Tualatin River Watershed Agricultural Water Quality Management Area Plan

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Developed by the

Tualatin River Watershed Local Advisory Committee

Oregon Department of Agriculture

With support from the

Tualatin Soil and Water Conservation District

Oregon Department of Agriculture
Water Quality Program
635 Capitol St. NE
Salem, OR 97301
503-986-4700
www.oregon.gov/ODA/NRD/pages/water_quality_front.aspx

Tualatin SWCD
1080 Baseline St., Suite B-2
Hillsboro, OR 97123-3831
503-648-3174
www.swcd.net

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Acronyms and Terms Used in this Document

Ag Water Quality Program – Agricultural Water Quality Management Program
Area Plan – Agricultural Water Quality Management Area Plan
Area Rules – Agricultural Water Quality Management Area Rules
CAFO – Confined Animal Feeding Operation
CNPCP – Coastal Nonpoint Pollution Control Program
CWA – Clean Water Act
CZARA – Coastal Zone Act Reauthorization Amendments
DEQ – Oregon Department of Environmental Quality
ECREP – Enhanced Conservation Reserve Enhancement Program
FSA – Farm Service Agency
GWMA – Groundwater Management Area
HUC – Hydrologic Unit Code
LAC – Local Advisory Committee
Management Area – Agricultural Water Quality Management Area
MOA – Memorandum of Agreement
NPDES – National Pollution Discharge Elimination System
NRCS – Natural Resources Conservation Service
OAR – Oregon Administrative Rules
ODA – Oregon Department of Agriculture
ODFW – Oregon Department of Fish and Wildlife
ORS – Oregon Revised Statute
OWEB – Oregon Watershed Enhancement Board
PMP – Pesticides Management Plan
PSP – Pesticides Stewardship Partnership
Regulations – Agricultural Water Quality Management Area Regulations
RUSLE – Revised Universal Soil Loss Equation
SWCD – Soil and Water Conservation District
T – Soil Loss Tolerance Factor
TMDL – Total Maximum Daily Load
TRWC – Tualatin River Watershed Council
USDA – United States Department of Agriculture
US EPA – United States Environmental Protection Agency
VEGBAC - Vegetated Buffer Areas for Conservation Program
WQPMT – Water Quality Pesticides Management Team

Foreword

This Agricultural Water Quality Management Area Plan (Area Plan) provides guidance for addressing water quality due to agricultural activities in the Agricultural Water Quality Management Area (Management Area). The purpose of the Area Plan is to identify 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) that are enforced by the Oregon Department of Agriculture (ODA).

Required Elements of Area Plans

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

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

Plan Content

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

Chapter 2: Local Background. Provides the local geographic, water quality, and agricultural context for the Management Area. Describes the water quality issues, Agricultural Water Quality Management Area Rules (Area Rules), and available or effective 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. Summarizes land condition and water quality status and trends to assess progress toward the goals and objectives in Chapter 3.

Chapter 1: Agricultural Water Quality Management Program Purpose and Background

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

As part of Oregon's Agricultural Water Quality Management Program (Ag Water Quality Program), the Area Plan guides landowners and partners such as Soil and Water Conservation Districts (SWCDs) in addressing local agricultural water quality issues. The purpose of the Area Plan is to identify strategies to prevent and control water pollution from agricultural activities and soil erosion (ORS 568.909(2)) on agricultural and rural lands for the area 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 Agricultural Water Quality Management Area Local Advisory Committee (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 603-095-0100). 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.

The Area Plan and its associated regulations 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).

1.2 History of the Ag Water Quality Program

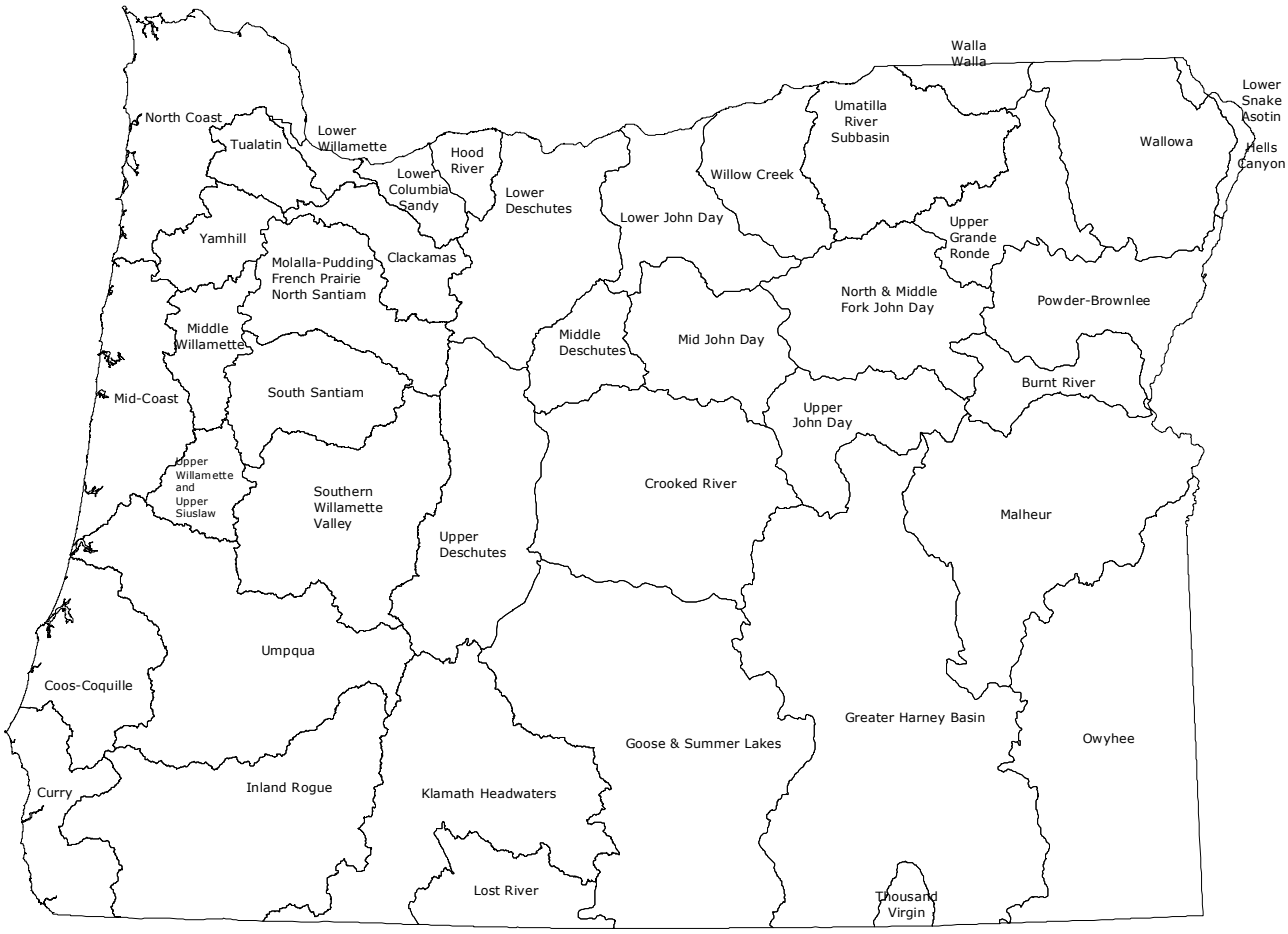
In 1993, the Oregon Legislature passed the Agricultural Water Quality Management Act (formerly known as "Senate Bill 1010") directing ODA to develop plans to prevent and control water pollution from agricultural activities, soil erosion, and to achieve water quality standards (ORS 568.900 through ORS 568.933). Senate Bill 502 was passed in 1995 to clarify that ODA regulates agriculture with respect to water quality (ORS 561.191). The Area Plan and its associated 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 associated 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 associated Area Rules.
- Monitoring, evaluation, and adaptive management.
- Developing partnerships with SWCDs, 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 that are drivers for establishing an Ag Water Quality Management Plan include:

