Area Plan or Rules. The following tables are intended as suggestions for landowners who want ideas on how to meet Area Rules and generally maintain and enhance natural resources on their property. The tables provide some idea of the water quality benefits of each practice as well as potential costs and benefits to landowners. The tables are organized by resource, such as nutrients and manure.

Landowners who want more information on any of the following practices, or who are looking for other ideas for water quality improvement and conservation on their lands, may contact several agencies and organizations that provide technical assistance, including the Upper Willamette SWCD, the NRCS, and the Oregon State University (OSU) Extension Service. Also, please consult Appendix I for a list of publications describing water quality improvement practices for agricultural landowners.

Table 9: Riparian Areas and Streams

Practice	Resource Concerns Addressed	Potential Benefits of Practice to Producer	Potential Costs of Practice to Producer
a. Rotational grazing in riparian area; timed when growth is palatable to animals and when riparian areas are not saturated.	May help establish desirable riparian vegetation and address temperature and bacteria TMDLs.	Allows limited use of riparian area for grazing, improves wildlife habitat.	Requires intense management to ensure that grazing does not prevent site capable vegetation from establishing.
b. Livestock exclusion from riparian area; establishing off-stream watering facilities.	Helps promote desirable riparian vegetation; promotes streambank integrity; helps filter nutrients and sediment from runoff; may help narrow channel and reduce erosion in channel; reduces effects of solar radiation.	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 in riparian areas than seasonal riparian grazing. May require financial investment for livestock control and off-stream watering facilities.
c. Planting perennial vegetation in riparian area.	Helps establish perennial riparian vegetation rapidly; promotes streambank integrity; may help narrow channel and reduce erosion in channel; reduces effects of solar radiation and address temperature, mercury and bacteria TMDLs.	May lessen streambank erosion and loss of pastures. If livestock are excluded from riparian area, area may be eligible for federal cost-share programs. 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.

Table 10: Nutrient and Manure Management

Practice	Resource Concerns Addressed	Benefits to Producer	Costs to Producer
a. Apply nutrients according to soil test results and at agronomic requirements.	Helps prevent nutrient and bacteria runoff into surface water or leaching into groundwater.	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. Store manure under a tarp or roof; preferably on an impervious surface such as concrete or plastic.	Helps prevent nutrient and bacteria runoff into surface water or leaching into groundwater.	Prevents nutrient leaching so manure applied on crops or pasture has higher nutrient content; may save some fertilizer costs; producers wishing to construct storage facilities may apply for funding programs.	Cost of constructing manure storage facilities.
c. Establish animal heavy use areas, where animals can be confined during the winter to protect other pastures from trampling and	Helps prevent sediment, nutrient and bacteria runoff into surface water or leaching into groundwater and address bacteria TMDL. Helps protect streamside areas.	Protects pastures from compaction during the winter, improving growth. May improve animal health by covering animal heavy use areas with material so	Cost of fencing animal heavy use area; cost of feeding hay during the winter; cost of materials for protecting animal heavy use area; may mean landowner will need a

Practice	Resource Concerns Addressed	Benefits to Producer	Costs to Producer
compaction. When soils are saturated, limit livestock access to pastures; cover animal heavy use areas with rock, hog fuel, and/or geotextile.		animals are not wading in mud.	Confined Animal Feeding Operation Permit.
d. Site barns and animal heavy use areas away from streams.	Helps prevent sediment, nutrient, and bacteria runoff into surface water or leaching into groundwater. Helps protect streamside areas.	Helps prevent flooding in barns and animal heavy use areas.	Need either off-stream watering facility or other source of water for livestock.
e. Prevent silage leaching and/or store and manage leachate from silage and other vegetative materials.	Helps prevent nutrient runoff into surface water or leaching into groundwater.	Preventing leaching maintains higher nutrient content of ensiled feed material.	May require cost of facility development and purchase of moisture-absorbing materials.
f. Installing gutters and downspouts in areas with high livestock use.	Helps prevent sediment, nutrient and bacteria runoff into surface water or leaching into groundwater. Helps protect streamside areas and address bacteria TMDLs.	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.

Table 11: Erosion, Sediment, and Mercury Control

Practice	Resource Concerns Addressed	Benefits to Producer	Costs 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, mercury, 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 fords appropriately, install water bars to divert runoff to roadside ditches.	Helps prevent sediment and mercury 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 and mercury runoff into waters of the state.	May help prevent ditch bank erosion and slumping.	Costs of establishing vegetation.
d. Plant cover crops in orchards or nurseries.	Helps prevent sediment and mercury runoff into waters of the state; helps filter nutrients and slow runoff.	May reduce weed problems in orchards and nurseries; prevents loss of applied fertilizer.	Costs of establishing cover crops; cover crops may compete with primary crop.

Practice	Resource Concerns Addressed	Benefits to Producer	Costs to Producer
e. Irrigate pasture or crops according to soil moisture and plant water needs.	Helps prevent irrigation return flow and associated nutrients, sediment, and mercury 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 to prevent unwanted drainage into barnyards and animal heavy use areas.	Helps prevent nutrient and mercury runoff into waters of the state.	Decreases muddiness and shortens saturation period in protected areas.	Cost of installation.

Table 12: Pest Management

Practice	Resource Concerns Addressed	Benefits to Producer	Costs to Producer
a. Apply pesticides according to the label. Use the correct rate and timing. Comply with label restrictions and precautions.	Reduces risk of pesticide runoff to streams or other water resources.	Compliance with Oregon law; reduces health risks to applicator, may decrease costs.	
b. Triple rinse pesticide application equipment; dispose of rinse water and containers according to Oregon law. Apply rinsates to sites. Dispose of or recycle clean containers according to Oregon law.	Reduces risk of pesticide runoff to streams.	Compliance with Oregon law. Eliminates disposal costs of collected rinsates identified as hazardous waste.	
c. Calibrate, maintain and correctly operate application equipment.	Reduces risk of pesticide runoff to streams.	May reduce use and therefore cost of pesticides; reduces health risks to applicator.	Time involved to scout fields is usually offset by reduced or more effective pesticide use.
d. Integrated pest management practices such as pheromone traps, beneficial insect release, and field monitoring. (either in combination with pesticide use or as a replacement to pesticide use)	Reduces risk of pesticide runoff to streams, may reduce loss of non-target species.	May improve effectiveness of pest control system.	
e. Store and mix pesticides on leak-proof facilities.	Reduces risk of pesticide runoff to streams or soil contamination.	Helps protect drinking water; reduces health risks to applicator.	Cost of installation and maintenance.
f. Properly dispose of older unwanted legacy chemicals.	Prevents accidental release of unwanted pesticides into the soils or waterways.	Unwanted chemicals and risk are removed from the producers' property.	None if taken to a hazardous waste collection event. These are held periodically in Lane County.

Table 13: Nutrient and Irrigation Efficiencies

Practice	Resource Concerns Addressed	Benefits to Producer	Costs to Producer
Apply fertilizer at the correct rate and time applications for crop uptake.	Reduces the risk of excess nitrogen in the soil at the end of the growth season.	Precise application saves the producer money in fertilizer costs.	Time related to precision application.
Sample soil prior to fertilizer application to know existing nutrients.	Prevents the application of excess nutrients.	Precise application saves the producer money in fertilizer costs.	Cost of soil sampling and analysis.
Plant winter cover crops to take up excess nitrogen left over after crops are harvested.	Takes up extra nitrogen and limits potential for leaching into ground water.	Stores extra nitrogen in plant matter for later release when cover crop is incorporated into the soil.	Cost of seed and fuel to plant cover crop.
Properly maintain irrigation systems to prevent over-irrigation.	Prevents leaching of excess nitrogen past the root zone.	Uniform irrigation application and save producer money on nitrogen costs.	Replacement nozzles at least every four years is recommended.
Monitor soil water content and adjust irrigation schedules to maintain soil water content in an appropriate range in the root zone.	Prevents over- irrigation and leaching of excess nitrogen past the root zone.	Allows accurate irrigation application and keeps nutrients available to crops.	Soil monitoring equipment and time to evaluate soil water content.
Schedule irrigation applications based on expected evapotranspiration rates.	Prevents over- irrigation and leaching of excess nitrogen past the root zone.	Allows accurate irrigation application and keeps nutrients available to crops.	Time to evaluate expected evapotranspiration rates.

Selker et al, 2004

Chapter 3: Strategic Initiatives

Goal

Prevent and control water pollution from agricultural activities and soil erosion, and to achieve applicable water quality standards.

Mission

The mission of this Area Plan is to develop a framework of strategies for agricultural lands within the McKenzie, Middle Fork, and Coast Fork watersheds (the Management Area) that will contribute to desirable water quality and to develop programs to achieve the goals of the Plan while maintaining the economic sustainability of agriculture.

3.1 Measurable Objectives

ODA is working with SWCDs and LACs throughout Oregon towards establishing long-term Measurable Objectives to achieve desired conditions. At the current time, ODA and the Upper Willamette SWCD are using Focus Area milestones and the Camp Creek SIA to serve as a means to show progress in this Management Area. These are described below.

3.1.1 Management Area

ODA is working with SWCDs and LACs throughout Oregon towards establishing long-term Measurable Objectives to achieve desired conditions. At the current time, ODA and SWCDs are working on several strategic initiatives. These include Focus Areas and Strategic Implementation Areas; details are provided below.

3.1.2 Focus Area(s)

Gettings Creek Focus Area

Gettings Creek is a small perennial stream that is a tributary to the Coast Fork Willamette (Figure 5). The UW SWCD began work in the watershed in 2012 as one of the early pilots. The Gettings Creek watershed is located on the east side of I-5, just north of Cottage Grove. The watershed is approximately 10,000 acres (60% forest, 20% rural residential, and 20% agricultural). Agriculture in the watershed is mainly cattle and small acreage livestock owners located in the lower sub-watershed. Industrial and private timber holdings dominate the upper sub-watershed. Parameters of concern identified for the Gettings Creek Watershed were temperature and *E. coli*.

This Focus Area began during the 2013-2015 biennium using a class system to measure implementation success. During this timeframe a large landowner within the Focus Area reduced the numbers of livestock within riparian areas resulting in a 16% decrease in the numbers of livestock grazing. The ODA Streamside Vegetation Assessment (SVA) method, using riparian vegetation as a surrogate for temperature, was used to measure implementation success during the subsequent two biennia. The SVA categories are provided in the 2017 Pre-assessment table, below.

The Focus Area was closed in December 2017. Results and lessons learned from the Gettings Creek Focus Area are discussed in Chapter 4. The SWCD is currently working in the Upper Siuslaw Focus

Area, which is in the Upper Willamette-Upper Siuslaw Agricultural Water Quality Management Area. Therefore, this Management Area does not currently have a Focus Area.

