Oregon
Department
of Agriculture

Sandy Subbasin Agricultural Water Quality Management Area Plan

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Developed by the:

Oregon Department of Agriculture

And

The Sandy Subbasin Local Advisory Committee

With support from the:

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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
CFS – Cubic Feet Per Second
CNPCP – Coastal Nonpoint Pollution Control Program
CRP – Conservation Reserve Program
CREP – Conservation Reserve Program
CWA – Clean Water Act
CZARA – Coastal Zone Act Reauthorization Amendments
DEQ – Oregon Department of Environmental Quality
EMSWCD – East Multnomah Soil and Water Conservation District
EPA – Environmental Protection Agency
EQIP – Environmental Quality Incentive Program
ESA – Endangered Species Act
FIFRA – Federal Insecticide Fungicide Rodenticide Act
GWMA – Groundwater Management Area
HUC – Hydrologic Unit Code
IPM – Integrated Pest Management
LAC – Local Advisory Committee
LMA – Local Management Agency
Management Area – Agricultural Water Quality Management Area
MGD – Million Gallons Per Day
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
RCA – Required Corrective Action
RM – River Mile
RUSLE – Revised Universal Soil Loss Equation
SOW – Scope of Work
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
USFS – U.S. Forest Service
WPCF – Water Pollution Control Facility
WQPMT – Water Quality Pesticides Management Team

Foreword

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

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

Required Elements of Area Plans

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

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

Plan Content

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

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

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

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

Chapter 1: Agricultural Water Quality Management Program Purpose and Background

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

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

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

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

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

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

1.2 History of the Ag Water Quality Program

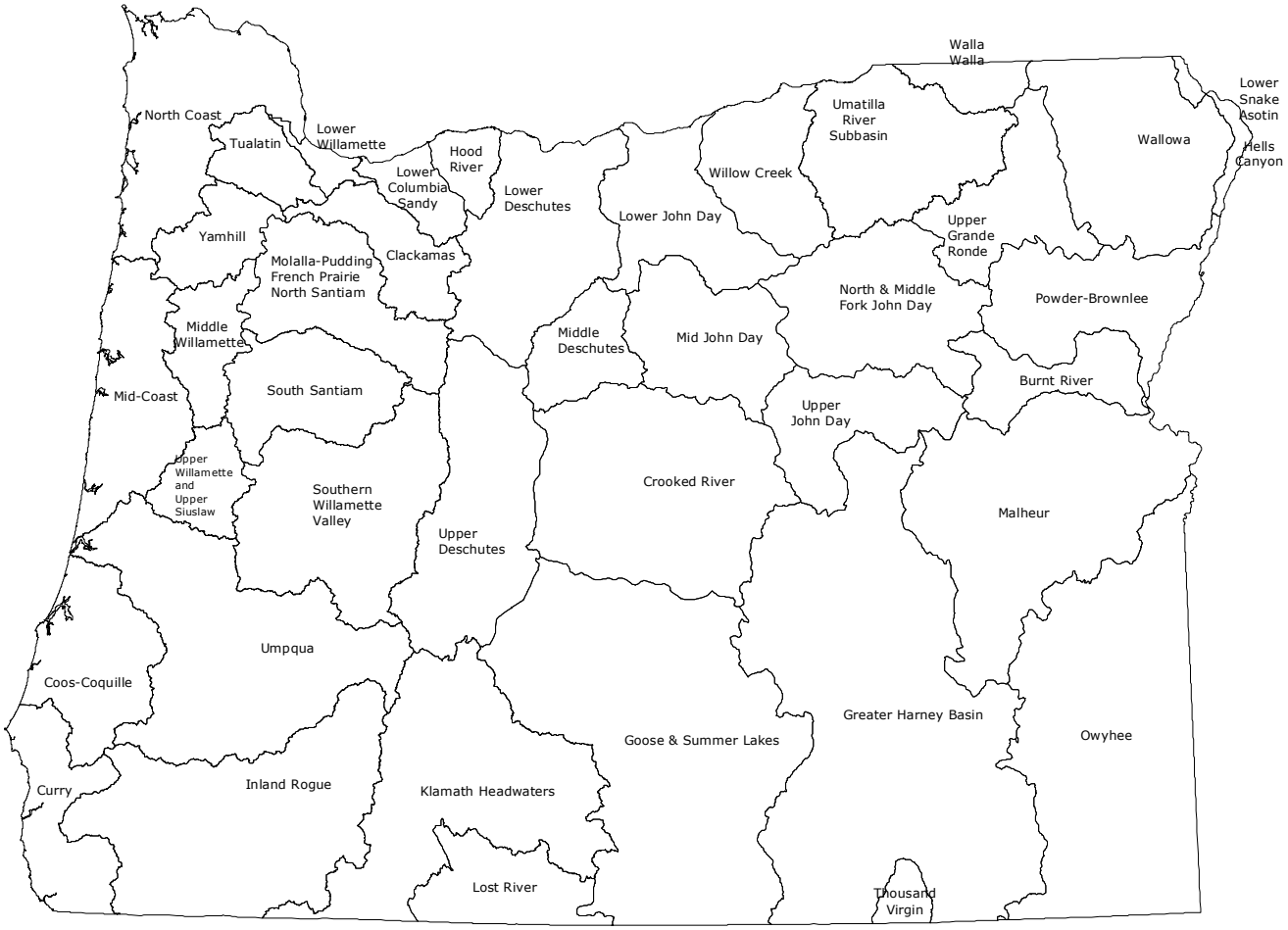
In 1993, the Oregon Legislature passed the Agricultural Water Quality Management Act, directing ODA to develop plans to prevent and control water pollution from agricultural activities and soil erosion, and to achieve water quality standards (ORS 568.900 through ORS 568.933). The Oregon Legislature passed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

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

- Providing education, outreach, and technical assistance to landowners.
- Implementing projects to improve agricultural water quality.