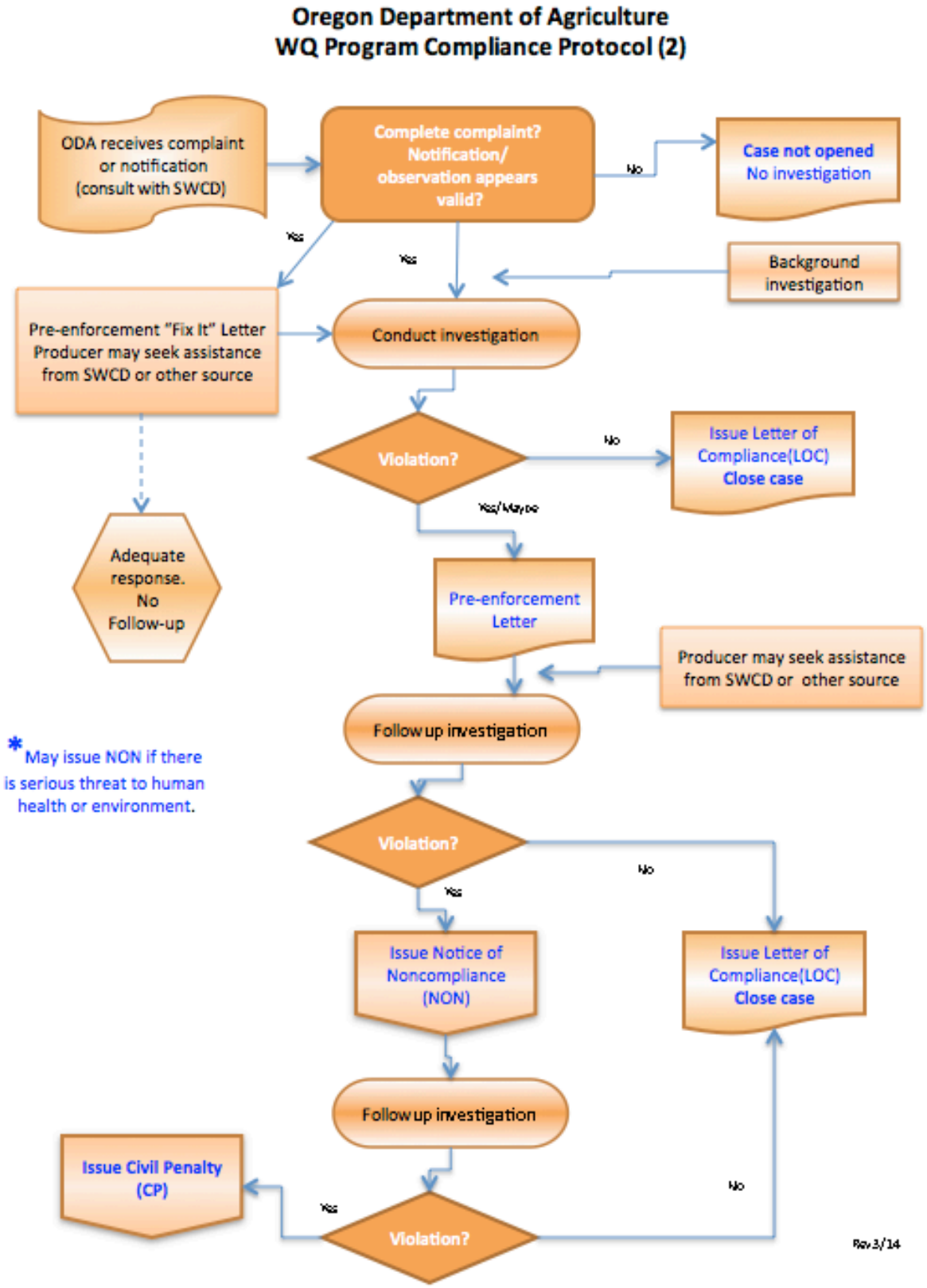
- State water quality standards.
- Load allocations for agricultural nonpoint source pollution assigned under Total Maximum Daily Loads (TMDLs) issued pursuant to the Clean Water Act (CWA), Section 303(d).
- Approved management measures for Coastal Zone Act Reauthorization Amendments (CZARA).
- Agricultural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

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

The emphasis of the Area Plan is on voluntary action by landowners or operators to control the factors affecting water quality in the Management Area. The Area Rules are outlined as a set of minimum standards that landowners and operators must be meet on all agricultural or rural lands.

ODA will use enforcement where appropriate and necessary to gain compliance with agricultural water quality rules. Figure 2 outlines ODA's compliance process. Any enforcement action will be pursued only when reasonable attempts at voluntary solutions have failed (OAR 603-090-0000(5)(e)). If a violation is documented, ODA may issue a pre-enforcement notification or an Order such as a Notice of Noncompliance. If a Notice of Noncompliance is issued, ODA will direct the landowner or operator to remedy the condition through required corrective actions (RCAs) under the provisions of the enforcement procedures outlined in OAR 603-090-060 through OAR 603-090-120. If a landowner does not implement the RCAs, civil penalties may be assessed for continued violation of the rules. See the Compliance Flow Chart for a diagram of the compliance process. If and when other governmental policies, programs, or rules conflict with the Area Plan or associated Area Rules, ODA will consult with the appropriate agency to resolve the conflict in a reasonable manner.

Figure 2: Compliance Flow Chart



1.3.2 Local Management Agency

A Local Management Agency (LMA) is an organization that ODA designated to implement 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 associated regulations 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 associated 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 Agriculture's Role

Each individual landowner or operator in the Management Area is required to comply with the Area Rules, which set minimum standards. However, the rules alone may not be enough in every Management Area. Each landowner and operator in the Management Area is required to comply with the Area Rules. Landowners also are encouraged to engage in restoration activities to achieve the goals and objectives of the Area Plan. Each landowner and operator's actions will 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 associated Area Rules, agricultural landowners and operators 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 or operator.

However, agricultural landowners or operators 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

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 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 discharges from agricultural fields may be at a defined discharge point 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 impacted from 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 impacted in this Management Area are summarized in Chapter 2.

Many water bodies throughout Oregon do not meet state water quality standards. Many of these water bodies 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, nitrates, pesticides, and mercury. These parameters vary by Management Area and are summarized in Chapter 2.

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

Every two years, DEQ is required by the federal CWA to assess water quality in Oregon. 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 is required to establish TMDLs for pollutants specific to the pollutants that led to the placement of a waterbody on the on the 303(d) list.

A TMDL includes an assessment of water quality data and current conditions and describes a plan to achieve conditions so that water bodies will meet water quality standards. TMDLs specify the daily amount of pollution a water body 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 meeting the load allocation assigned to agriculture specifically, or to nonpoint sources in general, depending on how the TMDL was written.

Total Maximum Daily Loads generally apply to an entire basin or subbasin, and not just to an individual water body on the 303(d) list. Water bodies 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 associated regulations must address agricultural or nonpoint source load allocations from relevant TMDLs.

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

1.4.4 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 into all of the Area Rules.

ORS 468B.025 states that:

> "(1) ...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."

The aspects 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 cooler stream temperatures, streambank stability, and filtration of pollutants. Other water quality functions from streamside vegetation include: water storage 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 measureable 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 (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 local or regional scientific research. ODA does not consider invasive, non-native plants such as introduced varieties of reed canary grass and blackberry to be site-capable vegetation.

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 all streams flowing through agricultural lands. The agricultural water quality regulations for each Management Area require that agricultural activities provide the water quality functions equivalent to what site-capable vegetation would provide.

In some cases, for narrow streams, mature site-capable vegetation such as tall trees may not be needed. 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.

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 agricultural lands.

1.5.1 Confined Animal Feeding Operation Program

Oregon Department of Agriculture is the lead state agency for the CAFO Program. The CAFO Program was developed to ensure that operators do not contaminate ground or surface water with animal manure. Since the early 1980s, CAFOs in Oregon have been registered to a general Water Pollution Control Facility permit designed to protect water quality, while allowing the operators and producers to remain economically viable. A properly maintained CAFO does not pollute 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 Water Pollution Control Facility 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. This permit does allow discharge in certain circumstances as long as the discharge does not violate water quality standards.

Oregon NPDES CAFO permits require the registrant to operate according to a site-specific, ODA-approved, Animal Waste Management Plan that is incorporated into the NPDES CAFO permit by reference.

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: the Lower Umatilla Basin GWMA, the Northern Malheur County GWMA, and the Southern Willamette Valley GWMA. Each GWMA has a voluntary action plan to reduce nitrate concentrations in groundwater. After a scheduled evaluation period, if DEQ determines that the voluntary approach is not effective, then 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 salmon IDs 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 associated Area Rules throughout Oregon.

1.5.4 Pesticide Management and Stewardship

The ODA Pesticides Program holds the primary responsibility for registering pesticides and regulating their use in Oregon under the Federal Insecticide Fungicide Rodenticide Act. ODA's Pesticide Program administers 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, Oregon Department of Forestry (ODF), DEQ, and Oregon Health Authority (OHA). The WQPMT facilitates and coordinates activities such as monitoring, analysis and interpretation of data, effective response measures, and management solutions. The WQPMT relies on monitoring data from the Pesticides Stewardship Partnership (PSP) program and other monitoring programs to assess the possible impact of pesticides on Oregon's water quality. Pesticide detections in Oregon's streams can be addressed through multiple programs and partners, including the PSP program.

Through the PSP, state agencies and local partners work together to monitor pesticides in streams and to improve water quality (www.deq.state.or.us/wq/pesticide/pesticide.htm). ODA, Department of Environmental Quality, and Oregon State University Extension Service work with landowners, SWCDs, watershed councils, and other local partners to voluntarily reduce pesticide levels while improving water quality and crop management. Since 2000, the PSPs have made noteworthy progress in reducing pesticide concentrations and detections.

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

1.5.5 Drinking Water Source Protection

Oregon implements its drinking water protection program through a partnership between DEQ and OHA. The program provides individuals and communities with information on how to protect the quality of Oregon's drinking water. Department of Environmental Quality and OHA encourage preventive management strategies to ensure that all public drinking water resources are kept safe from current and future contamination. For more information, see: www.deq.state.or.us/wq/dwp/dwp.htm.

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

The Environmental Quality Commission, which serves as DEQ's policy and rulemaking board, may petition ODA for a review of part or all of any Area Plan or its associated 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 and operators have been implementing effective conservation projects and management activities throughout Oregon to improve water quality for many years. However, it has been challenging for ODA, SWCDs, and LACs to measure progress. ODA is working with SWCDs, LACs, and other partners to develop and implement strategies that will produce measurable outcomes. ODA also is working with partners to develop monitoring methods to document progress.

1.7.1 Measurable Objectives

A measurable objective is a numeric long-term desired outcome to achieve by a specified date. Milestones are the interim steps needed to make progress toward the measurable objective and consist of numeric short-term targets to reach by specific dates. Together, the milestones define the timeline needed to achieve the measurable objective.

After ODA, the LAC, and the LMA establish measurable objectives and associated milestones, they will evaluate progress toward the milestones at each biennial review of the Area Plan. Using adaptive management, the biennial review 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 longer-term measurable objective(s), and will revise strategies to address obstacles and challenges.