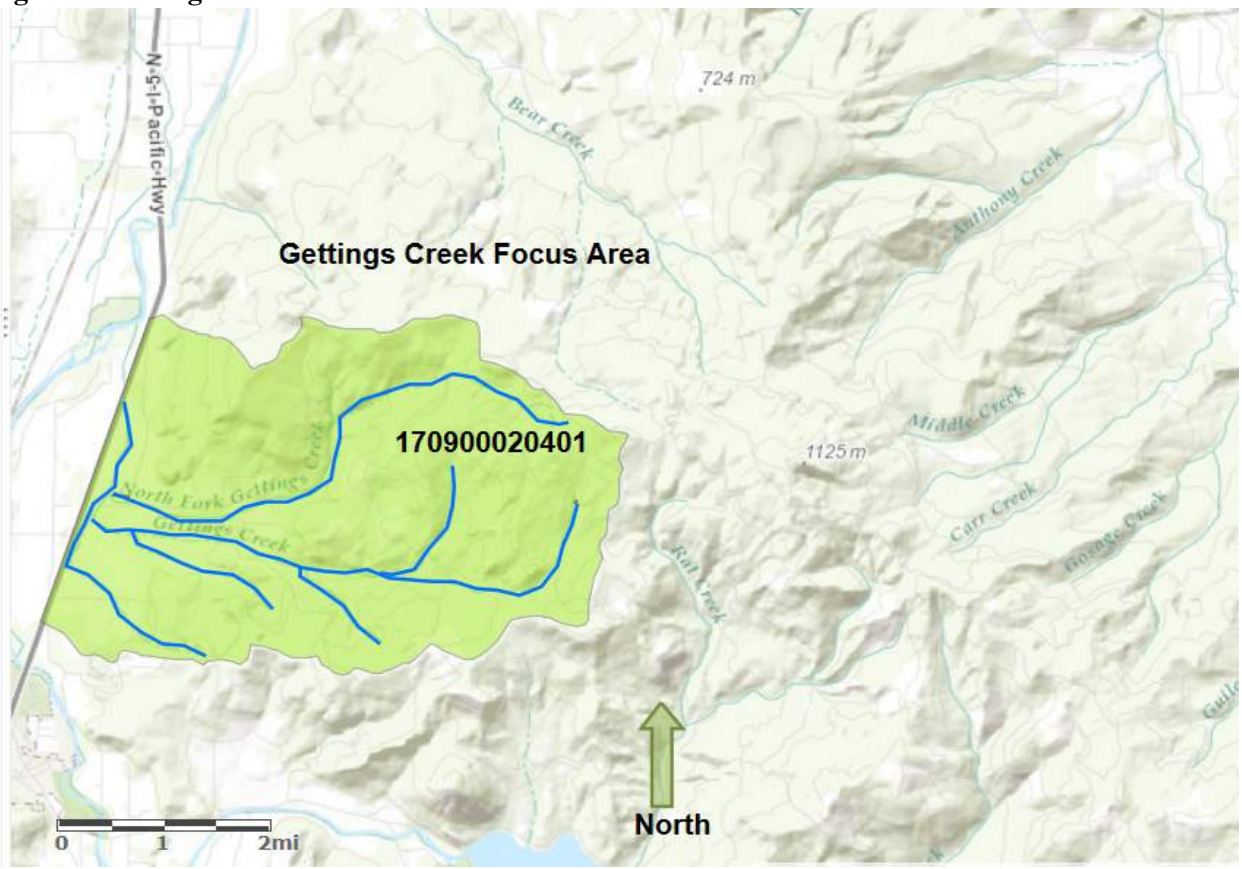
Table 14: Streamside Conditions at the beginning of the 2017 Fiscal Biennium

Ag Buildings	Bare	Bare Ag	Grass	Grass Ag	Not Ag	Shrub	Shrub Ag	Tree	Tree Ag	Water	Total Ag Acres
1.96	0.89	0.31	2.5	63.91	297.7	12.84	0.0	53.14	0.0	3.14	436.39

Gettings Creek Milestone for the 2017-2019 Fiscal Biennium:

- Increase trees and shrubs by six acres.

Figure 5. Gettings Creek Focus Area



3.1.3 Strategic Implementation Area

An OWEB SIA Technical Assistance Capacity Building grant for the Camp Creek SIA was awarded in 2018 for a four-year implementation timeframe. The Camp Creek 6th field watershed is located in the foothill's northeast of Springfield (Figure 6). Camp Creek is the main tributary of the 17,000-acre watershed which is tributary to the McKenzie River. Crops within the SIA include pasture and hay land, livestock, orchards and row crops. Water quality is influenced by a lack of streamside vegetation along some portions of the creek, elevated stream temperature and bacteria levels and elevated nutrients.

The purpose of the SIA is to conduct outreach, provide technical assistance and write grants for projects with the goal of reaching water quality goals for the watershed. An OWEB grant of $100,000 is awarded to the UW SWCD to administer. The OWEB grant provides an additional $25,000 for monitoring. The SIA began in 2018. Over the next four years, the SWCD will work with partners and willing landowners to address water quality issues. Partners include EWEB, McKenzie Watershed Council, Pure Water Partners, and the NRCS.

As part of the SIA process, ODA has conducted a remote evaluation to identify properties where a potential violation or opportunities for improvement exist. During the first year of the SIA, landowners with a potential violation may elect to work with the UW SWCD to bring their farms into compliance with the SWV Agricultural Water Quality Rules.

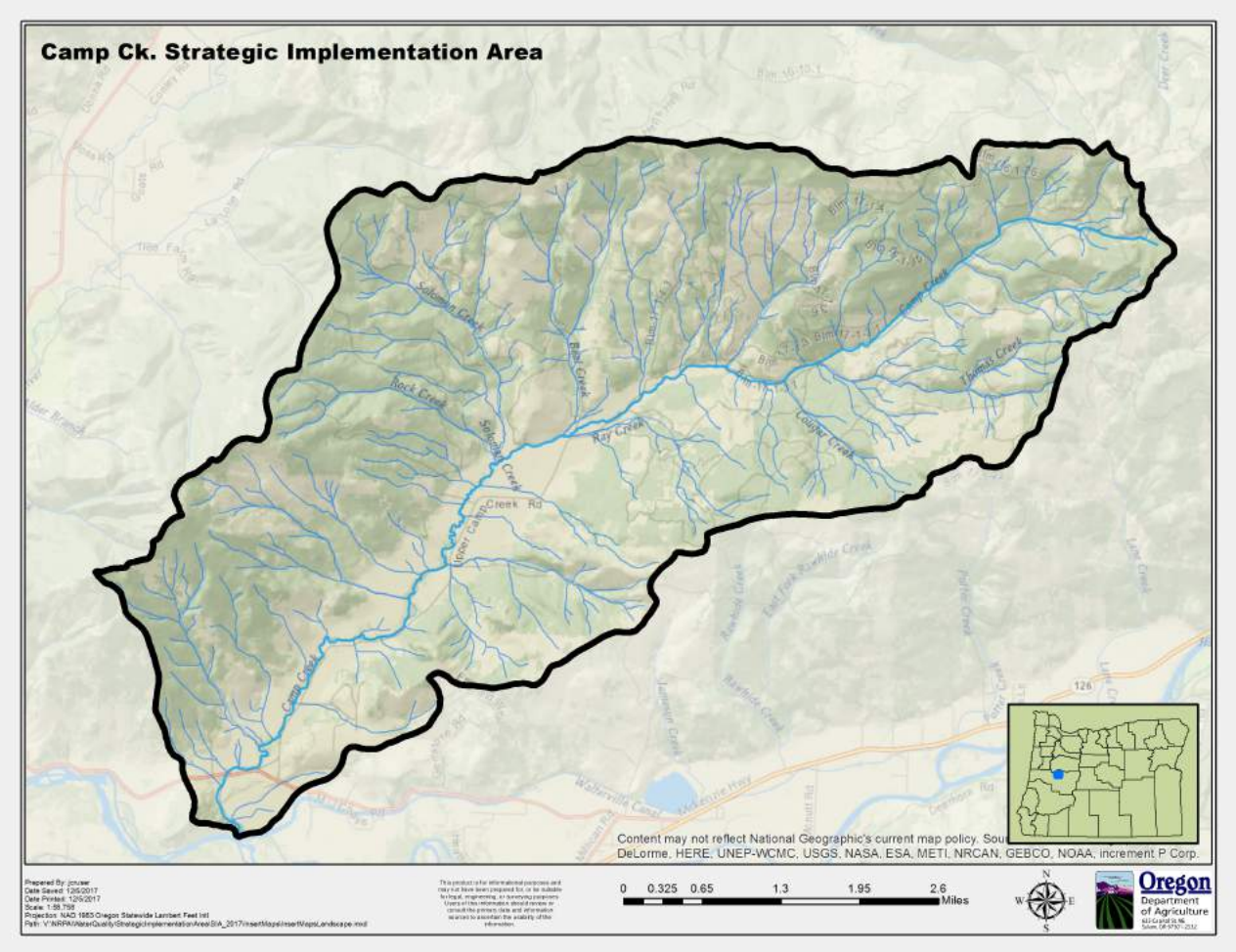
Measures of success for the SIA include:

1) ODA's evaluation of compliance with the agricultural water quality rules. The target is to have 100 percent compliance at a point in time and to have all agricultural landowners in the watershed aware of the requirements and also the resources available to them to help them comply with the rules or to do additional water quality projects to achieve the broader goals for the watershed.
2) ODA will measure streamside vegetation in the early stages of the SIA and conduct a post-assessment upon completion of the SIA using the ODA Streamside Vegetation Assessment Tool (SVA).
3) UW SWCD has identified specific objectives, actions and outcomes they hope to achieve with willing landowners and project Partners. These include:
    a) Stakeholder Engagement Plan -
    Following the initial ODA Open House, UW SWCD is implementing a stakeholder engagement plan that includes:
        - Post card invitation to an informational meeting,
        - Conduct informational meeting,
        - Recruit landowners to participate in the Pure Water Partners incentive program.

    b) Monitoring Plan
    UW SWCD is in the process of working with partners to develop a local monitoring plan for the Camp Creek SIA. Monitoring within the SIA is intended to be able to tell whether work within the SIA has made an improvement in water quality over time. OWEB provides a start-up amount of $25,000 to begin monitoring. The anticipated timeframe for monitoring is up to 10-years. The monitoring plan proposal will be submitted to a statewide oversight group that includes OWEB, ODA, ODFW and DEQ for approval. The statewide monitoring team is available to SIA partners for feedback and advice throughout the SIA process. Although this work has just begun, UW SWCD has been working with six landowners and most landowners have expressed interest in participating.

    A progress report will be provided in Chapter 4 in subsequent Plan updates.

Figure 6. Map of the Camp Creek SIA



3.2 Strategies and Activities

The LAC recommends that ODA, the Upper Willamette SWCD, Watershed Councils, Oregon State University Extension, and other partners use the following strategies to help achieve the goals and objectives of this Area Plan.

3.2.1 Education and Outreach

- Hold workshops on water quality issues and the conservation practices that will help improve water quality.
- Develop demonstration projects to showcase successful conservation practices and systems.
- Submit news articles and public service announcements to area newspapers, radio stations, and newsletters.
- Integrate training about the agricultural water quality program with pesticide applicator training credit hours.
- Share education materials with agribusiness field representatives, farm stores, and others having regular contact with agricultural producers.
- Develop a repository for educational and technical materials that is accessible to the public and maintained with current information. Agencies, agribusinesses, and other organizations may then refer landowners to the repository for more information. The LAC recommends that the Upper

Willamette SWCD, as the Local Management Agency, serve as the repository for this information, and that as much of this information as possible be maintained on or linked to the Upper Willamette SWCD and ODA websites.

3.2.2 Technical Assistance

Provide technical assistance to landowners in the Management Area to help them comply with the Area Rules and develop and meet their conservation and production goals.

3.2.3 Focus Area Work

Identify and focus outreach and technical assistance work in small geographic areas to help demonstrate the rate of change in land conditions that are protective of water quality.

- Identify water quality parameter(s) of concern and a possible land condition surrogate (e.g. streamside vegetation as a surrogate for temperature).
- Compile and map available baseline land condition and water quality data.
- Conduct outreach to promote awareness of water quality issues and their solutions.
- Conduct systematic outreach to meet with landowners, assess land conditions, and offer voluntary technical assistance.
- Seek to secure necessary resources to help landowners achieve land conditions that contribute to good water quality.
- Map land conditions after two years of implementation and quantify changes from the baseline.
- Compile updated available water quality data and provide to ODA for the purpose of quantifying changes from the baseline.
- Evaluate and discuss program effectiveness at the next biennial review of the Area Plan.

3.2.4 Incentives for Voluntary Work

- Submit grant proposals to the Environmental Protection Agency (EPA), Oregon Watershed Enhancement Board (OWEB), USDA, DEQ, ODA and other organizations, that will support the adoption of voluntary conservation actions to achieve the goals and objectives of the Area Plan.
- Promote incentive-based cost-share programs to assist landowners with implementing voluntary conservation projects.

For a list of agencies and organizations to contact for more information about resource management, please refer to Appendix B: Educational and Technical Services for Natural Resource and Farm Management.

3.2.5 Funding

Sometimes the cost of conservation measures may not fit well in a producer's operating budget. Local, state, and federal technical and financial resources are available to improve the cost-effectiveness of protecting and improving water quality. It is not the intent of the Area Plan to impose a financial hardship on any individual. If there are potential water quality threats on their land, it is the responsibility of the landowner or operator to request technical and/or financial assistance and to develop a reasonable time frame for addressing potential water quality problems.

As resources allow, the SWCD, NRCS, and other natural resource agency staff is available to help landowners evaluate approaches for reducing runoff and soil erosion on their farms and incorporate these into voluntary conservation or water quality plans. Personnel in these offices can also design and assist with project implementation, and help identify sources of cost sharing or grant funding.

Technical and financial assistance may be available through current USDA conservation programs. Other programs that stand ready to partner for conservation include the U.S. EPA's nonpoint source implementation grants ("319 funds"), or state programs such as the OWEB grant programs, the Riparian Tax Incentive Program, and the Wildlife Habitat Conservation and Management Program.

The SWCDs will seek funding to implement the Area Plan. Funding is necessary in four main areas:

- Education: to fund workshops, tours, and development of published materials.
- Technical assistance: to hire staff to work with landowners to develop and implement solutions to agricultural water quality concerns.
- Financial assistance: to provide cost-share dollars to assist landowners to implement agricultural water quality conservation activities.
- Monitoring: to monitor land conditions and water quality and evaluate how agricultural activities are impacting streams in the Management Area.

