Clackamas Agricultural Water Quality Management Area Plan

Developed by the:

Oregon Department of Agriculture

With support from the:

Clackamas Local Advisory Committee

Clackamas Soil and Water Conservation District

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Acronyms and Terms Used in this Document

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

Foreword

This Agricultural Water Quality Management Area Plan (Area Plan) provides guidance for addressing water quality due to agricultural activities in the Agricultural Water Quality Management Area (Management Area). The purpose of this Area Plan is to identify strategies to prevent and control water pollution from agricultural lands through a combination of educational 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 (Oregon Administrative Rule (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 the Oregon Department of Agriculture (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 Agricultural Water Quality Management Program.

Chapter 2: Local Background. Provides the local geographic, water quality, and agricultural context for the Management Area. Describes the water quality issues, Area Rules, and available or beneficial practices to address water quality issues.

Chapter 3: Local Goals, Objectives, and Implementation Strategies. Chapter 3 presents goal(s), measurable objectives and timelines, and strategies to achieve the goal(s) and objectives.

Chapter 4: Local Implementation, Monitoring, and Adaptive Management. ODA and the Local Advisory Committee (LAC) will work knowledgeable sources to summarize land condition and water quality status. Trends are summarized 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), this Area Plan guides landowners and partners such as Soil and Water Conservation Districts (SWCDs) in addressing water quality issues due to agricultural activities. The purpose of this 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 the Management Area (OAR 603-090-0000(3)) and to achieve and maintain water quality standards (ORS 561.191(2)). This Area Plan has been developed and revised by ODA, the LAC, with support and input from the Clackamas SWCD and the Oregon Department of Environmental Quality (DEQ). Throughout the development and revision processes, the public was invited to participate. This included public comment at meetings and public hearings during the Area Plan approval process. This Area Plan is implemented using a combination of outreach and education, conservation and management activities, compliance with Area Rules developed to implement the Area Plan, monitoring, evaluation, and adaptive management.

The provisions of this Area Plan do not establish legal requirements or prohibitions (ORS 568.912(1)). Each Area Plan is accompanied by 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 (OARs 603-090-0000 to 603-090-0120) and under the rules for this Management Area (OARs 603-095-1200 through 603-095-1280). The Ag Water Quality Program's general rules guide the Ag Water Quality Program, and the rules for the Management Area are the regulations that landowners must follow. Landowners will also be encouraged through outreach and education to implement conservation management activities.

This Area Plan and its associated regulations apply to all agricultural activities on non-federal and non-Tribal Trust land within the 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).

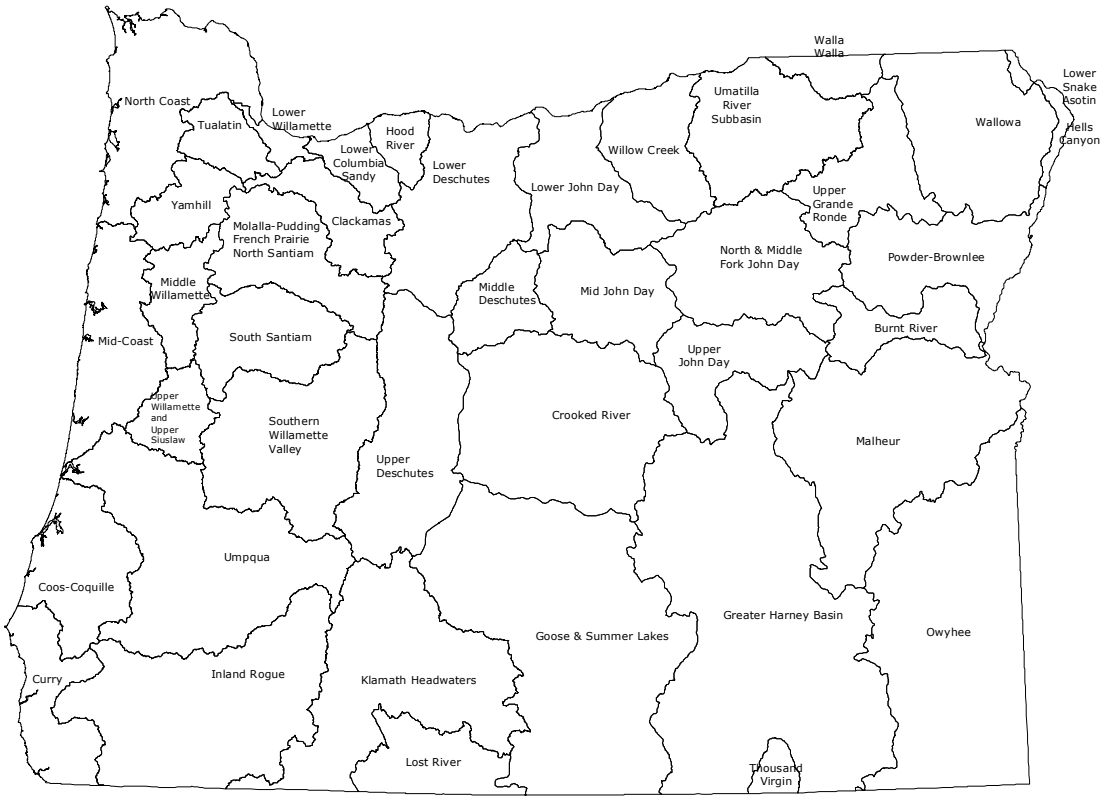
1.2 History of the Ag Water Quality Program

In 1993, the Oregon Legislature passed the Agricultural Water Quality Management Act, directing ODA to develop plans to prevent and control water pollution from agricultural activities and soil erosion, and to achieve water quality standards (ORS 568.900 through ORS 568.933). Senate Bill 502 was passed in 1995 to clarify that ODA regulates agriculture with respect to water quality (ORS 561.191). This Area Plan and its associated 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 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 rules.
- Conducting biennial reviews of Area Plans and rules.
- Monitoring, evaluation, and adaptive management.
- Developing partnerships with SWCDs, state, federal, and tribal agencies, watershed councils, and others.

Figure 1: Map of 38 Agricultural Water Quality Management Areas



1.3 Roles and Responsibilities

1.3.1 Oregon Department of Agriculture (ODA)

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

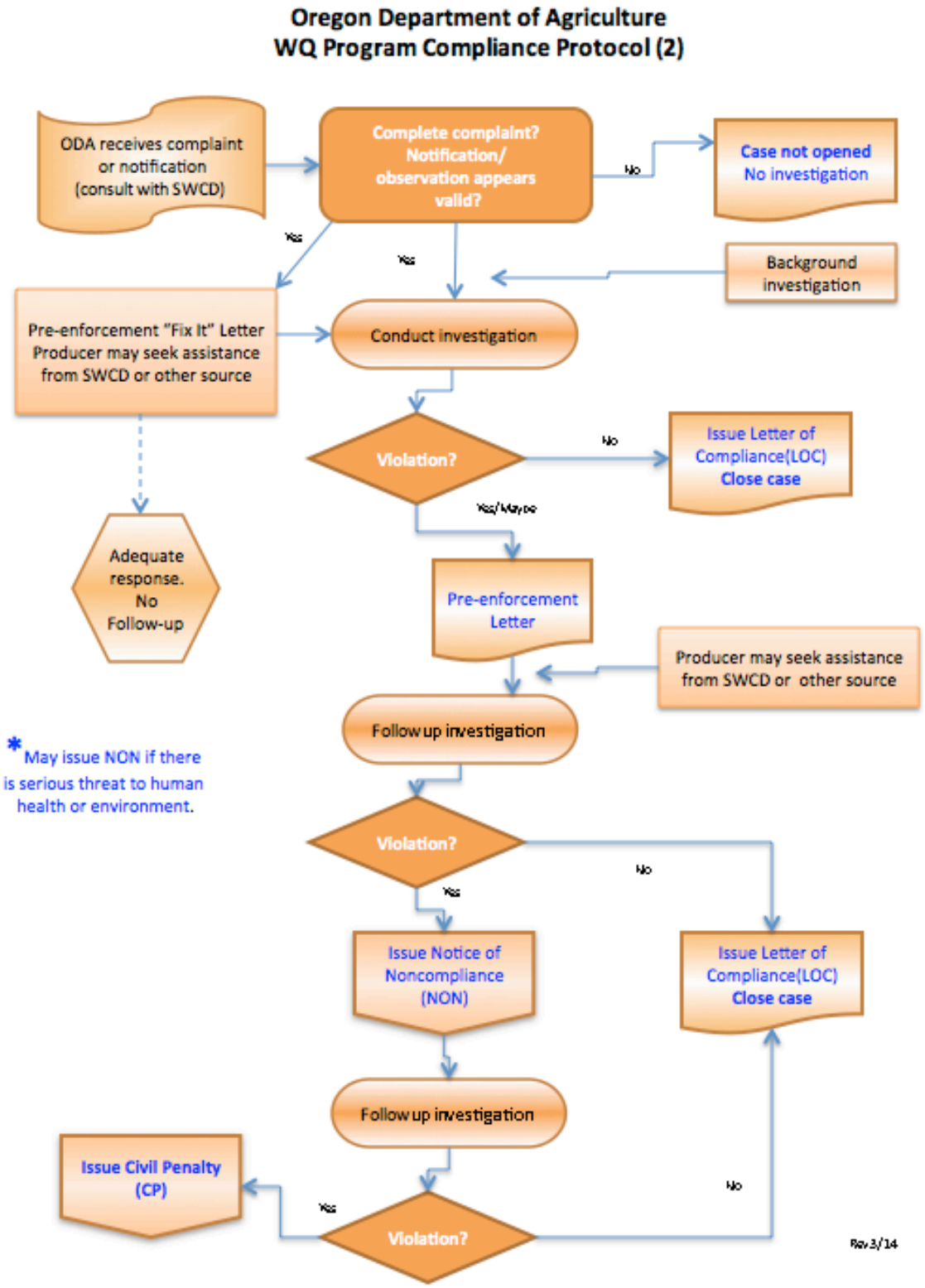
- State water quality standards.
- Load allocations for agricultural nonpoint source pollution assigned under Total Maximum Daily Loads (TMDLs) issued pursuant to the Clean Water Act (CWA), Section 303(d).
- Approved management measures for Coastal Zone Act Reauthorization Amendments (CZARA).
- Agricultural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

ODA has the legal authority to develop and implement Area Plans and administrative 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 will base 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 Area Rules (OAR 603-090-0080 through OAR 603-090-0120). ORS 568.912(1) and ORS 568.912(2) give ODA 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 this Area Plan is on voluntary, incentive-based, 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 must be met on all agricultural or rural lands. Landowners and operators who fail to address these rules may be subject to enforcement procedures, which are outlined below.

ODA will use enforcement where appropriate and necessary to gain compliance with water quality Area Rules. Figure 2 outlines ODA's compliance process. Any enforcement action will be pursued only when reasonable attempts at voluntary solutions have failed. 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, the landowner or operator will be directed by ODA to remedy the condition through required corrective actions 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 required corrective actions, civil penalties may be assessed for continued violation of the Area Rules. See the Compliance Flow Chart for a diagram of the compliance process. If and when other governmental policies, programs, or rules conflict with this Area Plan or associated Area Rules, ODA will consult with the agency (ies) and attempt to resolve the conflict in a reasonable manner.

Compliance Flow Chart



1.3.2 Local Management Agency

A Local Management Agency (LMA) is an organization that ODA designated to assist with the implementation of the Area Plan (OAR 603-090-0010). The legislative intent is for SWCDs to be Local Management Agencies 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 who 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 (LAC)

For each Management Area, the director of ODA appoints an LAC (OAR 603-090-0020) with as many as 12 members, to assist with the development and subsequent biennial reviews of the local Area Plan and Area Rules. The LAC serves in an advisory role to the director of ODA and to the Board of Agriculture. LACs are composed primarily of 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 Area Rules.
- Recommend strategies necessary to achieve 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 Area Rules alone may not be enough in every area. Landowners 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 with other local partners) to achieve land conditions that contribute to good water quality. Landowners also may also choose to improve their land conditions without assistance.

Area Rules only address impacts that result from agricultural activities. A landowner is responsible for only those conditions caused by activities conducted on land managed by the landowner or occupier. Conditions resulting from unusual weather events or other circumstances not within the reasonable control of the landowner or operator are not regulated under the Area Rules.

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:

- 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.

1.3.5 Public Participation

The public was encouraged to participate when ODA, LACs, and SWCDs initially developed the Area Plans and Area Rules. ODA and the LAC in each Management Area, 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.

ODA, 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 public comment period and a 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 Confined Animal Feeding Operations (CAFOs) and pesticide applications in, over and within three feet of water. Many CAFOs are regulated under ODA's CAFO Program. Irrigation water discharges from agricultural fields may be at a defined discharge point, but does not currently require a permit.

Nonpoint water pollution originates from the general landscape and is difficult to trace to a single source. Nonpoint 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 of water 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 are usually fish and aquatic life, water contact recreation, and public and private domestic water supply. These uses are generally the first to be impaired as a water body is polluted, 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. These water bodies may or may not have established water quality management plans documenting needed 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, the DEQ is required by the federal Clean Water Act (CWA) to assess water quality in Oregon. CWA Section 303(d) requires DEQ to identify a list of waters that do not meet water quality standards. The resulting list is commonly referred to as the 303(d) list. DEQ, in accordance with the CWA, is required to establish TMDLs specific to the pollutants that led to the placement of a waterbody on the 303(d) list.

A TMDL includes an assessment of water quality data and current conditions and describes a plan to achieve conditions so that water body will meet water quality standards. TMDLs specify the daily amount of pollution that a water body can receive and still meet water quality standards. Through the TMDL, point sources are allocated pollution limits as "waste load allocations" that are then incorporated in NPDES permits, while a "load allocation" is attributed to nonpoint sources (agriculture, forestry, and urban). TMDLs are legal orders issued by the DEQ, so sectors assigned waste or load allocations are legally required to meet them. The agricultural sector is responsible for meeting the pollution limit (load allocation) attributed to agriculture specifically, or to nonpoint sources in general, as applicable.

TMDLs generally apply to an entire basin or subbasin, and not just to an individual water body on the 303(d) list. When data show that water quality standards have been achieved, water bodies will be identified on the list of water bodies that are attaining water quality standards.

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

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

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

ODA incorporated ORS 468B into all of the Area Rules to achieve the intent of ORS 561.191(2). 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 (ORS 468B.005)

"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 agricultural 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 vegetation can improved without the removal of the agricultural activity.
- Streamside vegetation condition is measureable and can be used to track progress in achieving desired site conditions.

The Ag Water Quality Program uses the concept of "site-capable vegetation" to describe streamside vegetation expected under the Area Rules. 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 historic and current human influences that are outside the program's regulatory purview (e.g., channelization, roads, modified flows, past 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, NRCS soil surveys, and local or regional scientific research.

The goal for Oregon's Ag Water Quality Program is to achieve water quality functions (e.g., shade, streambank stability, and filtration of pollutants) produced by site-capable vegetation along streams associated with agricultural lands. The Area Rules for each Management Area require that agricultural activities provide water quality functions consistent with what the site would provide with site-capable vegetation.

Achieving water functions along a stream may not require mature site-capable vegetation. For example, one to three foot width streams may provide shade, protect streambanks, and filter pollutants with only grasses and shrubs that are at a less mature stage of site capable vegetation. However, on larger streams, mature vegetation is important. Limited exceptions include:

- Junipers are mature site-capable vegetation in central and eastern Oregon, but they reduce bank stability and increase erosion.
- Upland species (such as sagebrush) can be the dominant site-capable vegetation along streams with erosional down cutting, but they do not improve water quality.

1.5 Other Water Quality Programs

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

1.5.1 Confined Animal Feeding Operation (CAFO)

ODA is the lead state agency for the CAFO Program. The CAFO Program was developed to ensure that operators and producers do not contaminate ground or surface water with animal manure. Since the early 1980s, CAFOs 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, ODA was directed by the 2001 Oregon State Legislature to convert the CAFO Program from a Water Pollution Control Facility permit program to a federal National Pollutant Discharge Elimination System (NPDES) program. ODA and DEQ jointly issued a NPDES CAFO Permit in 2003 and 2009. The 2009 permit expired in May 2014, and a new permit is under development. The NPDES CAFO Permit is compliant with all Clean Water Act requirements for CAFOs; it 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. CAFO NPDES Permits protect both surface and ground water resources.

1.5.2 Drinking Water Source Protection

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

1.5.3 Groundwater Management Areas (GWMAs)

Groundwater Management Areas are designated by DEQ when groundwater in an area has elevated contaminant concentrations resulting, at least in part, from nonpoint sources. Once the GWMA is declared, a local groundwater management committee comprised of affected and interested parties is formed. The committee then 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. These include 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. If after a scheduled evaluation point DEQ determines that the voluntary approach is not effective, then mandatory requirements may become necessary.

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, DEQ, and the Oregon Health Authority. 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 can be addressed through multiple programs and partners, including the PSP Program described above.

Through the PSP Program, 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). DEQ, ODA, 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. There has been noteworthy progress since 2000 in reducing pesticide concentrations and detections.

ODA led the development and implementation of a Pesticides Management Plan (PMP) for the state of Oregon (www.oregon.gov/ODA/PEST/water_quality.shtml). 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. The PMP sets forth a process for preventing and responding to pesticide detections in Oregon's ground and surface water resources by managing the pesticides that are currently approved for use by the U.S. EPA and Oregon in both agricultural and non-agricultural settings.

1.5.5 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, because they have cultural, economic, and recreational importance to Oregonians, and because they are important indicators of watershed health. ODA's commitment to the Oregon Plan is to develop and implement Area Plans and associated Area Rules throughout Oregon.

1.6 Partner Agencies and Organizations

1.6.1 Oregon Department of Environmental Quality (DEQ)

Oregon has been delegated authority to implement the CWA in Oregon. DEQ is the lead state agency with overall authority to implement the CWA in Oregon. DEQ coordinates with other state agencies, including ODA and Oregon Department of Forestry, to meet the needs of the CWA. DEQ sets water quality standards and develops TMDLs for impaired waterbodies which are ultimately approved or disapproved by the EPA. In addition, DEQ develops and coordinates programs to address water quality including National Pollution Discharge Elimination Permits (for point sources), 319 program, Source Water Protection, 401 Water Quality Certification, and GWMAs. DEQ also coordinates with ODA to help ensure successful implementation of Area Plans as part of its 319 program.

A Memorandum of Agreement (MOA) between DEQ and the ODA recognizes that ODA is the agency responsible for implementing the Ag Water Quality Program established under ORS 568.900 to ORS 568.933, ORS 561.191, and OAR Chapter 603, Divisions 90 and 95. The MOA between ODA and DEQ was updated in 2012 and describes how the agencies will work together to achieve water quality goals for waterbodies associated with agricultural lands.

The MOA includes the following commitments:

- ODA will develop and implement a monitoring strategy, as resources allow, in consultation with DEQ.
- ODA will evaluate Area Plans and Area Rules effectiveness 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 with the objective of determining:
    - 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 Plan.
    - Whether the rate of progress is adequate to achieve the goals of the Area Plan.

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 rules. The petition must allege with reasonable specificity that the Area Plan or associated rules are not adequate to achieve applicable state and federal water quality standards (ORS 568.930(3)(a)).

1.6.2 Other Partners

ODA 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) Natural Resources Conservation Service (NRCS) and Farm Service Agency, watershed councils, Oregon State University Extension Service, 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 implemented 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 this progress. ODA is working with SWCDs, LACs, and our partners to develop and implement objectives and strategies that will produce measurable outcomes.

1.7.1 Measurable Objectives

Measurable objectives allow the Ag Water Quality Program to better evaluate progress toward meeting water quality standards and load allocations where TMDLs have been completed. Many of these measurable objectives relate to land condition and are mainly implemented through focused work in small geographic areas (section 1.7.3). The measurable objectives for this Area Plan are in Chapter 3, and progress toward achieving the objectives is summarized in Chapter 4.

At a minimum, the measurable objectives of the Ag Water Quality Program and this Area Plan are to:

- Increase the percentage of lands achieving compliance with the Area Rules.
- Increase the percentage of lands in active management that will lead to meeting desired land conditions outlined in the Area Plan.

1.7.2 Land Condition and Water Quality

Land conditions can serve as useful surrogates (indicators) for water quality parameters. For example, streamside vegetation is generally 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.
- It requires extensive monitoring of water quality at an intensive temporal scale to evaluate progress.
- Improved land conditions can be documented immediately, but there may be a significant lag time before water quality improves, or water quality impacts may be due to other sources.
- Reductions in water pollution from agricultural activities are primarily through improvements in land and management conditions.

Water quality monitoring data may help ODA and partners to measure progress and identify problem areas in implementing the Area Plan. It is necessary to show the Ag Water Quality Program is successfully meeting the intent and purpose of the Ag Water Quality Management Act.

1.7.3 Focused Implementation in Small Geographic Areas

Focus Areas

A Focus Area is a small watershed with water quality concerns that are associated with agriculture. ODA's intent in selecting Focus Areas is to deliver systematic, concentrated outreach and technical assistance in small geographic areas ("Focus Areas") through the SWCDs. A key component of this approach is measuring land conditions before and after implementation to document the progress made with available resources. The focused implementation 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 can provide 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 the appropriate source specific conservation practices and demonstrate the effectiveness of these conservation practices.
- A higher density of projects allows neighbors to learn from neighbors.
- A higher density of prioritized projects leads to greater connectivity of projects.
- Limited resources are used more effectively and efficiently.

- Work in one Focus Area, followed by other Focus Areas, will eventually cover the entire Management Area.

SWCDs choose 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 remainder of the Management Area will continue to be addressed through general outreach and technical assistance.

Strategic Implementation Areas

Strategic Implementation Areas are small watersheds selected by ODA, in cooperation with partners, and after review of water quality and other available information. ODA leads the assessment of current conditions and the landowner outreach. Strategic Implementation Areas and Focus Areas are both tools to concentrate efforts in small geographic areas to achieve water quality standards. As with Focus Areas, SWCDs and partners work with landowners to improve conditions that may impact water quality in Strategic Implementation Areas. However, Strategic Implementation Areas also have a compliance evaluation and assurance process that allows ODA to proactively gain compliance with Area Rules

Results from the Strategic Implementation Area can be found in Chapter 4, Sec. 4.5.

1.8 Implementation, Monitoring, Evaluation, and Adaptive Management

Implementation of the Area Plan and associated Area Rules will be assessed by evaluating the status and trends in agricultural land conditions. Measurable objectives will be assessed 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 results and findings will be summarized 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), 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 monitoring. ODA examines streamside vegetation at specific points in 90-foot bands along the stream from the aerial photos and assigns each sample stream segment a score based on ground cover. 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 one correct riparian index score. The main point is to measure positive or negative change. The results are summarized in Chapter 4 of the Area Plan.

1.8.2 Agricultural Ambient Water Quality Monitoring Assessment

ODA currently evaluates water quality data from monitoring sites in DEQ's water quality database that reflects agricultural influence on water quality. These data are also published in the DEQ water quality database and evaluated at the statewide level to determine trends in water quality at agricultural sites

statewide. Results from monitoring sites in the Management Area, along with local water quality monitoring data, are described in Chapter 4.

1.8.3 Biennial Reviews and Adaptive Management

The Area Plan and associated Area Rules 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 enforcement actions, landscape and water quality monitoring, and outreach efforts over the past biennium across the Management Area and for the Focus Area. In addition, progress toward achieving agricultural load allocations may be documented (if a TMDL has been established). As a result of the biennial review, the LAC submits a report to the Board of Agriculture and the director of ODA. This report describes progress and impediments to implementation, and recommendations for modifications to the Area Plan or Area Rules necessary to achieve the purpose of the Area Plan. The results of this evaluation will be used to update the goal(s), measurable objectives, and strategies in Chapter 3.