Measurable objectives allow the Ag Water Quality Program to better evaluate progress toward meeting water quality standards. Many of these measurable objectives relate to land conditions and primarily are implemented through focused work in small geographic areas (section 1.7.3), with a long-term goal of developing measurable objectives and monitoring methods at the Management Area scale. The 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 nutrients, because many pesticides and nutrients 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.
- 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 may be 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 may help ODA and partners to measure progress or identify problem areas in implementing Area Plans. However, as described above, water quality monitoring may be less likely to document the short-term effects of changing land conditions on water quality parameters such as temperature, bacteria, nutrients, sediment, and pesticides.

1.7.3 Focused Implementation in Small Geographic Areas

Focus Areas

A Focus Area is a small watershed with water quality or concerns associated with agriculture. Through the Focus Area process, the SWCD delivers systematic, concentrated outreach and technical assistance in small geographic area. A key component of this approach is measuring land conditions before and after implementation, to document the progress made with available resources. The Focus Area approach is consistent with other agencies' and organizations' efforts to work proactively in small geographic areas, and is supported by a large body of scientific research (e.g., Council for Agricultural Science and Technology, 2012).

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. In some cases, a Focus Area is selected because of efforts already underway or landowner relationships already established. The scale of the Focus Area matches the SWCD's capacity to deliver concentrated outreach and technical assistance, and to complete (or initiate) projects over a biennium. The current Focus Area for this Management Area is described in Chapter 3.

Working within a Focus Area is not intended to prevent implementation within the remainder of the Management Area. 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 agricultural water quality regulations, 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 agricultural water quality regulations. Finally, ODA completes a post-assessment to document progress made in the watershed. Chapter 3 describes any SIAs that are underway in this Management Area.

1.8 Monitoring, Evaluation, and Adaptive Management

ODA, the LAC and the LMA will assess the effectiveness of the Area Plan and associated Area Rules by evaluating the status and trends in agricultural land conditions and water quality data. This assessment will include an evaluation of progress toward measurable objectives on agricultural lands across the entire Management Area and within the Focus Area. ODA will utilize other agencies' and organizations' local monitoring data when available. The Area Plan summarizes the results and findings in Chapter 4 for each biennial review. 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 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. The results for this Management Area are summarized in Chapter 4.

1.8.2 Agricultural Ambient Water Quality Monitoring

The Oregon Department of Agriculture evaluates water quality data from DEQ's long-term monitoring sites to determine trends in water quality at agricultural sites statewide. Results from monitoring sites in this Management Area, along with local water quality monitoring data, are described in Chapter 4.

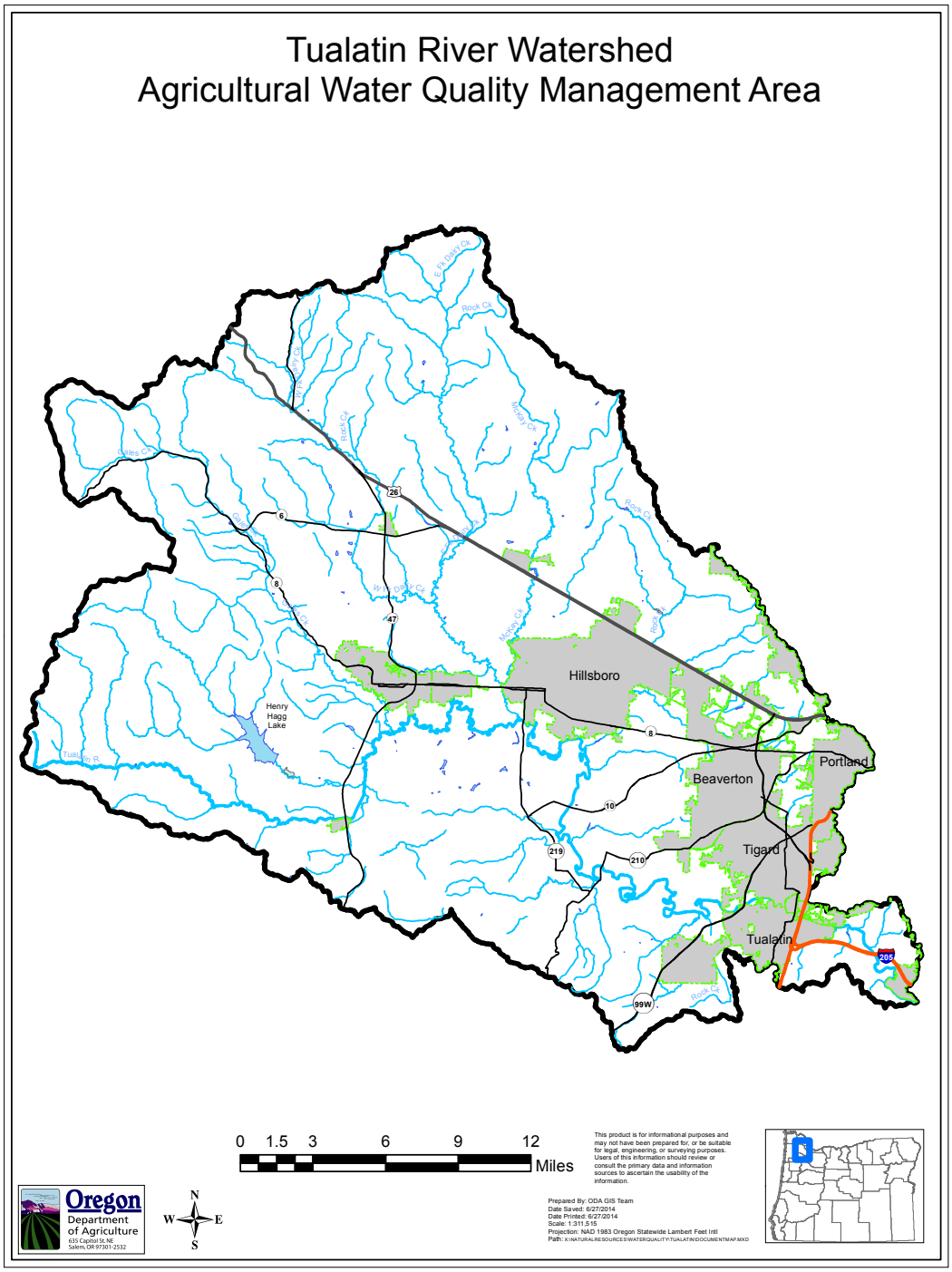
1.8.3 Biennial Reviews and Adaptive Management

This and all Area Plans and associated Area Plans 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 associated 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 consists of the Tualatin River watershed. The boundaries are the same as those defined by the US Geologic Survey for the 5th field Tualatin Subbasin Hydrologic Unit (Figure 3).

Figure 3. Map of Management Area



2.1 Local Roles and Responsibilities

The ODA and the Tualatin SWCD intend to implement this Area Plan in mutual cooperation with private landowners, DEQ, USDA NRCS, Farm Services Agency, OSU Extension Service, Clean Water Services, private organizations, and federal, state, and local agencies.

Implementation of this Area Plan is accomplished through an Intergovernmental Agreement between ODA and the Tualatin SWCD. This Agreement defines the Tualatin SWCD as the Local Management Agency for implementation of the Area Plan. The Tualatin SWCD was also involved in development of the Area Plan and associated regulations.

2.1.1 Local Advisory Committee (LAC)

This Area Plan was developed with the assistance of an LAC. The LAC was formed in 1995 to assist with the development of the Area Plan and regulations and with subsequent biennial reviews (Table 1). The LAC has met regularly to review the Area Plan and regulations since its adoption by the ODA director in 1996.

Table 1. Current Local Advisory Committee (LAC) members

Name	Location	Description
Dan Logan, Chair	North Plains	Farming, timber
Nicole Anderson	Basin-wide	OSU Extension
Dave Krahmer	Cornelius	Vegetables; Farm Bureau
Larry Landauer	Forest Grove	Plant nursery
Jim Love	Forest Grove	Berries; Tualatin Valley Irrigation District
Roy Malensky	Hillsboro	Berries
George Marsh	Cornelius	Dairy
Bruce Roll	Hillsboro	Clean Water Services
Bob Terry	Gaston	Plant nursery
Jerry Ward	Scholls	Filberts; SWCD Board
Brian Wegener	Tualatin	Riverkeepers
Rich Hunter, alternate		
Jeff Malensky, alternate		

2.2 Geographical and Physical Setting

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

The Tualatin River Watershed is a 712 square mile drainage area encompassing most of Washington and portions of Clackamas, Columbia, Multnomah, Tillamook, and Yamhill counties in northwest Oregon. The fractions of the watershed outside of Washington County are small - together making up only nine percent of the watershed area. The 84-mile long Tualatin River originates in Oregon's Coast Range and flows generally eastward discharging into the Willamette River at West Linn. The watershed has a modified marine climate with a very definite winter rainfall pattern. Peak flows normally occur in January receding to sluggish base flow conditions in the summer months. Summer flows are augmented with releases from Hagg Lake and Barney Reservoir.

Home to over 500,000 people, the watershed is approximately 15 percent urban, 35 percent farmland (including natural areas) and 50 percent forest. Major cities include: Hillsboro, Beaverton, Forest Grove, Tigard, and Tualatin. Five percent of the watershed is managed by the state of Oregon and two percent is

managed by the Bureau of Land Management. The remainder of the watershed is privately owned or in municipal use.

Agriculture is a significant land use within the watershed, with approximately 25 percent of the land used for commercial agriculture. Agriculture is very important to the economy of the area, and agricultural lands in the watershed provide a high dollar return per acre. Washington County ranked twelfth for agricultural gross income in the state in 2013, with gross agricultural sales exceeding $103,504,000 (2013 Oregon county and state agricultural estimates. Oregon State University Extension Service).