For sources of financial assistance, see Appendix F: Conservation Funding Programs.

3.3 Monitoring and Evaluation

Several organizations are currently conducting monitoring in the Southern Willamette Valley Management Area. ODA and DEQ's monitoring are introduced in Chapter 1.8. ODA is also conducting a long-term temperature study, which is described below. In addition, the Pure Water Partners (PWP) is also conducting monitoring in the Management Area that will help inform our efforts.

3.3.1 DEQ Status and Trends Monitoring

Water quality in the Management Area is currently monitored by DEQ, USEPA and USGS. Many other organizations also provide data. DEQ summarizes monitoring results in a report called *Southern Willamette Valley Agricultural Water Quality Management Area Water Quality Status and Trends Report,* February 2019. Data collected between January 01, 2000 and November 01, 2018 within the Management Area are described in this report. Parameters included in the report were temperature, pH, dissolved oxygen, total suspended solids, total phosphorus, and bacteria (*E. coli and fecal coliform).*

This report will be updated for future biennial reviews. The full report can be found online at https://www.oregon.gov/deq/wq/programs/Pages/wqstatustrends.aspx. An interpretation of the monitoring and evaluation results is provided in Chapter 4.

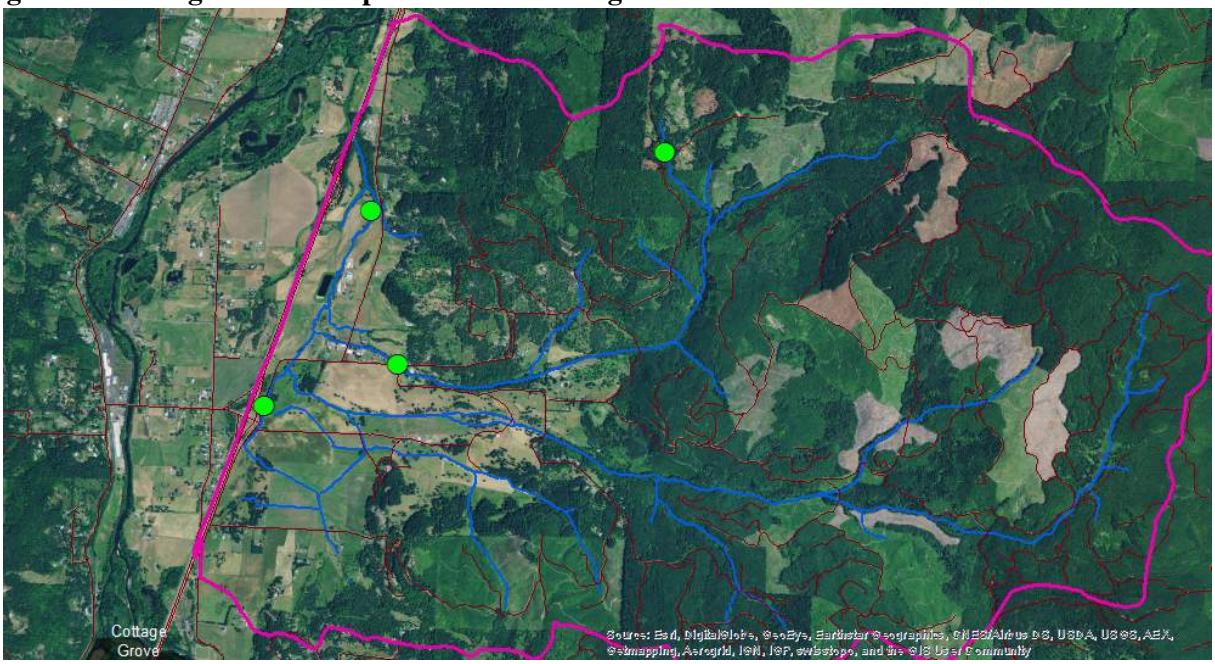
3.3.2 ODA Temperature Monitoring

In 2017, ODA began working with 13 local organizations to collect data on stream temperature, air temperature, stream flows, and riparian vegetation on agricultural lands. This monitoring will be carried out for 20 years. Data will be used by ODA to determine whether improved stream temperatures can be measured as a result of improved riparian vegetation on agriculture lands. In addition, the local organizations will use the data to answer their own questions relating to stream temperature. Oregon's DEQ will use the data to assess whether the monitored stream reaches are meeting water temperature standards.

As part of this project, the Upper Willamette SWCD deployed equipment at four locations in the Gettings Creek watershed (Figure 7). Data collected will enable us to understand the effects of current

implemented projects in the Gettings Creek Focus Area compared with pre-project data and to assist in future project planning and implementation.

Figure 7. Gettings Creek Temperature Monitoring Locations



3.3.3 Pure Water Partners Monitoring

Several organizations are currently conducting monitoring in the Southern Willamette Valley Management Area. ODA and DEQ's monitoring are introduced in Chapter 1.8. The ODA Aerial Monitoring program will conclude at the end of 2017. ODA is shifting monitoring to a long-term temperature study, which is described below. In addition, the Pure Water Partners (PWP) is also conducting monitoring in the Management Area that will help inform our efforts.

The Pure Water Partners (PWP) program is an incentive-based strategy that aims to protect existing healthy riparian areas and restore degraded riparian forests along the McKenzie River through voluntary actions. The Partners initiative began in 2018 and is ongoing. As such, the PWP provides a more palatable alternative to additional land use regulation.

Acknowledging the value of healthy riparian areas, the PWP seeks to reward landowners for management practices that benefit water quality, as well as habitat. These rewards include financial incentives such as cash payments or vouchers for in-kind services that can be used, for example, for developing landscape plans or implementing riparian area native plantings. This incentive-based approach not only rewards good land management practices, but also incentivizes property owners to restore their land, ultimately improving the ecological health of the watershed (OSU, 2012a).

The structure of the PWP monitoring component is planned as a two-tier approach: 1) watershed monitoring to assess if VIP investments are meeting key objectives; and, 2) site level monitoring to ensure restoration, protection and naturescaping actions are successful per landowner agreements.

1. Conduct repeat LiDAR flights every 4-5 years to measure change in canopy cover, structural footprints, and other infrastructure (i.e., roads, levees, docks, bridges, impoundments/dams, etc.), and creek/river channel morphology.

2. Conducts water quality monitoring across the watershed to assess changes in baseline conditions, harmful algal bloom production, and daily water quality trend. These efforts include baseline monitoring to assess long-term trends associated with metals, bacteria, nutrients, organic carbon, and other general water quality parameters (EWEB, 2011). Baseline monitoring collects water samples from 16 locations throughout the watershed four times per year that are sent to a certified analytical laboratory for metals, bacteria, nutrients, and general water quality parameter analysis (see http://eweb.org/sourceprotection/baseline)

3. Extending the Willamette SLICES (a regional Framework developed by Hulse et al. (2002)) approach up into the McKenzie Watershed for the purpose of long-term status and trend monitoring. Under the McKenzie River PWP, expansion of the SLICES spatial framework will be used to incorporate baseline monitoring of status and trends for three key metrics—floodplain forest extent, mainstem channel complexity and native fish so that the central question of whether restoration goals are being met can be answered over time.

4. Landowner self-reporting through submittal of annual photos from pre-determined photo points. This monitoring process involves landowners taking systematic (every year at a set time, date, and location) photos of designated areas on a landowner's property. Monitoring partners will assist the landowner in finding the best location for setting up monitoring points. The photos will be delivered via mail or email to the monitoring partners.

5. PWP partner (McKenzie Watershed Council or Upper Willamette SWCD) conducts regular site visits to collect riparian health metrics and assess effectiveness of actions. A trained specialist from one of the aforementioned partners will visit the landowner's property on regular basis based on the frequency specified in the agreement. The technician will use the most recent aerial imagery and LiDAR data from LCOG in conjunction with the eligibility criteria and the contract terms to assess the property and document any changes.

Chapter 4: Implementation, Monitoring, and Adaptive Management

4.1 Progress Toward Measurable Objectives

4.1.1 Management Area

ODA is working with SWCDs and LACs throughout Oregon towards establishing long-term Measurable Objectives to achieve desired conditions. At the current time, ODA and the SWCDs are using the Gettings Creek Focus Area milestones and the Camp Creek SIA to serve as a means to show progress in this Management Area. Results for these are described below.

4.1.2 Focus Area

Gettings Creek Focus Area

The milestone for the 2017-2019 fiscal biennium was to increase trees and shrubs by 6-acres; however, no changes in the tree and shrub categories were achieved during the 2015-2017 nor 2017-2019 biennia. Landowners were interested in doing projects, and although grant applications were submitted for these projects, the grants were not funded. Even though this Focus Area has closed, the UW SWCD will continue to seek funding so that work may be done as funds become available.

Table 15: Milestones for 2017-19 Fiscal Biennium

Fiscal Biennium	Ag Buildings	Bare	Bare Ag	Grass	Grass Ag	Not Ag	Shrub	Shrub Ag	Tree	Tree Ag	Water	Total Ag Acres
2015-2017	1.96	0.89	0.31	2.5	63.91	297.7	12.84	0.0	53.14	0.0	3.14	436.39
2017-2019	1.96	0.89	0.31	2.5	63.91	297.7	12.84	0.0	53.14	0.0	3.14	436.39

Landowner buy-in was hampered by lack of funding. Landowners were interested in addressing water quality concerns but a lack of resources was a big hurdle for project implementation. Agricultural projects have not been a priority for conservation funding in a highly competitive process. Had two larger projects received funding and been implemented, the measurable objective would likely have been met.

The UW SWCD found that site visits with individual landowners was the most successful approach. Hosting demonstrations of successful work that landowners have accomplished was also a success. The SWCD found that monitoring is essential to show landowners where potential issues are present. The ODA temperature monitoring project will include the Gettings Creek Focus Area will help inform landowners over the coming years.

4.1.3 Strategic Implementation Area

ODA's evaluation indicated there are two potential violations and four opportunities for improvement. Since the open house, the District has provided outreach to 181 individual landowners in that area. In May of 2018, staff helped to coordinate an open house informational meeting held at the Walterville Grange. Twenty-five area landowners attended the meeting to discuss the SIA process. From that meeting, the district staff scheduled five landowner visits to assess land conditions and provide technical assistance. Since that time, staff has developed an outreach strategy plan for the area and has begun developing a monitoring strategy for the area as well. Staff has also been conducting one-on-one site assessment visitations with 18 individual landowners with four project plans developed to date.

4.2 Activities and Accomplishments

Through partnerships with local, State and Federal partners and seeking funding though grants, UW SWCD has secured over $1.5 million that is dedicated to the Management Area.

Outreach:

- May 2017 – Provided information regarding the Southern Willamette Ag water quality program to the McKenzie Technical Team who has the charge of administering FERK 412 funding for projects in the McKenzie sub-basin. (14 attendees)
- September 2017 – Provided activity update regarding the Ag water quality program to the Farm Service Agency (FSA) County Committee meeting (10 attendees)
- September 2017 -Attended tour of Berggren Demonstration Farm in the Southern Willamette LMA. Distributed Ag water quality fact sheets to (15 attendees) Discussion was held on the type of projects being implemented to address ag water quality concerns
- September 2017 -Provided information to the Southern Willamette Groundwater Management Area PINE sub-committee regarding work with Southern Willamette LMA landowners. (12 attendees)
- September 2017 – Distributed Southern Willamette Ag water quality fact sheets at a District sponsored speaker event. (33 attendees)
- February 2018 – Distributed Ag water quality fact sheets at a District sponsored speaker event. (100 attendees)
- May 2018 – Distributed Ag water quality fact sheets and met with landowners one-on-one during the Pure Water Partners informational workshop held at the Leaburg training center. (30 attendees)
- May 2018 – Provided Ag water quality information to landowners attending a District sponsored speaker event. Distributed fact sheets regarding the Southern Willamette LMA. (45 attendees)
- June 2018 – Manned a District informational booth at the "Get Outside" Celebration, sponsored by the McKenzie River Trust. Distributed Southern Willamette LAC fact sheets to landowners. (500 attendees)
- October 2018 – Distributed Ag water quality fact sheets as part of a District informational table at the District sponsored "Pints for a Cause" fundraiser. (75 attendees)
- November 2018 – Distributed Ag water quality LMA fact sheets at a District sponsored speaker event. (40 attendees)
- January 2019 – Provided informational table at the Pure Waters Partners informational meeting held at the Leaburg training center. Information included fact sheets from the Southern Willamette LMA and information for the newly designated Camp Creek SIA. (30 attendees)

Summary:

During the period from May 2017 to present, District staff distributed the Southern Willamette LMA information and discussed in one-on-one interaction with landowners at 12 different events. Over 900 individuals were reached and over 650 fact sheets were distributed.