Chapter 2: Introduction and Local Background

This document is a plan to prevent and control water pollution from agricultural activities in order for the State to achieve water quality standards for water bodies in the Clackamas Management Area (including the Clackamas River watershed and the neighboring Willamette mainstem and tributaries to the west). The Clackamas Subbasin Agricultural Water Quality Management Area Plan (Area Plan) was created through the joint efforts of a Local Advisory Committee (LAC) consisting predominantly of affected landowners / operators residing within the Management Area, Oregon Department of Agriculture (ODA), and the Clackamas Soil and Water Conservation District (SWCD). This Area Plan applies to all land currently in agricultural use, regardless of size, within the Management Area. For example, the Area Plan applies equally to large commercial production lands and to small rural land grazing a few animals. It also applies to all agricultural lands which lay idle or on which management has been deferred. Urban areas and land subject to the Forest Practices Act, when they are not involved with agricultural activities, are not subject to this Area Plan.

2.1 Local Roles and Responsibilities

2.1.1 Local Advisory Committee (LAC)

The Clackamas LAC was formed in December 1998 to assist ODA with the development of the Area Plan and Area Rules, and to recommend strategies to achieve the water quality goals and objectives of the Area Plan. The LAC is comprised predominantly of agricultural producers who live within the Management Area. LAC members are involved in a wide variety of operations including dairy, vegetables, grains, flowers, nuts, nursery, livestock, Christmas trees, equestrian, and berries. The Oregon Farm Bureau, Clackamas River Basin Council, Clackamas County Water Environment Services, Oregon Department of Fish and Wildlife (ODFW), and Clackamas SWCD are also represented on this committee. Members are:

Name	Location	Description
Chair, Barry Bushue	Boring	Landowner (berries, nursery, flowers, vegetables), Oregon Farm Bureau
Vice-Chair, Paul Staehely	Oregon City	Landowner (dairy)
Judy Bible	Oregon City	Landowner (Christmas trees)
Jim Calcagno	Oregon City	Landowner (fresh market vegetables)
Mike Dillard	Damascus	Landowner (nursery)
Kurt McKnight	Boring	Landowner (berries, processing plant)
Lydon Scheef	Oregon City	Landowner (grains)
Andrew Swanson	Clackamas County Service Dist. 1	Clackamas County – Water Environmental Services
Jacqueline Tommas	Estacada	Clackamas River Basin Council
Bob Underwood	Boring	Landowner (berries, hazelnuts, Christmas trees)

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

- State Board of Agriculture representatives
- Persons serving on local soil and water conservation districts
- Private landowners

- Representatives of local, state and federal boards, commissions, and agencies
- Members of Indian tribes
- Members of the public
- Persons associated with industry
- Members of academic, scientific, and professional communities
- Public and special interest groups

2.1.2 Local Management Agency

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

The Clackamas SWCD has a long history of effectively identifying conservation concerns, developing action plans to address problems, and facilitating assistance to agricultural operators who voluntarily participate in conservation programs. The Clackamas SWCD also plays an important role in the development of partnerships between local agencies, volunteer organizations, and private landowners/operators to address natural resource and conservation issues. The Clackamas SWCD works cooperatively with many agencies and organizations, including the United States Department of Agriculture (USDA), USDA Natural Resources Conservation Service (NRCS), USDA Farm Service Agency (FSA), watershed councils, Oregon State University Extension Service, Clackamas County Stockman's Association, Northwest Dairy Goat Association, Clackamas County Farm Forest Association, and local businesses. These agencies and organizations provide technical, financial, and educational assistance to individual agricultural operators for the installation and maintenance of conservation practices and pollution prevention and control measures.

As resources allow, Clackamas SWCD, USDA NRCS, private sector field staff, and Oregon State University Extension Service staff are available to assist landowners in evaluating effective management strategies for preventing and controlling water pollution from agricultural lands. Personnel in these offices can also design and assist with implementation of management strategies, and assist in identifying any sources of cost-sharing funds for the construction and use of some of these strategies. Implementation priorities will be established on a periodic basis through biennial review of the Area Plan and through annual plans of work developed jointly by the LMA and ODA, with input from partner agencies.

The Area Plan contains voluntary, incentive based approaches to water quality management and is not enforceable. The Area Rules are the only enforceable provision of the agricultural water quality program. Any actions related to determination of noncompliance with the Area Rules or enforcement will be taken up directly by ODA, as outlined in OARs 603-090-0080 through 603-090-0120.

2.2 Area Plan and Rules: Development and History

The director of ODA approved the Area Plan and Area Rules in 2001. Since approval, the LAC met in 2005, 2008, 2010, 2012, and 2015 to review the Area Plan and regulations. The review process included assessment of the progress of Area Plan implementation toward achievement of plan goals and objectives. At the review in 2012, changes to the Area Plan included adding measurable objectives, updates to

targeted technical assistance in Focus Areas and updates to site-capable vegetation. Also, the 303(d) listing and TMDLs were updated for mercury in the Willamette tributaries and main stem Willamette River. At the latest biennial review in October of 2015, changes to the Area Plan included reformatting to the statewide chapter format, incorporating updates and comments from both the Farm Bureau and DEQ, and updating measurable objectives. The LAC, Clackamas SWCD, and ODA will continue to review and update the Area Plan at all upcoming biennial reviews.

2.3 Geographical and Physical Setting

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

The Clackamas Subbasin is a 4th field watershed with Hydrologic Unit Code (HUC) number 17090011 in western Oregon (Figure 1). Most of the Clackamas Subbasin is located in Clackamas County, with a small southern portion in Marion County. The Clackamas River drains 940 square miles (600,700 acres) and flows into the Willamette River in the Gladstone / Oregon City area. The Clackamas Agricultural Water Quality Management Area also encompasses most of the 5th field Abernethy Creek - Willamette River watershed (HUC number 1709000704), located in the northeastern portion of the Middle Willamette 4th field watershed (HUC number 17090007). This 5th field watershed includes the mainstem Willamette River (river miles 25 to 45) and creeks that flow directly into the Willamette River. The Abernethy Creek and Beaver Creek / Parrot Creek drainages flow into the Willamette River at Oregon City. The remaining creeks are located west of the Willamette River in the Wilsonville area (Newland Creek, Boeckman Creek, Seely Ditch, Coffee Lake Creek, and Corral Creek). There are 14 creeks in total, whose watersheds encompass a total of 136 square miles. Because of this additional area, the Management Area's total area is 1,076 square miles (688,351 acres).

Elevation in the Clackamas Subbasin ranges from 12 feet at the confluence of the Clackamas and Willamette rivers to 6,000 feet in the Cascade Range. The annual rainfall ranges from 46.5 inches in the Willamette Valley to an average of about 51.3 inches at Clackamas Lake (3,400 feet). Annual snowfall averages about 13.5 inches. The ratio for snowfall is ten inches of snow per one inch of rain (Fox, 1999).

The Clackamas Subbasin has an average road density of 3.5 miles of road for every square mile of land. The highest road densities occur in the Lower Clackamas River watershed with 5.6 miles of road per square mile, followed by Richardson Creek watershed, 5.0 miles of road per square mile, and Rock Creek watershed, 4.7 miles of road per square mile (Metro, 1997). The Clackamas Subbasin also contains an estimated 13.1 road-stream crossings per square mile of land (Metro, 1997).

In 1997, Metro estimated that the percent of impervious area in the Clackamas Subbasin was approximately four percent. Impervious surfaces include paved areas, building roofs, compacted soils, or any other impervious surface that would allow water to run off to nearby storm drains or streams. The highest figures for impervious area range from 20 to 22 percent and occur in the more urbanized watersheds (Metro, 1997).

Approximately 13 percent of land in the Clackamas Subbasin has a high susceptibility to landslide activity. The highest susceptibility to landslides occurs in the watersheds located on lands managed by the U.S. Forest Service (USFS) (Metro, 1997).

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

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

The predominant land use in the Management Area is timber, most of it occurring on federal lands in the eastern part of the Management Area. Fifty-four percent of land in the Subbasin is USFS National Forest Land (Table 1). In the valley portions of the Management Area, the dominant land use is rural and agriculture, with the urban areas quickly expanding. In 2010, the population of Clackamas County was 375,992. (http://quickfacts.census.gov/qfd/states/41/41005.html)

Table 1. Land Ownership in the Clackamas Subbasin Management Area

Landowner	Acres	Percent
Federal - USFS National Forest	414,419	50.1%
Private - Agriculture	233,261	28.2%
Private - Non-Agriculture	149,001	18.0%
Indian Reservation	17,227	2.1%
Federal - BLM	13,755	1.7%
State Lands	86	< 0.1%
Acreage Totals	**827,749**	**100.0%**

BLM - U.S. Bureau of Land Management
USFS - U.S. Forest Service
Source: Oregon Geospatial Data Clearinghouse, 1992-1993
USGS & USEPA, 1999

Clackamas County's agricultural industry is ranked fourth in the state in all farm sales, with $300 million in annual revenue. Clackamas County is ranked second in Oregon for nursery and greenhouse sales (Oregon Department of Agriculture, 2011). Clackamas County ranks first in the sale of Christmas trees, the number of farms (3,700), the number of farms in certified organic production (63), and the number of horses (9,300), a $32 million industry that is ranked ninth nationally. Most Clackamas County farms are small - 50 percent are less than 10 acres, and only 25 percent are larger than 21 acres (http://web4.co.clackamas.or.us/mrm/3110.html).

Most of the farmland is located in the western portion of the Management Area, from the cities of Oregon City and Wilsonville and to Sandy and Estacada. The majority of agricultural lands are located on rolling hills and high terraces with somewhat to well-drained soils. A portion of the agricultural land is artificially drained. The slopes of most of the cultivated land ranges from zero to eight percent, with some cultivated areas having slopes ranging from seven to thirty percent (Gerig, 1985). The different types of agriculture include caneberries, nursery stock, orchards, row crops, dairy farms, grasses, irrigated hay and pasture, livestock, dry-land farm crops (e.g., cereal grains), and specialty crops. The total agricultural sales in Clackamas County in 2010 were $295 million with $231 million in crop sales and $64 million in animal product sales (Oregon Department of Agriculture, 2011).

The types of crops grown in the Management Area shifted during the 20th century. In the mid-1800s, farming was based on subsistence, so it was common for people to have small dairies. In the late 1800s, Italian prune orchards were common, especially in the Springwater area. Around 1900, a railroad reaching Estacada was built and dams on the Clackamas River were constructed. This helped change the focus of agriculture to grain, berries, and filberts. In the 1920s and 1930s, more people started

specializing in dairies and potatoes, and began converting grain to grass seed, especially fine fescue. Many of these crops have been converted to Christmas trees and nursery stock, with berries still common in the Sandy/Damascus area.
Farming activities have also undergone changes in the Management Area. Cover cropping and field buffer strips are examples of some of the methods being used to minimize erosion. The improvement of equipment has allowed for fewer trips over a field, resulting in decreased compaction of soil. Subsoiling has also helped to reduce runoff and compaction.

Water Resources

Water in the Management Area is appropriated and diverted primarily for municipal, fish, industrial, hydropower, and irrigation use. The amount of water appropriated in the Clackamas Subbasin is 716 cubic feet per second (cfs) and 30 cfs from the Willamette for the Wilsonville area. The primary consumptive use for which water rights are issued in the Management Area is municipal. Several communities obtain domestic drinking water from surface water and groundwater in the Management Area. From the city of Estacada down to Oregon City, the Clackamas River provides drinking water to more than 400,000 people. Groundwater supplies more than 50,000 people in the Clackamas Subbasin. About 40 private domestic surface water intakes also withdraw from streams in the Clackamas Subbasin. A complete list of public drinking water systems can be found in Appendix G. Agricultural activities that can impact drinking water include:

- Improper storage and management of animal wastes.
- Concentrated livestock and other agricultural practices that contribute to riparian area and upland erosion and sedimentation to surface water bodies.
- Over-application or improper handling of pesticides/fertilizers.
- Excessive irrigation that transports contaminants or sediment to ground and surface water.

In the Clackamas Subbasin, 58 cfs are allocated for irrigation. An estimated 26,927 acres were irrigated in the Clackamas Subbasin in 2002, according to the USDA National Agricultural Statistics Service. Of this, 67 percent was irrigated with surface water. By 2010, irrigated acreage is expected to increase to 9,000 acres, with 70 percent of this acreage being irrigated with surface water (Oregon Water Resources Department, 1992).

Stream flows in the Clackamas Subbasin vary widely between summer and winter. The high and low flows have different impacts on the landscape and resources. At its confluence with the Willamette River, the Clackamas River discharges a mean peak rate of 8,139 cfs in February. The mean low occurs in August with 1,276 cfs (Oregon Water Resources Department, 1992). The slow release of snowmelt from the Cascades helps keep stream temperatures cool and maintain summer flows. Natural cover increases infiltration and allows a slow release of water. This in turn helps maintain summer flows and low stream temperatures. However, changes in natural cover or land uses can affect flow. With the removal of natural cover, runoff rates increase and stream discharge peaks rise faster and higher with storm events, resulting in higher and sharper peak flows.

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

Biological Resources

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

The Management Area hosts a number of vertebrate species that depend on aquatic habitats. Native salmonid and other fish species with a federal or state conservation status are summarized in Table 2. Additional native fish species include: northern pikeminnow *(Ptychocheilus oregonenisis)*, mountain whitefish *(Prosopium williamsoni)*, rainbow trout *(Oncorhynchus mykiss)*, resident cutthroat trout *(Oncorhynchus clarki)*, bull trout *(Salvelinus confluentus),* peamouth (*Mylocheilus caurinus*), redsided shiners (*Richardsonius balteatus*), three-spine stickleback (*Gasterosteus aculeatus*), white sturgeon (*Acipenser transmontanus*), sculpins (Cottus spp.), suckers (Catostomus spp.), and dace (Rhinichthys spp.).

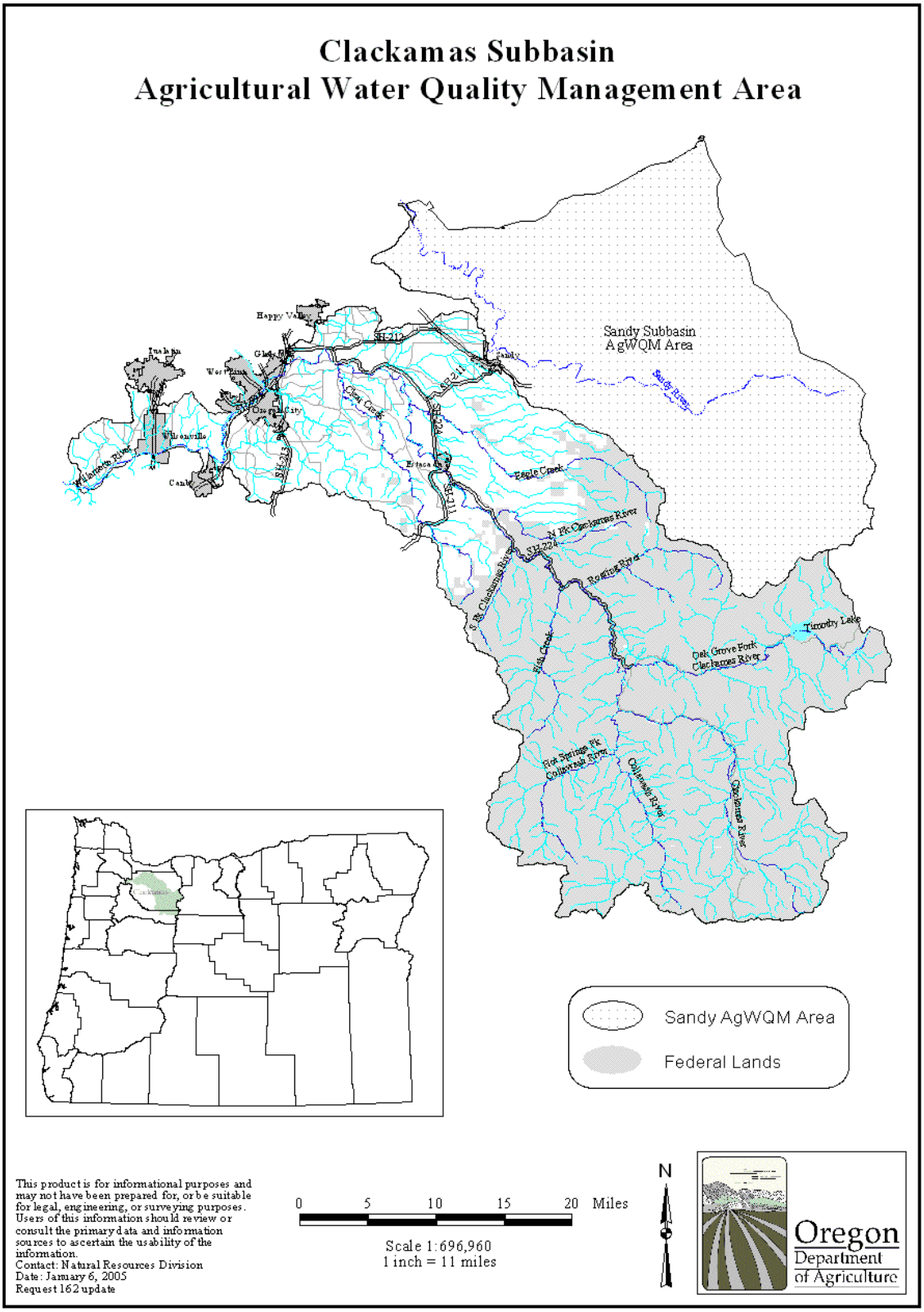
Aquatic amphibians and reptiles in the Management Area include the Pacific giant salamander *(Dicamptodon ensatus)* and several species on the Oregon sensitive species list (Oregon Department of Fish and Wildlife, 2008). The Oregon spotted frog (*Rana pretiosa)* is a candidate species for listing under the federal Endangered Species Act, and is also a state sensitive species. State-listed sensitive amphibian species in Clackamas County also include the coastal tailed frog (*Ascaphus truei)*, Cascades frog (*Rana cascadae),* northern red-legged frog *(Rana aurora),* and western toad *(Anaxyrus boreas)*. State-listed sensitive reptile species include the western painted turtle *(Chrysemys picta bellii)* and the western pond turtle *(Actinemys marmorata)*. Aquatic mammals in Clackamas County include beavers (*Castor canadensis),* muskrats (*Ondatra zibethica)*, and river otters (*Lutris canadensis)*. Several types of geese, ducks, and other bird species also live and feed in the Management Area's aquatic habitats.

Table 2. Clackamas Subbasin Management Area - Native Fish Species with Federal or State Conservation Status

Common Name - Scientific Name • Population(s)	Federal Status (Endangered Species Act)	State Status (Sensitive Species List or Oregon ESA)
Steelhead Trout – winter run *(Oncorhynchus mykiss)* • Lower Columbia River • Upper Willamette River	• Threatened • Threatened	• Critical • Vulnerable
Chinook Salmon – spring run *(Oncorhynchus tshawytscha)* • Lower Columbia River • Upper Willamette River	• Threatened • Threatened	• Critical • Not listed
Chinook Salmon – fall run *(Oncorhynchus tshawytscha)* • Lower Columbia River	• Threatened	• Critical
Coho Salmon *(Oncorhynchus kisutch)* • Lower Columbia River	• Threatened	• Endangered
Chum Salmon *(Oncorhynchus keta)* Columbia River	• Threatened	• Critical
Coastal Cutthroat Trout *(Oncorhynchus clarkii clarki)* Lower Columbia Coastal	• Not listed	• Vulnerable
Pacific Lamprey *(Lampetra tridentata)*	• Not listed	• Vulnerable
Western Brook Lamprey (*Lampetra richardsoni)*	• Not listed	• Vulnerable
Oregon Chub *(Oregonichthys crameri)*	• Threatened	• Not listed

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

2.3.2 Map of the Management Area



2.4 Agricultural Water Quality in the Management Area

2.4.1 Local Issues of Concern

This Area Plan addresses agricultural sources of water pollution. There are two fundamental types of water pollution in the Management Area:

- Point source pollution emanates from clearly identifiable discharge points such as wastewater plants. Significant point sources are required to obtain permits that specify their pollutant limits.
- Nonpoint source pollution originates from the general landscape and is difficult to trace to a single source. Pollutants from nonpoint sources are carried to surface water or groundwater through the action of rainfall, snowmelt, irrigation runoff, and seepage. Nonpoint sources of pollution in the Management Area include erosion (from development in urban / suburban / urbanizing areas, agricultural and forest lands, streambanks, and roadsides) and contaminated runoff (from livestock and other agricultural operations, urban areas, septic systems, and natural sources).

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

- Hot springs on the Clackamas River and other bodies of water in the Management Area,
- Septic systems, human waste from water-based recreation, and public sewage disposal,
- Public roadways or rights of way or easements next to streams, rivers, or other bodies of water,
- Public culverts, roadside ditches, drainage, and shoulders,
- Dams, dam removal, hydroelectric plants, and non-agricultural impoundments,
- Housing and other development in agricultural land areas,
- Extreme and/or unforeseen weather events,
- Any other factor that occurs on public or private lands outside the direct control of the landowner/operator.

Several wastewater facilities in the Management Area hold permits to discharge their effluent into rivers and streams. The Estacada wastewater treatment plant discharges approximately 600,000 gallons of treated effluent per day directly into the Clackamas River. Other wastewater treatment plants within the Management Area are the Sandy plant, which discharges approximately 1.5 million gallons per day (November 1 - April 30) into Tickle Creek, and the Boring plant, which discharges approximately 9,000 gallons per day in dry weather and 19,000 gallons per day in wet weather into the North Fork of Deep Creek. The Mount Hood National Forest manages the Timberlake/Ripplebrook Wastewater Treatment Plant. The plant averages a discharge of 33,000 gallons per day with most of it being collected into on-site ponds. During high rain periods that occur between November 1 and April 30, the pond gates are opened allowing the treated water to enter the Clackamas River for up to two days at a time, up to four times during the winter months. The source of drinking water for the city of Sandy is in the Management Area and is discharged into the Management Area. The city of Sandy diverts its discharge water to a nursery in Boring to be used for irrigation between May 1 and October 30.

The urban sector of the Management Area has additional point and nonpoint water quality issues to address. A large effort has been focused on storm water and surface water runoff. Numerous programs, cooperative projects, and rules are in place to address urban surface water issues. Efforts include proper

septic disposal, erosion control, rules for new development, public education, maintenance, water quality monitoring, disposal of vector waste, and treatment of runoff from impervious surfaces.

2.4.2 303(d) List of Impaired Water Bodies

A number of waterbodies within the Management Area are water quality limited (do not meet state water quality standards) for one or more parameters. The Oregon Department of Environmental Quality (DEQ) is required to submit a list of impaired waterbodies to the U.S. Environmental Protection Agency (EPA) every two years under section 303(d) of the federal Clean Water Act. This list is commonly referred to as the "303(d) list."

While this Area Plan applies to all agricultural water pollution, the objectives and strategies currently emphasize parameters on the 303(d) list in the Management Area including temperature, bacteria, mercury, and aquatic weeds / algae. Appendix A lists the impaired waterbodies from the 2002, 2004 / 2006, and 2010 changes to the 303(d) list. The listed waterbodies are in the Clackamas 4th field HUC and the Abernethy Creek - Willamette River 5th field HUC (which is in the Middle Willamette Subbasin 4th field HUC, and includes 20 miles of the Willamette mainstem). More information is available in the DEQ 2010 integrated report and the 303(d) list database on the DEQ website (www.deq.state.or.us/wq/assessment/2010Report.htm).