2.2.2 Geographic and Programmatic Scope

Operational boundaries for the land under the purview of this Area Plan include all lands within the Management Area in agricultural use and agricultural and rural lands that are lying idle or on which management has been deferred, with the exception of activities subject to the Forest Practices Act. Agricultural use means the use of land for the raising or production of livestock or livestock products, poultry or poultry products, milk or milk products, fur-bearing animals; or for the growing of crops such as, but not limited to, grains, small grains, fruit, vegetables, forage grains, nursery stock, Christmas trees; or any other agricultural or horticultural use or animal husbandry or any combination thereof. Wetlands, pasture, and woodlands accompanying land in agricultural use are also under the purview of this Area Plan.

Current productive agricultural use or profitability is not required for the provisions of the Area Plan to apply. Highly erodible lands with no present active use are included under Area Plan jurisdiction.

This Area Plan will address the following water quality issues and activities related to lands in agricultural use:

- Erosion and surface water management
- Irrigation water management
- Nutrient management
- Pesticide management
- Permitted Confined Animal Feeding Operations (CAFOs)
- Animal enterprises not subject to CAFO permits
- Riparian area and wetlands vegetation

2.3 Agricultural Water Quality in the Management Area

2.3.1 Local Issues of Concern

Every water body in the Management Area contains some level of contaminants. The problem spans streams, creeks, rivers, lakes, ponds, construction sites, clearing and grading areas, and areas with septic systems. The Tualatin River and tributaries are used for fish and wildlife, irrigation, drinking water, supporting industries, and recreation such as swimming, fishing, and boating. All of these beneficial uses are affected by the water quality in the Management Area.

In the past, most water quality problems were traced to the most obvious cause: point source pollution. Since point source pollution is any pollution source that comes from a specific location, such as a pipe discharging pollutions directly into the river, the problem can usually be traced back up the pipe to the source. Much progress has been made in preventing further water quality problems from point sources.

Nonpoint source pollution is more difficult to control because the sources are often hard to identify and difficult to measure. This type of pollution results from a variety of activities; nonpoint source pollution can be the water that runs off crop, forest, and urban landscapes. Nonpoint sources include contaminated agricultural lands, livestock operations, eroding stream banks and roadsides, failing septic systems, runoff from parking lots and construction sites, and irrigation and drainage systems. Pollutants from nonpoint sources are carried to the surface water or groundwater through the action of rainfall, irrigation runoff, erosion, and seepage.

In response to the Federal Clean Water Act (CWA) of 1972, the DEQ listed the Tualatin River and its tributaries as "water quality limited." In 1998, 274 out of 898 stream miles in the Tualatin watershed were listed for one or more of the following parameters: bacteria, dissolved oxygen, temperature, pH, biological criteria (aquatic life), chlorophyll a, and toxics (iron, arsenic, and manganese).

Oxygen is necessary to all forms of life, but too much or too little oxygen in the system can kill organisms. Dissolved oxygen gets into water by diffusion from the surrounding air, by aeration (rapid movement), and as a byproduct of photosynthesis. As dissolved oxygen levels in water drop, many aquatic species are stressed. According to DEQ, the two factors that most affect dissolved oxygen concentrations in the tributaries are temperature and sediment oxygen demand (the decomposition of bottom sediments, which consumes dissolved oxygen).

During summer months, **water temperature** in the Tualatin watershed is much too high for fish. Salmon and trout need cool water temperatures to rear young and survive. When water is too warm, salmon and trout experience many negative effects, ranging from decreased spawning success to death. In addition, warm water encourages bacteria to grow and dissolved oxygen levels to decrease. Summer water temperatures in at least 19 stream segments in the Tualatin watershed exceed water quality criteria. According to DEQ, the primary causes of increased water temperature are the lack of riparian vegetation and the discharge of warmer water from point sources. Other influences include water withdrawal, water releases from reservoirs, and changes in channel morphology such as increased channel width with shallower depth.

Bacterial contamination of waterways can affect the health of people, crops, fish and others who use the water. Bacteria can enter waterways through several different routes. The highest levels of bacteria in the Tualatin watershed generally occur during periods of storm-water runoff due to rain events. Sources of bacteria include failing septic systems, pet waste, other animal wastes, and illegal dumping.

Every resident is affected by the level of **nutrients** (nitrogen, phosphorus) and animal waste that enters our waterways. Nutrients can occur naturally in streams and rivers, but elevated concentrations are often the result of pollution due to human activities. Phosphorus has been identified as the most important nutrient that must be kept out of surface water. Nutrients, particularly phosphorus, promote the growth of algae. Algae uses up the oxygen fish and other aquatic life need to survive. It makes water murky (turbid), can produce ugly algal blooms, and causes water's pH to change, damaging fish and other animals. Sources of phosphorus include animal and human waste, fertilizers, and other organic material or geologic sources.

High levels of phosphorus and nitrogen from agricultural operations threaten the streams in the upper Tualatin watershed. Excess nutrients in the system can produce harmful algae blooms, similar to the one that occurred upstream of the drinking water and irrigation water take-outs on the Upper Tualatin River in 2008. The species of blue-green algae observed in that bloom (*Anabaena flos-aquae*) had the potential to produce both liver and neurotoxins. This incident was associated with a fish kill below Wapato Lake and significantly increased water treatment costs (approximately $300,000) at the Joint Water Commission drinking water takeout. The algae may have caused crop damage and endangered farmworker health.

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 can significantly harm humans and wildlife through the 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.

Amendments to the federal Safe Drinking Water Act in 1996 directed and empowered states to begin or expand efforts to protect sources of drinking water. In 2003, Oregon DEQ and the Department of Human Services (now the Oregon Health Authority) identified vulnerable areas and potential threats for municipal drinking water sources. Pesticides and nutrients are two potential pollutants of concern that could be contributed by agricultural sources. To date, monitoring data have shown low levels of these pollutants at Tualatin drinking water intakes.

While there may not be severe impacts on water quality from a single nonpoint source or activity, the combined effects from all sources contribute, along with impacts from other land uses and activities, to the impairment of beneficial uses of the Tualatin's waters. Pollutant from agricultural lands can reach the Tualatin and its tributaries through one of three means: 1) in solution in rainfall runoff or irrigation return flows, 2) attached to soil particles and transported via erosion, 3) or through solar loading due to lack of riparian vegetation.

2.3.2 303(d) List of Impaired Water Bodies

Oregon's 303(d) list has three main categories: category 4a consists of waters with impaired water quality for which a TMDL has been approved by US EPA; category 5 consists of impaired waters for which a TMDL must be developed; and drafting new listings or changes to the existing list, which have not yet been approved by EPA.

Many of the impaired waters in the Tualatin basin are now included as category 4a with approved TMDLs. These include both tributary and mainstem Tualatin River listings for water temperature, pH and chlorophyll *a* (addressed by the TMDL for total phosphorus), bacteria, ammonia and dissolved oxygen (addressed by a joint TMDL for ammonia and settle-able volatile solids), habitat modification and bio-criteria. The latter two impairments are indicators of poor general aquatic conditions for fish and other aquatic life. TMDLs for temperature, dissolved oxygen, and total phosphorus were shown to address these aquatic impairments due to their future improvements of water quality and riparian vegetative conditions.

The most recent list approved by US EPA was developed in 2010. This list added several tributary stream miles impaired for low dissolved oxygen during winter spawning. These cannot be categorized as 4a because the existing TMDLs addresses only summer impairments for dissolved oxygen. The list also includes new stream segments with bio-criteria impairments and reaches with high concentrations of iron, arsenic, and manganese. DEQ has not yet identified a schedule for writing new TMDLs to address these impairments.

DEQ recently closed a public comment period for the draft 2012 list. At the time, the previous version of this report was completed. DEQ addressed comments, revised the list as necessary, and submitted the list to US EPA for approval. EPA will likely approve some listings, and open a comment period for additional listings sometime this year. Parameters that may be added to category 5, and therefore, may need a TMDL include: arsenic, lead, copper, chromium, thallium, mercury and trichloroethelene.

2.3.3 Basin TMDLs and Agricultural Load Allocations

In August 2001, the US EPA approved the Tualatin Subbasin TMDL for phosphorus, ammonia, temperature, bacteria, and dissolved oxygen. In 2006, DEQ issued a TMDL for mercury for the entire Willamette Basin. These five water quality parameters are extremely important for supporting the beneficial uses in the Tualatin River watershed. See http://www.deq.state.or.us/wq/tmdls/docs/willamettebasin/tualatin/tmdlwqmp.pdf for more information.

Temperature

The 2001 Tualatin TMDL quantified pollutant allocations and allows **no increase in temperature above background from May 1 through October 31**. Because thermal pollution is difficult to measure, the temperature TMDL identified streamside shade as a surrogate measure.

If system potential vegetation is present along streambanks, that reach of stream complies with the TMDL. System potential vegetation describes a condition where vegetation density and height are defined by the kind of native vegetation that could grow in the soil, moisture, and light conditions present at the site.

Bacteria

The 2001 Tualatin TMDL provided different allocations for bacteria in runoff depending on the season, the tributary, and whether samples were taken during a storm. Allocations apply year-round although allocations differ for dry and wet seasons. The calculation of bacterial loads can guide the selection of management strategies that are designed to reduce the quantity and/or quality of runoff. DEQ encourages the use of management strategies that optimize reduced runoff quantity and improved quality.

Table 2. Bacteria load allocations for agriculture.