- Investigating complaints of potential violations of Area Rules.
- Conducting biennial reviews of Area Plans and Area Rules.
- Monitoring, evaluation, and adaptive management.
- Developing partnerships with state, federal, and tribal agencies, watershed councils, and others.

Figure 1: Map of 38 Agricultural Water Quality Management Areas



1.3 Roles and Responsibilities

1.3.1 Oregon Department of Agriculture (ODA)

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

- State water quality standards.

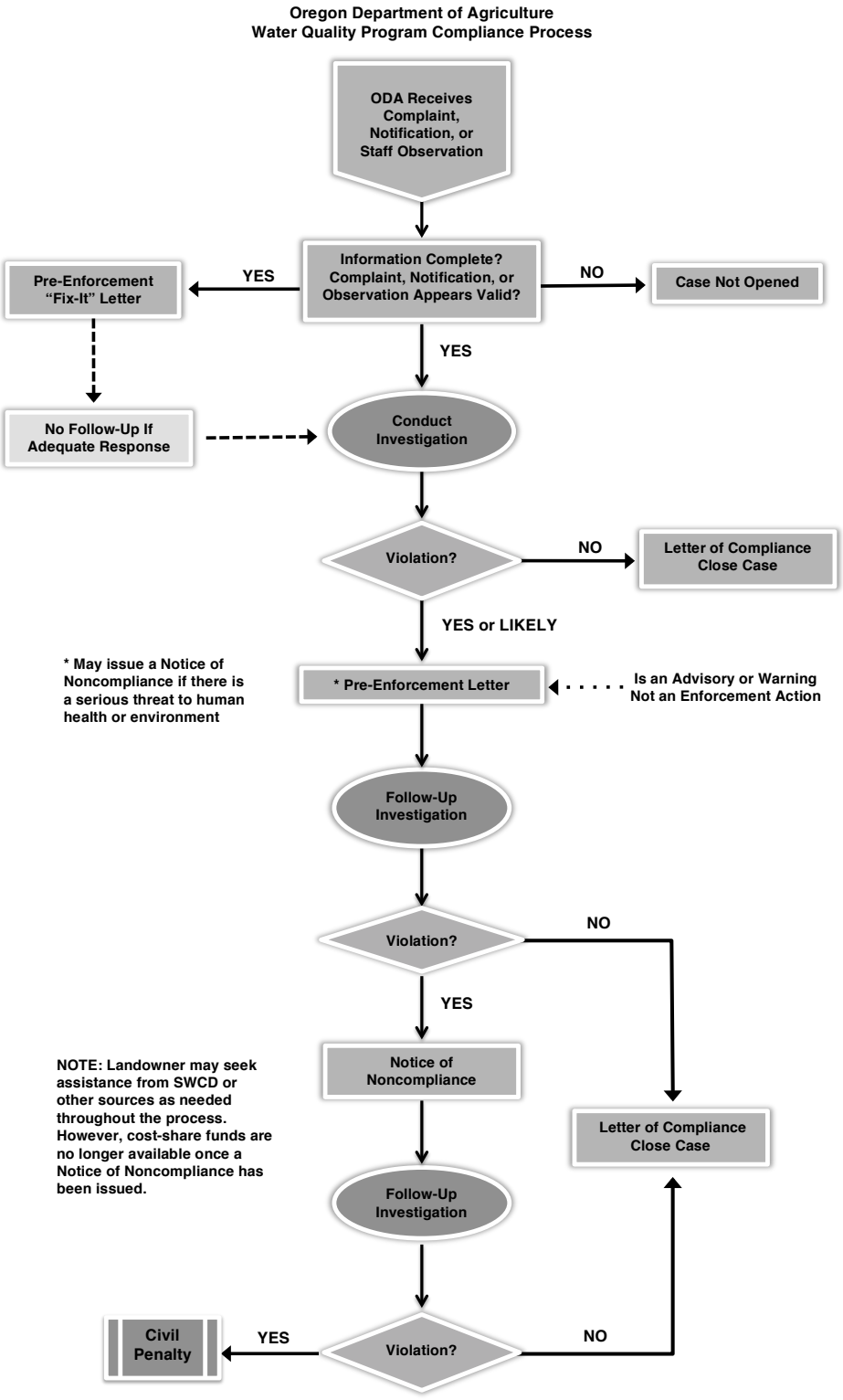
- Load allocations for agricultural nonpoint source pollution assigned under Total Maximum Daily Loads ((Total Maximum Daily Loads) (TMDLs)) issued pursuant to the Clean Water Act (CWA), Section 303(d).
- Approved management measures for Coastal Zone Act Reauthorization Amendments (CZARA).
- Agricultural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

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

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

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

Figure 2: Compliance Flow Chart



1.3.2 Local Management Agency

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

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

1.3.3 Local Advisory Committee (LAC)

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

The LAC is convened at the time of the biennial review, however, 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 subsequent revisions of the Area Plan.
- Participate in the development and subsequent revisions of the Area Rules.
- Recommend strategies necessary to achieve the goals and objectives in the Area Plan.
- Participate in biennial reviews of the progress of implementation of the Area Plan and Area Rules.
- Submit written biennial reports to the Board of Agriculture and the ODA director.