In 2012, EPA proposed that some additional waterbodies be included on the 303(d) list. In the Management Area, EPA's proposed listings include pesticides, dissolved oxygen, and biological criteria. These proposed listings are also included in Appendix A. If these proposed waterbodies are added to the 303(d) list in the Management Area, this Area Plan will add agricultural conservation and management strategies to address the new listings during the next biennial review.

The seven parameters that are currently the focus of the Area Plan and Area Rules are briefly described below. The first four parameters are on the current 303(d) list, while the last three have been proposed by the EPA for addition to the 303(d) list.

1. Temperature: Oregon's native cold-water aquatic communities, including salmonids, are sensitive to water temperature. Several temperature criteria have been established to protect various life stages and fish species, depending on their temperature requirements. Many sources contribute to elevated stream temperatures. On agricultural lands, absence of streamside vegetation, water withdrawals, farm ponds, and land management that leads to widened stream channels contribute to elevated stream temperatures.

2. Bacteria: DEQ measures the bacteria *Escherichia coli (E. coli)* in streams to determine the risk of infection and disease to people who come in contact with fresh water while fishing, swimming, or boating. There are numerous sources of bacteria in streams, including humans (from recreation or failing septic systems) and wildlife. On agricultural lands, *E. coli* generally comes from livestock waste, either deposited directly into waterways or carried to waterways via runoff and soil erosion. Runoff and soil erosion from agricultural lands may also carry bacteria from other sources.

3. Mercury: Mercury occurs naturally and is used in many household products (thermometers, fluorescent light tubes, thermostats, batteries, and dental fillings). Mercury is released into the environment through human activities and volcanoes, and can be carried long distances by atmospheric air currents. Mercury passes through the food chain readily, and has significant public health and wildlife impacts from consumption of mercury-contaminated fish. In the Willamette basin, almost half of the mercury in water comes from erosion of soil that carries naturally occurring mercury (including erosion from agricultural lands and streambanks). A similar amount comes from deposition on land or water from local or global atmospheric sources.

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

5. Pesticides: EPA's proposed additions to the 303(d) list for the Management Area include three agricultural insecticides: chlorpyrifos (in current use), dieldrin (no longer in use, but persists in the environment), and guthion (aka azinphosmethyl, which cannot be used after September 30, 2012). Chlorpyrifos, dieldrin, and guthion are proposed for the 303(d) list in North Fork Deep Creek, while chlorpyrifos and dieldrin are proposed for the 303(d) list in Noyer Creek. On agricultural lands, sediment from soil erosion can carry these pesticides to water. Current use agricultural pesticide applications, mixing-loading, and disposal activities may also contribute to pesticide detections in surface water.

6. Dissolved Oxygen: EPA's proposed additions to the 303(d) list for the Management Area include dissolved oxygen, which migratory and residential fish need for successful spawning. The Clackamas River and four of its tributaries are proposed for listing. Low dissolved oxygen levels may be associated with warmer water temperatures, algal respiration, and/or decomposition of excess organic sediment.

7. Biological Criteria: EPA's proposed additions to the 303(d) list for the Management Area include biological criteria, which measure the aquatic macroinvertebrates community (aquatic bugs) that are sensitive to water quality. These proposed listings do not specify which water pollutant(s) may be affecting the macroinvertebrates. The Clackamas River and four of its tributaries are proposed for listing, along with three tributaries in the Abernethy Creek - Willamette River watershed.

The Willamette mainstem is also listed for several toxins, iron, and dioxin, but these are beyond the scope of this Area Plan. If a Willamette Basin TMDL is developed in the future for any of the toxins, it may include agricultural load allocations that apply to the entire Management Area.

DEQ submitted Oregon's 2012 Integrated Report and 303(d) list to EPA in November 2014. EPA will review and either approve or disapprove the 2012 303(d) list as submitted. After EPA has taken final action, the 2012 303(d) list will become effective for Clean Water Act purposes.

2.4.3 Basin TMDLs and Agricultural Load Allocations

DEQ, in accordance with the federal Clean Water Act, is required to establish Total Maximum Daily Loads (TMDLs) for pollutants on the list of impaired water bodies (303(d) list). TMDLs generally apply to an entire basin or subbasin, and not just to an individual water body that was on the 303(d) list. TMDLs specify the daily amount (load) of pollution that a water body can receive and still meet water quality standards. Through the TMDL, nonpoint sources (including agriculture, forestry, and urban) are assigned "load allocations", while point sources are assigned "waste load allocations" in their permits. The agricultural sector is responsible for reducing agricultural water pollution to meet the load allocation assigned to agriculture. Once TMDLs are completed for a basin, the basin's water bodies are removed from the 303(d) list and are assigned to Category 4A (water quality limited, TMDL approved). In the

future, when data show that water quality criteria have been met, water bodies will be assigned to Category 2 (attaining).

In response to the 303(d) listings through 2006, DEQ developed TMDLs for the entire Willamette Basin for temperature, bacteria (*E. coli)*, and mercury (Oregon Department of Environmental Quality, 2006). The Willamette TMDL can be accessed via the DEQ website (www.deq.state.or.us/wq/tmdls/willamette.htm). The Willamette Basin also has a TMDL for dioxin (Oregon Department of Environmental Quality, 1991). The dioxin TMDL can be accessed via the DEQ website (www.deq.state.or.us/wq/tmdls/columbia.htm#dd). Other impairments identified in the Management Area, such as flow and habitat modification, do not require TMDLs. Table 3 summarizes the agricultural load allocations that apply to the Management Area.

As part of the TMDL process, DEQ identifies the Designated Management Agencies or parties responsible for submitting TMDL implementation plans. An agreement between ODA and DEQ establishes that Agricultural Water Quality Management Area Plans serve as TMDL implementation plans for agriculture. This Area Plan is the implementation plan for the agricultural component of the TMDLs that apply to the Management Area. Area Plan biennial reviews and revisions will address any new pollutant load allocations assigned to agriculture in future TMDLs.

Table 3. Agricultural load allocations that apply to the Management Area

Geographic Scope in Management Area	TMDL	Load Allocation for Agriculture
Parameter: Temperature		
Entire Clackamas River Subbasin	Willamette TMDL (2006), Chapter 6	All nonpoint sources collectively (agriculture's allocation is not specified): 0.05°C of the 0.3°C human use allocation (with a surrogate of effective shade)
Willamette Mainstem in Abernethy Creek - Willamette River 5th field HUC (river miles 25-45)	Willamette TMDL (2006), Chapter 4	All nonpoint sources collectively (agriculture's allocation is not specified): 0.05°C of the 0.3°C human use allocation (with a surrogate of effective shade)
Abernethy Creek - Willamette River 5th field HUC	Willamette TMDL (2006), Chapter 7	All nonpoint sources collectively (agriculture's allocation is not specified): 0.05°C of the 0.3°C human use allocation (with a surrogate of effective shade)
Parameter: Bacteria		
Agricultural, rural, and urban land uses within Clackamas River Subbasin	Willamette TMDL (2006), Chapter 6	Agriculture: 78% reduction compared to average loads in 2006 (83% for Bargfeld Creek; 89% for Delano Creek)
Willamette Mainstem in Abernethy Creek - Willamette River 5th field HUC (river miles 25-45)	Willamette TMDL (2006), Chapter 2	Agriculture: 61% reduction compared to average loads in 2006
Tributaries in Abernethy Creek - Willamette River 5th field HUC	Willamette TMDL (2006), Chapter 7	Agriculture: 95% reduction in summer and 61% reduction in fall-winter-spring compared to average loads in 2006
Parameter: Mercury		
Entire Management Area	Willamette TMDL (2006), Chapter 3	Agriculture: 27% reduction compared to average loads in 2006
Parameter: Dioxin		
Entire Management Area	Columbia River Basin TMDL (1991)	Only pulp and paper mills have been assigned an allocation; agriculture is a potential source, but no load allocation has been assigned due to lack of data

2.4.4 Beneficial Uses

Good water quality is beneficial for many different uses. Beneficial uses of Oregon's water are designated by the Oregon Water Resources Department (OWRD) or the Oregon Water Resources Commission (OAR 304-041-0002). Water quality standards are established to protect beneficial uses of Oregon's waters. Beneficial uses are designated for the Willamette Basin, including the Management Area, in OAR 304-041-0340, Table 304a. Beneficial uses of water in the management area include production agriculture; fishing; swimming; boating; habitat for aquatic organisms and wildlife; native species enhancement; irrigation; domestic, municipal, and industrial water supplies; hydropower; and aesthetics. Stream temperature, bacteria, and mercury affect the most sensitive beneficial uses of water, which are salmonid production and survival, water contact recreation, and fish consumption. While there may not be severe impacts on water quality from a single source or activity, the combined effects from all sources contribute to the impairment of beneficial uses of the Management Area's water. Most of the beneficial use impairments occur during summer low flow periods.

2.4.5 Sources of Impairment

Agricultural Waste

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

Livestock Waste: Nutrients and Bacteria

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

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

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

Crop Nutrients

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

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

Sound agronomic strategies include: use of fertilizer at agronomic rates; setting realistic yield goals; regular calibration of fertilizer application equipment; appropriate application timing; use of weather reports and crop growth stage to guide application timing; periodic soil testing and plant tissue analysis; periodic nutrient analysis of manure and/or compost products that are applied; managing irrigation to prevent nutrient loss through leaching and/or surface runoff; carefully managing nutrient applications; and accounting for "non-fertilizer" sources of nutrients such as manure, compost bio-solids, and leguminous and non-leguminous crop residues.

Pesticide Use

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

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

When feasible, adopt integrated pest management (IPM) strategies. IPM promotes a diverse, multi-faceted approach to pest control. This strategy establishes an economic threshold for control actions, to guide the manager to use a variety of field/orchard sanitation and cultural practices, field scouting, beneficial insects, and other biological controls, and the use of properly selected chemical pesticides. While IPM does not exclude the use of chemical pesticides, it does seek to optimize their use and minimize off-target movement into the environment.

Store and handle pesticide materials correctly. Storage and handling facilities should be secure and include a leak-proof pad with curbing for mixing and loading. An alternative to a permanent, concrete pad is to always mix pesticides in the field, frequently moving sites to prevent chemical buildup. Wash/rinse water should be directly applied to the appropriate crop. Empty liquid pesticide containers should be triple rinsed, then punctured and disposed of in an approved manner. Dry chemical bags should be emptied completely. Bundle and store paper bags until they can be disposed of in an approved manner.

Establish appropriate vegetative buffer strips as may be indicated on some pesticide labels. Buffer strips will help to retain soil (which may include pesticides) and surface runoff (which may have dissolved pesticides) from making contact with waters of the state.

Watch for a pesticide waste collection day in your area. These events allow individuals to safely and anonymously drop off unwanted, unused, or out of date agricultural pesticides, along with some empty containers.

Irrigation Tailwater

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

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

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

Management strategies a landowner or operator can take to help minimize irrigation tailwater reaching waters of the state include: adopting an irrigation water management plan, using irrigation soil moisture monitoring, planting and irrigating crops on a contour, planting sloping field edges to grasses, installing sediment basins at field edges in swales, using drip irrigation, recycling return flows, and using minimum or no till.

Sediment

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

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

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

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

Strategies that may help prevent erosion include: switching from conventional tillage to no till, using contour planting, planting a cover crop, deep ripping a field to improve water infiltration, controlling the timing and location of livestock grazing, or any practice that reduces the detachment and movement of soil. Strategies that may help control sediment include: strip cropping, catch basins, grass-lined waterways, vegetative filter strips, and straw bales. Sediment control strategies need to be well designed and maintained.

Roads and related structures (staging areas, stream crossings, bridge abutments, cut slopes, etc.) have been identified in many watersheds as significant sources of sediment input to streams. A single poorly

maintained farm road could comprise the vast majority of one farm's sediment output. Landowners and operators are encouraged to obtain advice on road construction and maintenance, especially for roads built on steeper terrain, close to streams, or crossing streams. Many management methods are available for constructing and maintaining roads to increase their stability and to reduce erosion. Landowners may be held liable for water pollution from any road on their property and should carefully review the wording of any easement agreements.

Warning Signs That Agricultural Waste May Be Reaching Water

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

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

2.5 Prevention and Control Measures

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

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

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

Streamside Area Condition

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

Streamside vegetation can improve several water quality parameters by providing shade (temperature, aquatic weeds / algae, and dissolved oxygen) and streambank stability (mercury, pesticides, and dissolved oxygen).

Agricultural Waste

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

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

Preventing waste from reaching waters of the state can improve several water quality parameters (bacteria, mercury, pesticides, aquatic weeds / algae, and dissolved oxygen).

Definitions

Wastes – 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. For the purposes of this plan, "wastes" include but are not limited to commercial fertilizers, soil amendments, composts, animal wastes, vegetative materials, or any other wastes. ORS 468B.005(7).

Waters of the State – Includes 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 effect a junction with natural surface or underground waters), which are wholly or partially within or bordering the state of within its jurisdiction. ORS 468B.005(10).

Resolution of Complaints and Enforcement Actions

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

ODA may investigate complaints from individuals against landowners or operators who are alleged to be out of compliance with the Area Rules. Individual complaints must relate to a specific property being managed under conditions resulting in a potential violation, and include a thorough description of the problem and location. The complaint must be filed with ODA in writing and be signed by the complainant. The complaint form can be found on ODA's website (www.oregon.gov/ODA/NRD/docs/pdf/water/complaint_form.pdf).

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

As originally envisioned, a landowner/operator with an approved Voluntary Water Quality Farm Plan (Voluntary Plan) may have received limited "safe harbor" from enforcement by ODA. However, ODA's enforcement process has evolved to provide all landowners with opportunities to come into compliance without penalties except in the case of imminent danger or risk to human health.

ODA recognizes that every farm and situation is different and will take into account individual circumstances when conducting investigations and enforcing the Area Rules. A landowner or operator will be responsible for only those conditions caused by activities conducted on land managed by the landowner or operator. The Area Rules do not apply to conditions resulting from exceptional circumstances that could not have been reasonably anticipated, such as fire, natural disaster, or extreme weather conditions such as flooding.

2.5.1 Riparian/Streamside Area Management

Role of Streamside Vegetation to Prevent and Control Pollution
ODA, the LMA, and the LAC will evaluate and document the effectiveness of the Area Plan by assessing improvement of land conditions in the focus area during each biennial review. Comparing baseline and post-implementation land conditions (along with available water quality data) will allow these partners to determine whether the land condition measures have improved. These partners and other stakeholders will also be able to evaluate progress in implementing the Area Plan more readily than from reports of efforts scattered throughout a Management Area.

ODA anticipates that the focus area process will help answer several questions about the effectiveness of the Oregon Agricultural Water Quality Program, including:

- How much can we improve land conditions through focused outreach and voluntary technical assistance in two years?
- If we see significant improvements in land conditions in the focus areas, does this correlate with a significant improvement in water quality parameters?

Stream Temperature and Site-Capable Streamside Vegetation
Across Oregon's 38 Water Quality Management Areas, many LMAs - including the Clackamas SWCD - are focusing their initial focus area implementation on streamside vegetation.

There are several reasons for this focus:

- Streamside vegetation improves water quality for multiple parameters, including temperature, sediment, bacteria, nutrients, mercury, and pesticides.
- Streamside vegetation is visible from public roads and on aerial photos, allowing agencies, stakeholders, and the general public to see that agriculture is part of the solution.
- Landowners can take steps to improve streamside vegetation, with or without assistance from the LMA, watershed councils, or other local partners.
- Streamside vegetation also improves fish and wildlife habitat.

The Oregon Agricultural Water Quality Program uses the concept of "site-capable streamside vegetation" to describe the vegetation that agricultural streamsides generally need in order to provide effective shade and other water quality functions. Site-capable streamside vegetation is the native or non-native vegetation that can be expected to grow at a particular site, given natural site factors (e.g. elevation, soils, climate, wildlife, fire, floods) and historical and current human influences (e.g. channelization, roads, invasive species, land management). Site-capable streamside vegetation can be determined for a specific site based on: streamside vegetation observed at the site (including type, location, and size), streamside

vegetation observed at nearby reference sites, and NRCS soil surveys (which often describe the vegetation in uncultivated areas).

Site-capable streamside vegetation provides three functions related to agricultural water quality:

1. Shade that blocks direct solar radiation and moderates stream temperatures.
2. Bank stability and reduction of streambank erosion.
3. Filtration of pollutants (bacteria, nutrients, pesticides, mercury, sediment) from overland flows.

To measure baseline conditions in the focus area, the LMA will map streamside areas on agricultural lands and estimate the percentage of streamside areas that fall into three categories, referred to as Class I, II, and III in this Area Plan (Table 4). After working with landowners for two years, the LMA will re-assess the streamside vegetation conditions and document the percentage of streamside areas that fall into the three classes. ODA, the LMA, and the LAC will evaluate progress based on the percent of streamside areas that can be reclassified from Class III to Class II, following the removal of agricultural impacts and the establishment of streamside vegetation. Reclassification from Class II to Class I will usually take longer than two years, because the vegetation needs to grow to a height where it can provide shade and other functions.

Table 4. Classes of Streamside Vegetation for Assessing Land Conditions

Class	Streamside Vegetation	Agricultural Impacts	Functions Listed Above
I	Present	Are not present	Provides the three functions
II	Able to establish	Are not present	May not provide the three functions
III	Unable to establish	Prevent vegetation from establishing	Does not provide the three functions

Agricultural streamside vegetation condition can be categorized into one of three classes, as described earlier in Table 4. Table 5 summarizes the correlation between streamside vegetation, compliance with the Area Rules (riparian rule), meeting the goals of the Area Plan, and meeting the nonpoint load allocation for the temperature TMDL.

Table 5. Relationship Between Streamside Vegetation Class, Agricultural Impacts, Streamside Functions, Area Rules (Riparian Rule), Area Plan, and Temperature TMDL

Class	Streamside Vegetation Condition	Agricultural Impacts Present	Effective Shade Provided	Area Riparian Rule	Area Plan Goals	Temperature TMDL Nonpoint Load Allocation
I	Site-capable	Not present	Probably	In compliance	Meets goals	Meets
II	Establishing	Not present	Maybe	In compliance	May meet goals	Contributes
III	Unable to establish	Present	No	Not in compliance	Does not meet goals	Does not meet

Class I areas have site-capable streamside vegetation. Agriculture is not impacting the streamside area. Effective shade, streambank stability, and ability to filter overland flows are present. The streamside vegetation is in compliance with the Area Rules and meets the streamside vegetation goals of the Area Plan.

Class II areas have streamside vegetation that is establishing, but has not reached site-capable maturity. Agriculture is not impacting the streamside area. Effective shade may or may not be present, depending on stream width. The streamside area may provide some streambank stability and filtration of overland

flows. Class II areas are in compliance with the Area Rules and may meet the streamside vegetation goals of the Area Plan.

Class III areas do not have streamside vegetation that is able to establish because of agricultural impacts. Effective shade is not present. The streamside area probably does not provide streambank stability or filtration of overland flows. Class III areas are not in compliance with the Area Rules and do not meet the streamside vegetation goals of the Area Plan.

2.5.2 Upland Management

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

Healthy upland areas provide several important ecological functions, including:

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

Chapter 3: Goals, Objectives, and Strategies

Mission

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

3.1 Goals of the Area Plan

The goals set forth the aspirational goals of the Area Plan, which will be achieved through voluntary, incentive-based work undertaken by landowners in cooperation with the SWCD and other partners.

1. **Prevent and control water pollution from agricultural activities and soil erosion and achieve applicable water quality standards**
   - Reduce bacteria from agricultural sources to meet the agricultural load allocations for nonpoint sources in the Clackamas Subbasin TMDL,
   - Increase site-capable streamside vegetation along agricultural streams to provide effective shade,
   - Reduce erosion and sediment from agricultural and rural to help meet water quality standards for pesticides,
   - Manage irrigation and tail water runoff to waters of the state,
   - Control pollution as close to the source as possible,
   - Limit livestock access to streams, wetlands, and riparian areas and promote management of animal waste to prevent runoff to waters of the state.

2. **Achieve conditions on agricultural lands that contribute to the improvement of water quality in the Management Area**
   - Ensure that streamside vegetation provides streambank stability, filtration of overland flows, and moderation of solar heating, consistent with site capability,
   - Eliminate visible sediment loss from cropland through precipitation or irrigation-induced erosion,
   - Eliminate significant bare areas (near streams, on pasturelands, and on rangelands) that may contribute waste to waters of the state,
   - Ensure that active gullies (near streams, on pasturelands, and on rangelands) have healed or do not exist where they may contribute waste to waters of the state,
   - Ensure that livestock manure is stored in a manner and location such that it cannot contribute waste to waters of the state.

3. **Create a high level of awareness and understanding of water quality issues among landowners / operators, the agricultural community, and the public through education and technical assistance activities from the point of view of farmers and ranchers**
   - Conduct education programs to promote public awareness of water quality issues and their solutions,
   - Develop education programs that promote demonstration projects, to showcase successful conservation and management strategies and systems,
   - Produce and distribute an SWCD newsletter that includes water quality information,
   - Develop an ongoing media program to inform agricultural landowners / operators and the public of conservation issues and events,

- Create and maintain a list of experienced agricultural landowners / operators willing to share their successes with other interested people by speaking, leading tours, and providing tour sites,
- Build partnerships with agribusiness to promote conservation,
- Sponsor workshops and tours,
- Assist landowners and operators conducting agricultural management or land disturbing activities who choose to develop and implement a voluntary conservation plan,
- Compile ongoing research results and effective solutions to water quality problems.

4. Monitor, evaluate, and document the effectiveness of this Area Plan in improving land conditions and water quality, with an initial focus on streamside vegetation

- All streamside areas along agricultural lands support site-capable vegetation (Class I),
- Water from agricultural lands meets water quality standards and agricultural or nonpoint load allocations,
- Program effectiveness is measured and documented across the Management Area and across each focus area,
- Voluntary participation is maximized.

5. Monitor and evaluate the implementation rate of the Area Plan, and update the Area Plan as needed

- Document the number, stream length, acreage, and approximate location of projects that improve water quality – for the focus area and across the Management Area,
- Evaluate the effectiveness of outreach and education programs designed to provide public awareness and understanding of water quality issues – for the focus area and across the Management Area,
- Monitor water quality and compare status and trends with changes in streamside vegetation – for the focus area and across the Management Area,
- Evaluate the effectiveness of available technical and financial resources in meeting the goals and objectives of the Area Plan – for the focus area and across the Management Area,
- Document prohibited conditions (non-compliance with the Area Rules) and subsequent corrections.

6. Secure adequate funding for administration and implementation of the Area Plan to achieve mission, goals, and objectives

- Clackamas SWCD includes Area Plan implementation and biennial review administration and outreach in their annual and long-range work plans,
- Ensure adequate administration of the Area Plan,
- Obtain funding for conservation planning assistance, conservation education, and water quality monitoring through grants and partnerships with agencies and organizations,
- Form partnerships with the agribusiness sector and others for additional funding.

7. Base actions on sound conservation planning

- Identify sound agricultural management strategies, which, through widespread adoption, will lead to a reduction in agricultural nonpoint sources of water pollution to the maximum extent practicable,
- Review and/or conduct ongoing research on the effectiveness of conservation measures,
- Obtain practical knowledge from agricultural producers and suppliers,
- Provide landowner assistance in planning and implementation from SWCDs, USDA, NRCS and other partner organizations.

3.2 Focus Areas and Measurable Objectives

Measurable Objectives are being developed to measure progress and effectiveness of Oregon's efforts to protect and improve agricultural water quality. The intent is to show that Oregon agriculture is improving water quality and the state and federal financial investment in agricultural water quality improvements are paying off and showing measurable results. Measurable Objectives need to be specific, measurable, achievable, relevant, and time-bound. At future biennial reviews, ODA, the Clackamas SWCD, and the Clackamas LAC will evaluate progress towards the Measurable Objective (and associated Milestones and Timelines) and use an adaptive management approach to modify the Milestones, if needed.