Technical Assistance:

During the biennial period, district staff conducted 73 one-on-one individual landowner site visits within the Southern Willamette LMA. From these visits, 21 landowner projects were developed addressing ag water quality concerns.

During this period, six developed projects were funded utilizing available funding. The funding totaled **$90,000** for "on the ground" project activities. Five projects have been completed, practices implemented include. Technical assistance for these projects were provided through an ODA technical assistance grant awarded to the District of **$130,000**.

- Manure management
- Exclusion Fence
- Riparian enhancement
- Heavy Use Protection
- Pasture Rotation/cross fencing
- Nutrient management
- Irrigation water management
- Off-Stream water facility
- Low Water Crossing
- Streambank stabilization

Pure Water Partners (PWP):
The District has been a core partner in the PWP program since its inception in 2012. This program works with landowners in the lower McKenzie Watershed to enhance and protect water quality in the tributaries and mainstem McKenzie River which is the sole source of drinking water for the city of Eugene. This program provides incentives to landowners to restore and protect near stream riparian vegetation, utilizes various other programs that include a septic system maintenance program for landowners near stream and a Healthy Farms/Clean Water program that assist landowners to reduce chemical and nutrient inputs on near stream cropland.

Staff has been working with over 40 landowners during the biennium, by using this program as a conservation tool to provide technical and funding assistance towards water quality concerns. To date this program has leveraged over **$500,000** of outside funding, and invested over **$300,000** to assist landowners. The future of this project is to expand into the Middle Fork and Coast Fork Watersheds.

Conservation Implementation Strategy (CIS):
During the biennium, District staff authored a Conservation Implementation Strategy (CIS) plan through the NRCS for the McKenzie Watershed. This plan provides a strategy to work with landowners, and provides focused cost/share funding, to implement a selection of conservation practices that address identified water quality concerns. This five-year strategy will provide over **$300,000** for implementation of practices design to address water quality concerns in the watershed.

National Water Quality Initiative (NWQI):
Recently, District staff applied for and was approved to be one of five areas in Oregon to develop a strategic plan for sole source drinking water for the McKenzie River as it serves the metropolitan area of Eugene and outlying areas. This strategy will study existing plans available, determine any informational gaps, work to fill the gaps, and provide guidance for future federal funding for assisting in the protection of the water quality of the McKenzie River. Phase one of this process has brought **$77,000** of federal funds to the LMA area.

4.3 Monitoring—Status and Trends

4.3.1 Water Quality

Within the Southern Willamette Valley Agricultural Water Quality Management Area, data from DEQ's Ambient Water Quality Monitoring System (AWQMS) 60 monitoring stations were sufficient to assess status and/or trends out of 391 total monitoring stations.

The majority of the Management Area is forested. We cannot say with any degree of confidence that water quality status and trends can be attributed to agriculture as a source of pollution. Of the 391

stations, only one (station FAMBUGB) has a 22 percent agricultural land use, two (stations 14164700 and 14164550) have 17 and 12 percent agricultural land use and the remainder range from a few around eight percent but most at zero percent. Table 16 provides results for a few stations that may be influenced by agriculture by comparing where the stations are located with Google Earth images. Many of these stations are also influenced by urban uses which must be considered when thinking about what these data may indicate.

Figure 8. Monitoring station locations within the Southern Willamette Valley Agricultural Water Quality Management Area.

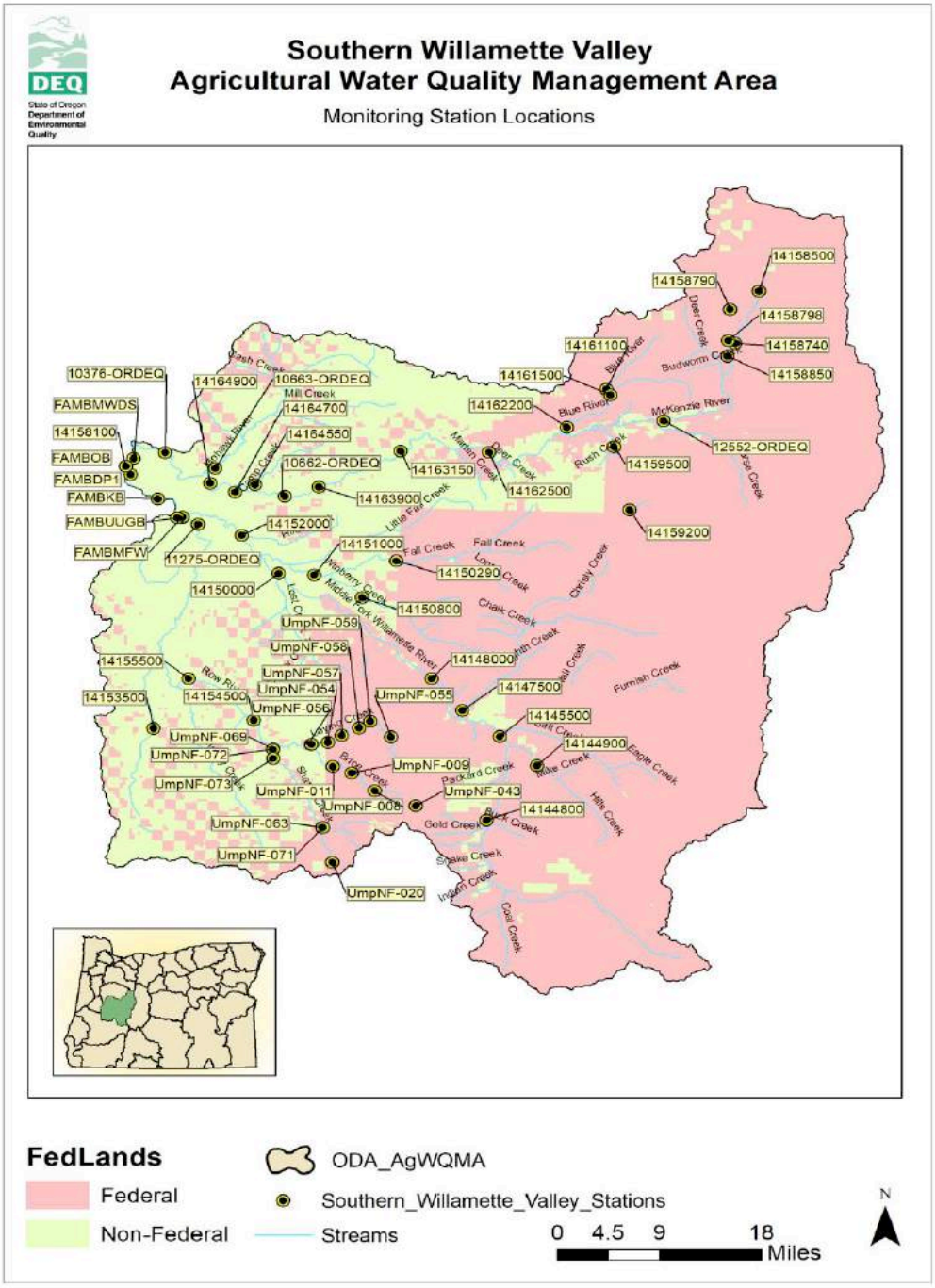


Table 16. Stations for which status and trends data may be influenced by agriculture.

Site ID	Site Description	*E. coli* (mpn/100mL)	pH	Dissolved Oxygen (mg/L)	Temperature (deg C)	Total Phosphorus (mg/L)	Total Suspended Solids (mg/L)
		# exceeding standard/N[1]				median[2]/ N[1]	median[3]/N[1]
14163900	**McKenzie R Near Walterville (0% Ag)**	-	-	-	38/333	-	-
141164550	**Camp Creek @ Camp Cr Rd Bridge (12% Ag)**	-	-	-	115/347	-	-
10376-ORDEQ	**McKenzie R @ Coburg Rd (2% Ag)**	0/114↓	3/175	30/184↑	-	-	2/118
FAMBMWDS	**WR DSTR of Beltline Bridge (4% Ag)**	0/109	0/57↑	16/51↑	-	0.05/55	3/52↓
FAMBUUGB	**WR Upstream of UGB (22% Ag)**	0/107	0/54↑	12/47↑	-	0.03/54	2.4/49
14164550	**Cedar Cr @ Springfield, OR (17% Ag)**	-	-	-	130/348	-	-
FAMBMFW	**MF Willamette (2% Ag)**	0/9	0/8	2/7	-	-	-
FAMBCFW	**CF Willamette @ RM 0.70 (8% Ag)**	0/16	0/8	0/8	-	-	-
11275-ORDEQ	**CF Willamette @ Mt. Pisgah Park (8% Ag)**	0/107	6/162	24/171↑	-	-	3/102
14152000	**MF Willamette R @ Jasper, OR (2% Ag)**	-	-	169/463↓	1456/3797 ↓	-	-
14155500	**Row River Near Cottage Grove, OR (1% Ag)**	-	-	-	304/3793	-	-
14153500	**CFW R BLW Cottage Grove Dam (2% Ag)**	-	-	-	442/3786↓	-	-

[1] N = Total # of observations

[2] DEQ has no benchmark for total phosphorus in this Management Area; ODA benchmark for potential water quality concerns = 0.08 mg/L

[3] Without applicable targets or criteria, all stations with sufficient data to assess status were categorized as "Meeting". Trend was determined by significant trends associated with long-term datasets.

↓Statistically significant degrading trend

↑ Statistically significant improving trend

A dash (-) means data were not sufficient to determine status and trends.

Conclusions:

E. coli

Data collected indicate compliance but with a degrading trend near larger cities. It is unclear whether agriculture is a contributing factor. It would be interesting to know whether homeless populations in the cities is a factor as well as whether failing septic systems throughout the watershed may be a source. Regardless, it is worth considering whether agriculture may be able to make improvements that would address potential sources from that sector.

Temperature

Stream temperatures are high throughout the Management Area but disproportionately so and surprisingly on forested areas of the watershed. Restoration efforts on the upper forested portions of the watershed are underway and may be temporarily contributing to higher stream temperatures. While stream temperature does not seem to be attributable to agriculture, work being done through the SIA process and with watershed councils and the SWCD may show improvements from these lands nonetheless.

Total Phosphorus

Data were not available in sufficient quantity to assess status. Data collected at six stations were sufficient to assess trends. All six stations did not have statistically significant trends.

Total Suspended Solids

Some rivers within the Management Area such as the Mohawk may be contributing sources of sediment that are a natural process. The LAC speculated whether RUSLE might be used to document whether

erosion on farmland is a source. They also noted that soil health efforts and cover crops may help to improve conditions that contribute to TSS.

Additional Conclusions:

- Grab samples may not provide a complete characterization of water quality for parameters that fluctuate on a daily basis (e.g., DO and pH). For this reason, continuous data are preferred and should be considered when monitoring these parameters in the future.

- This report is best used as a summary and statistical analysis of the status and trends in water quality data collected throughout the Southern Willamette Valley Agricultural Water Quality Management Area. Interpretation of results will require knowledge of local conditions known to affect the observed water quality conditions at individual sites.

- Some Partner data has yet to be entered into the Ambient Water Quality Monitoring System (AWQMS). Once these data, such as EWEB's data, we may have enough data to run status and trends for McKenzie River watersheds including the Camp Creek SIA.

4.4 Biennial Reviews and Adaptive Management

4.4.1 LAC Discussion and Recommendations

Which strategies have been most effective and why?

Although the Gettings Creek Focus Area did not result in changes to streamside vegetation landowners were willing to do projects. This Focus Area is closed but UW SWCD will continue to seek funding sources in the future that may enable these landowners to do projects.

The Camp Creek SIA has been very successrul so far with many landowners expressing interest in doing projects. The UW SWCD is actively working with all landowners whose properties were identified with a potential compliance issue. The UW SWCD has been highly successful in developing Partnerships through the Pure Water Partners and changes in water quality results are anticipated for future biennial reviews.

Are there cultural, economic, or environmental factors that are limiting the effectiveness of our strategies?

One LAC member expressed strong distrust of government processes, however, most are favorable to the progress being achieved within this Management Area through the Agricultural Water Quality Management Act. The LAC's overall strong leadership within this Management Area has been very successful in influencing other growers to take an interest in taking action to voluntarily make improvement that will contribute to achieving water quality goals.