5th-Field Subbasin	*E. coli* counts/100 mL			
	Summer (May 1 – Oct 31)		Winter (Nov 1 – April 30)	
	During Runoff Events[1]	All other times[2]	During Runoff Events[1]	All other times[2]
Gales	9500	406	3500	406
Rock	3000	406	700	406
Dairy	7000	406	3500	406
Scoggins/Upper Tualatin	9500	406	1500	406
Middle Tualatin	12000	406	11000	406
Lower Tualatin	12000	406	5000	406

[1] Measured as a mean event concentration
[2] Measured as a grab sample

Settle-able Volatile Solids

The 2001 Tualatin TMDL requires reductions between May 1 and October 31 in the amount of erodible material that uses up oxygen once that material is delivered to streams. These limits are intended to help increase dissolved oxygen by decreasing the delivery of chemicals that will react with oxygen. These allocations can be met by controlling erosion from both fields and in-stream sources including bed and bank erosion.

Table 3. Settle-able volatile solids load allocations (May 1 – October 31) for agriculture.

Stream	Load Allocations
Ash Creek, Fanno Creek, Summer Creek	None
Gales Creek, West Fork Dairy Creek, Chicken Creek, McFee Creek, Upper Rock Creek	30% Reduction in Runoff
All other streams	20% Reduction in Runoff

Total Phosphorus

The 2001 Tualatin TMDL set load allocations as in-stream concentrations of total phosphorus. The concentration limits vary across the tributary basins in the Tualatin watershed based on the background concentrations of total phosphorus in groundwater, and are applicable during the dry season of May 1-October 31. The allocations do not intend for additional total phosphorus to be delivered to streams from human sources. In general, controlling erosion and runoff from fields, using best management practices in applying fertilizers, and covering manure sources should meet the TMDL allocations from agricultural sources.

Table 4. Phosphorus load allocations for agriculture.

Receiving water body	Total Phosphorus Concentrations (May 1 – Oct 31: Median (mg/L))	Total Phosphorus Concentrations (Daily Maximum (mg/L))
Mainstem Tualatin below Dairy Creek (Unless otherwise specified below)	0.14	0.49
Mainstem Tualatin above Dairy Creek (Unless otherwise specified below)	0.04	0.14
Bronson Creek @ Mouth (205th)	0.13	0.46
Burris Cr./ Baker Cr./ McFee Cr./Christensen Cr. (all @ Mouth)	0.12	0.42
Cedar Creek/Chicken Creek/Rock Creek (South)/ Nyberg Creek/Hedges Creek/Saum Creek (all @ Mouth)	0.14	0.49
Dairy Creek @ Mouth	0.09	0.32
Fanno Creek @ Mouth	0.13	0.46
Gales Creek @ Mouth	0.04	0.14
Rock Creek @ Mouth	0.19	0.67

Mercury

The Willamette Basin TMDL for mercury includes the Management Area. This TMDL requires a **27 percent reduction in mercury year-round**. Mercury sources that may be influenced by agricultural activity include runoff of atmospherically deposited mercury and erosion of mercury-containing soils. Mercury deposition from the atmosphere and erosion of mercury containing soils are two of the larger sources of nonpoint source mercury in the Willamette Basin. Best management practices that control erosion, filter out runoff, and encourage runoff to infiltrate into the soil instead of flowing into streams will address this source. These practices are similar to those required to meet the TMDLs load allocations for total phosphorus and bacteria.

2.4 Prevention and Control Measures

Currently, water quality related to nutrients and animal waste is improving in the watershed. Most dairy owners in the area have installed conservation systems to manage nutrients. Thanks to the efforts of many individuals, ammonium is no longer a major concern. Although phosphorus levels have decreased, they remain a concern. There are also ongoing problems with low dissolved oxygen and pesticides.

The Joint Water Commission, a consortium of drinking water providers in the Management Area, developed a five-year action plan. The action plan includes monitoring surface waters to identify whether there are pesticides at levels of concern, contributing funds in partnership with the SWCD to properly dispose of unused pesticides, and developing outreach programs with the SWCD to improve pesticide management in the basin.

To improve water quality in the Management Area, phosphorus, ammonia, bacteria, and pesticide levels must be reduced. Excessive temperatures are addressed by providing shade along streams. Reducing erosion will improve water quality conditions for phosphorus, dissolved oxygen, pesticides, and mercury; dissolved oxygen is increased when reducing nutrients and increasing shade.

The Area Plan and Rules focus on controlling pollution at the source. Sources include erosion of agricultural land and streambanks, irrigation water discharges, inadequate riparian vegetation and waste discharges.

ODA's and the SWCD's objectives are to reduce pollution from agricultural and rural lands by:

- Eliminating polluted runoff
- Establishing riparian vegetation

Agricultural landowners are strongly encouraged to implement practices that eliminate polluted runoff from entering waters of the state. The SWCD recommends the following best management practices:

1. Plant grass filter strips to help filter out nutrients and pesticides from fields before entering streams.
2. Utilize nutrient management techniques, including soil testing and applying nutrients at agronomic rates based on the soil tests.
3. Utilize pest management techniques, including IPM, scouting, and apply based on label recommendations; reduce drift, monitor weather.
4. Utilize irrigation water management techniques.
5. Annual cover crops to reduce erosion during winter months.
6. Perennial cover crops between crop rows to filter runoff and reduce erosion.
7. No-till on highly erodible lands.
8. Cover manure piles.
9. Do not apply manure to fields during the winter months.
10. Keep livestock out of the streams by using fencing.

Streamside landowners are strongly encouraged to plant and maintain native trees and shrubs near streams. Trees and shrubs planted along streams provide multiple benefits to water quality and wildlife habitat.

1. Shade reduces thermal loading reaching the stream.
    a. Cooler water holds more dissolved oxygen for salmonids and trout.
    b. Salmon and trout eggs and fry require water that is less than 55 degrees to survive.
    c. Cooler water reduces the growth of harmful algae, bacteria and other microorganisms.
2. Roots of trees and shrubs stabilize streambanks, reducing erosion and protecting the land base.
3. Vegetated riparian areas encourage runoff to infiltrate the soil, which helps prevent harmful nutrients, waste, and pesticides from entering surface water and groundwater.

In addition to the voluntary strategies above, ODA will use its regulatory authority where appropriate and necessary to gain compliance with required conditions. Any enforcement action will be pursued only when reasonable attempts at voluntary solutions have failed.

2.4.1 Voluntary Measures

The SWCD intends to prevent and control agricultural nonpoint source pollution through volunteer efforts of cooperators. Individual landowners are offered informational, technical, and financial assistance from local, state, and federal agencies.

Strategies include education programs and implementation of conservation practices. These strategies are carried out at the local level by the SWCDs in cooperation with landowners, other agencies, volunteer organizations, and others.

Landowners have flexibility in choosing strategies and practices to address water quality issues on their lands. Landowners may choose to address problems on their own or they may choose to develop a Conservation Plan with the SWCD.

Conservation Practices

Conservation Practices for pollution control are determined to be effective, practical means of controlling and preventing pollution. Conservation Practices are actions taken by each individual agricultural operation for the achievement of production and water quality goals. Appropriate practices for individual farms may vary with the specific cropping, topographical, environmental, and economic conditions existing at a given site. Due to these variables, it is not possible to recommend any uniform Conservation Practices for farms in the Management Area.

A detailed list and description of measures is contained in other documents such as the Field Office Technical Guide (FOTG) maintained by the NRCS. The following is a sampling of effective practices typically used in the Management Area.

Erosion control:

- Residue Management
- Mulching
- Conservation Crop Rotation
- Conservation Cover
- Cover Crop
- Grassed Waterway
- Underground Outlet

Preventing irrigation water discharges:

- Irrigation Water Management
- Irrigation System Tailwater Recovery

Nutrient and pesticide management:

- Pest Management
- Nutrient Management

Streamside and wetland habitats:

- Stream Channel Stabilization
- Streambank and Shoreline Protection
- Critical Area Planting
- Filter Strip
- Tree and Shrub Establishment
- Riparian Forest Buffer
- Use Exclusion
- Fence
- Watering Facility
- Animals Trails and Walkways
- Field Border
- Hedgerow Planting
- Windbreak/Shelter break Establishment
- Restoration and Management of Declining Habitats
- Wetland Creation
- Wetland Enhancement
- Wetland Restoration
- Wetland Wildlife Habitat Management
- Upland Wildlife Habitat Management
- Stream Habitat Improvement Management
- Critical Area Planting

Preventing waste discharges:

- Roof Runoff Management
- Waste Storage Facility

- Composting Facility
- Manure Transfer
- Heavy Use Area Protection
- Waste Management System
- Closure of Waste Impoundments
- Constructed Wetland
- Waste Utilization

Conservation Practices and land use changes are most effective when selected and installed as integral parts of a comprehensive resource management plan based on natural resource inventories and assessment of management practices. The result is an approach using the Conservation System concept. Conservation Systems use Conservation Practices and land use changes that are designed to be complementary, and when used in combination, are more technically sound than each practice separately.

Conservation Plans

A conservation plan is a customized, detailed guide to help the farm operator manage land profitably while protecting natural resources. Plans address site-specific issues through practices to conserve soil, water, and related plant and animal resources. The purpose of a plan is to help landowners achieve objectives as land and water users and to help them meet water quality requirements.

The SWCD helps develop plans at no cost to landowners. Each landowner makes all decisions on the plan, implements the plan, and has complete control over the activities on their land (within local permitting guidelines). The conservation plan includes a timeline for implementing conservation practices that address the objectives and resource concerns, and specifications or standards for those practices.

Steps to develop a Conservation Plan:

- Identify opportunities or resource concerns,
- Assess resources and problems on the property,
- Develop and evaluate possible solutions to the problems,
- Make your decisions,
- Implement the plan,
- Evaluate the plan and make adjustments as necessary.