3.2.1 Focus Area: Deep, Doane, Dolan Creek and Upper Johnson Creek

Clackamas SWCD conducted water quality monitoring to help evaluate water quality conditions in the Clackamas Subbasin. This monitoring identified Deep / Doane / Dolan creeks (6th field HUC number: 170900110605) as an agricultural area with water quality concerns. This area was selected as the initial focus area to focus systematic outreach and voluntary technical assistance related to streamside vegetation, and to document the effectiveness of Area Plan implementation. The SWCD will continue monitoring water quality in these creeks in 2012-2013.

In 2011, Clackamas SWCD evaluated the current condition of streamside vegetation along Deep / Doane / Dolan creeks, using satellite images, and produced a preliminary baseline map that shows streamside conditions before delivery of technical assistance in the focus area. The preliminary baseline assessment estimates the percent of agricultural streamsides that fall into three streamside vegetation classes, shown in Chapter 4, Section 4.1.

In 2013, Clackamas County SWCD added a small upper portion of the Johnson Creek watershed. The land uses in these two areas make it conducive to joining for the purposes of outreach and partnership with our watershed councils and neighboring SWCD. The current focus area covers 608,723 acres. There are 1,624 miles of perennial stream and 1,678 miles of seasonal streams.

The CSWCD has completed a riparian condition assessment of the Doane, Dolan, Deep, and Upper Johnson Creek Focus Area. The assessment used 2011 as the baseline year to track progress. The following table shows the classification categories used for each streamside conditions. The results from the riparian condition classification assessment can be found in Appendix E and Section 4.2. Section 2.5.1 has a complete description of the classification conditions.

Riparian Condition Classifications			
Class I	**Class II**	**Class III**	**Class IV**
Vegetation likely sufficient to moderate solar heating, stabilize streambanks, and filter out pollutants consistent with site capability.	Agricultural activities not impairing riparian growth, but vegetation likely insufficient to moderate solar heating, stabilize streambanks, or filter out pollutants consistent with site capability.	Agricultural activities likely not allowing vegetation to moderate solar heating, stabilize streambanks, or filter out pollutants consistent with site capability.	Non-agricultural activities, e.g. state highway, likely not allowing vegetation to moderate solar heating, stabilize streambanks, or filter out pollutants consistent with site capability.

3.2.2 Measurable Objectives for the Management Area

- By the 2030 biennial review, across the entire Management Area, 90 percent of Class III sites from 2011 baseline data, where landowners accept voluntary assistance, will be Class II.
- By the 2030 biennial review, across the entire Management Area, 90 percent of Class II sites from 2011 baseline data will be Class I.

3.2.3 Milestones and Timelines for Measurable Objectives

- The Clackamas SWCD, in conjunction with CRBC and other partners, will annually update riparian classifications, from 2011 baseline data, across the management area where projects are completed. The Clackamas SWCD will track progress towards measurable objectives and present the data to the LAC at each biennial review.
- By 2023, 50% of streamside areas along agriculture lands where agriculture activities formerly prevented streamside vegetation from establishing (Class III) now allow site-capable vegetation to establish (Class II).
- By 2023, 50% of streamside areas along agricultural lands classified as Class II are Class I.
- At five year intervals the Clackamas SWCD, in conjunction with CRBC and other partners, will assess streamside areas along agricultural lands classified as not having site capable vegetation (Class II) to ensure their survival and progress towards providing functions of site capable vegetation (Class I) functions. The Clackamas SWCD and CRBC will also monitor previous planting sites to ensure they do not degrade. If degradation does occur, then the class systems will be updated.

3.2.4 Measurable Objectives and Results from 2012 Biennial Review

- By June 30, 2012, focus areas will be identified within the Management Area, where focused voluntary outreach and technical assistance will be delivered systematically for successive two-year periods.
    - In 2011, Clackamas SWCD identified Deep / Doane / Dolan creeks as the first Focus Area within the Management Area. In 2013, Clackamas SWCD added a small upper portion of the Johnson Creek watershed to the Focus Area. The land uses in these two areas make it conducive to joining for the purposes of outreach and partnership with watershed councils and neighboring SWCD.
- By June 30, 2014, a rough assessment of streamside vegetation conditions along agricultural lands in the entire Management Area will be complete; this assessment will be used to help identify a series of focus areas to focus program implementation and to track and report progress in streamside vegetation improvements over time.
    - Clackamas SWCD and other partners worked together to determine future focus areas based on condition of streamside vegetation and existing contacts and relationships. ODFW also provided input into the prioritization process based on number of listed fish species, stream miles used by listed fish species, and hatchery influence. In December of 2014, Clackamas SWCD completed a riparian condition classification across the entire Focus Area.
- By the 2014 biennial review, all land in the first focus area, where agricultural activities formerly prevented streamside vegetation from establishing (Class III), and where landowners accepted voluntary assistance, now allow site-capable streamside vegetation to establish (Class II); land conditions (classes) are documented across the entire focus area for pre-and post-implementation.
    - Pre-implementation riparian conditions (classes) were assessed across the entire Focus Area and reported to ODA in the Focus Area Action Plan. Results from that assessment can be seen in table 4 of Section 4.1 and Appendix E.

3.2.5 Strategies for Working in Focus Areas

The following steps outline the general process for implementing the Area Plan in a focus area and for documenting effectiveness:

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

In 2011, the Clackamas SWCD developed an action plan for implementing technical assistance in the focus area. In late 2011, the Clackamas SWCD contacted all landowners where agricultural activities appear to prevent the establishment of streamside vegetation (Class III), to offer technical assistance. When conducting site visits from 2011 to 2014, the preliminary baseline map was refined to reflect actual baseline conditions, which may differ from conditions inferred from satellite images. After implementing projects in the focus area, an updated map will be produced to show the new conditions. Clackamas SWCD will report on progress by comparing the baseline and post-implementation percent of streamside areas in each of the three streamside vegetation classes. Results of the assessments are reported to the LAC at the Biennial Review and are summarized in Chapter 4.

3.2.6 Future Focus Areas

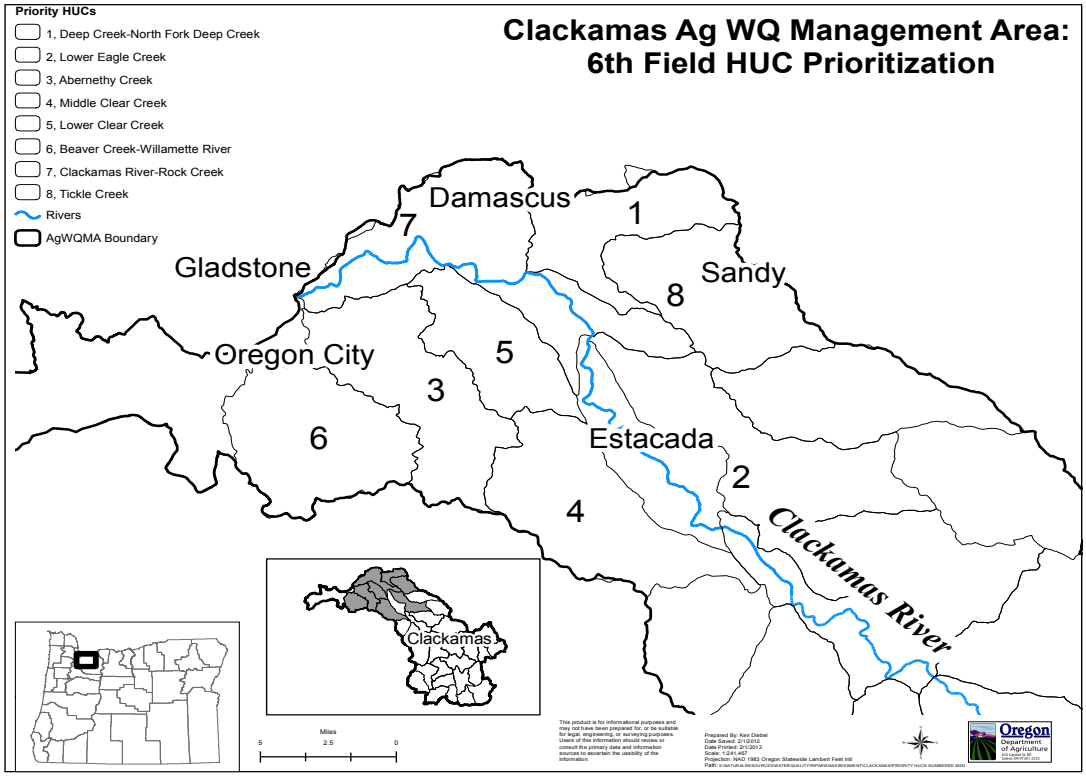
Future focus areas are 6th field HUCs with agricultural land uses in the Management Area. ODA, the LMA, and other partners worked together to determine the order of future focus areas, based on condition of streamside vegetation and existing contacts and relationships. ODFW also provided input into the prioritization process based on number of listed fish species, stream miles used by listed fish species, and hatchery influence.

The following is a list of current and future focus areas (6th field HUCs) and their approximate implementation order, based on input from the LMA and ODFW (see Figure 2 for map), with the initial / current focus area listed first:

1. Deep, Doane, and Dolan creeks	HUC number: 170900110605
2. Lower Eagle Creek	HUC number: 170900110503
3. Abernethy Creek*	HUC number: 170900070404
4. Middle Clear Creek	HUC number: 170900110602
5. Lower Clear Creek	HUC number: 170900110606
6. Beaver Creek*	HUC number: 170900070403
7. Rock Creek	HUC number: 170900110607
8. Tickle Creek	HUC number: 170900110604
9. Corral, Coffee Lake, and Tanner creeks*	HUC number: 170900070401, 402, 405

Located in the Abernethy Creek - Willamette River 5th Field HUC (Middle Willamette Subbasin 4th Field HUC). The other six creeks are in the Clackamas Subbasin 4th field HUC.

Figure 2. Future focus areas in the Clackamas Management Area, listed in proposed order for implementation



3.3 Strategies for Area Plan Implementation

To protect or improve water quality, an effective strategy must increase awareness of the problems and the range of potential solutions, motivate appropriate voluntary action, and provide for technical and financial assistance to plan and implement effective water pollution prevention and control measures. The SWCDs and other partners will cooperate to implement the following strategies at the local level with landowners:

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

Voluntary Approach

Prevention and control of agricultural water pollution will be encouraged in a cooperative spirit through the voluntary efforts of landowners, aided by information and technical and financial assistance from local, state, and federal agencies, and other partner organizations.

Education and measuring progress are the keys to the success of this Area Plan. The Clackamas SWCD, NRCS, Oregon State University Extension Service, and other groups and agencies will work together to provide agricultural landowners in the Management Area with information about the goals, objectives, and strategies of the Areas Plan, and the requirements of the Area Rules.

The following strategies will be employed at the local level by the LMA in cooperation with landowners, other agencies, and organizations.

1. Work to improve the quality of water in the Management Area through planning and implementation of technically sound and economically feasible conservation and management strategies that contribute to meeting Area Plan objectives. Examples of conservation and land management activities and strategies are described in Appendix B. Contact information for partner agencies and organizations is provided in Appendix C.
2. Create a high level of awareness and an understanding of water quality issues among the agricultural community and rural public, in a manner that minimizes conflict and encourages cooperative efforts, through education and technical assistance.
    - Incorporate Area Plan implementation as an important element in the Clackamas SWCD's Annual Work Plan and Long Range Plan, with support from partner organizations,
    - Develop on-the-ground projects in cooperation with partner organizations to solve critical problems identified by landowners and operators,
    - Showcase successful management strategies and systems through appropriate media and newsletters,
    - Conduct educational programs to promote public awareness of water quality issues and their solutions,
    - Proactively offer and provide site evaluations on any agricultural lands within the Management Area to assess conditions that may affect water quality,
    - Prioritize sub-watersheds within the Management Area for targeting implementation strategies,
    - Provide education and technical assistance regarding agricultural activities that may contribute to emerging water quality issues not currently addressed by a TMDL, such as sedimentation, pesticides, and nutrients contributing to harmful algae blooms.
3. Show progress in preventing and controlling water pollution from agricultural and rural lands through periodic monitoring of land conditions and water quality.
4. Encourage adequate funding and administration of the program to achieve Area Plan goals and objectives through:
    - Systematic, long-range planning,
    - Focused, coordinated efforts using priority-area-based approaches,
    - Identifying needs,
    - Developing projects,
    - Actively seeking funding,
    - Ensuring successful implementation of funded projects.

3.3.1 Education and Outreach

As resources allow, the SWCDs, in partnership with other agencies and local organizations, will develop educational programs to improve the awareness and understanding of agricultural water quality issues. They will strive to provide the most current information in a manner that avoids conflict and encourages cooperative efforts to solve problems. Implementation of the Area Plan is a priority element in the SWCD's Annual Work Plan and Long-range Business Plan.

The following elements are part of an effective educational program:

- Develop an outreach strategy.
- Showcase successful projects and systems by conducting tours for landowners and media.
- Recognize successful projects and systems through appropriate media and newsletters.
- Promote cooperative on-the-ground projects to solve critical problems identified by landowners/operators and in cooperation with partner organizations.
- Conduct educational programs to promote public awareness of agricultural water quality.
- Evaluate current research and scientifically valid monitoring results.

The Clackamas SWCD and the Clackamas River Basin Council are involved with pesticide reduction and elimination outreach efforts that include:

- Creating bilingual pesticide outreach material.
- Participating in pesticide collection events.
- Distributing windsocks to applicators for drift reduction.
- Replacing pesticide applicator nozzles for increased accuracy and efficiency.
- Calibrating pesticide spray nozzles for applicators.

3.3.2 Conservation Planning and Conservation Activities

Effective water quality management depends on activities and structural measures that are the most effective, practical means of controlling and preventing pollution from agricultural activities. Appropriate management activities for individual farms may vary with the specific cropping, topographical, environmental, and economic conditions at a given site. Due to these variables, it is difficult to recommend any specific, uniform set of management activities in this document to improve agricultural water quality.

Management activities and land management changes are most effective when selected and installed as parts of a comprehensive resource management plan based on natural resource inventories and assessment of management activities.

A detailed list of specific measures that can be used to address agricultural pollution are contained in other documents such as the NRCS Field Office Technical Guide, available for reference at the local NRCS office. Landowners and operators have flexibility in choosing management approaches to address water quality issues on their lands.

Voluntary conservation plans describe the management systems and schedule of conservation activities that the landowner will use to conserve soil, water, and related plant and animal resources on all or part of a farm unit. Landowners, operators, consultants, or technicians available through a SWCD or the NRCS may develop voluntary conservation plans. A conservation plan can be used to outline specific measures necessary to address the “Prevention and Control Measures” outlined in this Area Plan.

Conservation activities should:

- Identify priorities for management activities, including reasonable timelines.
- Control pollution as close to the source as possible.
- Improve irrigation water use and conveyance efficiency to reduce the potential of polluted return flows.
- Show reduction in potential sources of pollution through scientifically valid monitoring and periodic surveys of stream reaches and associated lands.

- Be flexible to adjust management based on feedback, or monitoring and changing environmental and economic conditions.

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

3.3.3 Cost and Financing

Costs of implementing this Area Plan are difficult to assess in the absence of detailed, site-specific inventories of resource problems and proposed solutions. To implement this Area Plan, the LMA needs support and resources for staff to coordinate with Management Area partners to conduct the following:

- Educational programs (production and presentation),
- Identification of high priority areas for implementation,
- Focused outreach and delivery of technical assistance,
- Ongoing evaluation of Area Plan progress toward preventing and controlling water pollution from agricultural lands and achieving water quality goals,
- Coordinated planning and implementation activities with other agencies, organizations, and individuals working on similar goals,
- Water quality monitoring,
- Meeting management and facilitation.

The effectiveness of implementation of the Area Plan is directly related to the level of funding available for this purpose.

Voluntary technical and financial assistance to landowners, for the installation of certain conservation and management strategies, may be available through the state, federal, and other programs listed alphabetically below. Other agencies or organizations may also be able to provide technical or financial assistance to private landowners. Under these programs, landowners may be responsible for a portion of the project's cash or other costs.

Landowners / operators and project partners are cautioned to inquire about the eligibility requirements for current programs prior to implementing conservation measures. Landowners / operators and project partners are also cautioned to inquire about the current availability of programs. For example, the 2012 Farm Bill is expected to substantially change the names structure of the programs available through FSA and NRCS.

Please see Appendix C for contact information of agencies and partner organizations.

Clackamas SWCD Conservation Funding Programs
Clackamas SWCD offers a variety of grant and cost-share programs to assist private landowners / managers and public entities with the cost of installing approved conservation measures to address eligible natural resource concerns. (www.conservationdistrict.org/programs)

Clean Water State Revolving Fund Program
This program provides low-cost loans for the planning, design, and construction of various water pollution control activities, including nonpoint sources from agricultural lands. Any public agency in Oregon is eligible for a loan, including SWCDs. Contact the Portland DEQ office for information. (www.deq.state.or.us/wq/loans/loans.htm)

Conservation Reserve Enhancement Program (CREP)
This program, administered by USDA FSA, provides cost share funds for the installation of riparian fencing and planting on a specified buffer. A rental payment on the riparian buffer, based on the USDA soil rental rate, is dispersed annually for 10 to 15 years. Contact the Clackamas SWCD or FSA for information. (www.or.nrcs.usda.gov/programs)

Conservation Reserve Program (CRP)
This program, administered by the NRCS and FSA, provides rent and cost-share for landowners to remove environmentally sensitive lands from production. Rental payments are dispersed annually over a 10-15 year period. Contact the FSA for information. (www.or.nrcs.usda.gov/programs)

Conservation Stewardship Program (CSP)
This program, administered by the NRCS, provides financial and technical assistance to promote the conservation and improvement of soil, water, air, energy, plant and animal life, and other conservation purposes on Tribal and private working lands. Working lands include cropland, grassland, prairie land, improved pasture, and rangeland, as well as forested land that is an incidental part of an agriculture operation. Contact the NRCS for information. (www.or.nrcs.usda.gov/programs)

Environmental Quality Incentives Program (EQIP)
This program, administered by the NRCS, provides assistance to farmers and ranchers in complying with federal, state, and tribal environmental laws, and encourages environmental enhancement. Through this program, a conservation plan that includes structural, vegetative, and land management practices on eligible land, is implemented. Cost-share payments may be made to implement eligible structural or vegetative practices. Five- to ten-year contracts are made with eligible producers. Contact the NRCS for information. (www.or.nrcs.usda.gov/programs)

Nonpoint Source Pollution 319 Grants
This program, administered by DEQ, provides grant funds available through Section 319 of the federal Clean Water Act. It is a critical program in reducing Oregon's water pollution from nonpoint sources. Each year, DEQ identifies programmatic and geographic targets, solicits project proposals, assembles a proposal package for EPA's review, develops contracts and agreements for disbursement of grant funds, oversees program implementation, and evaluates program accomplishments. Contact DEQ for information. (www.deq.state.or.us/wq/nonpoint/grants.htm)

Oregon Watershed Enhancement Board (OWEB) Grant Programs
The OWEB Small Grants program is administered jointly by the Clackamas SWCD and local watershed councils. Funds are available for specific practices. Contact Clackamas SWCD for information. In addition, OWEB offers a regular grant program that agricultural landowners, or their partner organizations or agencies, can apply for. Contact OWEB for information.
(www.oregon.gov/oweb/grants)

Riparian Lands Tax Incentive Program
This program, administered by ODFW, offers a property tax incentive to landowners for improving or maintaining qualifying riparian lands. Under this program, landowners receive a complete property tax exemption for their riparian property. This can include land up to 100 feet from a stream. For riparian land to qualify for this program, it must be outside adopted urban growth boundaries, and planned and zoned as forest or agricultural lands (including rangeland), or must have met these criteria as of July 1, 1997. If a riparian area is already in good shape, it may also qualify for the program. For more information, call the local ODFW office or visit their website.
(www.dfw.state.or.us/lands/tax_overview.asp)

Rock Creek Partnership
The Rock Creek Partnership is a group of community-based land stewardship organizations working together to enhance water quality in the Rock Creek watershed, a tributary of the Clackamas River. The partnership provides free streamside restoration, including invasive species removal, native plantings, and two years of maintenance and monitoring. The Rock Creek Partnership is a collaborative effort between the Clackamas River Basin Council, Friends of Trees, and SOLV*E*, with funding from Clackamas County's Water Environment Services . (www.rockcreekpartnership.org)

Shade Our Streams
Shade Our Streams is a multi-year community tree planting project to improve water quality in the Clackamas River Basin. The project will plant more than 300,000 native trees along 30 stream miles, restoring streamside habitat at no cost to property owners. Shade Our Streams will focus on the Deep, Clear, and Eagle creek watersheds. hade Our Streams is a project of the Clackamas River Basin Council, with funding from Portland General Electric. (www.clackamasriver.org/resources-for-landowners/shade-our-streams)

Wildlife Habitat Conservation and Management Program
This program, administered by ODFW, is specifically for property zoned exclusive farm use or mixed farm and forest use that are managed for wildlife habitat. The landowner who qualifies and successfully completes the required steps will receive a tax benefit. For more information, contact the local ODFW office. (www.dfw.state.or.us/lands/whcmp/index.asp)

Wildlife Habitat Incentives Program (WHIP)
This program, administered by NRCS, provides financial incentives to develop habitat for fish and wildlife on private lands. Contact NRCS for information. (www.or.nrcs.usda.gov/programs)

3.3.4 Monitoring and Evaluation of Area Plan Progress

ODA, the LMA, and the LAC will evaluate and document the effectiveness of the Area Plan by assessing improvement of land conditions in the focus area during each biennial review. Comparing baseline and post-implementation land conditions (along with available water quality data) will allow these partners to determine whether the land condition measures have improved. These partners and other stakeholders will also be able to evaluate progress in implementing the Area Plan more readily than from reports of efforts scattered throughout a Management Area.

ODA anticipates that the focus area process will help answer several questions about the effectiveness of the Oregon Agricultural Water Quality Program, including:

- How much can we improve land conditions through focused outreach and voluntary technical assistance in two years?
- If we see significant improvements in land conditions in the focus areas, does this correlate with a significant improvement in water quality parameters?

The LMA participates in water quality monitoring efforts related to the Area Plan, in consultation with ODA, DEQ, Clackamas County, watershed councils, OSU Extension, the U.S. Geological Survey, and the U.S. Forest Service. Many of these agencies and partners have also monitored water quality in the past. ODA and the LMA are responsible for monitoring land conditions that influence water quality in agricultural areas.

For each Management Area, ODA currently evaluates other agencies' and organizations' water quality data to answer several questions. Data are reviewed every two years and summarized to the LAC and LMA during the biennial review process. Questions include:

- What water quality and land condition data from agricultural watersheds are available?
- What are the trends in available water quality and land condition data in agricultural watersheds since Area Plan and Area Rule adoption?
- What are the trends in available water quality and land condition data in agricultural watersheds since the last biennial review?

Land Condition Assessment

ODA and the Clackamas SWCD will work together to conduct baseline and follow-up land condition assessments at the Management Area level. Specifically, ODA, the Clackamas SWCD, and other partners will design and conduct an assessment focusing on streamside vegetation conditions along agricultural lands in the Management Area prior to the next biennial review. This assessment will allow ODA and other partners to track improvements in streamside vegetation conditions over time. Often, changes in land conditions are detectable much earlier than changes in water quality. For example, when a landowner restores streamside vegetation, land conditions improve rapidly, even though it may take 20 years for streamside vegetation to reach the height where it can provide effective shade to moderate stream temperatures.