4.4.2 ODA Compliance

As typical throughout Oregon, the approach of identifying issues and working with growers through primarily providing information, engaging with the SWCDs, NRCS, and WCs to provide technical assistance and sometimes financial assistance has proven successful in achieving compliance with the rules without a need to resort to punitive measures such as civil penalties (Table 17).

Table 17. Resulting Compliance Actions

Compliance Action	#s of Actions	Description
Letter of Compliance	1	Compliance Achieved
Letter of Warning	0	Required Actions Possible
Water Quality Advisory	1	ODA Recommends Actions
Fix It Letter	0	Site Visit Not Warranted
Notice of Non-Compliance	0	ODA Requires Actions
Civil Penalty	0	Penalty Fee Assessed

During the biennium, four compliance cases were initiated. Of these, one case was initiated via public written complaint, one agency notification and two through the ODA SIA process. Issues encountered were primarily related to riparian and nutrients.

References

Boer, J. 2000. Personal communication regarding geologic reconnaissance work in the upper McKenzie River Basin. Portland State University, Portland, Oregon.

Council for Agricultural Science and Technology. 2012. Assessing the Health of Streams in Agricultural Landscapes: The Impacts of Land Management Change on Water Quality. Special Publication No. 31. Ames, Iowa.

Cude, C. 1995. Oregon water quality index report for Upper Willamette Basin. Oregon Department of Environmental Quality, Portland, Oregon.

Eugene Water and Electric Board. 2000. Drinking Water Source Protection Plan. Eugene Water and Electric Board, Eugene, Oregon.

Lane Council of Governments. 1996. McKenzie Watershed Council Technical Report for Fish and Wildlife Habitat. McKenzie Watershed Council, Springfield, Oregon.

Morgenstern, Karl. 2006. Nonpoint Source Pollution Assessment and Evaluation. Eugene Water and Electric Board. Eugene, Oregon.

Oregon Department of Environmental Quality. 2007. Reducing Mercury Pollution in the Willamette River. Oregon Department of Environmental Quality, Portland Oregon.

Oregon Water Resources Board. 1961. Upper Willamette River Basin. Oregon Water Resources Board, Salem, Oregon.

Oregon Water Resources Department. 1990. Water Rights Information System. Oregon Water Resources Department, Salem, Oregon.

Oregon Water Resources Department and U.S. Army Corps of Engineers. 2000. Willamette Basin Reservoirs: An overview of U.S. Army Corps of Engineers dams and reservoirs on Willamette River Tributaries. Oregon Water Resources Department, Salem, Oregon.

Orr, E.L., Orr, W.N., and Baldwin, E.M. 1992. Geology of Oregon. 4th Edition. Kendall/Hunt Publishing Company, Dubuque, Iowa.

Patching, R. 1987. Soil Survey of Lane County, Oregon. U.S. Department of Agriculture Soil Conservation Service, Washington, D.C.

Penhallegon, R. 2000. Personal communication regarding agricultural commodities in the McKenzie watershed. Oregon State University Extension Service, Eugene, Oregon.

Portland State University Population Research Center. 2007. Population estimates for Oregon, its counties, and incorporated cities, July 1, 2007. Population Research Center, Portland, Oregon.

Sirois, B. 2000. Drinking Water Protection Plan: Environmental Setting and Risk Assessment. Eugene Water and Electric Board, Eugene, Oregon.

United States Geological Survey. 1998. Seasonal and spatial variability of nutrients and pesticides in streams of the Willamette Basin, Oregon, 1993-95. Water-Resources Investigations Report 97-4082-C, Portland, Oregon.

University of Oregon Geography Department. 2000. Precipitation map for Lane County. University of Oregon, Eugene, Oregon.

Watson, E.J., et al. 1961. Upper Willamette River Basin. Oregon Water Resources Board. Salem, Oregon.

Appendix A: Common Agricultural Water Quality Parameters of Concern

The following parameters are used by DEQ in establishing the 303(d) List and assessing and documenting waterbodies with TMDLs. Note: This is an abbreviated summary and does not contain all parameters or detailed descriptions of the parameters and associated standards. Specific information about these parameters and standards can be found at: www.deq.state.or.us/wq/assessment/assessment.htm or by calling (503) 229-6099.

Parameters

Bacteria: *Escherichia coli (E. coli)* is measured in streams to determine the risk of infection and disease to people. Bacteria sources include humans (recreation or failing septic systems), wildlife, and agriculture. On agricultural lands, *E. coli* generally comes from livestock waste, which is deposited directly into waterways or carried to waterways by livestock via runoff and soil erosion. Runoff and soil erosion from agricultural lands can also carry bacteria from other sources.

Biological Criteria: To assess a stream's ecological health, the community of benthic macro invertebrates is sampled and compared to a reference community (community of organisms expected to be present in a healthy stream). If there is a significant difference, the stream is listed as water quality limited. These organisms are important as the basis of the food chain and are very sensitive to changes in water quality. This designation does not always identify the specific limiting factor (e.g., sediment, nutrients, or temperature).

Dissolved Oxygen: Dissolved oxygen criteria depend on a waterbody's designation as fish spawning habitat. Streams designated as salmon rearing and migration are assumed to have resident trout spawning from January 1 – May 15, and those streams designated core cold water are assumed to have resident trout spawning January 1 – June 15. During non-spawning periods, the dissolved oxygen criteria depends on a stream's designation as providing for cold, cool or warm water aquatic life, each defined in OAR 340 Division 41.

Harmful Algal Blooms: Some species of algae, such as cyanobacteria or blue-green algae, can produce toxins or poisons that can cause serious illness or death in pets, livestock, wildlife, and humans. As a result, they are classified as Harmful Algae Blooms. Several beneficial uses are affected by Harmful Algae Blooms: aesthetics, livestock watering, fishing, water contact recreation, and drinking water supply. The Public Health Department of the Oregon Health Authority is the agency responsible for posting warnings and educating the public about Harmful Algae Blooms. Under this program, a variety of partners share information, coordinate efforts and communicate with the public. Once a water body is identified as having a harmful algal bloom, DEQ is responsible for investigating the causes, identifying sources of pollution and writing a pollution reduction plan.

Mercury: Mercury occurs naturally and is used in many products. It enters the environment through human activities and from volcanoes, and can be carried long distances by atmospheric air currents. Mercury passes through the food chain readily, and has significant public health and wildlife impacts from consumption of contaminated fish. Mercury in water comes from erosion of soil that carries naturally occurring mercury (including erosion from agricultural lands and streambanks) and from deposition on land or water from local or global atmospheric sources. Mercury bio-accumulates in fish, and if ingested can cause health problems.

Nitrate: While nitrate occurs naturally, the use of synthetic and natural fertilizers can increase nitrate in drinking water (ground and surface water). Applied nitrate that is not taken up by plants is readily carried by runoff to streams or infiltrate to ground water. High nitrate levels in drinking water cause a range of human health problems, particularly with infants, the elderly, and pregnant and nursing women.

Pesticides: Agricultural pesticides of concern include substances in current use and substances no longer in use but persist in the environment. Additional agricultural pesticides without established standards have also been detected. On agricultural lands, sediment from soil erosion can carry these pesticides to water. Current use agricultural pesticide applications, mixing-loading, and disposal activities may also contribute to pesticide detections in surface water. For more information, see: https://www.oregon.gov/deq/wq/Pages/WQ-Standards-Toxics.aspx.

Phosphorous/Algae/pH/Chlorophyll a: Excessive algal growth can contribute to high pH and low dissolved oxygen. Native fish need dissolved oxygen for successful spawning and moderate pH levels to support physiological processes. Excessive algal growth can also lead to reduced water clarity, aesthetic impairment, and restrictions on water contact recreation. Warm water temperatures, sunlight, high levels of phosphorus, and low flows encourage excessive algal growth. Agricultural activities can contribute to all of these conditions.

Sediment and Turbidity: Sediment includes fine silt and organic particles suspended in water, settled particles, and larger gravel and boulders that move at high flows. Turbidity is a measure of the lack of clarity of water. Sediment movement and deposition is a natural process, but high levels of sediment can degrade fish habitat by filling pools, creating a wider and shallower channel, and covering spawning gravels. Suspended sediment or turbidity in the water can physically damage fish and other aquatic life, modify behavior, and increase temperature by absorbing incoming solar radiation. Sediment comes from erosion of streambanks and streambeds, agricultural land, forestland, roads, and developed areas. Sediment particles can transport other pollutants, including bacteria, nutrients, pesticides, and toxic substances.

Temperature: Oregon's native cold-water aquatic communities, including salmonids, are sensitive to water temperature. Several temperature criteria have been established to protect various life stages and fish species. Many conditions contribute to elevated stream temperatures. On agricultural lands, inadequate streamside vegetation, irrigation water withdrawals, warm irrigation water return flows, farm ponds, and land management that leads to widened stream channels contribute to elevated stream temperatures. Elevated stream temperatures also contribute to excessive algal growth, which leads to low dissolved oxygen levels and high pH levels.

Appendix B: Sources of Information and Technical Assistance

Upper Willamette Soil and Water Conservation District (Upper Willamette SWCD)
780 Bailey Hill Road, Suite #5
Eugene, OR 97402
(541) 465-6436
Provides technical assistance in a wide variety of agricultural and natural resource areas and assists landowners in accessing federal and local funding programs.

Farm Services Agency (FSA)
780 Bailey Hill Road, Suite #5
Eugene, OR 97402
(541) 465-6443
Maintains agricultural program records and administers federal cost-share programs. Maintains up-to-date aerial photographs and slides of agricultural and forest lands.

Lane County Farmers' Market
55 East 8th Avenue
Eugene, OR 97401
(541) 687-6721
Local produce directly from farmers. Many experienced organic growers onsite.

McKenzie River Trust
1245 Pearl Street
Eugene, OR 97401
(541) 345-2799
mrt@mckenzieriver.org
www.mckenzieriver.org
Local, non-profit land conservancy; works with landowners in Lane/Douglas counties to preserve their property. Employs tools to help landowners protect lands critical to water quality and wildlife habitat.

Natural Resources Conservation Service (NRCS)
780 Bailey Hill Road, Suite #5
Eugene, OR 97402
(541) 465-6443
Provides information on soil types, soils mapping, interpretation. Administers/provides assistance in developing conservation plans for federal programs - Conservation Reserve Program, Conservation Reserve Enhancement Program, Environmental Quality Incentives Program, Wetlands Reserve Program. Makes technical determinations on wetlands and highly erodible lands.

Northwest Coalition for Alternatives to Pesticides (NCAP)
P.O. Box 1393
Eugene, OR 97440
(541) 344-5044
http://www.pesticide.org
info@pesticide.org
Works to protect people/environment by advancing healthy solutions to pest problems. Has library of 15,000+ articles, documents, books on pesticide issues, health, environmental effects of pesticides, and alternative practices. Provides info on managing specific pest problems or crop without pesticides. Has water quality program; provides info on protection of waterways and research on pesticide contamination of waterways.

Oregon Department of Agriculture (ODA)
635 Capitol St NE
Salem, OR 97301
Natural Resources Division: (503) 986-4700
Pesticides Division: (503) 986-4635
Natural Resources is responsible for developing/implementing Management Area Plans/Rules, Confined Animal Feeding Operation Program, and providing support to Oregon's SWCDs. Pesticides program regulates the sale/use of pesticides; tests/licenses all users of restricted-use pesticides, responsible for fertilizer registration, and investigates incidents of alleged pesticide misuse.

Oregon Department of Environmental Quality (DEQ)
165 East 7th Avenue, Suite 100
Eugene, OR 97401
(541) 686-7838
Responsible for protecting water and air quality, cleaning up spills/releases of hazardous materials, managing the proper disposal of solid and hazardous wastes. Maintains a list of water quality limited streams and establishes Total Maximum Daily Loads for water quality limited waterbodies.

Oregon Department of Fish and Wildlife (ODFW)
Springfield Field Office
3150 E Main Street
Springfield, OR 97478-5800
(541) 726-3515
http://www.dfw.state.or.us
Works with landowners to protect and enhance habitat for a variety of fish/wildlife species, manages recreational fishing and hunting programs, monitors fish and wildlife populations, conducts education and information programs, and administers wildlife habitat tax deferral program.

Oregon Department of Forestry (ODF)
Veneta office:
87950 Territorial Hwy
Veneta, OR 97487
(541) 935-2283

Springfield office:
3150 E Main Street
Springfield, OR 97478-5800
(541) 726-3588

http://www.odf.state.or.us
Implements forest practices laws, administers forestry property tax programs, provides forest management assistance to landowners, administers/assists with federal/local cost-sharing programs.