1.3.4 Agricultural Landowners

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

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

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

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

- Conditions resulting from unusual weather events.
- Hot springs, glacial melt water, extreme or unforeseen weather events, and climate change.
- Septic systems and other sources of human waste.

- Public roadways, public culverts, public roadside ditches and shoulders.
- Dams, dam removal, hydroelectric plants, and non-agricultural impoundments.
- Housing and other development in agricultural areas.
- Impacts on water quality and streamside vegetation from wildlife such as waterfowl, elk, and feral horses.
- Other circumstances not within the reasonable control of the landowner.

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

1.3.5 Public Participation

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

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

1.4 Agricultural Water Quality

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

1.4.1 Point and Nonpoint Sources of Water Pollution

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

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

1.4.2 Beneficial Uses and Parameters of Concern

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

beneficial uses in the Management Area. Beneficial uses that have the potential to be impaired in this Management Area are summarized in Chapter 2.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

1.4.5 Streamside Vegetation and Agricultural Water Quality

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

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

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

Site-Capable Vegetation

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

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

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

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

1.5 Other Water Quality Programs

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

1.5.1 Confined Animal Feeding Operation Program

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

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

1.5.2 Groundwater Management Areas

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

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

1.5.3 The Oregon Plan for Salmon and Watersheds

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

1.5.4 Pesticide Management and Stewardship

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

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

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

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

PMP sets forth a process for preventing and responding to pesticide detections in Oregon's ground and surface water resources.

1.5.5 Drinking Water Source Protection

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

1.6 Partner Agencies and Organizations

1.6.1 Oregon Department of Environmental Quality (DEQ)

The US EPA delegated authority to Oregon to implement the federal CWA in our state. DEQ is the lead state agency with overall authority to implement the CWA in Oregon. DEQ coordinates with other state agencies, including ODA and ODF, to meet the requirements of the CWA. The DEQ sets water quality standards and develops TMDLs for impaired waterbodies, which ultimately are approved or disapproved by the US EPA. In addition, DEQ develops and coordinates programs to address water quality including NPDES permits for point sources, the CWA Section 319 grant program, Source Water Protection, the CWA Section 401 Water Quality Certification, and GWMAs. DEQ also coordinates with ODA to help ensure successful implementation of Area Plans.

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

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

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

1.6.2 Other Partners

Oregon Department of Agriculture and SWCDs work in close partnership with local, state, and federal agencies and organizations, including: DEQ (as indicated above), the United States Department of Agriculture (USDA) NRCS and Farm Service Agency, watershed councils, Oregon State University Agricultural Experiment Stations and Extension Service, Tribes, livestock and commodity organizations, conservation organizations, and local businesses. As resources allow, SWCDs and local partners provide technical, financial, and educational

assistance to individual landowners for the design, installation, and maintenance of effective management strategies to prevent and control agricultural water pollution and to achieve water quality goals.

1.7 Measuring Progress

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

1.7.1 Measurable Objectives

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

The AgWQ Program is working throughout Oregon with SWCDs and LACs toward establishing long-term measurable objectives to achieve desired conditions. ODA, the LAC, and the SWCD will establish measurable objectives and associated milestones for each Area Plan. Many of these measurable objectives relate to land conditions and primarily are implemented through focused work in small geographic areas (section 1.7.3), with a long-term goal of developing measurable objectives and monitoring methods at the Management Area scale.

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

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

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

1.7.2 Land Condition and Water Quality

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

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

- Landowners can see land conditions and have direct control over them.
- Improved land conditions can be documented immediately.
- Reductions in water quality from agricultural activities are primarily due to changes in land conditions and management activities.
- It can be difficult to separate agriculture's influence on water quality from other land uses.

- There is generally a lag time between changes on the landscape and the resulting improvements in water quality.
- Extensive monitoring of water quality would be needed to evaluate progress, which would be cost-prohibited and could fail to demonstrate improvements in the short term.

Water quality monitoring data will help ODA and partners to measure progress or identify problem areas in implementing Area Plans. However, as described above, water quality monitoring may be less likely to document the short-term effects of changing land conditions on water quality parameters such as temperature, bacteria, nutrients, sediment, and pesticides.

1.7.3 Focused Implementation in Small Geographic Areas

Focus Areas

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

Systematic implementation in Focus Areas provides the following advantages:

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

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

Strategic Implementation Areas

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

1.8 Monitoring, Evaluation, and Adaptive Management

The Oregon Department of Agriculture, the LAC and the LMA will assess the effectiveness of the Area Plan and Area Rules by evaluating the status and trends in agricultural land conditions and water quality data (Chapter 4). This assessment will include an evaluation of progress toward measurable objectives. ODA will utilize other agencies' and organizations' local monitoring data when available. ODA, DEQ, SWCDs, and LACs will examine these results during the biennial review and will revise the goal(s), measurable objectives, and strategies in Chapter 3, as needed.

1.8.1 Agricultural Water Quality Monitoring

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

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

1.8.2 Biennial Reviews and Adaptive Management

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

Chapter 2: Local Background

2.1 Local Roles and Responsibilities

2.1.1 Local Advisory Committee

For each Management Area, the director of ODA appoints a LAC (OAR 603-090-0020) with as many as 12 members to assist with the development and subsequent biennial reviews of the local Area Plan and Area Rules. The LAC serves in an advisory role to the director of ODA and to the Board of Agriculture. LACs are composed primarily of agricultural landowners in the Management Area and must reflect a balance of affected persons. 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.