Implementation Activities Assessment

During the biennial review process, ODA, the Clackamas SWCD, and the LAC assess the effectiveness of activities implemented to achieve the Area Plan's goals and objectives. This assessment of implementation includes the following:

- Outreach and education conducted to promote awareness of water quality issues and encourage agricultural land conditions that protect water quality, and the level of participation in these activities,
- Voluntary conservation projects installed by agricultural landowners and managers in cooperation with the LMA and other agencies and organizations,
- Number of complaint investigations, the result of each complaint investigation, and corrections of violations.

For a description of monitoring and evaluation activities, see Chapter 4 Section 4.2.

Chapter 4: Implementation, Monitoring, and Adaptive Management

4.1 Implementation and Accomplishments

The Clackamas SWCD implemented the following activities to support the agricultural water quality goals stated in Chapter 3 in Section 3.1.

Table 1. Clackamas Agricultural Water Quality Management Area: Area Plan Goals, Area Plan Implementation, and SWCD Accomplishments for 2012 to 2015

<table>
<tr><th>Goal from Clackamas Area Plan</th><th>Clackamas SWCD Accomplishments and Progress in Implementing the Area Plan</th></tr>
<tr><td>1. Reduce, minimize, and control water pollution and soil erosion from agricultural activities to achieve applicable water quality standards. This involves controlling pollution as close to the source as possible.

2. Contribute to the improvement of water quality in the Clackamas Subbasin such that all streams in the Subbasin can be removed from the 303(d) list.

6. Base actions on sound conservation planning.</td><td>Landowners usually have resource constraints that restrict their ability to utilize management strategies to best address conditions on the land to meet the goals of the Area Plan. To address these constraints, the Clackamas SWCD helps landowners by developing conservation plans, providing technical assistance and financial assistance.

Not all landowners, especially small acreage landowners, receive certified conservation plans. Scaled back conservation plans are often included in the technical assistance we provide landowners. Many landowners implement practices without additional financial or technical assistance from the District. Landowners are encouraged to address the greatest threat to water quality first.

List of Implemented On-the-Ground Strategies:
<table>
<tr><th colspan="3">USDA NRCS and CSWCD implementation</th></tr>
<tr><th>Quantity</th><th>Practice</th><th>NRCS Practice Code</th></tr>
<tr><td>1</td><td>Aerated manure composting system</td><td>317</td></tr>
<tr><td>19 acres</td><td>Site prep for tree and shrub establishment</td><td>490</td></tr>
<tr><td>184,800 ft.</td><td>Conversion to drop irrigation system</td><td>441</td></tr>
<tr><td>65 acres</td><td>Irrigation water management</td><td>449</td></tr>
<tr><td>2,000 ft.</td><td>Livestock exclusion fencing</td><td>382</td></tr>
<tr><td>1 acre</td><td>Riparian forest buffer</td><td>391</td></tr>
<tr><td>1 acre</td><td>Tree and shrub establishment</td><td>612</td></tr>
<tr><td>1</td><td>Livestock watering facility</td><td>614</td></tr>
<tr><td>1</td><td>Waste transfer system</td><td>634</td></tr>
<tr><td>1</td><td>Roof runoff structure</td><td>558</td></tr>
<tr><td>500 ft.</td><td>Underground outlet</td><td>620</td></tr>
<tr><td>1 acre</td><td>Field border</td><td>386</td></tr>
<tr><td>9.7 acres</td><td>Conversion to drip irrigation system</td><td>441</td></tr>
<tr><td>109.5 acres</td><td>Irrigation water management</td><td>449</td></tr>
<tr><td>1,700 ft.</td><td>Access road improvement</td><td>560</td></tr>
<tr><td>261.1 acres</td><td>Cover crop</td><td>340`</td></tr>
<tr><td>8.6 acres</td><td>Conservation cover</td><td>327</td></tr>
<tr><td>42.2 acres</td><td>Conversion to no- till drilling</td><td>329</td></tr>
<tr><td>15.9 acres</td><td>Brush management</td><td>314</td></tr>
<tr><td>22.5 acres</td><td>Tree and shrub establishment</td><td>612</td></tr>
<tr><td>8 acres</td><td>Site preparation</td><td>490</td></tr>
<tr><td></td><td></td><td></td></tr>
</table></td></tr>
</table>

	Practices to enhance conservation stewardship plans USDA NRCS
27.8 acres	Drift reducing nozzles on equipment used on this farm
68.4 acres	Split nitrogen application – for better N utilization
107 acres	High level integrated pest management
1	Transition to organic production
56.7 acres	Silvopasture for wildlife – sowing grasses or grains under forest stands for wildlife grazing
95.6 acres	Monitor key grazing areas for better pasture mgmt.
700 ft.	Riparian forest buffer

Clackamas River Basin Council Shade Our Streams Program				
Planting Year	Sub-basin	#of tax lots	Stream length (miles)	Planted Acres (acres)
2012	Clear Creek	3	0.71	5.79
	Deep Creek	2	0.16	0.79
	Eagle Creek	1	0.08	0.46
2012 total		**6**	**0.95**	**7.04**
2013	Clear Creek	16	3.51	21.31
	Deep Creek	8	1.93	11.11
	Eagle Creek	1	0.10	0.48
2013 total		**25**	**5.54**	**32.9**
2014	Clear Creek	11	1.98	12.12
	Deep Creek	16	2.68	16.72
	Eagle Creek	1	0.41	2.02
2014 total		**28**	**5.07**	**30.86**
Three year total		**59**	**11.56**	**70.8**

Conservation Plans

191 acres were planned for conservation by the SWCD in the Clackamas Watershed

Site Visits

Conducted 42(+NRCS) site visits to properties in the Clackamas River watershed

Assisted Landowners with:

Brush Control
Equipment Rental
Erosion Control
Fencing/Livestock
Heavy Use Area
Irrigation
Mud/Manure Management
Nutrient Management
Pasture Management
Pesticide Use
Riparian Buffer Management
Riparian Fencing
Streambank Erosion
Streamside Restoration
Wildlife Habitat

One pesticide collection event was held this biennium on June 1, 2013. The following partners were involved: Clackamas Soil and Water Conservation District, Clackamas River Water Providers, Clackamas River Basin Council and Oregon DEQ. The event targeted agricultural producers and small acreage landowner.

Twenty-five participants brought in 18,627 pounds of old, damaged or restricted pesticides. Clean Harbors was contracted to do the safe disposal of the chemicals.

	The District contracted to have macroinvertebrate sampling and site analysis conducted at 5 sites in the Clackamas River Watershed. These results are available on our website http://conservationdistrict.org
3. Create a high level of awareness and understanding of water quality issues among the producer and agricultural community and the public through education and technical assistance activities from the point of view of the agricultural industry.	**Clackamas SWCD conducts water quality related workshops, tours and events to address urban and rural natural resource concerns. Events include:** • The Springwater Environmental School - installed a native plant garden to serve as a conservation education tool for students. • Oregon Lavender Farm Harvest Festival outreach booth for sustainable agriculture in Clackamas County • Convened a focus group meeting with two nursery growers and two Christmas tree growers to find out what kind of assistance is wanted and would be accepted by the industry in regards to conservation practices that would protect surface water. • Displays were held at the Springwater Grange Strawberry Festival, Springwater Fair and the Springwater Grange Breakfast. • In 2012 and 2013 CSWCD had a booth at the NW Christmas Tree Association conference. • Clackamas County Fair booths focusing on soil health, pollinator conservation, riparian habitat, pasture management, and our conservation programs. • 2 NW Oregon Ag Show annual event booths w/NRCS & EMSWCD. • 2 Annual OSU Extension Tree School at CCC The District had booths & was a platinum sponsor • CSWCD partnered with OSU to present a multiple day Composting Workshop for Agricultural producers. • The District had a display at the Oregon City Farmers market Green Fair. • The District and CRBC partnered to give a presentation on riparian restoration • A presentation on pasture management was given to 10 members of the Clackamas River Pony Club • The District coordinated a workshop for nursery growers in February 2014, *Maximizing Pesticide Use Efficiency in Nurseries* – 54 attendees. Clackamas Pesticide Stewardship Partnership partnered for this workshop. Speakers were from OSU Integrated Plant Protection Center, DEQ and OSU North Willamette Research and Education Center. • The District partnered with East Multnomah SWCD to hold Unlock *Secrets in the Soil for Perennial Crops* – 17 attendees. The workshop focused on nursery and Christmas tree crops. • The District assisted ODA in their Strategic Implementation Area meeting for landowners. Noyer Creek was the selected SIA for this pilot project. • The District hosted a workshop regarding steps landowners can take to reduce streamside erosion. Speakers were Janine Castro, Colin Thorne, and Jenne Reische. • The District joined OSU, Ohio State and USDA ARS to offer a hands-on workshop on sprayer calibration and application assessment. 33 attendees spent from 3 p.m. to 9 p.m. learning about and calibrating sprayers. **Publications** • A Soil Health 2014 Calendar was created and sent out to 150 growers in the Clackamas River Watershed. Partners in the project were NRCS, EMSWCD, Tualatin SWCD and Clackamas SWCD. • Continued to promote our Equipment Rental Program. • Two editions of the Ripple Press newsletter were produced and sent to landowners in the Clackamas River Watershed – total 2,670 copies were mailed.

	• Agriculture for Water Quality newsletter was sent out to 324 growers in the Clackamas River Watershed.
	• Articles were published in local newspapers, direct mailers, online local newspapers, Citizen News –county newsletter and the CSWCD website. Topics include stream bank erosion, windsocks for reducing pesticide wind drift, covering manure piles, and workshops.
	• Fact sheets, display boards, and brochures produced include:
	  o CSWCD – Pasture management checklist
	  o Display board on pasture management, pesticide wind drift, soil health, old agricultural dam removal
	
	Multi-Media
	• A video was created in 2012 focusing on erosion prevention in Christmas tree production. Two Christmas tree growers who implement a number of different practices were interviewed. The video was played at the Christmas tree spring meeting in 2013.
	
	The video may be viewed on the District's Conservation Channel on Vimeo, which is accessible from the District Website at www.conservationdistrict.org.
	
	In addition, the District has a Facebook page and a Twitter account for reaching more county residents.

4. Monitor and evaluate the effectiveness of this Area Plan.	• The riparian assessment for the focus area has been completed. An update with new riparian plantings from the past few years will be completed for the ODA Ag Water Quality Scope of Work final report on July 15, 2015.
	• **12 formal complaints were received through the ODA Water Quality Program since January 2012, resulting in 21 actions by ODA:**
	  o 2 - Complaints with no connection to waters of the state
	  o 6 - Letter of Compliance
	  o 3 - Water Quality Advisory
	  ▪ 8 - Letter of Warning
	  ▪ Notice of Noncompliance
	  ▪ 1 - Civil Penalty
	  ▪ 0 - No Jurisdiction

5. Secure adequate funding for administration and implementation of the program to achieve mission, goals, and objectives.	**The following list is an example of funding successes for the Subbasin:** • Property tax revenues: Since July 2007, Clackamas Soil and Water Conservation District has had authority to levy a property tax to support conservation technical assistance, district operations, strategic planning, capacity building, and program development. **Grant funding for projects plus tax revenue** gave the District approximately $1.7 million in FY 2011-12, approximately $2 million in FY 2012-2013, and approximately $2.1 million in FY 2013-14. **All dollar figures below are included in these budget figures.** • CSWCD provided Clackamas River Basin Council with administrative funding to continue watershed improvements. • Supplemental Environmental Project funds – When a fine is levied for a water quality violation, 80% of the fine may be applied to a project that is meant to improve water quality. The District has received $35,270 over the past two years that has gone toward a pesticide collection event, manure composting system, rain gardens for storm water control and vegetable wash-water disposal, pollinator hedgerow, and riparian restoration. • Clackamas River Water Providers has provided $10,000 to assist with pesticide reduction workshop costs, mailings, windsocks for pesticide wind-drift reduction program, and a sprayer calibration and nozzle replacement program.

In 2011, Clackamas SWCD identified Deep/Doane/Dolan creeks as their first focus area. Pre and post assessments were completed to measure implementation activities for improving streamside vegetation and are found in Tables 2 and 3 below.

Table 2. Pre and Post stream class assessment data from original Focus Area (Deep/Doane/Dolan)

	Original Assessed stream length (ft.) in the original focus area	Stream length (ft.) planted within original focus area	*Current* assessed stream length (ft.) in original focus area
	2011	**2013**	**June 30, 2013**
Class I	13,000	0	13,573
Class II	10,932	573	12,214
Class III	18,992	1,855	17,067

Table 3. Projected stream class assessment data after 2013 planting of original Focus Area

	Current assessed stream length (ft.) in original focus area	Stream length (ft.) scheduled to be planted within original focus area	Anticipated stream length (ft.) in original focus area
	June 2013	**Fall 2013**	**June 30, 2013**
Class I	13,573	0	14,116
Class II	12,214	543	13,207
Class III	17,067	1,536	15,531

2011 to 2013, the Clackamas SWCD documented the following changes:

- Percent of streams in class I increased by **4% (1,116 ft.)**
- Percent of streams in class II increased by **17% (1,855 ft.)**
- Percent of streams in class III decreased by **9% (1,855 ft.)**

Once the plantings scheduled in fall 2013 are completed, the anticipated changes from the original assessment:

- Percent of streams in class I increased by **9% (543 ft.)**
- Percent of streams in class II increased by **31% (3,391 ft.)**
- Percent of streams in class III decreased by **18% (3,391 ft.)**

In 2013, CSWCD included Upper Johnson Creek into the Focus Area and completed a pre-assessment of streamside vegetation and results are shown below in Table 4.

Table 4. Pre and Post assessment of stream classes in current Focus Area (Deep/Doane/Dolan+Johnson)

	Stream feet within Focus Area		
	2013 – original measurement	**Length of new planting**	**2015 New measurement**
Class I	376,651	–	379,751'
Class II	132,518	3,100'	130,818'
Class III	137,029	1,400'	135,629'
Class IV	568,254	2,964'	

	Percent of Stream Miles within Focus Area	
	2013	**2015**
Class I	31.0%	31.2%
Class II	10.9%	11.0%
Class III	11.2%	11.1%
Class IV	46.7%	46.7%

4.2 Water Quality Monitoring—Status and Trends

ODA compiles monitoring data across the state and analyzes other agencies' and organizations' monitoring data to answer several questions related to agricultural land conditions (including streamside vegetation) and water quality:

- What are current water quality and land conditions in agricultural areas?
- What are the trends in water quality and land condition?
- How well does the existing monitoring network assess agricultural water quality and land conditions and trends?
- What are the trends in streamside vegetation along agricultural lands?
- How do streamside vegetation conditions compare with site-capable vegetation?
- How do changes in streamside vegetation condition compare with trends in water quality in monitored watersheds?

To answer these questions, ODA evaluates water quality data from existing sites in DEQ's ambient water quality monitoring program that reflects agricultural influence on water quality. In 2011, ODA received funding from the Oregon Legislature to begin water quality sampling at 19 additional agriculturally influenced sites around Oregon.

ODA staff summarized water quality monitoring data for the Management Area for the 2015 biennial review:

- The DEQ ambient monitoring program includes only one site meeting ODA's criteria for agricultural influence, on the Clackamas River at Milo McIver State Park. This site is influenced by a fairly small agricultural area. No apparent water quality problems have been noted at this site.

Other partners involved in watershed monitoring in the basin include:

- The Clackamas River Basin Council (CRBC) – their website clackamasriver.org discusses many topics including watershed care and pesticide reduction, water quality data results, and the Shade our Streams program, a multi-year community tree planting project to improve water quality.

- The Clackamas Water Providers – their website www.clackamas providers.org describes their efforts in watershed protection, water quality data results, pesticide reduction, and drinking water protection.
- Water Environment Services – their website at www.clackamas.us/wes/watershed health.htm focuses on watershed plans that address hydrology, water quality, habitat, and biological concerns.

4.2.1 Pesticide Stewardship Partnership Monitoring Summary for the Clackamas River Watershed

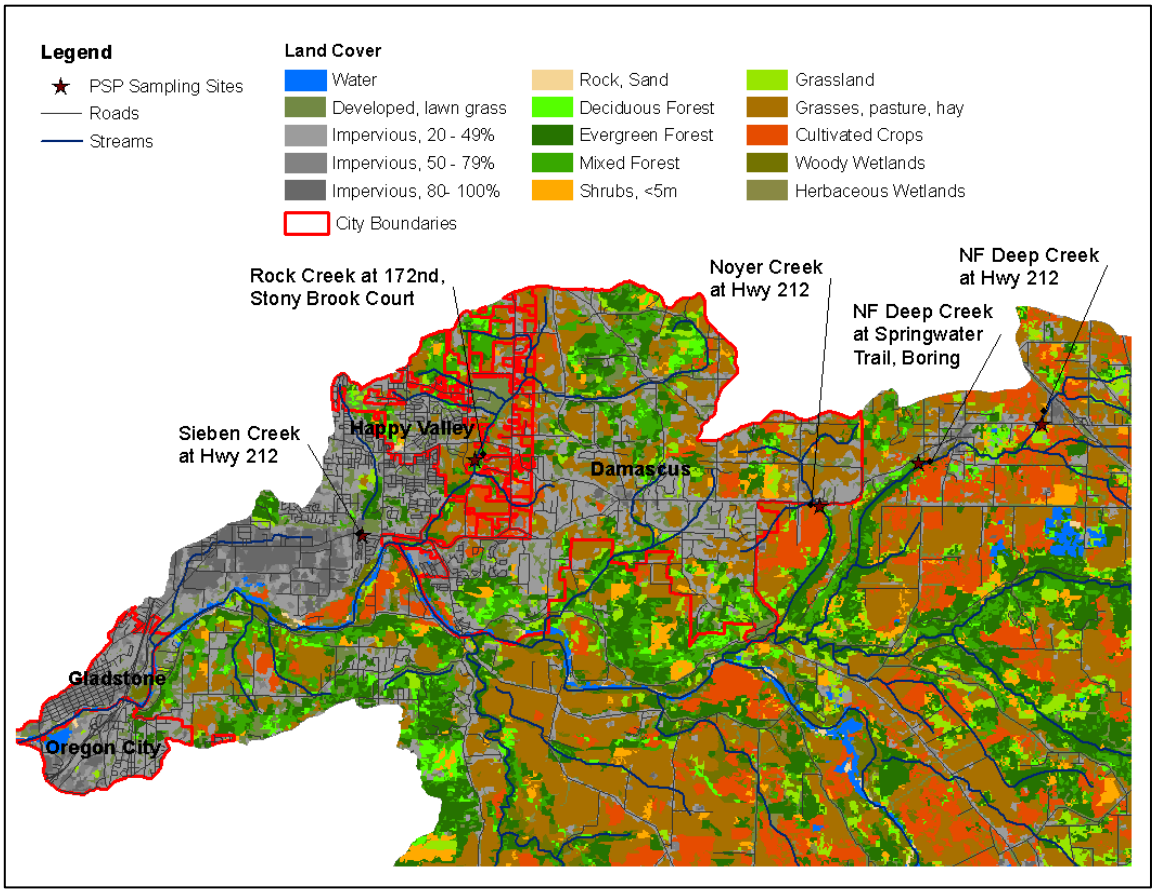
Updated February 2015 by DEQ.

The Clackamas River provides drinking water for 400,000 people. Endangered fish spawn, rear and migrate in the Clackamas River and its tributaries. Thousands of people recreate on the Clackamas River year-round.

Several groups are collaborating to protect the Clackamas River watershed's resources and to understand how pesticides are degrading water quality, particularly for fish health and drinking water. The Oregon Department of Environmental Quality and local watershed-based groups initiated a Pesticide Stewardship Partnership in the Clackamas River watershed in 2005. The Pesticide Stewardship Partnership (PSP) is a collaborative monitoring, information sharing and problem solving effort. Regulations, alone, can't fully address all current pesticide issues because few current-use pesticides have established water quality standards. As well, mixtures of pesticides can result in greater impacts to aquatic life than a single pesticide, on its own. DEQ has found the PSP model very successful at reducing pesticide concentrations in surface water in the Hood River, Mill Creek (The Dalles) and Walla Walla Basins. But land uses in the Clackamas River basin are more heterogeneous than in those basins, so pesticide stewardship strategies need to reflect that complexity. Pesticides in the Clackamas River watershed have many applications including residential lawns and gardens, business landscaping, public parks, road and ditch maintenance, nurseries, Christmas tree farms, forestry, and golf courses.

Since 2005, DEQ has monitored five sites on tributaries to the lower Clackamas River: Noyer Creek, North Fork Deep Creek (two locations), Rock Creek, and Sieben Creek (Figure 1). The two sites surrounded by agricultural land use, including nurseries, are on Noyer Creek and North Fork Deep Creek.

Figure 1: Pesticide Stewardship Partnership sampling sites in the Clackamas River watershed



With the addition of new pesticide analytes in 2009, the number of pesticides detected in Clackamas streams has increased. Since that time, between 25 and 30 pesticides have typically been detected across the four monitoring sites in the watershed each year. Figure 3 illustrates the 2014 detection frequency (percent of total samples in which pesticides were detected) in the Clackamas River watershed. The 10 most detected pesticides were herbicides or breakdown products of herbicides. As with many other watersheds around the state diuron is one of the most frequently detected herbicides, with at least some of those detections close to or exceeding the lowest EPA aquatic life benchmark concentration. Figure 4 shows the maximum 2014 diuron detection was more than twice the lowest EPA benchmark of 2.4 ug/L, despite detection frequency across sites dropping to the lowest level in six years of monitoring.

Sampling Results

Between 2005 and 2008, DEQ's monitoring focused primarily on organophosphate insecticides, but in 2009 expanded to include over 100 pesticides. While very few of those pesticides have water quality criteria, most have non-regulatory benchmarks developed by EPA's Office of Pesticide Programs. DEQ's sampling and analysis have identified several pesticides measured in Noyer Creek and North Fork Deep Creek samples. Chemicals in Table 1 are those with elevated concentrations relative to benchmarks or frequent, multi-year detections. Chemicals in bold were detected at least once over aquatic life benchmarks or Oregon water quality criteria. The one pesticide found consistently in the Clackamas River watershed for which chronic and acute water quality criteria have been set is chlorpyrifos (Lorsban). Although chlorpyrifos has not been detected in North Fork Deep Creek since 2011, it was

detected at least once over the chronic water quality criterion every year between 2005 and 2013 in Noyer Creek (Figure 2). However, no chlorpyrifos was detected in Noyer Creek or any other monitoring location in 2014. Further, bifenthrin (Brigade), another insecticide that is highly toxic to aquatic life, was found over EPA benchmarks several times in 2012 and 2013, but was not detected in any samples in 2014. Another organophosphate insecticide, diazinon, has been detected multiple times in the Clackamas Basin since 2005, including once over the benchmark in 2012, but detections have notably decreased in recent years.