Oregon Department of State Lands (DSL)
775 Summer Street NE, Suite 100
Salem, OR 97301-1279
(503) 986-5200
http://statelands.dsl.state.or.us
Administers Oregon fill and removal law and provides technical assistance to landowners.

Oregon State University Extension Service (OSU Extension Service)
783 Grant Street
Eugene, OR 97402
(541) 344-5859
http://extension.oregonstate.edu/lane
Offers educational programs, seminars, classes, tours, publications, and individual assistance to guide landowners in meeting natural resource management goals.

Oregon Tilth
260 SW Madison Avenue, Suite 106
Corvallis, OR 97333
(503) 378-0690
http://www.tilth.org
The NW certifying agency for organic farms. Maintains manual on acceptable practices and visits farms to determine compliance. Publishes "In Good Tilth"; maintains a list of currently certified farmers.

Oregon Water Resources Department (WRD)
725 Summer Street NE, Suite A
Salem, OR 97301
(503) 986-0900
http://www.wrd.state.or.us
Provides information on stream flows and water rights, issues water rights, and monitors water use.

Oregon Watershed Enhancement Board (OWEB)
http://www.oweb.state.or.us
775 Summer St. NE, Suite 360
Salem, OR 97301-1290
(503) 986-0178
Provides funding for a variety of watershed enhancement, assessment, monitoring and educational activities. Provides support to watershed councils throughout Oregon.

Watershed Councils
Bring diverse interests together to cooperatively monitor and address local watershed conditions. Collect watershed condition data, conduct education programs, and train and involve volunteers.

McKenzie Watershed Council
P.O. Box 70166
Springfield, OR 97475
(541) 687-9076
www.mckenziewc.org
coordinator@mckenziewc.org

Coast Fork Watershed Council
28 South 6th Street, Suite A
Cottage Grove, OR 97424
(541) 767-9717
www.coastfork.org

Middle Fork Watershed Council
P.O. Box 27
Lowell, OR 97452
(541) 937-9800
www.mfwwc.org
contact@mfwwc.org

Mohawk Watershed Partnership
P.O. Box 615
Marcola, OR 97454-0615
(541) 687-9076
mwp@epud.nethttp://www.mckenziewc.org/mohawkWSP.html

Lost Creek Watershed Group
PO Box 27
Lowell, OR 97452
(541) 937-3351
mfwwc@efn.org

Appendix C: 2010 Water Quality Assessment List and Decision Matrix

"TMDL" means a TMDL has been established for the waterbody and approved by EPA, and is being implemented. The TMDL is the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards. The water is considered Water Quality Limited until it meets the water quality standard.

"303(d) List" means the waterbody exceeds listing criteria and is placed on the 303(d) List.

"Potential concern" means data indicate a waterbody may typically meet water quality standards except under unusual circumstances (e.g. unusual weather circumstances) or in situations where toxics exceed levels of concern but do not exceed definitions used for the 303(d) List. In these cases, the waterbodies are identified as being of potential concern and the Department of Environmental Quality will seek more data to verify the assessment.

BACTERIA (CRITERIA: WATER CONTACT RECREATION)

TMDL Approved September 2006

DEQ has set the bacteria TMDL to protect human water contact recreation, the most sensitive beneficial use. Urban stormwater discharge and agricultural run-off are two potential sources of bacteria. The bacteria TMDL addresses the entire area.

DISSOLVED OXYGEN

TMDL Approved, 1996

Coast Fork Willamette River, River Mile (RM) 0 to 28.5

303(d) List	**Season**
Middle Fork Sub Basin:	
Anthony Creek, Mouth to RM 4.3	Oct. 1 – May 31
Anthony Creek, Mouth to RM 4.3	June 1 – Sept. 30
Lost Creek, Mouth to RM 14.7	Oct. 1 – May 31
Lost Creek, Mouth to RM 14.7	June 1 – Sept. 30
Coast Fork Sub Basin:	
Camas Swale Creek, Mouth to RM 9.4	Oct. 1 – May 31

TEMPERATURE (CRITERIA: REARING 64 F, SPAWNING 55 F, OR BULL TROUT 50 F)

DEQ set the TMDL for temperature to protect salmon spawning, rearing, and passage as the most sensitive beneficial uses in the Southern Willamette Valley Management Area. DEQ has identified the existing nonpoint source pollution sources as solar heating of the Area's waterways due to a lack of riparian vegetation from forestry, agriculture, rural residential, and urban activities. There are separate temperature TMDLs for the mainstem Willamette, the McKenzie Subbasin, the Middle Fork Willamette Subbasin, and the Coast Fork Willamette Subbasin

303(d) List (covered under the TMDL)	**Season**
McKenzie Sub Basin:	
Blue River-RM 0 to 15.5	Year Round
Budworm Creek, RM 0 to 3.1	Year Around

Camp Creek, RM 0 to 10.9	Year Around
Cartright Creek, RM 0 to 6.1	Year Around
Cash Creek, RM 0 to 6.1	Year Around
County Creek, RM 0 to 2.4	Year Around
Deer Creek, RM 0 to 2.6	Year Around
Duckpen Creek, RM 0 to 2.1	Year Around
Horse Creek, RM 0 to 14.2	Summer
Lookout Creek, RM 0 to 9.8	Year Around
Marten Creek, RM 0 to 6.5	Year Around
McGowan Creek, RM 0 to 5.7	Year Around
McKenzie River, RM 0 to 54.6	Year Around
Mill Creek, RM 0 to 10.6	Year Around
Mohawk River, RM 0 to 25.4	Year Around
Rebel Creek, RM 0 to 1.2	Year Around
Rush Creek, RM 0 to 2.4	Year Around
Seeley Creek, RM 0 to 2.4	Year Around
Shotgun Creek, RM 0 to 6.6	Year Around
South Fork McKenzie River, RM 0 to 4.5	Summer

Middle Fork Willamette:

Anthony Creek, RM 0 to 4.3	Year Around
Bohemia Creek, RM 0 to 4.4	Year Around
Buckhead Creek, RM 0 to 3.6	Year Around
Chalk Creek, RM 0 to 4.8	Year Around
Christy Creek, RM 0 to 12	Year Around
Coal Creek, RM 0 to 8.9	Year Around
Coal Creek Trib., RM 0 to 2.2	Year Around
Eagle Creek, RM 0 to 5.3	Year Around
Fall Creek, RM 0 to 32.8	Year Around
Furnish Creek, RM 0 to 5.2	Year Around
Gold Creek, RM 0 to 5.1	Year Around
Goodman Creek, RM 0 to 2.3	Year Around
Guiley Creek, RM 0 to 4.7	Year Around
Hehe Creek, RM 0 to 6.6	Year Around
Hills Creek, RM 0 to 15.3	Year Around
Indian Creek, RM 0 to 4.3	Year Around
Little Fall Creek, RM 0 to 20.6	Year Around
Logan Creek, RM 0 to 3.6	Year Around
Lost Creek, RM 0 to 14.7	Year Around
McKinley Creek, RM 0 to 3.8	Year Around
Middle Creek, RM 0 to 3.8	Year Around
Middle Fork Willamette, RM 52.3 to 82.2	Year Around
Mike Creek, RM 0 to 2.2	Year Around
Monterica Creek, RM 0 to 2.3	Year Around
N. Fork, Middle Fork Willamette River, RM 0 to 28.3	Year Around
N. Fork Winberry Creek, RM 0 to 5.8	Year Around
Packard Creek, RM 0 to 5.2	Summer
Portland Creek, RM 0 to 3	Summer
Salt Creek, RM 0 to 13.8	Year Around
Shortridge Creek, RM 0 to 2	Year Around
Snake Creek, RM 0 to 3.6	Year Around

South Fork Winberry Creek, RM 0 to 9.5	Year Around
Wall Creek, RM 0 to 6.6	Year Around
Winberry Creek, RM 0 to 8	Year Around

Coast Fork Willamette:

Brice Creek, RM 0 to 11.2	Summer
Coast Fork Willamette, RM 0 to 38.8	Year Around
King Creek, RM 0 to 3.2	Year Around
Laying Creek, RM 0 to 14.4	Year Around
Marten Creek, RM 0 to 3.4	Year Around
Mosby Creek, RM 0 to 21.2	Year Around
Row River, RM 0 to 20.8	Year Around
Sharps Creek, RM 0 to 15,2	Year Around

Potential Concern	**Season**
McKenzie Sub Basin:	
Augusta Creek, RM 0 to 7.1	Summer

Middle Fork Willamette:

Salt Creek, South Fork, RM 0 to 6.6	Summer

METALS

Mercury TMDL

Human fish consumption is the most sensitive beneficial use for which DEQ has set the Mercury TMDL. Primary sources of mercury include air deposition from national and international sources, discharge from specific legacy mining sites, and erosion of soils containing mercury. The Mercury TMDL has a basin wide strategy for mercury reduction.

303(d) List	**Season**
McKenzie Sub Basin:	
Blue River, RM 0 to 15.5 (Manganese)	Year Around
Mohawk River, RM 0 to 25.4 (Iron)	Year Around

Coast Fork Willamette:

Coast Fork Willamette River, RM 0 to 38.8 (Iron)	Year Around
Coast Fork Willamette River, RM 0 to 38.8 (Mercury)	Year Around
Cottage Grove Reservoir (Mercury)	Year Around
Dennis Creek, RM 0 to 1.4 (Mercury)	Year Around
Dorena Reservoir (Mercury)	Year Around

Potential Concern	
McKenzie Sub Basin:	
McKenzie RiverRM 0 to 83 (Arsenic)	
McKenzie River, RM 0 to 34.1 (Chromium)	Year Around
McKenzie River, RM 0 to 34.1 (Copper)	Year Around
McKenzie River, RM 0 to 19.7 (Iron)	Year Around
McKenzie River, RM 0 to 34.1 (Manganese)	Year Around
McKenzie River, RM 0 to 34.1 (Nickel)	Year Around
South Fork McKenzie River, RM 0 to 36.3 (Iron)	Year Around

Coast Fork Willamette:	
Coast Fork Willamette River, RM 0 to 38.8 (Manganese)	Year Around

FLOW MODIFICATION	
303 (d) List	**Season**
McKenzie Sub Basin:	
Blue River, RM 0 to 15.5	Undefined
Camp Creek, RM 0 to 10.8	Undefined
McKenzie River, RM 34.1 to 54.5	Undefined
South Form McKenzie River, RM 0 to 4.5	Undefined
Middle Fork Willamette:	
Fall Creek, RM 0 to 7 and 13 to 32.7	Undefined
Middle Fork Willamette River, RM 0 to 15.6 and 18.7 to 44.2	Undefined
Coast Fork Willamette:	
Coast Fork Willamette, RM 0 to 31.3	Undefined
Row River, RM 0 to 7.4	Undefined

HABITAT MODIFICATION	
303 (d) List	**Season**
McKenzie Sub Basin:	
Mill Creek, RM 0 to 2.7	Undefined
Mohawk River, RM 0 to 25.4	Undefined
Middle Fork Willamette:	
Little Fall Creek, RM 0 to 20.6	Undefined
Simpson Creek, RM 0 to 5	Undefined
Coast Fork Willamette:	
Brice Creek, RM 0 to 11.2	Undefined
Mosby Creek, RM 0 to 21.2	Undefined
Sharps Creek, RM 0 to 12.5	Undefined

AQUATIC WEEDS OR ALGAE	
303 (d) List	**Season**
McKenzie Sub Basin:	
Blue River/Blue River Reservoir	Undefined
Middle Fork Willamette:	
Middle Fork Willamette/Dexter Reservoir	Undefined
Middle Fork Willamette/Hills Creek Lake	Undefined
Middle Fork Willamette/Lookout Point Lake	Undefined
Coast Fork Willamette:	
Coast Fork Willamette River, RM 0 to 31.3	Undefined
Row River/Dorena Lake	Undefined

NUTRIENTS

TMDLs Approved

Coast Fork Willamette-Mouth to Cottage Grove Reservoir (Phosphorus)
Coast Fork Willamette-Mouth to Cottage Grove Res. (Water-Ammonia)
Coast Fork Willamette, RM 0 to 31.3 (pH)

Potential Concern

McKenzie River, RM 73.4 to 84.8 (Phosphorus)