The Sandy Subbasin LAC was formed in January 1999 to assist with the development of this Area Plan and Area Rules. The LAC members are involved in a wide variety of operations including row crops, nursery, livestock, grain, vegetables, hay, timber, and berries. The East Multnomah SWCD and small acreage interests are also represented on the LAC. Recreational and environmental interests have also been represented on the LAC in the past. Current LAC members are:

(Chair)	Vacant	
(Vice-Chair)	Vacant	
Member Name	**Location**	**Description**
Chris Winters	Troutdale	Vegetables/Row Crops
Dave Tobie	Corbett	Hay/Vegetables
David Zeller	Gresham	Vegetables/Row Crops
Deniece Tucker	Troutdale	Nursery
Dianna Pope	Corbett	East Multnomah SWCD
John Bergan	Troutdale	Nursery
Susan Fry	Corbett	Pasture/Horses

The LAC may meet as frequently as necessary to carry out their responsibilities, which include but are not limited to:

- Participate in the development and ongoing revisions of the Area Plan;
- Participate in the development and revisions of the Area Rules;
- Recommend strategies necessary to achieve the goals and objectives in the Area Plan;
- Participate in biennial reviews of the progress of implementation of the Area Plan and Area Rules;
- Coordinating with ODA to submit a written biennial report to the Board of Agriculture and the ODA director.

2.1.2 Local Management Agency

The implementation of this Area Plan is accomplished through an Intergovernmental Agreement between ODA and the Sandy and East Multnomah SWCD(s). This Intergovernmental Agreement defines the SWCD(s) as the Local Management Agencies (LMA) for implementation of the Area Plan. The SWCD(s) were also involved in development of the Area Plan and associated Area Rules.

Responsibilities as the LMA include:

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

2.2 Area Plan and Rules: Development and History

The director of ODA approved the Area Plan and Area Rules in May of 2001. Since approval, the LAC has met in 2005, 2008, 2010, 2012, 2015, 2017, and 2019 to review the Area Plan and Rules. The review process included assessment of the progress of the Area Plan and implementation toward achievement of plan goals and strategies. See sections 1.8.3 and 4.4 for a description of the biennial review process and results from the 2019 Biennial Review.

2.3 Geographical and Physical Setting

2.3.1 Location and Land Use

The Sandy Subbasin is in northwest Oregon, with the southern three-fourths located in Clackamas County and the northern one-fourth located in Multnomah County. Elevation in the Sandy Subbasin ranges from 11,235 feet on the upper slopes of Mt. Hood to approximately 20 feet at the confluence of the Sandy and Columbia rivers. Figure 3.

The predominant land use in the Management Area is forest (Table 1). The forested areas are generally in the eastern part of the Management Area, in the foothills, and upper elevations of the Cascade Range. Commercial forest is under public and private ownership. Public lands include the Mt. Hood National Forest (68 percent of the Management Area) and Bureau of Land Management lands (3 percent of the Management Area). The U.S. Forest Service manages the national forest to restore and maintain ecosystem health and aquatic habitats while working with communities to provide opportunities for employment and economic growth through timber sales. Stewardship contracts are special timber sales where a portion of the revenues directly support stream and forest land restoration. Another 24 percent of the Management Area is in private, non-agricultural forest use. Private forest ownership is industrial, nonindustrial, and smaller woodlots. Private landowners manage their forests and woodlands for timber production, along with other diverse values, which may include forest health, fish and wildlife habitat, soil and water quality, and recreation. Water quality impacts on non-federal forests are regulated under the Oregon Forest Practices Act.

Table 1: Land Use in the Sandy Subbasin Management Area by State Zoning (Acres) *Data: 2017 - Oregon Department of Land Conservation and Development* *See Figure 3: Map of the Sandy Subbasin Management Area*	
Zones	**Sandy Management Area (Acres)**
Farm Use	14,897
Mixed Farm Forest	426
Forest Private and Federal	305,776
Rural Residential	13,538
Commercial	837
Industrial	224
Public Use, Parks and Open Space	23,771
Low to Very High Density Residential	4,247

The westernmost portion of the Management Area is predominantly agricultural, with the urban areas quickly expanding. In September of 2016, the population in the city of Sandy was estimated at 10,644; the city of Troutdale was 16,631, and the city of Gresham was 110,553 (Census 2016). The area known as the Mt. Hood Corridor, consisting of communities along Highway 26 from Brightwood to Government Camp, was estimated in 2010 to have approximately 5,057 residents (Census 2016).

2.3.2 Agriculture

A small portion of the watershed is intensively farmed. Intensive agriculture includes productive cultivated land such as row crops, nursery stock, cane berries, grasses, irrigated hay and pasture, and specialty crops (e.g. herbs). A high percentage of the farms in the Management Area are small acreage farms with 50 acres or less. Most of the farmland is in the northwestern portion of the watershed. The slopes of most of the cultivated land range from zero to 15 percent (Green, 1983). The agricultural activities east of Sandy tend to focus more on livestock and Christmas tree production.

Sandy Subbasin soils are formed through a range of conditions and a mix of parent material. High elevation cold soils were formed from volcanic ash mixed with glacial till and materials from Mt. Hood's basaltic and andesitic volcanic rock. Soils in the lower watershed are warm, dry, silt soils formed from glacial and volcanic materials deposited by water and wind in the lower watershed. Agricultural soils are composed primarily of silt loams with a three to eight percent slope (Gerig, 1985). Most of the major crops, such as row crops and nursery stock, are grown on deep, well drained to poorly drained, warm, moist soils on uplands in the Corbett and East Gresham area.