Benefits of a Conservation Plan:

- Saves money over the long term as land becomes more productive or retains productivity,
- Increases property value,
- Enhances open space and wildlife habitat,
- Helps meet regulatory requirements,
- Improves animal health and productivity,
- Improves plant health,
- Improves natural resource health for the entire community.

Conservation plans may be created by landowners or operators, consultants, or SWCD technicians. At a minimum, plans will outline specific measures necessary to achieve the required conditions outlined below and will be subject to approval by the local SWCD.

Existing agricultural management plans that meet the required conditions of the Area Plan traditionally qualify as authorized conservation plans upon review by the local SWCD. These generally include current NRCS whole farm plans and nursery areas operating under an approved tail-water recovery plan.

2.4.2 Required Conditions

The associated regulations (Oregon Administrative Rules) for the Management Area are cited below for reference.

All landowners must comply with the following requirements. A landowner or operator is responsible for only those conditions caused by activities conducted on land managed by the landowner or operator. Rules do not apply to conditions resulting from unusual weather events or other exceptional circumstances that could not have been reasonably anticipated.

2.4.2.1 <u>Erosion</u>

OAR 603-095-0140(1)
(a) There must be no visible evidence of erosion resulting from agricultural activities in a location where the eroded sediment could enter waters of the state.
(b) Visible evidence of erosion consists of one or more of the following features:
(A) Sheet wash, noted by visible pedestalling, surface undulations, and/or flute marks on bare or sparsely-vegetated ground; or
(B) Active gullies, as described in OAR 603-095-0010(1); or
(C) Multiple rills, which have the form of gullies but are smaller in cross section than one square foot; or
(D) Soil deposition that could enter surface water; or
(E) Streambanks breaking down, eroding, tension-cracking, shearing, or slumping beyond the level that would be anticipated from natural disturbances given natural hydrologic characteristics; or
(F) Underground drainage tile outlets that contribute to soil or bank erosion.
(c) Private roads used for agricultural activities, including road surfaces, fill, ditch lines, and associated structures, must not contribute sediment to waters of the state. All private roads used for agricultural activities not subject to the Oregon Forest Practices Act are subject to this regulation.

a. Indicators of Non-Compliance

Clear non-compliance

- Visible sediment that enters natural stream areas.
- Visible erosion from drainage ways as a result of livestock grazing, tillage or the destruction of riparian vegetation by the landowner or occupier.
- Underground drainage tile outlets either improperly installed or maintained allowing soil or bank erosion to actively occur.
- Visible formation and/or expansion of channels, gullies or rills.
- Visible pedestals on bare or sparsely vegetated ground.

Likely non-compliance, requires further investigation

- Eroding road ditches, drainage ways and field borders.
- Field swales with high water flow and without crop residues, grass cover or sediment control structures.
- Highly erodible land with minimal cover.
- Sediment deposits left from flowing water that are visible away from the ditch or channel.
- Lack of vegetation in and around drainage ditch.

b. Potentially affected TMDL parameters

Phosphorus, bacteria, dissolved oxygen, mercury

2.4.2.2 Streamside Vegetation

OAR 603-095-0140(2)
(a) Landowners or operators must allow vegetation, consistent with site capability, to become established along perennial and intermittent streams to protect water quality by providing shade, filtering out pollutants from surface runoff, and protecting streambank integrity during high stream flows, such as would be expected to follow a 25-year, 24-hour storm.
(b) If any agricultural activity disturbs enough streamside vegetation to impair the conditions and functions described in 603-095-0140(2)(a), the landowner or operator must replant or restore the disturbed area with vegetation that will provide the functions required in 603-095-0140(2)(a).
(c) Agricultural activities are allowed if they do not impair the conditions and functions described in 603-095-0140(2)(a).

a. Indicators of Non-Compliance
Clear non-compliance
- Active streambank erosion in conjunction with tillage, grazing, or destruction of vegetation by the landowner or occupier.
- Removal or destruction of vegetation that impedes the goals of shading water, stabilizing banks, and filtering pollutants in runoff during high rainfall.

b. Potentially affected TMDL parameters
Temperature, dissolved oxygen, bacteria, phosphorus, mercury

2.4.2.3 Irrigation Water Discharges

OAR 603-095-0140(3)
Irrigation discharge, both surface and subsurface, that enters waters of the state must not exceed water quality standards or cause pollution of the receiving water.

a. Indicators of Non-Compliance
Clear non-compliance
- Turbid irrigation water entering waters of the state.
- Turbid irrigation water exiting underground tile outlets.

Likely non-compliance, requires further investigation
- Irrigation application that creates surface runoff.
- Irrigation water applied at a rate that creates surface water turbidity.
- Irrigation water applied at a rate that results in ponding.
- Water exiting underground tile outlets.

b. Potentially impacted TMDL parameters
Temperature, dissolved oxygen, phosphorus, ammonia, mercury

2.4.2.4 Nutrients

OAR 603-095-0140(4)
Landowners and operators must store and use feed, fertilizer, manure, and other sources of crop nutrients, in a manner that prevents transport of pollutants to waters of the state.

a. Indicators of Non-Compliance

Clear non-compliance

- ❖ Discolored water from a manure pile entering water

Likely non-compliance, requires further investigation

- ❖ Manure pile adjacent to river

b. Potentially impacted TMDL parameters

Dissolved oxygen, phosphorus, ammonia, bacteria, mercury

2.4.2.5 Waste

OAR 603-095-0140(5)
Persons subject to these rules must not violate any provision of ORS 468B.025 or ORS 468B.050.

These statutes are described in Section 1.4.4.

a. Indicators of Non-Compliance

Clear non-compliance

- ❖ Runoff flowing through areas of high livestock usage and entering waters of the state.
- ❖ Livestock waste located in drainage ditches or areas of flooding.
- ❖ Fill material (loose soil) placed in or near waters of the state with a visible discharge of sediment entering waters of the state.
- ❖ Livestock feed placed in or near waters of the state with a visible discharge entering waters of the state.
- ❖ Agricultural products with high nutrient residues placed in or near waters of the state with a visible discharge entering waters of the state.
- ❖ Dead animals deposited in or near waters of the state.

Likely non-compliance, needs further investigation

- ❖ Animal confinement areas or waste from agricultural land management or earth disturbing practices located where there is a likelihood of pollutant transport to waters of the state.
- ❖ Animals confined but manure is not collected and stored in a manure storage facility that meets the requirements of field office technical guide standard for Manure Storage Facility or equivalent pollution control system.
- ❖ Animals confined in an unroofed pen that does not meet field office technical guide standard for Heavy Use Protection Area and Filter Strip or equivalent pollution control system.
- ❖ Fill material (loose soil) placed near waters of the state.
- ❖ Livestock feed placed near waters of the state.
- ❖ Agricultural products with high nutrient residues placed near waters of the state.

b. Potentially impacted TMDL parameters

Ammonia, bacteria, temperature, dissolved oxygen, phosphorus, mercury

2.4.2.6 Complaints and Investigations

603-095-0180
(1) When the department receives notice of an alleged occurrence of agricultural pollution through a written complaint, its own observation, through notification by another agency, or by other means, the department may conduct an investigation. The department may coordinate inspection activities with the appropriate Local Management Agency (as defined in ORS 568.906).
(2) Each notice of an alleged occurrence of agricultural pollution will be evaluated in accordance with the criteria in ORS 568.900 through 568.933, or any rules adopted thereunder, to determine whether an investigation is warranted.
(3) Any person alleging any violation of ORS 568.900 through 568.933, or any rules adopted thereunder, may file a complaint with the department.
(4) The department will evaluate and may investigate a complaint filed by a person under section OAR 603-095-0180(3) if the complaint is in writing, signed and dated by the complainant, and indicates the location and description of:
(a) The waters of the state allegedly being damaged or impacted; and
(b) The property allegedly being managed under conditions violating criteria described in ORS 568.900 to 568.933, or any rules adopted thereunder.
(5) As used in section OAR 603-095-0180(4), "person" does not include any local, state, or federal agency.
(6) If the department determines that a violation of ORS 568.900 through 568.933 or any rules adopted thereunder has occurred, the landowner may be subject to the enforcement procedures of the department outlined in OAR 603-090-0060 through 603-090-0120.

Chapter 3: Goals, Objectives, and Strategies

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

This will be accomplished by:

- Restoring and enhancing wetlands and riparian habitat.
- Reducing erosion and sediment delivery from agricultural and rural lands.
- Reducing nutrient loading from agricultural and rural lands.
- Controlling irrigation tail-water discharges to waters of the state.
- Limiting livestock access to streams, wetlands, and the riparian area.
- Ensuring proper animal waste storage and utilization or disposal.
- Minimizing off-site transport and maximize on-site retention and degradation of pesticide materials.
- Achieving 100 percent compliance with the Required Conditions described in this Area Plan.

3.1 Measurable Objectives

The following objectives were developed in cooperation with ODA, DEQ, the LAC, and the Tualatin SWCD. These objectives are specific, measurable, achievable, relevant, and time-driven. They include the collection of baseline data, ongoing monitoring of land and water conditions, and tracking of activities intended to improve water quality. The objectives will be refined over time as more information becomes available and personnel and financial resources change.

A. Riparian conditions on agricultural lands support good water quality

An assessment of the watershed indicates that 6.1 miles of stream had been restored prior to 2005 through SWCD and NRCS projects. Another 49 miles have been restored since 2005, for a total of 56.1 miles. The focus of stream restoration is on high and medium priority streams in the agricultural area.

1. By 2020, 75 stream miles will be enrolled in voluntary incentive-based programs.
2. By 2020, DEQ will work with conservation partners to provide estimates of pollutant reductions from those 75 stream miles.