Table 1: Pesticides in the Clackamas River watershed measured at concentrations exceeding benchmarks, or having frequent multi-year detections

INSECTICIDES	HERBICIDES	FUNGICIDES
Chlorpyrifos *(Lorsban)*	Diuron *(Karmex)*	**Chlorothalonil *(Bravo)***
Bifenthrin *(Brigade)*	Simazine *(Princep)*	Pyraclostrobin *(Headline)*
Diazinon *(Knox Out)*	Metolachlor *(Parallel)*	Propiconozole *(Propimax)*
Endosulfan Sulfate *(Thionex)*	Sufometuron-methyl *(Oust)*	
Ethoprop *(Mocap)*	Dimethenamid *(Frontier, Tower)*	
Imidacloprid *(Admire)*	Pendimethalin *(Prowl)*	
Carbaryl *(Sevin)*	Trifluralin *(Treflan)*	
	Oxyfluorfen *(Goal)*	
	Dichlobenil *(Casoron)*	

Figure 2: Summarized chlorpyrifos concentrations measured in Noyer Creek, 2005 – 2014

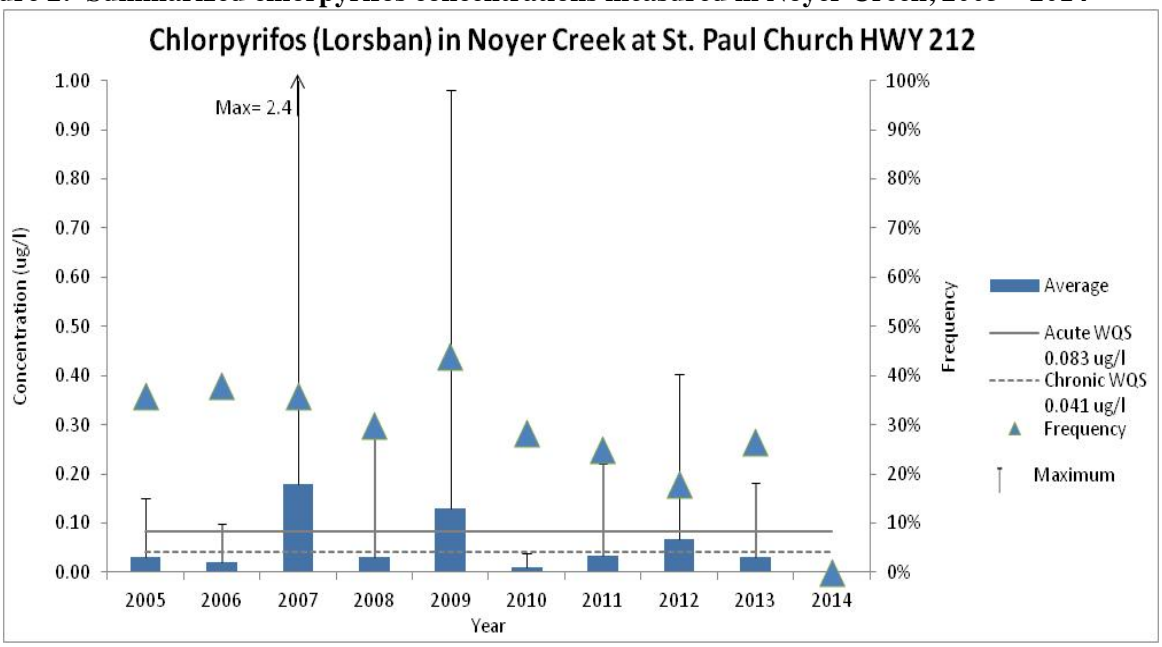


Figure 3: Detection frequency for pesticides in the Clackamas River watershed, 2014

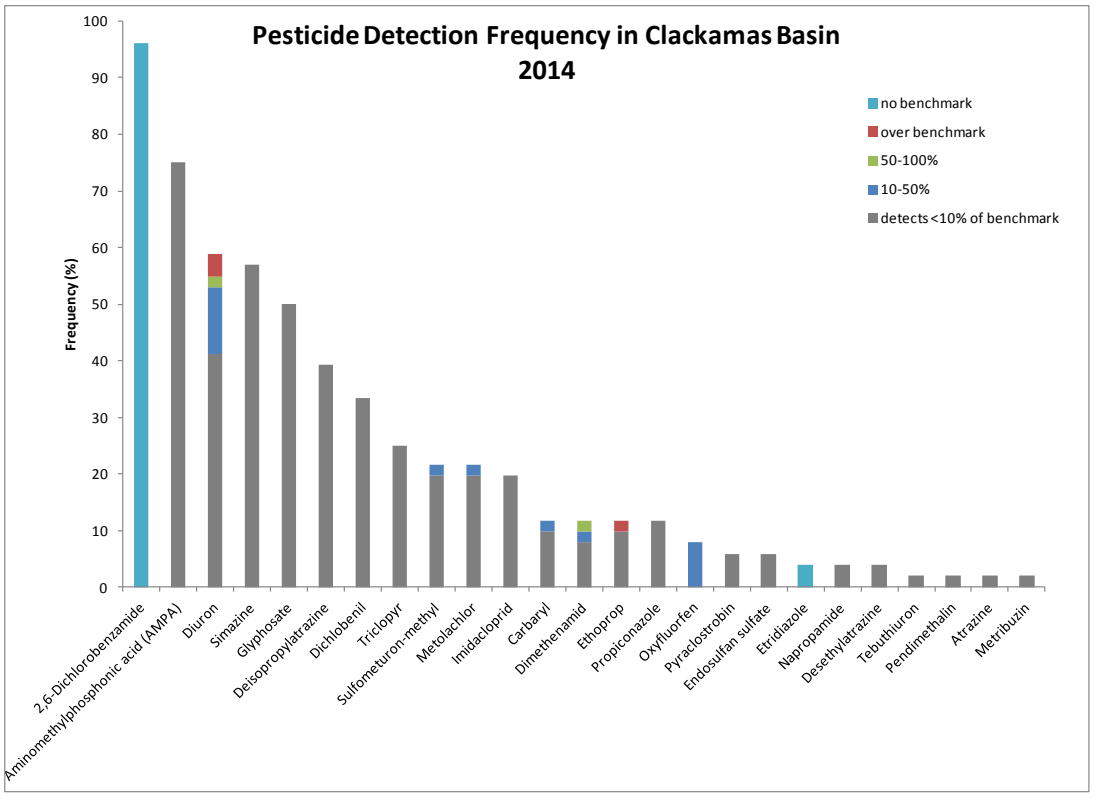
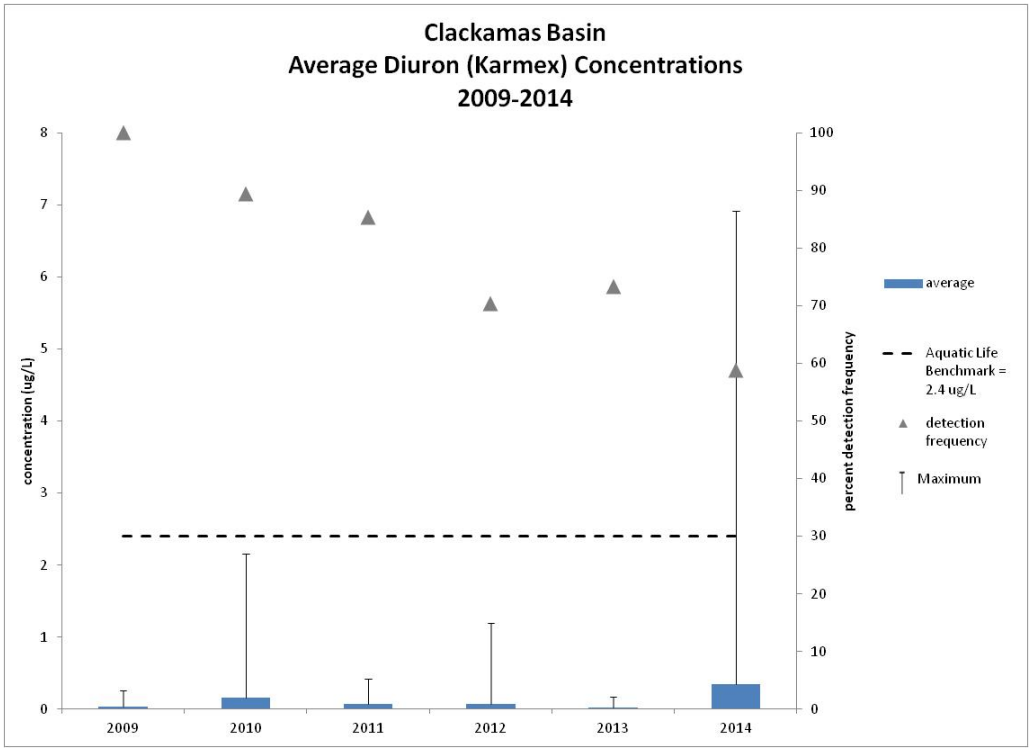


Figure 4: Diuron concentrations measured at four Clackamas River watershed sites, 2009 – 2014



4.3 Aerial Photo Monitoring of Streamside Vegetation

In 2009, ODA evaluated aerial photos for streamside condition along five creeks in the Management Area: Clear, Coffee Lake, Currin, North Fork Deep, and Parrot creeks. Each stream segment received a score that was compared to a score from a previous evaluation of 2004 aerial photos. All five creeks showed decreases in streamside vegetation. The decreases for Coffee Lake, Currin, and North Fork Deep creeks are considered significant (reduction in score of 1.58 to 2.99 out of 70).

ODA is developing a method for estimating a stream's potential score for 100% site-capable vegetation, to compare to the score based on actual conditions. Most recent aerial photos were taken in 2014, but data have not been analyzed. The results will be included in this section during future biennial reviews when data becomes available.

4.4 Strategic Implementation Area (SIA) for Clackamas County Noyer Creek

SIA Compliance Field Verification by Tax Lot Completed December 23, 2013

- 623 Parcels in SIA
- 386 Parcels Not Applicable
- 237 Parcels Identified for Evaluation
- 200 Parcels with No Concern
- 37 Parcels with Concern Level

NOTE: Level of concern coincides with threat to water quality

Table 5. Summary of pre and post-assessment results as of March 2015

Pre-assessment	# of Tax Lots	Post-assessment	# of Tax Lots
Serious	0	Serious	0
Significant	2	Significant	2
Moderate	16	Moderate	0
Low	19	Low	26
No	200	No	209

- None = no water quality concerns related to agricultural activities were observed,
- Low = minimal potential for agricultural activities to impact surface or groundwater OR vegetation along streams is inadequate, but unable to determine if agricultural activities are limiting vegetation,
- Moderate = likely potential for agricultural activities to impair surface or ground water OR agricultural activities may be preventing adequate vegetation along streams,
- Significant = Field-verified likely potential for agricultural activities to impair surface or ground water OR agricultural activities may be preventing adequate vegetation along streams,
- Serious = Field-verified pollution of surface or ground water or removal of vegetation along streams.

After the initial evaluation, 18 properties were categorized as being a 'Moderate' or 'Significant' concerns requiring a site visit from ODA. After the site visits were completed, only two of the properties remain out-of-compliance. Both ODA and the CSWCD are continuing to work with these landowners to achieve compliance with the rules of this Area Plan. In 2015, ODA began the SIA process in Upper Johnson Creek. This watershed is located in both the Lower Willamette and Clackamas management areas. During the 2017 biennial review, ODA will update the Clackamas LAC on the results from this SIA.

4.5 Biennial Reviews and Adaptive Management

The Clackamas LAC participated in four meetings for the 2015 biennial review of the Clackamas Agricultural Water Quality Management Area Plan. The meetings were held at the Clackamas SWCD office in Oregon City, OR from April to October. The main focus of the meetings were to introduce and adopt the new statewide format of the area plan, highlight the implementation activities completed in the subbasin, update measurable objectives for the next biennium, review compliance cases since the last biennial review, and adopt edits provided by both DEQ and the Farm Bureau.

The LAC then provided a summary of impediments to achieving water quality. Impediments listed included a general lack of knowledge of water quality rules amongst small acreage landowners, difficulty outreaching to small acreage landowners, and a general lack of technical and financial assistance for farmers to implement conservation practices. In addition, the LAC also recommended creating a more user-friendly addition of the Area Plan for farmers to easily learn about the agricultural water quality rules.

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Appendix A: Impaired Water Bodies on 303(d) List in Clackamas Management Area

Includes:

- Clackamas Subbasin 4th Field HUC
- Abernethy Creek - Willamette River 5th Field HUC

Source: For more information, please visit DEQ's web page for Oregon's 2010 Integrated Report and searchable database (www.deq.state.or.us/wq/assessment/2010Report.htm)

Clackamas Subbasin 4th Field HUC

Water Body Name	River Miles	Segment Length	Season	Listing Year
Parameter: *E. coli* • Criteria: 30-day log mean of 126 E. coli organisms per 100 ml; no single sample > 406 organisms per 100 ml • Beneficial Use: Water contact recreation • Status: Water quality limited, Willamette Basin TMDL (Chapter 6,) Approved 09/29/2006.				
Bargfeld Creek	0 to 2.3	2.3	Summer	2002
Clackamas River	0 to 15	15	Summer	2004
Cow Creek	0 to 2.6	2.6	Fall-Winter-Spring	2004
Deep Creek	1.9 to 14.1	12.2	Summer	2002
North Fork Deep Creek	0 to 9	9	Summer	2002
Rock Creek	0 to 6.1	6.1	Fall-Winter-Spring	2004
Sieben Drainage Ditch	0 to 1	1	Fall-Winter-Spring	2004
Sieben Drainage Ditch	1 to 1.8	0.8	Fall-Winter-Spring	2004
Tickle Creek	0 to 2.3	2.3	Summer	2002
Parameter: Temperature (Spawning) • Criteria: Salmon and steelhead spawning: 13.0 degrees Celsius 7-day-average maximum • Beneficial Use: Salmon and steelhead spawning • Status: Water quality limited, Willamette Basin TMDL (Chapter 6,) Approved 09/29/2006.				
Collawash River	0 to 7.7	7.7	Sept 1 - June 15	2004
Eagle Creek	0 to 15.6	15.6	Sept 1 - June 15	2004
Nohorn Creek	0 to 1.8	1.8	Sept 1 - June 15	2004
Parameter: Temperature (Rearing) • Criteria: Rearing: 17.8 C • Beneficial Use: Anadromous fish passage; Salmonid fish rearing • Status: Water quality limited, Willamette Basin TMDL (Chapter 6,) Approved 09/29/2006.				
Clackamas River	0 to 22.9	22.9	Summer	1998
Cow Creek	0 to 2.6	2.6	Summer	2002
Parameter: Temperature (Rearing - Cold Water) • Criteria: Rearing: Core cold water habitat: 16.0 degrees Celsius 7-day-average maximum • Beneficial Use: Core cold water habitat • Status: Water quality limited, Willamette Basin TMDL (Chapter 6,) Approved 09/29/2006.				
Bear Creek	0 to 4.8	4.8	Year Around (Non-spawning)	2004

Collawash River	0 to 12.2	12.2	Year Around (Non-spawning)	2004
Eagle Creek	0 to 25.4	25.4	Year Around (Non-spawning)	2004
Fish Creek	0 to 13.2	13.2	Year Around (Non-spawning)	2004
North Fork Eagle Creek	0 to 13.1	13.1	Year Around (Non-spawning)	2004
Parameter: Aquatic Weeds or Algae - Harmful Algal Bloom • Criteria: The development of fungi or other growths having a deleterious effect on stream bottoms, fish or other aquatic life, or which are injurious to health, recreation or industry may not be allowed. • Beneficial Use: Fishing; Livestock watering; Drinking water; Aesthetics; Water supply; Water contact recreation • Status: Water quality limited, 303(d) list, TMDL needed				
North Fork Reservoir	29.3 to 33.4	4.1	Undefined	2010

Abernethy Creek - Willamette River 5th Field HUC (in Middle Willamette 4th field HUC)

Water Body Name	River Miles	Segment Length	Season	Listing Year
Parameter: *E. coli* • Criteria: 30-day log mean of 126 E. coli organisms per 100 ml; no single sample > 406 organisms per 100 ml. • Beneficial Use: Water contact recreation. • Status: Water quality limited, Willamette Basin TMDL, Chapter 2, Approved 09/29/2006)				
Willamette River Mainstem	24.8 to 54.8	30	Fall-Winter-Spring	2004
Parameter: Temperature (Rearing) • Criteria: Rearing: 17.8 C • Beneficial Use: Salmonid fish rearing; Anadromous fish passage • Status: Water quality limited, Willamette Basin TMDL (Chapter 7), Approved 09/29/2006.				
Abernethy Creek	0 to 15.5	15.5	Summer	2002
Parameter: Temperature (Migration) • Criteria: Salmon and steelhead migration corridors: 20.0 degrees Celsius 7-day-average maximum. • Beneficial Use: Salmon and steelhead migration corridor. • Status: Water quality limited, Willamette Basin TMDL (Chapter 4), Approved 09/29/2006.				
Willamette River Mainstem	24.8 to 54.8	30	Year Around (Non-spawning)	2004
Parameter: Dioxin • Criteria: Table 20 Toxic Substances. • Beneficial Uses: Resident fish and aquatic life; Anadromous fish passage; Drinking water. • Status: Water quality limited, Columbia Basin River Dioxin TMDL, Approved 02/25/1991.				
Willamette River	24.8 to 54.8	30	Unidentified	1998
Parameter: Mercury • Criteria: Where no published EPA criteria exist for a toxic substance, public health advisories and other published scientific literature may be considered and used, if appropriate, to set guidance values. • Beneficial Use: Resident fish and aquatic life; Anadromous fish passage; Drinking water. • Status: Water quality limited, Willamette Basin TMDL (Chapter 3), Approved 09/29/2006.				
Willamette River Mainstem	24.8 to 54.8	30	Year Around	1998
Parameters: Aldrin, DDE, DDT, Dieldrin, PCBs • Criteria: Where no published EPA criteria exist for a toxic substance, public health advisories and other				

published scientific literature may be considered and used, if appropriate, to set guidance values. • Beneficial Use: Fishing • Status: 303(d) list				
Willamette River Mainstem	24.8 to 54.8	30	Year Around	2002
Parameter: Iron • Criteria: Table 20 Toxic Substances. • Beneficial Use: Drinking water; Human health; Fishing; Aquatic life • Status: Water quality limited, 303(d) list, TMDL needed				
Willamette River Mainstem	24.8 to 54.8	30	Year Around	2004

Clackamas Subbasin 4th Field HUC: Pending 2012 Impaired Water Body Listings

Water Body Name	River Miles	Segment Length	Season	Listing Year
Parameter: Pesticides • Criteria: Tables 20 and 40 Toxic Substances. • Beneficial Use: Aquatic life; Human health. • Status: Proposed by EPA for inclusion on 303(d) list (March 15, 2012).				
North Fork Deep Creek (Chlorpyrifos and Guthion/ Azinphosmethyl)	0 to 9	9	Year Round	-
Noyer Creek (Chlorpyrifos and Dieldrin)	0 to 3.5	3.5	Year Round	-
Parameter: Dissolved Oxygen • Criteria: Spawning: Not less than 11.0 mg/L or 95% of saturation. • Beneficial Use: Salmon, steelhead, and residential fish spawning. • Status: Pending 2012 Impaired Water Body Listings.				
Clackamas River	0 to 8.8	8.8	Oct 15 - May 15	-
North Fork Deep Creek	0 to 6.6	6.6	Oct 15 - Jun 15	-
Noyer Creek	0 to 3.5	3.5	Jan 1 - Jun 15	-
Rock Creek	1.4 to 6	4.6	Jan 1 - May 15	-
Trillium Creek	0 to 10	10	Jan 1 - May 15	-
Parameter: Biological Criteria • Criteria: Biocriteria: Waters of the state must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities. • Beneficial Use: Aquatic life • Status: Pending 2012 Impaired Water Body Listings.				
Clackamas River	0 to 83.2	83.2	Year Round	-
Deep Creek	0 to 14.1	14.1	Year Round	-
Eagle Creek	0 to 25.4	25.4	Year Round	-
North Fork Deep Creek	0 to 9	9	Year Round	-
Unnamed (Tickle Creek tributary)	0 to 2.5	2.5	Year Round	-

Abernethy Creek - Willamette River 5th Field HUC: Pending 2012 Impaired Water Body Listings

Water Body Name	River Miles	Segment Length	Season	Listing Year
Parameter: Biological Criteria • Criteria: Biocriteria: Waters of the state must be of sufficient quality to support aquatic species without				

detrimental changes in the resident biological communities. • Beneficial Use: Aquatic life • Status: Pending 2012 Impaired Water Body Listings.				
Abernethy Creek	0 to 15.3	15.3	Year Round	-
Tour Creek (Tributary of Abernethy)	0 to 1.2	1.2	Year Round	-
Unnamed Willamette Tributary (near Wilsonville)	0 to 1.5	1.5	Year Round	-

Partial List of Monitoring Sites for the 303(d) Listings

LOCATION - MONITORING SITES	AGENCY
Clackamas River at High Rocks (Old Hwy 213)	DEQ
Clackamas River at mouth	DEQ
Clackamas River D/S of River Mill Dam	DEQ
Clackamas River at McIver Pk. (Upper Boat Ramp)	DEQ
Clackamas River at Memaloose Road	DEQ
Clackamas River at Carver Bridge	DEQ
Clackamas River at Hwy 99E Bridge	DEQ
Cow Creek at SE Edgewater Road	Clackamas Co. SWCD
Cow Creek at SE Evelyn St	Clackamas Co. SWCD
Cow Creek at SE Last Road	Clackamas Co. SWCD
Cow Creek at SE 102nd Ave.	Clackamas Co. SWCD
Sieben Creek at Hwy 212	Clackamas Co. SWCD
Sieben Creek at SE Sunnyside Rd.	Clackamas Co. SWCD
Rock Creek near Hwy 212-224 Junction	Clackamas Co. SWCD
Rock Creek at Hwy 212-224	Clackamas Co. SWCD
Rock Creek at SE Sunnyside Road	Clackamas Co. SWCD
Rock Creek at Troge Rd.	Clackamas Co. SWCD
Bargfeld Cr. at Fishers Mill Rd (tributary to Clear Cr.)	Clackamas Co. SWCD
Delano Cr. at Delano Farms (tributary to Clear Creek)	Clackamas Co. SWCD
Clear Creek at Carver Park	Clackamas Co. SWCD
Clear Creek at Fishers Mill Rd	Clackamas Co. SWCD
Clear Cr. at Metzler Park	Clackamas Co. SWCD
North Fork Deep Cr. at Camp Kuratli	Clackamas Co. SWCD
North Fork Deep Cr. at Hwy 26	Clackamas Co. SWCD
Tickle Cr. at Langensand Rd. (tributary to Deep Cr.)	Clackamas Co. SWCD
Tickle Cr. at Tickle Cr. Rd. (tributary to Deep Cr.)	Clackamas Co. SWCD
Deep Cr. at Camp Kuratli	Clackamas Co. SWCD
Deep Cr. at Hwy. 211	Clackamas Co. SWCD
North Fork Eagle Cr. at Eagle Fern Pk. (tributary to Eagle)	Clackamas Co. SWCD
Eagle Cr. at Bonnie Lure Pk.	Clackamas Co. SWCD
Delph Cr. at Squaw Mt Rd. (Tributary to Eagle Cr.)	Clackamas Co. SWCD

Note: This list does not include all monitoring sites or agencies / organizations that have conducted water quality monitoring in the Management Area.

To view water quality data collected for a specific location, please visit the LASAR (Laboratory Analytical Storage and Retrieval) database on DEQ's website (http://deq12.deq.state.or.us/lasar2/). Search for sampling data by map.

Appendix B: Conservation and Land Management Activities and Strategies

The purpose of this appendix is to provide examples of activities and strategies landowners and operators can use to prevent and control water pollution and soil erosion from their land. This appendix addresses water quality parameters of concern in the Clackamas Agricultural Water Quality Management Area by supporting the voluntary implementation of activities and strategies such as those listed below under Streamside Areas and Agricultural Waste. Conservation plans and management systems are additional tools that landowners and operators may find helpful. Please see Appendix C for a list of partner agencies and organizations that can provide technical and/or financial assistance for implementing these activities and strategies.

Streamside Areas

Streamside Conditions and Functions

With appropriate information, time, and work, landowners can develop flexible streamside vegetation management strategies while providing the following water quality functions:

- shade to reduce solar radiation reaching the water,
- a buffer to filter sediment, organic material, bacteria, nutrients, and pesticides in surface runoff,
- stable streambanks to reduce erosion,
- fish and wildlife habitat for native species.