For detailed information about soil in the Sandy Subbasin Management Area, refer to USDA NRCS Web Soil Survey at https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm.

The types of crops grown in the Management Area have shifted over the last century. The primary land use, until around the 1930s, was timber with dairies also very common. In the 1920s and 1930s, some of the more intensive agriculture was focused around row crops, bulb farms, and strawberries. It was common to cultivate extremely steep land, which was physically possible with the horse and plow.

World War II drastically changed the farming emphasis in the watershed. Many people headed to Portland to work in factories, thus creating more of a "hobby farm" style for many people. Many of the steeper areas are no longer cultivated and have been converted to pasture or have been allowed to revert back to a more "wild state." Dairies have also disappeared from the area (Mershon, 1999). The land use in the area surrounding the city of Sandy is predominantly timber. Livestock is also common in the area, with the last ten years seeing more development of nursery stock.

Table 2: Agricultural Production in Clackamas and Multnomah Counties (2012)

2012 US Census of Agriculture: https://www.nass.usda.gov/AgCensus/ (last accessed 3/1/2019)

NOTE: This data is for discussion purposes only. It is not likely that the census results include all operations that meet the definition of a farm or that all those that do meet the definition of a farm respond to the census inquiry. Information could be missing or inaccurate and is a report for all of Clackamas and Multnomah Counties not just the Sandy Subbasin Management Area. 2017 US Census of Agriculture data will be available April 2019.

Production	Clackamas County	Multnomah County
Total Land in Agricultural Production (acres)	162,667	29,983
Number of Farms	3,745	598
Average Size of Farms (acres)	43	50
Irrigated Land (acres)	22,150	4,637
Total Cropland (acres)	2,541	17,441
Land in Pasture-All Types (acres)	45,342	7,728
# of permitted *Confined Animal Feeding Operations	8	2
# Farms in the USDA National Organic Program	75	21
# Farms enrolled in USDA **Conservation Programs	30	2
Livestock (# farms with:)		
# farms: with Beef Cows	986	111
Milk Cows	35	3
Equine: Horses, Ponies, Mules, and Donkeys	1,005	102
Layers/ Poultry/ Turkey	683	122
Goats: Milk/ Angora/ Meat	250	34
Sheep and Lambs	267	39
Hogs and Pigs	104	20
Llamas and Alpacas	165	21
Total Bee Colonies	9,365	830
Crops (acres)		
Field Seeds, Grass Seeds, Hay, Forage, Silage	26,236	1,270
Vegetable Row Crops	3,996	2,505
Orchards and Berries (acres)		
Land in Orchards	6,234	259
Land in Christmas Trees	15,951	303
Land in Berries	3,401	1,003
Greenhouse/ Nurseries		
All Greenhouse and Nursery Types (in acres of growing square footage)	401	22.8

* Data from Oregon Department of Agriculture, Confined Animal Feeding Operation Program 2018

** Conservation Reserve, Wetlands Reserve, Farmable Wetlands, and CREP

Farming practices in the Management Area has also undergone changes. With the invention of the tractor and less emphasis on farming, steep areas are no longer cultivated, thus reducing soil erosion. Over the past few years, cover cropping, field buffer strips, and changes in tillage practices have been promoted to reduce soil erosion from land that is being cultivated. Improvements in farming equipment have allowed for fewer trips over a field, resulting in decreased soil compaction. Sub-soiling has also helped to reduce runoff and compaction.

2.3.3 Water Resources

The Sandy River originates from Reid Glacier at approximately 6,200 feet above sea level. Annual rainfall ranges from 40-inches in the Troutdale area to 170-inches at some of the higher elevations in the Cascades. Annual snowfall is about 278-inches in the higher elevations. The ratio for snowfall is ten-inches of snow per one-inch of rain (Taylor, 1999). Heaviest precipitation occurs between November and January in the Subbasin.

The Subbasin drains approximately 582 square miles (373,400 acres), which flows into the Columbia River. The Sandy River and its tributaries drain 508 square miles (325,000 acres) and runs for 56 miles and flows into the Columbia River near the city of Troutdale. Major tributaries to the Sandy River include the Zigzag, Salmon, and Bull Run rivers. The remaining area represents smaller streams that flow directly into the Columbia River. These creeks include Tanner, Moffett, McCord, Horsetail, Oneonta, Multnomah, Coopey, Bridal Veil, Young, and Latourell. The Sandy Subbasin Management Area is a 4th field watershed with Hydrologic Unit Code (HUC) number 17080001.

Water in the Management Area is appropriated and diverted for municipal, fish, industrial, and irrigation use. The primary use for which water rights are issued in the Subbasin is municipal. The largest designation is to the city of Portland for municipal applications. All other uses in the basin have been appropriated for a combined amount of 173 cfs (cubic feet per second). Of that, 26 cfs are allocated for agriculture in the Subbasin (OWRD 1997). There are 2,504 acres of irrigated agricultural lands mostly in the lower watershed around Big and Beaver creeks. Water users also hold rights to store water in several impoundments and behind dams. Approximately 1,900 acre-feet of water may be stored in the Sandy Subbasin.

The city of Portland holds a statutory right to the water in the Bull Run and Little Sandy rivers. In an average weather year, the Portland Water Bureau estimates that peak season (122 days) daily average water demand is about 123 million gallons per day (MGD). Future projected demand from the system is contingent on a number of variables, including: population growth, service area, long-term climate change, and conservation assumptions. The current projection for average daily peak season demand (from the Bull Run system and the Columbia South Shore Well Field) in the year 2028 is 133 MGD (Portland Water Bureau, 2010). This would be about 25 percent utilization of the Bull Run River's annual discharge. To supply this water, two dams have been built on the Bull Run River thus creating two reservoirs. The city of Portland is not currently utilizing its right to the waters of the Little Sandy River.