B. Agricultural lands support good water quality

1. Farm Plans
   A total of 58,175 acres have been covered by farm plans since 1990: 42,734 acres by 32 NRCS program contracts/plans, 634 acres by 76 ECREP/BEGBAC, and 15,688 acres by other conservation plans.

   Developing farm plans is an emphasis of the SWCD and will be tracked over time and reported in the Area Plan. The number of new acres covered annually by farm plans is so variable that the LAC will not develop a measurable objective for this activity. The LAC had a goal of determining the amount of HEL lands with HEL plans, but the SWCD discovered that this would be to challenging to determine with existing resources due to lack of accessible data.

2. Livestock manure
   At the 2018 biennial review, the SWCD will provide:

a. An assessment of livestock operations likely to store manure where it can pollute waters of the state, and
b. A potential strategy to address issues identified during that assessment.

3. Bacteria, phosphorus, Dissolved Oxygen trends over time = see Section 4.3.1
   Monitoring data are not complete enough to develop measurable objectives. DEQ has agreed to conduct status and trend summaries for each biennial review. Given the location of sampling sites in the Tualatin basin, conducting these analyses every two years may not provide a significant amount of new information. It is possible that expending efforts to increase the information for additional parameters at more tributary locations would provide more information than frequent analysis of status and trend data for a limited number of parameters.

3.1.1 Strategic Initiatives

Strategic Initiatives consist of focused work in small geographic areas. The Management Area has a Focus Area, but no Strategic Implementation Areas (SIAs). Focus Areas are selected by SWCDs and all landowner participation in projects is voluntary. SIAs are designated by ODA and include a compliance evaluation with follow-up site visits as necessary.

3.1.1.1 Focus Areas

The Tualatin SWCD will identify Focus Areas (defined in Section 1.7.3) on an ongoing basis to concentrate efforts and measure resultant improvements.

The current Focus Area is the Dairy-McKay watershed.

In July 2013, the SWCD began work in the Dairy-McKay Focus Area. The Focus Area is 88,795 acres and is comprised of five-6th field watersheds within the Dairy Creek 5th field watershed. Agriculture makes up 39 percent of the land use in the area with 2,878 tax lots. Other land uses include forestry (50 percent) and urban (11 percent). The agriculture area is a mix of dryland and irrigated crops, including high value crops such as blueberries and nursery stock, and field crops such as grass seed and wheat. There are 166.8 miles of perennial streams.

The Dairy-McKay Focus Area has approved TMDLs for temperature and phosphorous. According to DEQ, temperatures in the Dairy Creek subbasin are well above that required by anadromous fish and phosphorus is above the target level defined in the TMDL. The SWCD will improve water quality for both of these parameters by working with landowners to install riparian forest buffers and grass filter strips.

The SWCD completed a pre-assessment, classifying stream reaches within the Focus Area using the Stream Matrix (Table 6), which is a GIS tool used by the SWCD and NRCS to guide restoration efforts. The Stream Matrix assesses eight water quality and habitat-related criteria. Each criterion is scored for an individual stream reach and a weighted average of all eight scores gives an overall score for the stream reach. Riparian vegetation condition was evaluated as one of the eight criteria, using aerial photos and field verification.

More weight is given to stream reaches that have poor riparian vegetation and fish presence. Sites with higher overall scores are higher priority sites for restoration projects.

Based on the Stream Matrix criteria, the SWCD placed each assessed stream reach into one of four classes. The classes are described as follows:

Class 1: No restoration needed. Streams are rated low priority in the Stream Matrix. Vegetation likely sufficient to moderate solar heating, stabilize streambanks, and filter our pollutants consistent with site capability.
Class 2: Significant progress has been made in restoration. Vegetation likely insufficient to moderate solar heating, stabilize streambanks, and filter our pollutants consistent with site capability.
Class 3: Filter strips (herbaceous) have been planted to stabilize streambanks and filter pollutants. Agricultural activities likely not allowing vegetation to moderate solar heating.
Class 4: Streams are rated medium or high priority in the Stream Matrix. Agricultural activities likely not allowing riparian vegetation to moderate solar heating, stabilize streambanks, and filter our pollutants consistent with site capability.

Dairy-McKay Focus Area Milestones

- In 2015, reduce the percentage of stream miles in Class 4 by 10%, from 75% to 65%.
- By June 30, 2017: reduce the percentage of stream miles in Class 4 by 10%.

The Focus Area results are presented in Table 5 in section 4.1.

3.2 Strategies for Area Plan Implementation

The main strategies are to:

- Control pollution as close to its source as possible, and
- Base actions on sound conservation planning.

The ODA and the SWCD intend to encourage participation in this water quality improvement program by:

- Providing educational programs to raise public awareness and understanding of water quality issues and solutions.
- Providing incentives for the development and implementation of farm plans.
- Offering technical assistance for the development and implementation of farm plans.
- Inventorying and surveying the watershed for compliance with Required Conditions.
- Pursuing water quality complaints.
- Encourage enrollment in voluntary incentive-based programs.

3.2.1 Education and Outreach

Public outreach has been a focus for the Tualatin SWCD since the original adoption of the Area Plan and Rules in 1996. The Tualatin SWCD continues to make public presentations to interest groups including small acreage farmers and equine operations, whose numbers are steadily increasing in this region. One-on-one site visits provide personalized technical assistance for landowners while monthly articles on agricultural water quality published in the local newspapers reach a wider audience with outreach information.

Additional outreach includes displays at public events, a quarterly newsletter (both print and electronic), and social media. The Tualatin SWCD maintains a website containing information about the SWCD and the services they provide, featured news, and outreach event dates. As always, there is continual partnering with local agencies, watershed councils, and citizen groups to stretch funds and accomplish more on-the-ground conservation.

3.2.2 Conservation Planning and Conservation Activities

As resources allow, the SWCD and USDA NRCS staff are available to assist landowners in evaluating effective practices for reducing runoff and soil erosion on their farms and incorporating these practices into farm plans. Personnel in these offices can also design and assist with implementation of practices, and assist in identifying any sources of cost-sharing funds for the construction and/or use of some of these practices.

Technical and cost-sharing assistance for installation of certain Conservation Practices may be available through traditional USDA conservation programs or through SWCD, grant, or other funding sources. Coordination of agricultural nonpoint source pollution control activities with federal programs created under the Food Security Act and other federal, state, local, and private initiatives will be critical to the success of the agricultural nonpoint source pollution control implementation activities.

3.2.3 Funding

In the absence of detailed, site-specific inventories of resource problems, quantification of nutrient and sediment loadings and other water quality issues of concern, and unknown workload associated with the development of farm plans, it is difficult to accurately estimate the annual administrative cost of implementing this Area Plan.

To carry out their responsibilities, the SWCD needs support for staff to work on implementation of this Area Plan. Staffing is needed to:

- Conduct educational programs.
- Identify high priority areas for implementation targeting.
- Provide technical assistance for development of farm plans.
- Investigate water quality complaints.
- Provide ongoing evaluation of Area Plan progress toward achieving water quality goals.
- Coordinate planning and implementation activities with other DMAs that have responsibilities for portions of the water quality improvement program.

Resources are also needed to:

- Help identify areas of high pollutant contribution.
- Conduct a water quality monitoring program.
- Produce educational materials.

In addition, availability of funds for a cost-sharing incentive program would catalyze implementation and aid in the adoption of measures that go beyond the minimum requirements.

The SWCD, ODA, and other cooperating agencies plan to avail themselves to all opportunities to obtain grants, cost-sharing funds, assessments, and monies from any other sources that can be used to accelerate the installation of nonpoint source pollution control practices through the formulation of farm plans. The NRCS Farm Bill, EPA's Clean Water Act Section 319 grants, the Oregon Watershed Enhancement Board (OWEB) grants, and other federal and state programs are potential sources of these funds. Other potential sources include state revolving loan funds and the Small Grants Program through OWEB that assist landowners in implementing conservation practices.

In addition to the USDA grant and cost share opportunities traditionally available to the agricultural community (as well as other grants potentially available such as the OWEB and EPA's nonpoint source

implementation grants), stable, long-term funding will be required to operate an agricultural base program for water quality management.

Since 2005, the SWCD has offered two riparian restoration programs through a unique partnership between federal, state, and local agencies in Washington County. These programs involve several partner agencies including Clean Water Services, FSA, NRCS, OWEB, the Freshwater Trust, and Oregon Department of Forestry. The Enhanced Conservation Reserve Enhancement Program (ECREP) and the Vegetated Buffer Areas for Conservation Program (VEGBAC) offer planting assistance, annual payments, and financial incentives to landowners who enroll streamside property.

3.2.4 Monitoring and Evaluation

The SWCD and its conservation partners will conduct monitoring to better quantify current conditions and progress toward meeting the goals and objectives of this Area Plan (see Chapter 4).

Chapter 4: Implementation, Monitoring, and Adaptive Management

4.1 Progress Toward Measurable Objectives

Attaining compliance with the TMDL requirement has proven to be challenging. The establishment of the temperature TMDL and the adjustment of the previous phosphorus TMDL provide new and more reasonable goals for landowners in the Management Area. The progress and success of implementation efforts will be assessed through determination of changes in land use practices and the measurement of water quality changes over time.

Dairy-McKay Creek Focus Area

The SWCD's objective was to reduce the percentage of stream miles in Class 4 by 10 percent by 2015 (reduce from 75 percent to 65 percent). However, this objective was not met due to limited SWCD staffing. The SWCD has increased staff and will continue doing so to address this objective.

TABLE 5. Riparian condition results. The 2015 goal was to reduce Class 4 to 65%.