A healthy streamside area provides adequate vegetation to trap sediment, prevent flood debris from depositing on fields, and protect pasture and cropland from bank erosion. Protecting streamside vegetation along smaller streams will help maintain cooler temperatures that benefit fish while providing cooler water to larger streams and rivers downstream. While streamside vegetation can be effective at removing pollutants from overland or infiltrated flows, it is not effective at removing pollutants that pass directly through streamside areas as concentrated (channelized, ditched, tiled, or piped) flows.

Streamside Management Activities and Strategies

An important component of any effective streamside vegetation management strategy is to minimize the impact of livestock on riparian vegetation and streambank stability, while ensuring that livestock have access to water. This could be done in any number of ways, including culvert or bridge placement or replacement, livestock behavior modification, fencing, off channel watering, or other measures. Fencing is very effective, when properly constructed, maintained, and used, but it is not the only solution.

There are many management strategies that may be taken to protect and/or restore ecological functions in riparian and wetland areas to improve water quality and watershed health. Common approaches include removing invasive, non-native vegetation and planting native trees and shrubs. Native species are best suited to the natural ecosystems in the Management Area, and may be more resistant to diseases and pests. Non-native, non-invasive species in the streamside area may also provide valuable shade, streambank stability, and cover for wildlife. Although native vegetation provides benefits over non-native species, it is not always necessary to remove non-native, non-invasive species in order to replant an area with native plants.

Habitat can be provided by allowing snags (dead trees) to remain standing for wildlife, unless safety factors indicate otherwise. Another way to improve fish and wildlife habitat is to allow fallen trees to remain on the ground or in the stream, unless removal is essential for traffic, navigation, serious flooding reasons, or erosion prevention.

Strategies that can help reduce the impacts of streambank erosion include establishing buffer zones, establishing grassed waterways, or protecting streambanks with trees and shrubs. Another option is to allow marginally productive lands in floodplains or poorly drained riparian areas to revert to riparian or wetland status.

Warning Signs That Streamside Vegetation May Not Be Adequate

Landowners often want to know what they need to do, or not do, to be in compliance with a rule or law. Some likely potential indicators of non-compliance with the Streamside Area Condition Rule (OAR 603-095-1240(2)) include:

- active streambank sloughing or erosion in conjunction with tillage or grazing,
- destruction of streamside vegetation by humans or livestock,
- stream not protected by appropriate filter strip or vegetated buffer.

Conservation Plans

While the success of this Area Plan depends on the cooperation of agencies, volunteer organizations, the agribusiness community, and landowners, the adoption of conservation measures that will help improve water quality in the Management Area can only be done by individual landowners. In order to determine appropriate management strategies on an operation, landowners are encouraged to develop and implement voluntary conservation plans.

A conservation plan is a voluntary tool that identifies the unique natural resource concerns (including potential sources of water pollution) on a specific property, and applies proven solutions to promote the landowner's goals for land management, environmental sustainability, and farm profitability. A conservation plan combines the farming or ranching skills of the landowner with the science-based knowledge of the conservation planner.

A conservation plan can help a landowner to:

- identify immediate or potential resource problems that could hurt production,
- adapt to changing operational goals,
- establish a schedule to implement needed conservation strategies,
- qualify or prepare for various USDA / NRCS conservation programs,
- prepare for agricultural or market certifications,
- address regulatory requirements.

To develop a conservation plan, a landowner can work with local NRCS or SWCD staff or select another resource professional. To implement the plan, a landowner works with technical specialists (e.g. NRCS or SWCD staff, private sector conservationists, or engineers) to design and implement conservation strategies in the plan. There are a wide variety of government and non-government conservation programs available that provide technical and/or financial assistance. The plan should be updated periodically to reflect changes in management objectives or resource conditions.

This Area Plan, when originally adopted in 2001, included a section on Voluntary Water Quality Farm Plans, which are a specific type of conservation plan. Voluntary Water Quality Farm Plans were originally envisioned as an incentive to afford landowners with limited "safe harbor" protection against immediate enforcement actions by ODA, if prohibited condition violations were found to occur on lands under their management. ODA's enforcement process has evolved to provide all landowners with opportunities to come into compliance without penalties, except in the case of imminent danger or risk to human health. Even though Voluntary Water Quality Farm Plans no longer play a specific role in

providing a landowner with safe harbor, conservation plans are still a valuable tool for implementing this Area Plan.

Management Systems

An agricultural management system allows a landowner or operator to integrate and optimize organizational, economic, technological, and conservation methods to ensure maximum output per unit of land area, while minimizing labor and capital costs and impacts on water quality and other natural resources. Appropriate management strategies for individual farms vary with the specific cropping, topographical, environmental, and economic conditions. Separate strategies with the goals of economic profitability and resource development and protection are often combined into management systems. Landowners have the option to choose whatever management system or strategies they deem effective to economically control and prevent agricultural water pollution, including the strategies listed in the sections above (Streamside Areas; Agricultural Waste). Management systems are the core of any voluntary conservation plan, and landowners are encouraged to adopt and implement management systems regardless of whether voluntary conservation plans are developed.

Appendix C: Educational and Technical Services for Natural Resource and Farm Management

Local Management Agency (LMA) and Local Advisory Committee (LAC)

Clackamas Soil and Water Conservation District (SWCD)

Serves as the Local Management Agency (LMA) for implementation of the Area Plan in the Clackamas Management Area. Provides conservation planning and other technical assistance to private landowners / managers and public agencies to identify and address natural resource concerns. Offers grant and cost-share programs to assist with the cost of installing approved conservation measures.

Clackamas County (Oregon City): 503-210-6000 / www.conservationdistrict.org

Clackamas Management Area Local Advisory Committee (LAC)

Voluntary committee composed of twelve agricultural producers and other stakeholders in the Management Area. Charged with developing and reviewing the Area Plan and Area Rules, in accordance with the Agricultural Water Quality Management Act.

Clackamas SWCD: 503-210-6000 / www.conservationdistrict.org
Oregon Department of Agriculture 503-986-4700 / www.oregon.gov/ODA/NRD

Federal Agencies

USDA – Natural Resources Conservation Service (NRCS)

Provides information on soil types, soils mapping, and interpretation. Administers and provides assistance in developing plans for CRP, EQIP, WRP, and other cost share programs. Makes technical determinations on wetlands and highly erodible land.

Clackamas County (Oregon City): 503-655-3144 / www.or.nrcs.usda.gov/contact

USDA – Farm Service Agency (FSA)

Maintains agricultural program records and administers various cost share programs. Their offices also provide up-to-date aerial photography of farm and forest land.

Clackamas/Multnomah County: 503-655-3144 / www.fsa.usda.gov/or

State Agencies

Oregon Department of Agriculture (ODA)

Oversees the Oregon Agricultural Water Quality program, issues permits and helps producers comply with confined animal feeding water management programs, provides support to SWCDs, and investigates complaints of water pollution from agricultural lands.

Natural Resources Program (Salem): 503-986-4700 / www.oregon.gov/ODA/NRD

Oregon Department of Environmental Quality (DEQ)

Responsible for protecting and enhancing Oregon's water and air quality, cleaning up spills and releases of hazardous materials, and managing the proper disposal of solid and hazardous wastes. Maintains a list of water quality limited streams (303(d) list), sets total maximum daily load (TMDL) allocations.

Portland: 800-452-4011 / www.oregon.gov/DEQ/WQ

Oregon Department of Fish and Wildlife (ODFW)

Works with landowners to balance protection of fish and wildlife with economic, social, and recreational needs. Advises on habitat protection. Offers technical and educational assistance for habitat and restoration projects. Provides plan review for special property tax assessment for wildlife habitat projects.

North Willamette Watershed District (Clackamas): 971-673-6000 / www.dfw.state.or.us

Oregon Department of Forestry (ODF)

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

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

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

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

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

Other Partners

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

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

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

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

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

468B.025 Prohibited activities.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Appendix E: Clackamas Focus Area Action Plan

Clackamas Agricultural Water Quality Management Area
Clackamas SWCD (2013-2015)

I. INTRODUCTION

A. Description of Watershed

The focus area includes a large portion of the Clackamas River watershed and the small upper portion of the Johnson Creek watershed. The land uses in these two areas make it conducive to joining for the purposes of outreach and partnership with our watershed councils and neighboring SWCD. See the attached map.
The focus area covers 608,723 acres. There are 1,624 miles of perennial stream and 1,678 miles of seasonal streams.
There are two main types of agriculture in this focus area: nursery stock and Christmas Tree production.

B. Basis for Selection of Focus Area

In the 2011-2012 Scope of Work for the Local Management Agency funding, Clackamas County SWCD participated in a pilot project to target outreach in a priority area to promote conservation practices. After one year of outreach with our partners, the District obtained approval to expand the priority area to include the surrounding area that had similar land use. This expansion would make outreach to producers more efficient and promote word of mouth advertising. It also increased our chances of finding willing landowners to participate. Having only one year to work in this area has not been enough time to reach land based goals, but it has provided the opportunity to convene a focus group of producers to help us develop an outreach strategy.

The number of organizations that we have already built a partnership with and are actively working to reduce pesticide use, promote riparian cover and protect water quality in this focus area is yet another reason to use this focus area to implement change. There are more organizations to build partnerships with for better implementation of conservation practices and that is where we would like to devote some our time over the next two years.

C. Water Quality Parameters of Concern

There are a number of parameters that are adversely affecting water quality in the focus area; however, the District will focus on are temperature and stream sedimentation. By successfully promoting conservation practices that reduce solar heating of surface water and erosion of soil, a number of water quality concerns will be positively affected. Riparian cover addresses temperature increase in surface water due to solar radiation. Cooler water is able to hold more dissolved oxygen, another concern in the Clackamas River basin. Riparian vegetation will also provide bank stability and filtration of overland runoff, helping to keep sediment out of the water.

Reducing erosion and runoff of agricultural soil to waterways may address some bacteria concerns as the bacteria may be carried in sediment laden runoff. Soil particles in runoff may also carry phosphorus, legacy pesticides or have naturally occurring mercury. These are all parameter of concern. Reducing phosphorus helps reduce growth of aquatic weeds and harmful algae.

The District will promote conservation practices that address the water quality concerns mentioned above. For reduction of sediment laden runoff we will assist in the development of erosion control strategies for landowners take into consideration the soil type, slope, source of water, type of erosion, irrigation, traffic lanes, crop and suitability to the site, tillage practices, machinery capability and management challenges for each site.

We will assist producer in choosing practices that will improve soil quality and reduce erosion, considering side benefits such as pollinator or wildlife habitat. We will strive to make the implementation of conservation practices as beneficial to the landowner as possible to encourage others to do the same. Possible practices include field borders, improved access roads, cover crops, water and sediment retention swales and buffers, irrigation efficiency, and no-till or minimum till practices.

To promote temperature moderation of surface water, the District will offer technical assistance to landowners for installing riparian area vegetation. Planners will design a planting plan considering tree height require to shade the stream while reduce edge effect on field crops. We will also take into consideration the landowner goals and what is required to shade the stream.

The District will also promote riparian vegetation projects by offering, as an option to landowners, the riparian vegetation program implemented by the Clackamas River Basin Council. They have a program funded by Bonneville Power Administration that will pay for the site prep and replanting of streamside areas. We want to make this process a win-win situation for landowners by offering them options for implementation.

D. Description of Assessment Method(s)

For our riparian assessment, the District will use the ODA tool when the training has been completed. We will include our previously assessed priority area in our riparian conditions assessment.

Riparian condition classifications			
Class I	**Class II**	**Class III**	**Class IV**
Vegetation likely sufficient to moderate solar heating, stabilize streambanks, and filter out pollutants consistent with site capability.	Agricultural activities not impairing riparian growth, but vegetation likely insufficient to moderate solar heating, stabilize streambanks, or filter out pollutants consistent with site capability.	Agricultural activities likely not allowing vegetation to moderate solar heating, stabilize streambanks, or filter out pollutants consistent with site capability.	Non-agricultural activities, e.g. state highway, likely not allowing vegetation to moderate solar heating, stabilize streambanks, or filter out pollutants consistent with site capability.

II. MEASURABLE OBJECTIVE(S)

[1] Reduce erosion. How: promote appropriate conservation practices, providing technical and financial assistance as needed and available. We will: contact 100% of agricultural producers on the contact list that have Highly Erodible Soil to offer service and support to install erosion control practices. From this, we expect 10% of landowners will choose to participate.

[2] Reduce stream temperature. How: increase woody plant cover on riparian areas, providing technical and financial assistance as needed and available, and by partnering with other organizations active in promoting stream shading in this area. We will: contact 100% of landowners (including through partner programs) with riparian areas we considered degraded. From this, we expect 5% of landowners will choose to participate in stream shading practices.

III. IMPLEMENTATION ACTIVITIES AND TIMELINE

Clackamas SWCD Planned Activities

Workshops/field days

- **Offer two workshops for producers per year. Topics could include soil quality and erosion control techniques. Many practices that improve soil quality will also address runoff and erosion control. A second topic may be a continuation of the soil quality workshop or stream improvement topics.**

Q2 A workshop for horse owners in the focus area is being planned for January. It will be held at the Pony Club near Estacada.

Q3 Clackamas River Pony Club to cover pasture improvement and barnyard mud control to keep runoff clean and clear.

Q3 Planning soil erosion control/soil quality workshop for June 26.

Q4 Workshop: Unlock Secrets in the Soil for Perennial Crops on June 26. Seventeen growers attended the workshop. The focus was on cover crops and erosion control. All participants were interested in attending more workshops.

Q5 (2014) The Calibration Workshop was a combination of classroom lecture, hands-on changing nozzles, calibrating pressure gauges, etc. There was also a field component with a night time spray using bioluminescent dye, black lights, and water sensitive paper to show coverage and droplet size.

Q6 No workshops or field days were held this quarter.

Q7 Nothing this quarter – workshop reported below.

Q8. Held a workshop for field reps that work with growers in the Clackamas River watershed. We talked to them about spray nozzle technology and reduced drift nozzles. These reps reach growers that we do not normally have contact with and they have said they would promote our cost-share program for replacing nozzles to reduce pesticide drift and pesticide quantity used. Clackamas River watershed has a Pesticide Stewardship Partnership to try and reduce the pesticides in the Clackamas to avoid making a TMDL to address the problem.

- **Offer one field day per year to look at cover crops, access road improvements, riparian improvements, erosion control techniques, etc.**
  Q3 Working on incorporating field work with the June 26 workshop.
  Q4 Not workable this quarter.
  Q5 (2014) See Above. This workshop included field work.
  Q6 No field days were held this quarter.
  Q7 No Field day this quarter.
  Q8 We participated in a field day this quarter, but it ended up being held outside of the focus area.

<u>Communication</u>

- **Develop contact list of producers– physical as well as e-mail**
  Q1. Physical list completed.

- **Solicit input from our established focus group (Christmas tree growers and nursery stock producers).**
  Q1. Provided input on the mailer "Agriculture for Clean Water"
  Q1 (2014) Solicited input from my focus group to develop a cost share program to help producers replace sprayer parts to make them more efficient and reduce pesticide use and spray drift.
  Q7 Participated in Christmas Tree IPM Outreach development session at OSU North Willamette Research and Education Center. We learned from the growers what kind of help they need to reduce pesticide drift and runoff. A contact from that session, invited me to an Oregon Christmas Tree Growers Association meeting to talk about the District and what we can do to assist Christmas Tree Growers in pesticide reduction and erosion control. Six growers attended.
  Q8. No action

- **Partner with Pesticide Stewardship Partners, OAN, NW Christmas Tree Association, Oregon Christmas tree growers, dealers, etc. to put on field day and workshops or strategize on promoting conservation practices.**
  Q1. Held a planning meeting to develop the pesticide BMP program.
  Q2. Worked with Pesticide Stewardship Partners and OAN
  to schedule an Integrated Pest Management Workshop in February for nursery growers in the focus area.
  Q3 Worked with a focus group of nursery growers to develop what is needed for the workshop series on pesticide reduction. Developing relationships with the OAN, OSU extension and Integrated Plant Protection Center (IPPC) to reach nursery growers in the Focus area.
  Q4 Partnered with East Multnomah SWCD to offer: Unlock Secrets in the Soil for Perennial Crops. Seventeen growers attended the workshop. The District is actively partnering with the IPPC and OSU North Willamette Research and Education Center (NWREC) on workshops for nursery growers in August. The District is developing a cost share program to replace pesticide sprayer nozzles for pesticide reduction in the Clackamas River Watershed. Partner funding will help with this project as well as a windsock program designed to promote reduction in pesticide drift in the Clackamas River watershed. Windsocks should be available by August.
  Met with two nursery growers and an equipment dealer to develop a cost share program to replace sprayer nozzles and pressure gauges on spray equipment. The program will be ready in Quarter 1 2014-2015.
  Q5 (2014) Partnered with OSU Extension and the Integrated Plant Protection Center (both partners in the Pesticide Stewardship Partnership) to hold a "Covering Your Assets Hands-on Workshop on Sprayer Calibration and Application Assessment" held at a nursery in the Focus Area. The workshop was a hands on/lecture/field event taught by an extension agent from Ohio and a researcher from USDA ARS. 36 attended the workshop that ran from 3 p.m. to 9 p.m. and included a night spray demonstration using bioluminescent dye, black lights, and water sensitive paper.
  The nozzle replacement program "Sprayer Efficiency Cost Share" program will be tied to a clinic held by the director of the IPPC and a local equipment expert and hosted by CCSWCD. Each participant will get a personalized "prescription" of the correct nozzles for their spray goals and then will be eligible for the cost share funds to pay for implementation. Three clinics will be held during the year, most likely focusing on a nursery session, Christmas tree session and an "other crops" session. The first clinic is tentatively scheduled for December 2014.
  Q6 Due to illness and absences, the clinics were not scheduled for December.
  Q7 One workshop on Integrated Pest Management techniques for nurseries. Thirty-eight attendees.
  Q8 Was offered a free booth at the upcoming Christmas Tree Conference in Portland in September. Was also requested to give a presentation on conservation practices for Christmas tree operations.

- **Partner with seed or pesticide dealers to get the word out and encourage producers to participate.**
  Q1. No action
  Q1. Workshop in February will include pesticide vendors either as invited guests or possible speakers.
  Q5(2014) Will be working with a sprayer expert from GK Machinery to hold our sprayer clinics.
  Q6 Coordination efforts were not possible. Will work on clinic coordination in Q7.
  Q7 Meeting scheduled for Q. 8 with Paul Jepson and Gerhardt Greve of GK Machinery to organize an agronomist meeting to train agronomist on drift reducing nozzles and pesticide reduction techniques. We anticipate the agronomists will have contact with growers that do not come to the District or OSU for assistance.
  Q8 A discussion with a farm supply customer service rep and an OSU partner resulted in the idea of educating field reps to talk to growers about reducing pesticide use and drift by changing sprayer nozzles and calibrating

sprayers. These folks have access to growers that we do not normally have contact. This idea was put into action with a workshop held on June 18. Fifteen field reps from 6 supply companies attended.

- **Send out postcards to all nursery and Christmas tree producers in the focus area advertising workshops and field day.**
  Q1. Mailer developed and ready to send (Q2 will send).
  Q4. Sent out 300 save the date cards to nursery and Christmas tree growers in the Clackamas River Watershed inviting them to the Soil health workshop.
  Q5 (2014) sent out 220 postcards, and 147 e-mails to Christmas tree and nursery growers inviting them to the sprayer calibration workshop.
  Q6 No advertising, no workshops.
  Q7 250 Save the Date postcards sent out to invite growers to "Combining Effective IPM and Pesticide Risk Management in Nurseries."
  No communication sent out this quarter.

- **Contact ODA nursery/Christmas Tree inspectors to help communicate about our events or programs. Hoping they can also encourage producers to participate.**
  Q1 No action
  Q2 No action, but now that the workshops are being scheduled we can get the inspectors involved in spreading the word and hopefully reinforcing the information.
  Q4. Made contact with ODA nursery inspector for the Clackamas River Watershed. She is interested in helping get the word out about events or programs.
  Q5 (2014) no action. Although an ODA pesticide staff person did attend the sprayer calibration course.
  Q8 No action this quarter.

- **Send brochures to all nursery and Christmas tree producers in the focus area offering assistance from Clackamas SWCD and partners**
  Q1 ready, but not sent
  Q2. Sent information mailer to all Christmas Tree and Nursery growers (324 mailers sent) in the focus area. The topics included riparian shade and erosion control. Mailer sent in partnership with East Multnomah SWCD with contact information for technical assistance.
  Q1 (2014) Spoke to Calibration workshop participants about District programs to help them with erosion issues, offering them windsocks to reduce pesticide drift and introduce them to the upcoming Sprayer Efficiency program.
  Also developed an information sheet on pesticide drift reduction using windsocks and offered to give them a windsock to use for such a purpose. This piece was used at the far west show, workshops and county fair.
  Q8 no action this quarter.

- **Publish 1 article to industry newsletters, local newspaper blogs, website or other pertinent publication per quarter.**
  Q1. Failed to complete this action in Q1
  Q6 Promotion to the Oregonian about an article on the windsock program for producers to have better on the ground information when spraying pesticides was written and published this quarter. It was picked up by Associated Press and published in other states as well. The Pesticide Stewardship Partnership in the Clackamas Basin (focus area) was mentioned.
  Q7 Gave information to the editor of Nursery News (OAN newsletter) to publish an article about the IPM workshop. See attachment.
  Q8. No publications this quarter.

- **Send out two newsletters (Ripple Press) to focus area landowners.**
  Q1 no action
  Q2 sent information mailer instead of a newsletter.
  Q4 mailer developed, but needs to be sent out in Q1 of 2014-2015.
  Q1(2014) Sent out mailer regarding to landowners and local newspapers, newsletters regarding sprayer calibration.
  Q7 no newsletter
  Q8 the newsletter was too ambitious with staff shortages.

Technical Assistance

- **Conduct 10 site visits per year**
  Q1. Five site visits by District
  Q2 Eleven site visits by District staff. Topics included riparian restoration and mud/manure problems on small acreage farms.
  Q3 One new customer site visit was completed this quarter.
  Q4 Four site visits to new customers were completed this quarter.
  Q5 (2014) Seven initial site visits were conducted in the focus area this quarter and seven folks in the focus area received technical assistance over the phone or e-mail.
  Q6 Four site visits were conducted in the focus area by District staff.
  Q7 Fourteen site visits were conducted in the focus area by riparian specialist.
  Q8. 10 site visits were conducted in the focus area.

- **Write 10 conservation or planting plans per year**
  Q1. no plans
  Q2 Seven plans were completed for the focus area. One was for a small acreage with a mud/manure problem that will include a heavy use area project this spring/summer. The other six plans were for riparian restoration. The District worked with the Johnson Creek Watershed Council on our CreekCare program to contact and work with the landowners. The District writes the plans.
  Q3 One conservation plan was completed for the focus area. This plan focuses on manure management for a horse facility on the banks of the Clackamas River. The plan covers 4.6 acres.
  Q4 no plans written this quarter
  Q15 (2014) One plan was written with a riparian focus. The plan covers 6.5 acres.
  Q6 Two conservation plans were written this quarter. The focus was on riparian restoration. The plans cover 3 acres.
  Q7Conservation plan requirement is complete. No plans were written in the focus area by District staff this quarter.
  Q8 Conservatin plan requirement is complete. No plans were written for the focus area by District staff this quarter.

Implementation of Practices

mplementation of practices is ongoing with riparian planting in the winter and most other conservation practices in the spring, summer, and fall. Practices may be implemented by our partners in the focus area. A tally of all will be reported quarterly.

A report on the riparian restoration work by our partners in the focus area will be submitted in quarter 7.