Other municipal water users in the Sandy Basin are the Corbett Water District and the city of Sandy. The city of Sandy has water rights on Brownell Springs and Alder Creek, as well as rights on the Salmon River for future use. Surface water and groundwater supply several public drinking water systems within the Sandy Basin. These water systems are summarized in Appendix D.

The Oregon Water Resources Department (WRD) has designated (OAR 690-502-160) a groundwater-restricted area that includes a portion of the Sandy Basin north of the city of Sandy. Groundwater extraction in this area may exceed the recharge rate and restrictions apply to shallow and deep aquifers in the Troutdale Formation. There are 330 individual rights to withdraw groundwater in the Sandy Basin for agricultural and municipal use as well as numerous private domestic wells.

Stream flow in the Sandy River watershed varies throughout the year, with high and low flows having different impacts on the landscape and resources. Stream flows vary widely between summer and winter. Table 3 is a summary of flow data from the Sandy River below Bull Run River.

During the winter high stream flows, a prominent resource concern is soil erosion. During periods of low stream flow, nutrients can more negatively impact water quality because of their greater concentration than in periods of higher stream flow.

Higher stream temperatures associated with low flow in the summertime are a major factor affecting aquatic life. Peak temperatures that typically occur in late-July and early August can impact salmonid rearing life stage. Several glaciers feed the Sandy River acting as reservoirs. During the summer, the glacial reservoirs release cool flows helping to maintain cool stream temperatures and regulate summer flows.

Table 3: Sandy River Surface Water Records Period of record from 1910-2016 Drainage Area = 436 square miles USGS Gage 14142500 at Sandy River Below Bull Run River https://waterdata.usgs.gov/or/nwis/current/?type=flow (last accessed February 2019)		
Winter Monthly Mean Peak Discharge	December at 3,720 cfs.	January at 3,570 cfs.
Summer Monthly Mean Low Discharge	August at 491 cfs.	September at 504 cfs.
Maximum Discharge on Record	December 22, 1964 at 84,400 cfs.	
Minimum Discharge on Record	September 26, 1962 at 45 cfs.	
Highest Annual Average Flow	1996 at 3,456 cfs.	
Lowest Annual Average Flow	2001 at 1,334 cfs.	
2018 Average Annual Flow was 2,131 cfs.		

Due to heavy precipitation in the winter, slope instability or landslides contribute to some of the sediment production in the area (Sandy River Basin Watershed Council, 1999). Glacial till also contributes to sediment production in the watershed during the summer glacial melting season.

The Troutdale Formation is the main groundwater aquifer in the Sandy Subbasin. The Troutdale Formation aquifer has permits issued for its use equaling about 17,000 acre-feet of groundwater per year. Municipal needs account for 71 percent and agriculture for 28 percent. The remaining one percent is for industrial and recreation uses. The Troutdale Formation aquifer can supply from 100 to 500 gallons per minute (OWRD, 1991). Groundwater reduction in the Troutdale Formation aquifer near Sandy has become a concern. A major problem in the Management Area is groundwater contamination from human activities. Improper sewage and industrial waste disposal have caused problems with groundwater contamination. The increasing number of individual septic systems threatens to further contaminate aquifers in the Sandy Subbasin, including the Troutdale Formation aquifer (OWRD, 1991).

Two wastewater treatment plants discharge directly into the Sandy River. The city of Troutdale discharges 1.6 MGD into the Sandy River and the Hoodland Wastewater Treatment Plant, serving Welches and Rhododendron, and discharges about 300,000 gallons a day into the Sandy River. The Government Camp Sanitary District discharges 90,000 gallons a day into Camp Creek, a tributary of the Sandy River. Discharge levels are strongly influenced by weather conditions. Sites and facilities holding storm water and industrial wastewater permits also discharge to surface water in the Sandy Subbasin, and several facilities hold permits to discharge wastewater to land application or subsurface systems.

2.3.4 Biological Resources

A number of river-reaches in the Management Area are recognized for their scenic beauty. The Sandy River, from Dodge Park to Dabney State Park, is a state Scenic Waterway and a national Wild and Scenic River. Other national Wild and Scenic Rivers in the Subbasin include the headwaters of the Sandy to the National Forest Service Boundary (12.4 miles) and the Salmon River from its headwaters to the confluence with the Sandy River. The Lower Columbia portion of the Subbasin is part of the Columbia River Gorge National Scenic Area.

The diversity and acreage of natural wildlife habitats in the Management Area has been reduced as land has been converted from natural forest and grasslands to managed forests, pasture, cropland, homesteads, rural, and urban areas. Between 1982 and 1992, about one hundred acres of wetlands were converted to other land uses. During that same time, approximately 1,800 acres of forestland was converted to some other broad uses (Greber, 1999). As a result of the changes in land use, some of the ecological functions of wetland and riparian areas have been impaired. These areas filter contaminates, trap sediment, and provide fish and wildlife habitat. Wetland and riparian vegetation also regulate hydrologic fluctuations by retaining water during high flows, stabilizes streambanks, and provides shade that helps maintain cooler water temperatures. Wetland and in-stream water replenish groundwater, which in turn provides in-stream water during summertime drought.