Class	Class Description	Miles of stream (%)	
		2013	2015
1	No restoration needed. Streams are rated low priority in the Stream Matrix (mapped as green) OR trees have been planted on both sides of the stream (mapped as purple). Vegetation likely sufficient to moderate solar heating, stabilize streambanks, and filter out pollutants consistent with site capability.	35.6 (20)	36.1 (20)
2	Significant progress has been made in restoration. Trees have been planted on one side of the stream (mapped as purple). Vegetation likely insufficient to moderate solar heating, stabilize streambanks, or filter out pollutants consistent with site capability.	6.6 (4)	9.7 (5)
3	Filter strips (herbaceous) have been planted to stabilize streambanks and filter pollutants (mapped as pale green). Agricultural activities likely not allowing vegetation to moderate solar heating.	2.2 (1)	2.2 (1)
4	Streams are rated medium or high priority in the Stream Matrix (mapped as yellow or red). Agricultural activities likely not allowing riparian vegetation to moderate solar heating, stabilize streambanks, or filter out pollutants consistent with site capability.	133.2 (75)	129.6 (73)

4.2 Implementation activities

Many conservation activities and implementation monitoring tracks have been implemented to benefit water quality. The SWCD and NRCS track activities that have been implemented through quarterly reports to ODA and through a NRCS database, respectively. Projects that have received funding from the OWEB are tracked in OWEB's restoration database. In addition, partner agencies can submit reports of projects and activities in the Management Area that improve water quality.

These Conservation Activities consisted primarily of tree and shrub establishment (and associated practices), cover crops, conservation cover, nutrient management, pest management, irrigation water management, and installment of micro-irrigation systems.

By planting riparian buffers, the SWCD's restoration programs help protect environmentally sensitive land, reduce streambank erosion, restore wildlife habitat, and safeguard ground and surface water in the Tualatin River Watershed. The ECREP and VEGBAC programs were developed in 2005 through a unique partnership among federal, state, and local agencies in Washington County. These programs involve several partner agencies including Clean Water Services, FSA, NRCS, OWEB, the Freshwater

Trust, and Oregon Department of Forestry. Approved farm plans are developed for all landowners enrolled in ECREP and VEGBAC.

Since 2005, 76 landowners in ECREP and VEGBAC established riparian buffers on 634 acres along almost 39 miles of stream. In 2014, 12 new projects were added, totaling 75.9 acres and 4.1 stream miles.

Table 6. SWCD Accomplishments (January 2014 – December 2015)

Strategy for Area Plan Implementation	Activity
Education and Outreach	100 events, reaching 3,806 people
	Distributed 2,921 water quality-related handouts
	Sent a newsletter to over 500 people quarterly
	93 site visits
	7,127 landowners contacted or provided w/TA
	34 newspaper articles
Conservation Planning and Conservation Activities	48 conservation plans, 912 acres (SWCD + NRCS)
	Implemented 35 projects, 7,700 acres (SWCD + NRCS)
Funding	Leveraged approximately $2.5 million from other sources

4.3 Monitoring—Status and Trends

4.3.1 Water Quality

Clean Water Services and the US Geological Survey have monitored water quality in the Tualatin River and its tributaries since the early 1990s. Trend results from several of these sites are available from the early 1990s through 2015 for total phosphorus and bacteria. There results are summarized in Table 7 below. Improvements in the Lower Tualatin River are partially attributed to improved treatment at wastewater treatment plants, and summertime water releases from Hagg and Barney lakes. Improvements in most other subbasins reflect reductions of nonpoint source pollution including the agricultural sector.

For several years now, water quality data demonstrate that the original TMDLs for total phosphorus and chlorophyll *a* successfully protect the lower river from algae blooms. However, data collected over the years indicate that bacteria pollution is still widespread across the watershed. Few sites show significantly decreasing trends. Concentrations of bacteria still exceed the state water quality standards in each of the tributaries where data are collected.

No water temperature data are collected at a frequency or intensity to compare water temperatures to the state water quality standard, or to look for potential trends in water temperature. The TMDL for temperature calls for the establishment of shade along streams; because this is a metric that will directly affect water temperatures, and is more easily measured and tracked. See Section 4.1 to judge progress toward water temperature improvements in the Tualatin watershed.

No trend analysis was completed for dissolved oxygen for this report. However, dissolved oxygen concentrations in both the Tualatin River and its tributaries remain too low to fully support fish and other forms of aquatic life. The establishment of riparian vegetation will help improve dissolved oxygen levels in two ways: cooler water temperatures will trap and hold higher oxygen concentrations, and streambanks stabilized with vegetation will decrease soil erosion, which in turn can improve dissolved oxygen as less oxygen-demanding particles are released into stream water. The other management practice important to dissolved oxygen levels is water conservation; relatively small increases of instream flow can significantly improve the dissolved oxygen levels in water. Therefore, efforts to decrease withdrawals of water from streams will improve water quality across the basin.

The trend results for the Dairy-McKay focus area do not yet show improvements in total phosphorus or bacterial concentrations. Clean Water Services has discontinued some of the sampling sites in this watershed. If data were still collected at the historic monitoring sites along McKay and East Fork Dairy Creek, we may have been able to see changes in portions of this area if not the whole subbasin.

Table 7. A summary of trend results at selected tributary sites in the Tualatin Subbasin. Clean Water Services did the data analysis.

Tributary Site	Trend in Total Phosphorus	Trend in *E. Coli* (bacteria)	Comments	
Chicken Creek	Decrease	Decrease	Total Phosphorus near TMDL target	Bacteria concentrations are above state water quality standards at all sites. The TMDL calls for reductions in bacterial concentrations. Significant decreasing trends are observed at half of the sites sampled. TMDL implementation appears to be working in general, but more must be done to achieve the TMDL target at all sites.
Gales Creek at Stringtown	No Change	Decrease	Total Phosphorus near TMDL target	
Gales Creek at HWY 47	Decrease	Increase	Total Phosphorus above TMDL target	
Dairy Creek at Susbauer Rd	No Change	No Change	Total phosphorus above TMDL targets	
Dairy Creek at HWY 8	No Change	No Change		
Rock Creek at Brookwood	Decrease	No Change	Total Phosphorus above TMDL target	
Rock Creek at Quatama	Decrease	No Change		
Beaverton Creek	No Change	Decrease	Total Phosphorus above TMDL target	
Fanno Creek	Decrease	Decrease	Total Phosphorus above TMDL target	

4.3.2 Aerial Photo Monitoring of Streamside Vegetation

Aerial photographs from 2007 and 2012 have been analyzed per the methodology presented in Section 1.8.1. The higher the score, the more trees and shrubs compared to grass and bare ground.

Eight streams were evaluated in 2007; one stream was excluded in 2012. One reach was evaluated on each stream; the length of each reach varied from about three to four miles.

Results from 2007 showed a wide range of conditions among the eight stream reaches. In general, Bledsoe and Wapato Creeks had the least amount of landscape cover within 90 feet of the stream, while Burris and McFee creeks had the most. Landscape conditions at Bledsoe Creek were dominantly grass/agriculture in all six bands, with no band having more than 17 percent trees. Bare agricultural land comprised 3 to 18 percent. Conditions along Wapato Creek were highly variable, with grass/agriculture 45 to 89 percent within each band, tree cover 2 to 14 percent, and bare agricultural land 0 to 35 percent.

TABLE 8. Riparian index scores from analysis of aerial photographs, 2007 and 2012.

Creek	Scores		Comments About Analyzed Reach
	2007	2012	
Bledsoe	31.3	31.1	
Burris	51.8	52.5	10% ditched
Council	40.2	---	Partially bordered by highway; many ponds and swampy areas along channel
Davis	43.8	44.9	60% ditched; five large ponds formed by dams; also relatively untouched riparian areas
Hill	40.9	41.3	30% ditched and appears to be used as irrigation conveyance
McFee	57.9	57.9	Little riparian disturbance
Wapato	32.0	34.5	60% ditched and appears to be used as irrigation conveyance
WF Dairy	40.5	41.8	Little riparian disturbance

By contrast, the landscape of Burris Creek was more consistent among the six bands: grass/agriculture ranged from 35 to 47 percent, tree cover ranged from 39 to 44 percent, and bare agricultural land did not exceed 4 percent. McFee Creek had the highest riparian index score, with tree cover that ranged from 56 to 76 percent, grass/agriculture 12 to 31 percent, and less than four percent of bare agricultural land.

The 2012 data showed few notable changes other than Wapato Creek. Wapato's score increased by eight percent due to a reduction in bare agricultural land and an increase in grass/agriculture.

4.4 Biennial Reviews and Adaptive Management

The March 14, 2016, biennial review consisted mostly of a discussion of ODA's proposed changes to the Area Plan and developing measurable objectives.

Since the last biennial review in 2014, ODA received twelve complaints associated with the removal of riparian vegetation, erosion, and manure and livestock management. ODA investigated all of the complaints with site visits. Two of the properties were in compliance and an in-field determination was made onsite. The remaining compliance cases have either recently been resolved or remain open. The landowners of the open cases are currently working with ODA and/or the Tualatin SWCD to gain compliance. ODA has arranged follow-up site visits in the near future with the remaining open cases to determine compliance. Resulting conservation actions from compliance cases include livestock exclusion fencing, riparian planting, proper manure storage and application, and stream bank stabilization projects.

Impediments identified by the LAC:

- Lack of funding for SWCD staff to do farm planning, project management, education, and outreach,
- Lack of funding to implement on-the-ground projects with landowners,
- Cooperative landowners participating in projects; now it is more challenging to convince new landowners to participate,
- Not enough incentive for landowners to change practices.

Recommendations from the LAC:

- Pursue funding to help fund SWCD projects and staff,
- Increase financial incentives for landowners to participate.