ALKALINITY

Potential Concern	Season
McKenzie Sub Basin:	
Blue River, RM 0 to 15.5	Year Around
Cash Creek, RM 0 to 6.1	Year Around
County Creek, RM 0 to 2.4	Year Around
Lookout Creek, RM 0 to 9.8	Year Around
Marten Creek, RM 0 to 6.5	Year Around
McKenzie River, RM 0 to 84.8	Year Around
Mill Creek, RM 0 to 10.6	Year Around
Mohawk River, RM 0 to 25.4	Year Around
Parsons Creek, RM 0 to 6.9	Year Around
Rebel Creek, RM 0 to 4.4	Year Around
Roney Creek, RM 0 to 2.7	Year Around
Rush Creek, RM 0 to 2.4	Year Around
South Fork McKenzie River, RM 0 to 36.3	Year Around
Middle Fork Willamette:	
Black Creek, RM 0 to 13.6	Year Around
Eighth Creek, RM 0 to 2.7	Year Around
Furnish Creek, RM 0 to 5.2	Year Around
Little Fall Creek, RM 0 to 20.6	Year Around
Middle Fork Willamette River, RM 0 to 82.2	Year Around
North Fork Winberry Creek, RM 0 to 5.8	Year Around
Shady Creek, RM 0 to 1.7	Year Around
Timber Creek, RM 0 to 2.7	Year Around
Coast Fork Willamette:	
Brice Creek, RM 0 to 15.5	Year Around
Coast Fork Willamette River, RM 0 to 28.3	Year Around
Row River, RM 0 to 20.8	Year Around

BIOLOGICAL CRITERIA

Potential Concern	Season
McKenzie Sub Basin:	
Cash Creek, RM 0 to 6.1	Year Around
Hardy Creek, RM 0 to 4.1	Year Around
Middle Fork Willamette:	
Double Creek, RM 0 to 2.9	Year Around

Furnish Creek, RM 0 to 5.2	Year Around
Goodman Creek, RM 0 to 2.3	Year Around
Middle Fork Willamette River, RM 0 to 82.2	Year Around
Salt Creek, RM 0 to 29.1	Year Around
Shady Creek, RM 0 to 1.7	Year Around

Mainstem Willamette Listings
Dioxin, Aldrin, DDE, DDT, Dieldrin, PCBs, and Iron

Appendix D: Water Quality Parameters List and Affected Beneficial Uses

The following is a list of parameters used by the DEQ in establishing the 303(d) List and the beneficial uses of water impacted by these parameters. This is an abbreviated summary and does not contain detailed descriptions of the standards. Specific information about these standards can be found in the Oregon 303(d) List or in OAR 340-041-0445. Listed parameters in the Management Area are indicated in boxes.

Parameters

Aquatic Weeds or Algae
Standard – The development of fungi or other growths having a deleterious effect on stream bottoms, fish, or other aquatic life, or which are injurious to health, recreation, or industry shall not be allowed.
Beneficial Uses Affected - Water Contact Recreation, Aesthetics, Fishing, Livestock Watering, Public and Private Domestic Water Supply, Irrigation, Industrial Water Supply.

Bacteria
Standard - Fecal bacteria levels shall not exceed a 30-day log mean of 126 E. Coli organisms per 100 ml, based on a minimum of 5 samples and no single sample shall exceed 406 E. Coli organisms per 100 ml. Bacterial pollution or other conditions deleterious to waters used for domestic purposes, livestock watering, irrigation, bathing, or shellfish propagation, or otherwise injurious to public health, shall not be allowed.
Beneficial Uses Affected - Water Contact Recreation, Public and Private Domestic Water Supply, Livestock Watering.

Biological Criteria
Standard – Waters of the State shall be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.
Beneficial Uses Affected - Resident Fish and Aquatic Life, Salmonid Spawning, Rearing, and Migration.

Chlorophyll a
Standard – The following average Chlorophyll a value shall be used to identify waterbodies where phytoplankton may impair the recognized beneficial uses:
1. Natural lakes, which thermally stratify: 0.01 mg/l.
2. Natural lakes, which do not thermally stratify, reservoirs, rivers, and estuaries: 0.015 mg/l.
Beneficial Uses Affected - Water Contact Recreation, Aesthetics, Fishing, Water Supply.

Dissolved Oxygen
Standard - For waterbodies identified as salmonid spawning, dissolved oxygen must not be less than 11.0 mg/l and inter-gravel levels must not fall below 6 mg/l. For waterbodies supporting cold water aquatic life, dissolved oxygen must not fall below 8 mg/l. For waterbodies supporting cool water aquatic life, dissolved oxygen must not fall below 6.5 mg/l. For waterbodies supporting warm water aquatic life, dissolved oxygen must not be less than 5.5 mg/l.
Beneficial Uses Affected - Resident Fish and Aquatic Life, Salmonid Spawning, Rearing, and Migration.

Flow Modification
Standard – The creation of tastes or odors or toxic or other conditions that are deleterious to fish or other aquatic life or affect the potability of drinking water or the palatability of fish or shellfish shall not be allowed.
Beneficial Uses Affected - Resident Fish & Aquatic Life, Salmonid Spawning, Rearing, and Migration.

Habitat Modification
Standard – The creation of tastes or odors or toxic or other conditions that are deleterious to fish or other aquatic life or affect the potability of drinking water or the palatability of fish or shellfish shall not be allowed.
Beneficial Uses Affected - Resident Fish & Aquatic Life, Salmonid Spawning, Rearing, and Migration.

Nutrients
Standard - see standards for aesthetics, pH, dissolved oxygen, chlorophyll a, and aquatic weeds or algae.
Beneficial Uses Affected - Aesthetics or use identified under related parameters.

pH
Standard - pH shall not fall outside 6.5 to 8.5. The following exception applies: waters impounded by dams existing on January 1, 1996, which have pH that exceed the criteria shall not be considered in violation of the standard if the Department of Environmental Quality determines that the exceedance would not occur without the impoundment and that all practicable measures have been taken to bring the pH in the impounded waters into compliance with the criteria.
Beneficial Uses Affected - Resident Fish & Aquatic Life, Water Contact Recreation, Salmonid Spawning, Rearing, and Migration.

Sedimentation
Standard – The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry shall not be allowed.
Beneficial Uses Affected - Resident Fish & Aquatic Life, Salmonid Spawning, Rearing, and Migration.

Temperature
Standard - 64F for waterbodies with salmonid fish rearing and migration, 55F for waterbodies with salmonid fish spawning, 61F for core cold water habitat, and 50F for waterbodies with bull trout. Following a temperature TMDL, temperature water quality limited waters cannot be warmed more than .3 degrees Celsius (.5 degrees F) by sources from anthropogenic heating.
Beneficial Uses Affected - Resident Fish & Aquatic Life, Salmonid Fish Spawning, Rearing, and Migration.

Total Dissolved Gas
Standard – The concentration of total dissolved gas relative to atmospheric pressure at the point of sample collection shall not exceed 110% of saturation, and the liberation of dissolved gases, such as carbon dioxide, hydrogen sulfide, or other gases, in sufficient quantities to cause objectionable odors or to be deleterious to fish or other aquatic life, navigation, recreation or other reasonable uses made of such waters shall not be allowed.
Beneficial Uses Affected - Resident Fish and Aquatic Life, Salmonid Spawning, Rearing, and Migration.

Toxics
Standard - Toxic substances shall not be introduced above natural background levels in the waters of the state in amounts, concentrations, or combinations which may be harmful, may chemically change to harmful forms in the environment, or may accumulate in sediments or bio-accumulate in aquatic life or

wildlife to levels that adversely impact public health, safety, or welfare; aquatic life; wildlife; or other designated beneficial uses. Standards for specific toxic substances may be viewed on the DEQ website at http://waterquality.deq.state.or.us/wq/wqrules/340Div41Tbl20.pdf.
Beneficial Uses Affected - Resident Fish and Aquatic Life, Public, Private and Industrial Water Supply, Livestock Watering, Fishing, Irrigation, Water Contact Recreation.

Turbidity
Standard – No more than 10% cumulative increase in natural stream turbidities shall be allowed, as measured relative to a control point immediately upstream of the turbidity causing activities.
Beneficial Uses Affected - Resident Fish and Aquatic Life, Aesthetics.

Appendix E: Pesticide Use in Oregon

Oregon has strict laws and regulations related to pesticide use, storage, and reporting. All pesticide users are required to apply and store pesticides according to the label. Users of restricted-use pesticides are required to obtain certification from the ODA. Improper application and storage of pesticides may lead to surface or groundwater quality problems.

The following are prohibited under ORS 634.372:

634.372 Prohibited acts. No person shall:
(1) Make false or misleading claims through any media, relating to the effect of pesticides or application methods to be utilized.
(2) As a pesticide applicator or operator, intentionally or willfully apply or use a worthless pesticide or any pesticide inconsistent with its labeling, or as a pesticide consultant or dealer, recommend or distribute such pesticides.
(3) Operate a faulty or unsafe pesticide spray apparatus, aircraft or other application device or equipment.
(4) Perform pesticide application activities in a faulty, careless or negligent manner.
(5) Refuse or neglect to prepare and maintain records required to be kept by the provisions of this chapter.
(6) Make false, misleading or fraudulent records, reports or application forms required by the provisions of this chapter.
(7) Operate pesticide applicators' apparatus, machinery or equipment without a licensed pesticide applicator or certified private applicator performing the actual application, or supervising such application if such is performed by a pesticide trainee. This prohibition does not apply to the operation of tractors, trucks or other vehicular equipment used only under the supervision of a certified private applicator.
(8) As a pesticide applicator, work or engage in the application of any classes of pesticides without first obtaining and maintaining a pesticide applicator's license, or apply pesticides, which are not specifically authorized by such license.
(9) As a pesticide operator, engage in the business of, or represent or advertise as being in the business of, applying pesticides upon the land or property of another, without first obtaining and maintaining a pesticide operator's license, nor shall such person engage in a class of pesticide application business which is not specifically authorized by license issued by the State Department of Agriculture. Further, no such person shall employ or use any person to apply or spray pesticides who is not a licensed pesticide applicator or pesticide trainee.
(10) As a pesticide trainee, work or engage in the application of any class of pesticides without first obtaining and maintaining a pesticide trainee's certificate and is otherwise in compliance with the provisions of this chapter.
(11) Act as, or purport to be, a pesticide dealer or advertise as such without first obtaining and maintaining a pesticide dealer's license.
(12) Act as, or purport to be, a pesticide consultant without first obtaining and maintaining a pesticide consultant's license.
(13) Apply any pesticide classified as a restricted-use or highly toxic pesticide to agricultural, horticultural or forest crops on land owned or leased by the person without first obtaining and maintaining a private applicator certificate.
(14) As a person described in ORS 634.106 (6), use power-driven pesticide application equipment or devices (use hand or backpack types only), or use or apply any pesticide other than those prescribed by the ODA.
(15) Deliver, distribute, sell or offer for sale any pesticide which is misbranded.
(16) Formulate, deliver, distribute, sell or offer for sale any pesticide, which is adulterated.
(17) Formulate, deliver, distribute, sell or offer for sale any pesticide, which has not been registered as required by ORS 634.016.

(18) Formulate, deliver, distribute, sell or offer for sale any powdered pesticide containing arsenic or any highly toxic fluoride which is not distinctly colored.
(19) Distribute, sell or offer for sale any pesticide except in the manufacturer's original unbroken package.
(20) Make application of pesticides, by aircraft or otherwise, within a protected or restricted area without first obtaining a permit for such application from the committee of the protected or restricted area in which the application is to be made, nor shall such person make such application contrary to the conditions or terms of the permit so issued.
(21) Use isopropyl ester of 2,4-D, or any other ester of equal or higher volatility with regard to plant damage as determined by the ODA, without first obtaining a permit for such use as provided in ORS 634.322 (10).
(22) Sell, use or remove any pesticide or device subjected to a "stop sale, use or removal" order until the pesticide or device has been released therefrom as provided in ORS 634.322 (3).
(23) Fail to comply with any provision or requirement of sections 2 to 9, chapter 1059, Oregon Laws 1999, or rules adopted thereunder. [1973 c.341 s.34; 1987 c.158 s.121; 1995 c.360 s.2; 1999 c.1059 s.14]

For complete laws and regulations related to pesticides, please consult the ODA website at http://www.oda.state.or.us/pesticide/info.html or an updated copy of the ORSs and Oregon Administrative Rules.

For more detailed recommendations on pesticide use and control of pests and disease, contact the ODA Pesticides Division, Oregon State University Extension Service, or a qualified consultant.

Appendix F: Conservation Funding Programs

The following is a list of some conservation funding programs available to landowners and organizations in Oregon. For more information, please refer to the contact agencies for each program. Additional programs may become available after the publication of this document. For more current information, please contact one of the organizations listed below.