The Sandy Subbasin watershed hosts a number of vertebrate species that depend on aquatic habitats. The most common and widespread cause of thermally-induced fish mortality is attributed to interactive effects of decreased or lack of metabolic energy for feeding, growth, or reproductive behavior, increased exposure to pathogens, decreased food supply, and increased competition from warm water tolerant species. This indirect or sub-lethal mortality is more delayed and occurs weeks to months after the onset of elevated temperatures (mid-60°F/ 15.5°C – low 70°F/ 21.2°C) (Sandy TMDL 2005). Native salmonids and other fish species with a federal or state conservation status is summarized in Table 3.

Additional native Oregon fish species include:

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

Table 4: Sandy Subbasin Native Fish Species with Federal or State Conservation Status

Species	Population	Federal Status Endangered Species Act	State Status Sensitive Species List or Oregon ESA
Steelhead Trout – winter run *(Oncorhynchus mykiss)*	Lower Columbia River	Threatened	Critical
Chinook Salmon – fall/spring runs *(Oncorhynchus tshawytscha)*	Lower Columbia River	Threatened	Critical
Coho Salmon *(Oncorhynchus kisutch)*	Lower Columbia River	Threatened	Endangered
Coastal Cutthroat Trout *(Oncorhynchus clarkii clarki)*	Lower Columbia River	Not Listed	Vulnerable
Chum Salmon *(Oncorhynchus keta)*	Columbia River	Threatened	Critical
Pacific Smelt (Eulachon) *(Thaleichthys pacificus)*	Southern Population	Threatened	Not Listed
Pacific Lamprey *(Lampetra tridentata)*	Oregon	Not Listed	Vulnerable
Western Brook Lamprey (*Lampetra richardsoni)*	Oregon	Not Listed	Vulnerable

Sources:

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

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

- Pacific giant salamander *(Dicamptodon ensatus)*
- Oregon spotted frog *(Rana pretiosa)*

- Coastal tailed frog *(Ascaphus truei)*
- Western toad *(Anaxyrus boreas)*
- Northern red-legged frog *(Rana aurora)*
- Cascades frog (*Rana cascadae*)
- Western painted turtle *(Chrysemys picta bellii)*
- Western pond turtle *(Actinemys marmorata)*

2.4 Water Quality in the Sandy Subbasin

2.4.1 Water Quality Concerns

Overall, surface water quality in the Management Area varies from very good to fair. Water quality is quite good through the winter months during increased stream flows. Summer low flows reduce fish holding, spawning, and rearing areas, food production, and water quality. Water quality parameters of concern in the Sandy Subbasin are bacteria, temperature, dissolved oxygen, toxics, and biological criteria.

2.4.2 Beneficial Uses

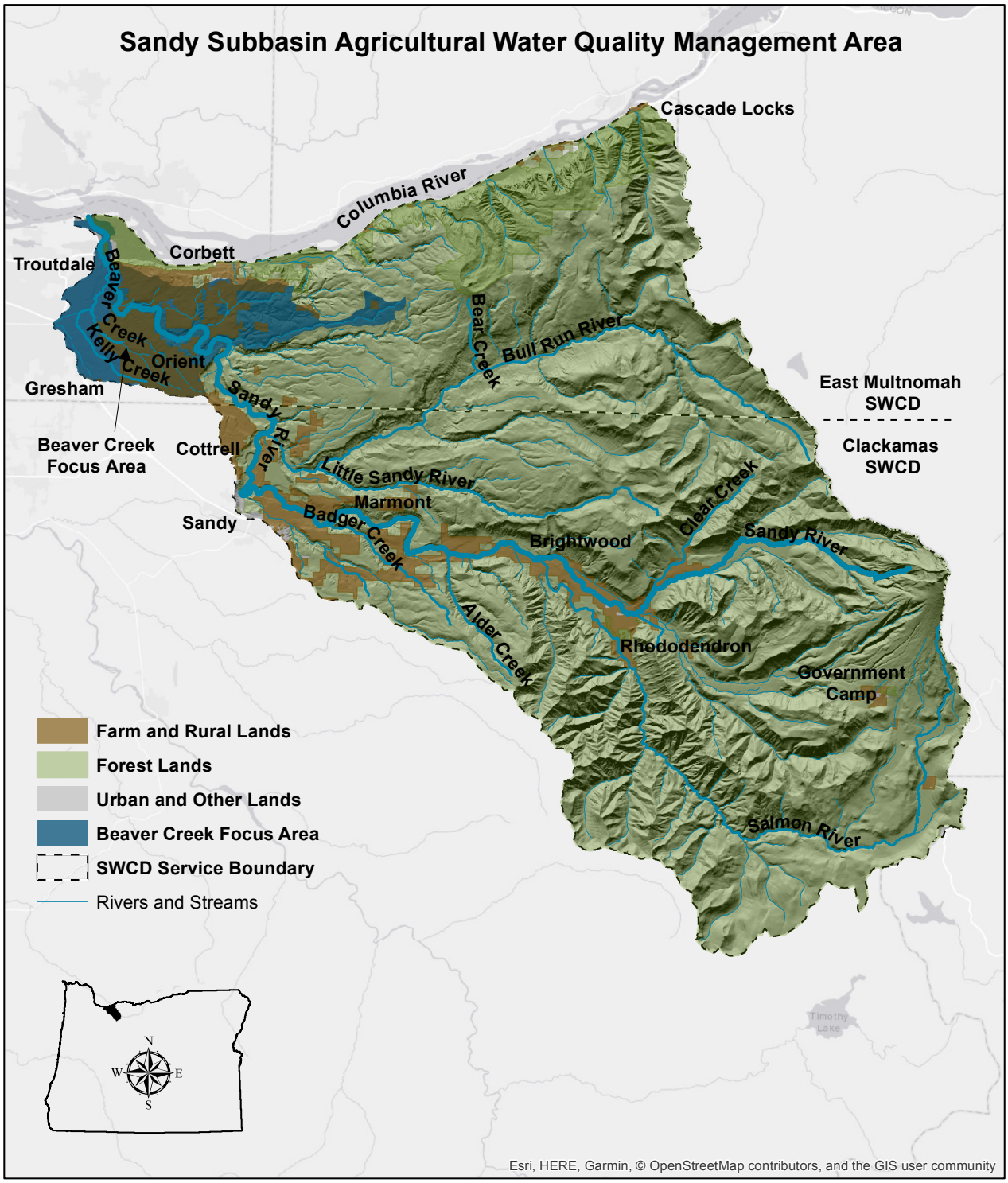
Water quality standards are established to protect beneficial uses of the state's waters. Beneficial uses are assigned by basin in the OARs for water quality (OAR 340-041-0002(17). Table 5 summarizes the State of Oregon's designated beneficial uses for the Sandy Subbasin.