Clackamas County SWCD Focus Area Activities Timeline and Report				
Quarter #	**Quarter Ending**	**Activity**	**Results**	**Notes**
1	**Sept. 2013**	Learn how to conduct riparian assessment from ODA	Two district employees attended the riparian assessment training	
		Develop assessment: map HEL soils and determine # of highly erodible land agricultural properties.	Not completed. Anticipate Q2 completion.	
		Develop a contact database of production agriculture in focus area	A mailing list of nursery and Christmas tree growers was developed.	
		Establish an industry focus group	We have a focus group of two Christmas tree growers and two nursery producers.	
		Establish relationship with ODA plant inspector for the Clackamas area to assist with outreach		
		Site visits to landowners	Five district led site visits	
		Conservation plans developed		
		Outreach event/participants	Display at the Damascus Farmers Market. Temps were high so the turnout was poor (7 participants)	
		Article/video		
		Direct mailing (paper or electronic)		Ready for Q2 mail
		Projects implemented		
		Funding applied for (District or Outside)		
		Field day or tour for focus area landowners.		
		Develop a handout/brochure/fact sheet	Agriculture for Clean Water mailer was developed; ready to send to nursery and X-mas tree grower in the focus area.	
		Focus group communication	The focus group reviewed the Agriculture for Clean Water mailer.	
		Industry partner communication	Participated in a meeting with focus area producers, OAN, ODA, OSU and OEC to develop a program including BMPs for pesticide reduction for Christmas tree and nursery producers.	
2	**Dec. 2013**	Update Clackamas LAC on activities		A spring update is planned
		Conduct riparian pre-assessment of the expanded focus area; provide quantitative results to ODA		Will be finished in Q3
		Complete the erosion risk assessment; provide quantitative		Will be finished in Q3

		results to ODA.		
		Site visits to landowners	11	
		Conservation plans developed	7	
		Outreach event/participants		One event is planned for January
		Article/video		
		Direct mailing (paper or electronic)	1 mailer developed last quarter; Sent to 324 Christmas Tree and Nursery growers	
		Projects implemented		
		Funding applied for (District or Outside)	A *Dollars on the Ground* grant was applied for and awarded to one nursery grower for an irrigation efficiency project.	
		Field day or tour for focus area landowners.		
		Develop a handout/brochure/fact sheet		
		Focus group communication		
		Industry partner communication	Scheduled an integrated pest management workshop for nursery growers in the Focus Area to be held February 20, 2014	Pesticide App. Management is topic; display opportunities for the District and Watershed council programs
3	**Mar. 2014**	Site visits to landowners	1	
		Conservation plans developed	1	
		Outreach event/participants	2/64	Very successful workshop with 54 attendees. This will build participation for soil quality and erosion control workshops.
		Article/video		
		Direct mailing (paper or electronic)	150 soil erosion/soil quality calendars sent to Christmas tree and nursery growers	
		Projects implemented	1 irrigation efficiency to reduce water use and erosion control.	
		Funding applied for (District or Outside)	1 grant ($35,000)plus loan ($14,000)was approved for the irrigation efficiency project. District funds.	
		Field day or tour for focus area landowners.		
4	**June 2014**	Site visits to landowners	4 site visits to new customers	
		Conservation plans developed	No plans written this quarter	

		Outreach event/participants	1 workshop with 17 participants; display at SIA meeting (18 participants); display at Clackamas River Basin Council (75 attended)	
		Article/video		
		Direct mailing (paper or electronic)	Sent 300 save the date postcards to nursery/Xmas tree growers for the soil health workshop	Newsletter to be sent in Q1 2014-15
		Projects implemented	One manure composting facility completed in Clackamas River District). Clackamas River Basin Council, planted 1,666 feet of riparian area in the focus area.	
		Funding applied for (District or Outside)	Funding for one project applied for and received	
		Field day or tour for focus area landowners.		
		Reassess focus area tasks – make improvements		Good idea for fall
5	**Sept. 2014**	Site visits to landowners	7	
		Conservation plans developed	1	6.5 acres
		Outreach event/participants	2/76	
		Article/video	Our riparian articles were published countywide so cannot be counted here.	
		Direct mailing (paper or electronic)	1 for calibration workshop 220 postcards 147 e-mails	
		Projects implemented	1 brush management (site prep) and conservation cover on steep slopes for erosion control	10.7 ac
		Funding applied for (District or Outside)	1 project that includes conservation cover and after brush management (site prep) on steep slopes.	
		Field day or tour for focus area landowners.	Included in the sprayer calibration outreach event	
		Reassess focus area tasks – make improvements		Not completed, good idea to do soon
6	**Dec. 2014**	Site visits to landowners	Four site visits were completed	
		Conservation plans developed	Two conservation plans were completed totaling 3 acres	
		Outreach event/participants	No events this quarter	
		Article/video	General report mentioned the work in the focus area	
		Direct mailing (paper or electronic)	none	
		Projects implemented	No projects this quarter	
		Funding applied for (District or Outside)	One application for funding submitted for $10,000	
		Technical assistance (non-site visit)	6 landowners were assisted	

7	**Mar. 2015**	Site visits to landowners	14 site visits by the riparian specialist this quarter	
		Conservation plans developed	No conservation plans written for focus area this quarter	
		Outreach event/participants	One workshop Combining Effective IPM with Pesticide Risk Management	38 participants
		Article/video	One article in the Nursery News - OAN newsletter about the workshop also published in the local newspapers	
		Direct mailing (paper or electronic)	Sent 250 save the date postcards for the workshop, plus sent e-mail invitations to all on the nursery contact list	
		Projects implemented	One project was implemented in the focus area – 10.7 acres of brush management in preparation for planting on Sunshine creek	
		Funding applied for (District or Outside)		
		Field day or tour for focus area landowners.		
8	**June 2015**	Post-assessment; provide quantitative results (% change) to ODA	Shape files reviewed. Most of newly planted streamside was not on the focus area stream or not considered agricultural.	
		Site visits to landowners	10 site visits to landowners in the focus area	
		Workshops for focus area producers	1	
		Workshop participants	15	
		Article/video	0	
		Direct mailing (paper or electronic)	0	
		District implemented projects	6	
		Acres in implemented projects	29	
		Display events for focus area	1	
		Display visitors	14	
(after)	**Dec. 2015**	Present results at the Clackamas Biennial Review	Not very impressive	

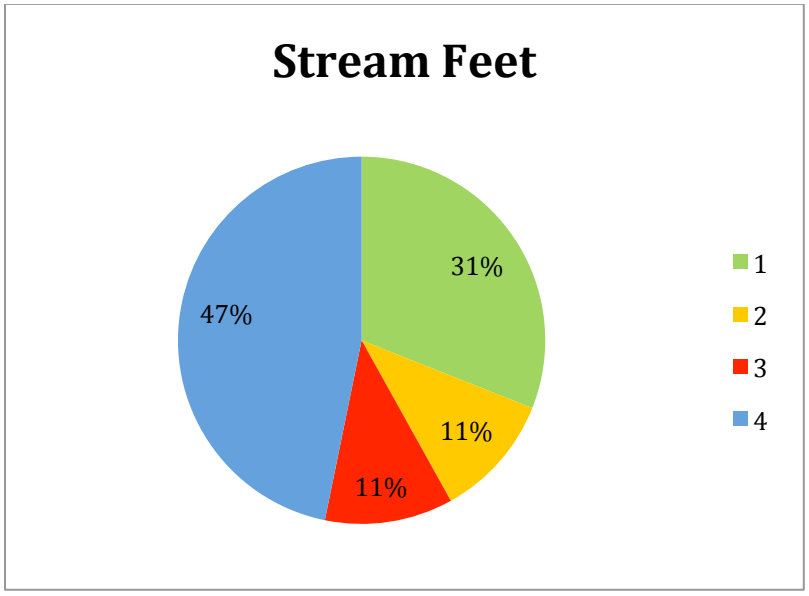
IV. RESULTS

A. Pre and Post-Implementation Assessments

ASSEMENT TO BE COMPLETED BY THE END OF QTR. 2
Assessment completed Qtr. 3-2014
See attached file - Sunshine creek stream veg assessment – ODA method
Assessment completed Qtr. 4 – 2014
Doane, Dolan, North Fork Deep Creeks and Tickle Creek Assessment Aerial photo interpretation method – see below
Assessment is complete. The results below are for the full focus area.

The table and graph below is the entire focus area including Doane, Dolan, North Fork Deep Creek and Tickle Creek, plus the area of Johnson Creek with in Clackamas County.

Class	Stream Feet
1.00	376,651.39
2.00	132,518.47
3.00	137,028.91
4.00	568,253.73
Total Feet	1,214,452.49



Completed Qtr. 1, 2014

Riparian condition classifications			
Class I	**Class II**	**Class III**	**Class IV**
Vegetation likely sufficient to moderate solar heating, stabilize streambanks, and filter out pollutants consistent with site capability.	Agricultural activities not impairing riparian growth, but vegetation likely insufficient to moderate solar heating, stabilize streambanks, or filter out pollutants consistent with site capability.	Agricultural activities likely not allowing vegetation to moderate solar heating, stabilize streambanks, or filter out pollutants consistent with site capability.	Non-agricultural activities, e.g. state highway, likely not allowing vegetation to moderate solar heating, stabilize streambanks, or filter out pollutants consistent with site capability.

B. Two-Year Implementation Summary

Final riparian planting measurements along streams in the focus area:
Class 1 – no planting
Class 2 – 3,100 feet planted to native vegetation
Class 3 - 1,400 feet planted to native vegetation
Class 4 - 2,964 feet planted to native vegetation – no change to a different classification

	Stream feet within Focus Area		
	2013 – original measurement	**Length of new planting**	**2015 New measurement**
Class I	376,651	–	379,751'
Class II	132,518	3,100'	133,918'
Class III	137,029	1,400'	135,629'
Class IV	568,254	2,964'*	

*improved riparian, but no change to the classification - some of this land is rural residential property and may have a pet horse

	Percent of Stream Miles within Focus Area	
	2013	**2015**
Class I	31.0%	31.2%
Class II	10.9%	11.0%
Class III	11.2%	11.1%
Class IV	46.7%	46.7%

Number of landowners contacted by mail or e-mail: 975
Number of site visits made by District staff within the focus area: 42
Number of riparian acres planted by CCSWCD: 25.5 acres
Number of riparian acres planted by Johnson Creek Watershed Council (in Clackamas County): 12.2 acres or roughly 1.3 miles – some of this property is rural residential, but may have a pet horse or goat.
Stream miles planted with native species by Clackamas River Basin Council: 15.61 miles (in some cases they counted both sides of the stream individually) – unfortunately after overlaying the GIS map of the planting, only 600 feet were included in our focus area and it was on land not influenced by agriculture.
Acres of irrigation management installed: 65 acres
Manure composting facilities: 1
Number of conservation plans written: 12
Number of fund application submitted: 5
Newsletters distributed: 324
Workshops/presentations held in the focus area: 8
Attendees at the workshops/presentations: 216
Displays/informational booths in focus area: 7
Other notes: The majority of riparian planting implemented through watershed council programs, supported by the District (through funding or referrals). Johnson Creek Watershed Council – CreekCare, Clackamas River Basin Council – Shade Our Streams

Planting implemented by Johnson Creek Watershed Council through the CreekCare program:
For the 2013-2015 biennium, we planted roughly 1.3 linear miles of stream (this work covers 12.2 acres) in Clackamas County as part of our CreekCare program.

Planting implemented by the Clackamas River Basin Council through the Shade our Stream program:

Shade Our Streams Planted Sites Planting Year	Site Phase	Sub-basin	Number of Tax Lots	Stream Length (Miles)	Planted Area (Acres)	Plants Planted
2012	Pilot Sites-Maintenance 3	Clear Creek	3	0.71	5.79	9,850
		Deep Creek	2	0.16	0.79	1,300
		Eagle Creek	1	0.08	0.46	1,090
2012 Planting Total*			**6**	**0.95**	**7.04**	**12,240**
2013	Maintenance 2	Clear Creek	16	3.51	21.31	41,625
Deep Creek	8	1.93	11.11	24,125		
Eagle Creek	1	0.10	0.48	875		
2014	Maintenance 1	Clear Creek	11	1.98	12.12	28,270
Deep Creek	16	2.68	16.72	43,850		
Eagle Creek	1	.41	2.02	5,200		
2014 Planting Total	**28**	**5.07**	**30.86**	**77,320**		
2012-2014 Completed Planting Total			**59 Tax Lots**	**11.56 Miles**	**79.88 Acres**	**156,185 Plants**

Appendix F: Previous Monitoring Efforts in the Clackamas Sub-Basin

ODA staff summarized pesticide monitoring data and pesticide management efforts in the Management Area for the 2012 biennial review:

- The U.S. Geological Survey conducted pesticide monitoring of the lower Clackamas River mainstem and tributaries in 2000-2005 (U.S. Geological Survey, 2008). A total of 63 pesticide compounds were detected, including 33 herbicides, 15 insecticides, 6 fungicides, and 9 pesticide degradation products. Pesticides were detected in all of the lower basin tributaries. The highest pesticide loads were found in North Fork Deep, Noyer, and Rock creeks, where 15 to 18 pesticides were detected. These creeks drain a mix of agricultural land (row crops and nurseries), pastureland, and rural residential areas. In the Clackamas River mainstem, 26 pesticides compounds were detected, typically at much lower concentrations than those detected in the tributaries. Although most of the 51 current-use pesticides detected have multiple uses, 48 can be used on agricultural crops (e.g. nurseries, floriculture, greenhouses). Pesticides occasionally exceeding their EPA aquatic-life benchmarks included the insecticides diazinon, chlorpyrifos, endosulfan, and azinphos-methyl. The greatest number of pesticides and the highest pesticide concentrations were detected during storms, which also yielded relatively high turbidity values.
- DEQ has conducted monitoring of current use pesticides from 2005 through 2011, including two predominantly agricultural creeks in the Management Area: North Fork Deep Creek and Noyer Creek. In 2011, 21 different pesticide substances were detected in Clackamas samples, compared to 17 in 2010. However, in 2011, two pesticides were detected at levels above water quality criteria or EPA (non-regulatory) aquatic life benchmarks, compared to five in 2010. In 2011, the detection frequency for the most commonly detected herbicides was similar to 2010. For instance, the two herbicides detected in over 50% of all 2011 Clackamas samples were the same two detected in over 50% of 2010 samples. In 2011, 11 pesticides were detected in Noyer Creek, 11 in North Fork Deep Creek, and 9 in Rock Creek. In 2010, 10 pesticides were detected in a single sample from Noyer Creek. Monitoring shows that pesticides commonly occur as mixtures of two or more different compounds. A growing body of research indicates that additive and/or synergistic effects can occur when multiple pesticides are found together in water samples (Baldwin et al. 2009, Macneale et al. 2010, Relyea 2009). Chlorpyrifos has been detected at levels above water quality criteria in Noyer Creek in six of the past seven monitoring years. However, chlorpyrifos concentrations have not exceeded water quality criteria at the North Fork Deep Creek site since 2007. In addition, other organophosphate insecticides with water quality criteria have also been detected over the past three years.
- Clackamas SWCD conducted pesticide sampling following storm events at 10 sites in the Deep Creek watershed in fall 2010 and spring 2011. Dieldrin exceeded recommended levels at one location, 4,4 DDE exceeded recommended freshwater criteria at six locations, 4,4 DDD exceeded freshwater criteria at two locations, Chlorpyrifos exceeded recommended levels at one location, and 4,4 DDT exceeded criteria at six locations. Other pesticides were detected (including aldrin, dieldrin, heptachlor, chlorpyrifos, simazine, Endosulfan II, trans-Nonachlor, and oxychlordane), but were below recommended criteria at all sites.
- In 2011, Clackamas River Water Providers, Clackamas SWCD, DEQ, and other partners sponsored two free, anonymous pesticide collection events that removed over 56,000 pounds of unusable pesticides, with most coming from the agricultural sector.

Appendix G: Public Water Systems Served By Service Water in the Clackamas Basins

Note: Table 1 does not include public water systems, which purchase drinking water from these water systems, but does include the population served by wholesale customers in the Total Population.

Sub-Basin	Watershed	County	PWS ID	Public Water System	Drinking Water Source	Population (including Buyers)	Number of Buyers	System Type
Lower Columbia/Sandy	Salmon River	Clackamas	01265	Arrah Wanna Water Company	Stream (Unnamed--Intake #1)	41		NC
Lower Columbia/Sandy	Zigzag River	Clackamas	00702	Rhododendron Summer Homes Assn.	Henry Creek	980		C
Lower Columbia/Sandy	Upper Sandy River	Clackamas	93609	Minikahda Water System	Minikahda Creek	25		NC
Lower Columbia/Sandy	Middle Sandy River	Clackamas	00789	City of Sandy	Alder Creek	7,320	1	C
Lower Columbia/Sandy	Bull Run River	Clackamas	00657	Portland Bureau of Water Works	Bull Run	765,092	14	C
Clackamas	Lower Clackamas River	Clackamas	00279	City of Estacada	Clackamas River	2,875		C
Clackamas	Lower Clackamas River	Clackamas	00187	Clackamas River Water - Clackamas	Clackamas River	36,900		C
Clackamas	Lower Clackamas River	Clackamas	00580	North Clackamas County Water Commission	Clackamas River	129,215	2	C
Clackamas	Lower Clackamas River	Clackamas	00591	South Fork Water Board - Oregon City	Clackamas River	138,307	3	C
Clackamas	Lower Clackamas River	Clackamas	00457	Lake Oswego Municipal Water	Clackamas River	39,193	1	C

System Type

C - "Community Water System (C)" means a public water system that has 15 or more service connections used by year-round residents, or that regularly serves 25 or more year-round residents.

NTNC - "Non-Transient Non-Community Water System (NTNC)" means a public water system that is not a Community Water System and that regularly serves at least 25 of the same persons over 6 months per year.

NC - "Transient Non-Community Water System (NC)" means a public water system that serves a transient population of 25 or more persons.

NP - "State Regulated Water System (NP)" means a public water system, which serves 4 to 14 service connections or serves 10 to 24 people. Monitoring requirements for these systems are the same as those for Transient Non-Community water systems.

Water Systems served by groundwater in the Clackamas and Sandy Basin

Subbasin/ County	Watershed	PWS ID	Public Water System	Population	System Type
Clackamas	Collawash River	92887	USFS Kingfisher CG	60	NC
Clackamas	Collawash River	92890	USFS Indian Henry CG	300	NC
Clackamas	Oak Grove Fork Clackamas River	01093	USFS Timber Lake JCC	450	NTNC
Clackamas	Oak Grove Fork Clackamas River	94206	USFS Harriet Lake CG	45	NC
Clackamas	Middle Clackamas River	00281	PGE Three Lynx (Oak Grove)	26	NTNC
Clackamas	Middle Clackamas River	01093	USFS Timber Lake JCC	450	NTNC
Clackamas	Middle Clackamas River	92606	USFS Riverside Campground - Hand Pump 3	45	NC
Clackamas	Middle Clackamas River	92621	USFS Roaring River Campground	45	NC
Clackamas	Middle Clackamas River	92624	USFS Sunstrip Campground - Hand Pump	30	NC
Clackamas	Middle Clackamas River	90485	Squaw Mountain Ranch Inc.	80	NC
Clackamas	Middle Clackamas River	92619	USFS Lazy Bend CG	100	NC
Clackamas	Middle Clackamas River	92622	USFS Fish Creek CG - Hand Pump	75	NC
Clackamas	Middle Clackamas River	92625	USFS Lockaby CG - Hand Pump	90	NC
Clackamas	Middle Clackamas River	94761	Silver Fox RV Park	100	NC
Clackamas	Eagle Creek	01419	Eagle Creek Mobile Estates	32	C
Clackamas	Eagle Creek	00266	Currinsville Mobile Home Park	90	C
Clackamas	Eagle Creek	01125	Mountain View Mobile Estates	93	C
Clackamas	Eagle Creek	01222	Eagle Crest Mobile Home Park	300	C
Clackamas	Eagle Creek	01264	Spar Tree Mobile Home Park	25	C
Clackamas	Eagle Creek	90053	Clackamas Co Parks - Eagle Fern	375	NC
Clackamas	Eagle Creek	93548	Eagle Creek Inn	50	NC
Clackamas	Eagle Creek	93549	Eagle Fern Camp	150	NC
Clackamas	Eagle Creek	94739	Porky's Deli & Pit	50	NC
Clackamas	Lower Clackamas River	00282	Springwater Estates	110	C
Clackamas	Lower Clackamas River	05086	Polehn Heights Water Association	150	C
Clackamas	Lower Clackamas River	90452	Clackamas Co Parks - Metzler Park	400	NC
Clackamas	Lower Clackamas River	93568	Springwater Golf Course	50	NC
Clackamas	Lower Clackamas River	94973	Clackamas Co Parks - Metzler Park #2	400	NC
Clackamas	Lower Clackamas River	00264	Paradise Community Association	75	C
Clackamas	Lower Clackamas River	00265	Twin Island Community	80	C
Clackamas	Lower Clackamas River	01252	Estacada Mobile Village	164	C
Clackamas	Lower Clackamas River	93594	OPRD Milo McIver State Park	850	NC
Clackamas	Lower Clackamas River	93957	PGE Faraday Dam	30	NTNC
Clackamas	Lower Clackamas River	00134	Kelso Water Association	350	C
Clackamas	Lower Clackamas River	00140	Barlow Trail Estates	180	C
Clackamas	Lower Clackamas River	00791	Wunder Mobile Park	100	C
Clackamas	Lower Clackamas River	01068	Big Valley Woods RV Resort	350	C
Clackamas	Lower Clackamas River	93700	Collins Retreat Center	30	NC

Clackamas	Lower Clackamas River	93720	Kelso Elementary, Sandy SD #46	400	NTNC
Clackamas	Lower Clackamas River	94992	Sandy Ridge Headstart (Clack Child Comm)	40	NTNC
Clackamas	Lower Clackamas River	00135	Boring Water District No 24	1,625	C
Clackamas	Lower Clackamas River	00139	Ranchero Petite Improvement District	40	C
Clackamas	Lower Clackamas River	00141	Orient Drive Mobile Estates	125	C
Clackamas	Lower Clackamas River	93564	Camp Kuratli At Trestle Glen	250	NC
Clackamas	Lower Clackamas River	94621	Backroads Pub & Grub	200	NC
Clackamas	Lower Clackamas River	94638	Borges Corner Store	50	NC
Clackamas	Lower Clackamas River	94669	Hoodview Junior Academy	120	NTNC
Clackamas	Lower Clackamas River	94670	Boring Middle School #44	480	NTNC
Clackamas	Lower Clackamas River	94706	Kellys Corner Market	100	NC
Clackamas	Lower Clackamas River	94946	Guide Dogs For The Blind, Inc.	75	NTNC
Clackamas	Lower Clackamas River	00280	Cedarhurst Improvement Club	70	C
Clackamas	Lower Clackamas River	90091	Viewpoint Restaurant/Lounge	50	NC
Clackamas	Lower Clackamas River	00188	Carver Water Co-Op Association	85	C
Clackamas	Lower Clackamas River	00189	Carver Mobile Ranch	95	C
Clackamas	Lower Clackamas River	00635	Sunrise Water Authority	40,374	C
Clackamas	Lower Clackamas River	01053	Riverbend Mobile Home Park	550	C
Clackamas	Lower Clackamas River	01145	Riverview Manufactured Home Court	375	C
Clackamas	Lower Clackamas River	05094	Youth Adventures Inc.	60	NTNC
Clackamas	Lower Clackamas River	90041	Clackamas Co Parks - Barton Park	300	NC
Clackamas	Lower Clackamas River	90516	Cedars Lutheran Outdoor Ministry	30	NC
Clackamas	Lower Clackamas River	93715	Eagle Creek Elementary, SD 108	330	NTNC
Clackamas	Lower Clackamas River	94639	Eagle Creek Chevron-Hwy 224	300	NC
Clackamas	Lower Clackamas River	95121	Clackamas Co Parks - Barton RV Park	90	NC