Program	General Description	Contact
Conservation Easements	Deed restrictions that protect specific aspects of land for water quality and/or habitat benefits. Easements are perpetual, flexible documents that are held by private conservation organizations, who are charged with ensuring that what is protected stays protected. Management responsibilities of land are shared with landowner. Donated easements can provide tax benefits. Easements can also be sold.	American Farmland Trust, McKenzie River Trust, Trust for Public 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.	NRCS, SWCDs, Oregon Department of Forestry
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.	NRCS, SWCDs
Conservation Stewardship Program (CSP)	Provides cost-share and incentive payments to landowners who have attained a certain level of stewardship and are willing to implement additional conservation practices.	NR CS, SWCDs
Emergency Watershed Protection Program (EWP)	Available through the USDA-NRCS. Provides federal funds for emergency protection measures to safeguard lives and property from floods and the products of erosion created by natural disasters that cause a sudden impairment to a watershed.	NRCS, SWCDs
Environmental Protection Agency Section 319 Grants	Fund projects that improve watershed functions and protect the quality of surface and groundwater, including restoration and education projects.	DEQ, SWCDs, Watershed Councils
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.	NRCS, SWCDs

Program	General Description	Contact
Farm and Ranchland Protection Program (FRPP)	Cost-shares purchases of agricultural conservation easements to protect agricultural land from development.	NRCS, SWCDs
Federal Reforestation Tax Credit	Provides federal tax credit as incentive to plant trees.	IRS
Fee Title Acquisition	In some situations, private land conservancies can acquire land for a fee from landowners. Generally, land conservancies purchase property in relatively good ecological health, and buy the property at appraised value.	McKenzie River Trust, The Nature Conservancy, SWCDs
Forestry Incentives Program (FIP)	Provides cost sharing for several forest stand improvement practices.	NRCS, SWCDs, Oregon Department of Forestry
Forest Resource Trust	State assistance up to 100% of the costs to convert non-stocked forestland to timber stands. Available to non-industrial private landowners.	Oregon Department of Forestry
Grassland Reserve Program (GRP)	Provides incentives to landowners to protect and restore pastureland, rangeland, and certain other grasslands.	NRCS, FSA, SWCD
Landowner Incentive Program (LIP)	Provides funds to enhance existing incentive programs for fish and wildlife habitat improvements.	U.S. Fish and Wildlife Service, Oregon Department of Fish and Wildlife
Oregon Watershed Enhancement Board (OWEB).	Provides grants for a variety of restoration, assessment, monitoring, and education projects. 25% match requirement on all grants.	SWCDs, Watershed Councils, OWEB
Oregon Watershed Enhancement Board Small Grants Program	Provides grants up to $10,000 for watershed restoration projects. 25% match requirement.	SWCDs, Watershed Councils, OWE B
Partners for Wildlife Program.	Provides financial and technical assistance to private and non-federal landowners to restore and improve wetlands, riparian areas, and upland habitats in partnership with the U.S. Fish and Wildlife Service and other cooperating groups.	U.S. Fish and Wildlife Service, NRCS, SWCDs
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.	NRCS, SWCDs.
Resource Conservation & Development (RC & D) Grants	Provides assistance to organizations within RC & D areas in accessing and managing grants.	Resource Conservation and Development
State Forestation Tax Credit	Provides for reforestation of under-productive forestland not covered under the Oregon Forest Practices Act. Situations include brush and pasture	Oregon Department of Forestry

Program	General Description	Contact
	conversions, fire damage areas, and insect and disease areas.	
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.	Oregon Department of Fish and Wildlife
Stewardship Incentive Program (SIP)	Cost-sharing program for landowners to protect and enhance forest resources. Eligible practices include tree planting, site preparation, pre-commercial thinning, and wildlife habitat improvements.	NRCS, SWCDs, Oregon Department of Forestry
Wetlands Reserve Program (WRP)	Provides cost sharing to landowners who restore wetlands on agricultural lands.	NRCS, SWCDs
Wildlife Habitat Incentives Program	Provides cost-share for wildlife habitat enhancement activities.	NRCS, SWCDs
Wildlife Habitat Tax Deferral Program	Maintains farm or forestry deferral for landowners who develop a wildlife management plan with the approval of the Oregon Department of Fish and Wildlife.	Oregon Department of Fish and Wildlife, SWCDs, NRCS.

Appendix G: Revised Universal Soil Loss Equation (RUSLE)

The RUSLE is a model that estimates the average annual level of soil loss on a field due to sheet and rill erosion. The sheet erosion process occurs when rainfall and runoff water combine to erode a relatively uniform layer of soil. Runoff may also erode soil to form numerous small channels a few inches deep, or rills.

The equation for estimating annual soil loss is:

A = RKLSCP

Where:

A = average annual soil loss in tons per acre;

R = rainfall and runoff intensity index by geographic location;

K = soil erodibility factor;

LS = topographic factor, L is for slope length and S is for slope percent;

C = cropping factor, the ratio of soil loss for the given conditions to that from a clean-cultivated field;

P = conservation practice factor, or the ratio of soil loss for a given practice to that for purely up-and-down-the-slope farming.

Each soil type has a soil loss tolerance factor, or T. If the annual soil loss exceeds the soil loss tolerance factor, the soil is eroding at an unsustainable rate; in other words, the soil quality is degrading. Natural Resource Conservation Service and SWCD offices have soil surveys to help landowners determine soil types, and also provide technical assistance to help landowners estimate the rate of soil loss on their property. For more information, contact the local NRCS and SWCD office.

Appendix H: ORS 468B.025 and 468B.050

ORS 468B.025 is an existing statute that was developed to address water pollution from waste discharge. To implement Senate Bill 502, approved in 1995 and codified at ORS 561.190 through 192, which ensures that ODA directly regulates farming activities for the purpose of protecting water quality, ODA is incorporating ORS 468B.025 and 468B.050 into all Area Plans and Rules in the state.

ORS 468B.025(1) states:
...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.

ORS 468B.050 identifies the conditions when a permit is required. In agriculture, under state rules, these are referred to as Confined Animal Feeding Operations and are operations that confine animals on prepared surfaces to support animals in wet weather, have wastewater treatment works, discharge any wastes into waters of the state, or meet the federal definition of a Concentrated Animal Feeding Operation (40 CFR § 122.23).

Definitions:

"Pollution" has the meaning given in ORS 468B.005(3) which states: "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."

"Wastes" has the meaning given in ORS 468B.005(7) which states: 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.

Other substances that will or may cause pollution include commercial fertilizers, soil amendments, composts, animal wastes, and vegetative materials.

Appendix I: References - Water Quality Improvement Practices

Below is a list of selected references with more specific information on water quality and natural resources improvement practices. Copies of many of these publications are available from the local Oregon State University Extension office or local SWCD. Underlined publications are also available online on the publishing agency's website.

General Water Quality Protection

Adams, E.B. 1992. Farming practices for groundwater protection. Washington State University, Spokane, Washington.

Hermanson, R.E. 1994. Care and feeding of septic tanks. Washington State University, Spokane, Washington.

Hirschi, M. et al. 1994. 50 ways farmers can protect their groundwater. University of Illinois, Urbana, Illinois.

Hirschi, M., et al. 1997. 60 ways farmers can protect surface water. University of Illinois, Urbana, Illinois.

Ko, L. 1999. Tips on land and water management for small acreages in Oregon. Oregon Association of Conservation Districts, Portland, Oregon.

U.S. Department of Agriculture NRCS. 1998. National Handbook of Conservation Practices. U.S. Department of Agriculture NRCS, Portland, Oregon.

Riparian Areas and Streams

Adams, E.B. 1994. Riparian Grazing. Washington State University, Spokane, Washington.

Darris, D. and S.M. Lambert. 1993. Native willow varieties for the Pacific Northwest. U.S. Department of Agriculture Soil Conservation Service, Corvallis Plant Materials Center, Corvallis, Oregon.

Nash, E. and T. Mikalsen, eds. 1994. Guidelines for streambank restoration. Georgia Soil and Water Commission, Atlanta, Georgia.

South Santiam Watershed Council. 1998. Guide for using Willamette Valley native plants along your stream. Linn SWCD, Tangent, Oregon.

Nutrient and Manure Management

Godwin, D. and J.A. Moore. 1997. Manure management in small farm livestock operations: protecting surface and groundwater. Oregon State University, Corvallis, Oregon.

Hart, J. 1995. How to take a soil sample...and why. Oregon State University, Corvallis, Oregon.

Hart, J. 1999. Analytical laboratories serving Oregon. Oregon State University, Corvallis, Oregon.

Marx, E.S., J. Hart, and R.G. Stevens. 1999. Soil Test Interpretation Guide. Oregon State University, Corvallis, Oregon.

Moore, J. and T. Willrich. 1993. Manure management practices to reduce water pollution. Oregon State University, Corvallis, Oregon.

Sattell, R. et al. 1999. Nitrogen scavenging: using cover crops to reduce nitrate leaching in western Oregon. Oregon State University, Corvallis, Oregon.

Grazing and Pasture Management

Ursander, D. et al. 1997. Pastures for Profit: a guide to rotational grazing. University of Wisconsin, Madison, Wisconsin.

Erosion and Sediment Control

Hansen, H. and W. Trimmer. 1997. Irrigation runoff control strategies. Oregon State University, Corvallis, Oregon.

Trimmer, W. and H. Hansen. 1994. Irrigation scheduling. Oregon State University, Corvallis, Oregon.

Pesticide Management and Integrated Pest Management

Publishers:

Acres USA	Rodale Press
P.O. Box 91299	33 East Minor St.
Austin, TX 78709	Emmaus, PA 18098
(512) 892-4400	(610) 967-5171
info@acresusa.com	info@rodale.com

Kerle, E.A., J.J. Jenkins, and P.A. Vogue. 1996. Understanding pesticide persistence and mobility for groundwater and surface water protection. Oregon State University, Corvallis, Oregon.

Menzies, G., C.B. MacConnell, and D. Havens. 1994. Integrated pest management: effective options for farmers.

Appendix J: 25-year Storm Event/Riparian Characteristic to Achieve

The 25-year, 24-hour storm is used because the ability to dissipate stream energy and maintain streambank integrity after this level of storm intensity is one of the criteria for a riparian area to be in Proper Functioning Condition.

The Proper Functioning Condition assessment process is a way to determine how well the physical processes are functioning in a riparian or wetland area. Once a riparian-wetland area reaches Proper Functioning Condition, it is in a state of resiliency that will allow the system to hold together during a 25- to 30-year flow event. In other words, the riparian area can resist major structural changes brought about by the storm event, and can recover in time for future events. Riparian areas that have not yet achieved PFC are classified as either functioning at-risk, nonfunctional, or unknown. A functioning at-risk area would likely experience major structural changes, such as excessive bank erosion and loss of riparian vegetation, in a 25-year, 24-hour flood event.

To be in compliance with the proposed riparian Area Rule OAR 603-095-2140 (1) (b) a landowner would need to cease activities that prevent the growth and establishment of vegetation that would help move a riparian area toward providing functions necessary for a stream to withstand the flows resulting from a 25-year storm. For example, if a landowner plowed a riparian area and destroyed the riparian vegetation, he or she would clearly be out of compliance with the rule. If a landowner stopped tilling and allowed vegetation to come in, they would be in compliance with the rule even if the riparian area were not yet able to withstand a 25-year, 24-hour storm event. If a landowner allowed grazing in a riparian area but allowed the area to move toward providing this level of riparian function, he or she would be in compliance with the rule.

For the Southern Willamette Valley, 25-year, 24-hour storm events range from 4.0 to 6.5 inches of rain.

How would compliance with the riparian Characteristic to Achieve be determined?

An inspector would first consider site capability when evaluating a riparian area for compliance with the rule. In other words, the inspector would first determine the kinds and amounts of vegetation the site could produce given legacy conditions (conditions caused by past management or events), such as riprap, and natural limiting conditions, such as soil type. The inspector would also determine if the site were capable of producing vegetation stable enough to withstand flows following a 25-year, 24-hour storm event. If the site is capable of providing this function, the inspector would then determine if the site is either moving toward providing the function or if there is already enough vegetation to adequately protect the streambank. In both situations, the site would likely be in compliance.

If the inspector determined the site was probably out of compliance using the previous criteria, he or she would conduct a green line transect along the stream (Figure 1) and document the ground cover along the transect. The main criteria for noncompliance would be a prevalence of bare ground throughout the riparian area, limited vegetation indicating little to no root mass below-ground, and evidence of bank slumping or sediment runoff into the stream. Also, the problem would clearly have to be caused by agricultural activities.

Figure 1. A green-line transect samples the first line of green vegetation from the water's edge. The green-line is the line nearest to the stream where perennial vegetation is first encountered.