Table 5: State of Oregon Designated Beneficial Uses for the Sandy Subbasin
Adapted from the 2003 Table 286A at: https://www.oregon.gov/deq/Rulemaking%20Docs/table286a.pdf

Beneficial Use	Streams Forming Waterfalls Near Columbia River Highway	Sandy River	Bull Run River and All Tributaries	All Other Tributaries to Sandy River
* Public Domestic Water Supply		X	X	X
Private Domestic Water Supply		X		X
Industrial Water Supply		X		X
Irrigation		X		X
Livestock watering		X		X
Fish and Aquatic Life	X	X	X	X
Wildlife and Hunting	X	X		X
Fishing	X	X		X
Boating		X		X
Water Contact Recreation	X	X		X
Aesthetic Quality	X	X	X	X
Hydro Power		X**	X	X

*With adequate pretreatment (filtration and disinfection) and natural quality to meet drinking water standards
**The Marmot Dam was removed in 2007 from the Sandy River.
Numeric and narrative water quality standards are designed to protect the most sensitive beneficial uses. Resident fish and aquatic life and salmonid spawning, rearing and migration are the most sensitive temperature-related beneficial uses occurring in the watershed.

Figure 3: Map of the Sandy Subbasin Management Area



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Prepared By: B. Sanchez
Date Saved: 2/7/2019
Date Printed: 2/7/2019
Scale: 1:300,000
Projection: NAD 1983 Oregon Statewide Lambert Feet Intl
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Salem, OR 97301-2532

2.4.3 WQ Parameters and 303(d) List

Section 303(d) of the Federal Clean Water Act requires that a list be developed of all impaired or threatened waters within each state. DEQ is responsible for assessing data, compiling the 303(d) list, and submitting the 303(d) list to US EPA for federal approval. Water quality monitoring data reviewed by DEQ indicated that portions of the Sandy River and tributaries failed to meet water quality standards. The following water quality parameters were used by DEQ in establishing the 303(d) list for the Sandy River Subbasin: temperature, bacteria, dissolved oxygen, and biological criteria.

In December 2018, the EPA approved Oregon's 2012 Clean Water Act Section 303(d) list of impaired waterbodies that need pollution reduction plans. The approved additions and removals are now effective for CWA purposes. For more information on water quality pollutants, see Appendix E.

Table 6: 303(d) List of *Pollutants and Impaired Waterbodies Sandy Subbasin Management Area *Updated from the DEQ 2012 Integrated Report (Last Accessed 2/4/19)* https://www.deq.state.or.us/wq/assessment/rpt2012/search.asp (Cat 5: Water Quality Limited, 303(d) List (TMDLs needed for these water quality pollutants)
Biological Criteria: Beaver, Clear, Little Sandy, and Little Zigzag Canyon creeks; Salmon River, South and Fork Salmon River
Chlordane: Kelley and Beaver creeks
DDE 4,4, DDD 4,4, DDT 4,4: Kelley and Beaver creeks and the Columbia River
Dieldrin: Kelley and Beaver creeks
Dissolved Oxygen: Bear Creek
Heptachlor epoxide: Kelley and Beaver creeks
Lead: Kelly Creek
pH: Columbia River
Polychlorinated Biphenyls (PCBs): Columbia River
Polynuclear Aromatic Hydrocarbons (PAHs): Columbia River
Temperature: Columbia River
* See **Appendix E** for description of pollutants and water quality criteria

2.4.4 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 on the 303(d) list. TMDLs specify the daily amount of pollution that a water body can receive and still meet water quality standards. See Table 7 for TMDLs in the Sandy Management Area and refer to section 1.4.3 for further information related to TMDLs.

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

Once TMDLs are completed for a basin, the basin's waterbodies 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).

Table 7: Pollutants with *TMDLs and Load Allocations for the Sandy Subbasin Management Area *Updated from the DEQ 2012 Integrated Report (Last Accessed 2/5/19)* (Cat 4A: Water quality limited, TMDL approved)
Bacteria (*E. coli*.): Applies to all waterbodies in the Sandy Subbasin ***Load Allocation*:** 86% reduction compared to average loads in 2005
Temperature: Applies to all waterbodies in the Sandy Subbasin ***Load Allocation*:** All nonpoint sources collectively (agriculture's allocation is not specified): 0.05°C of the 0.3°C human use allocation (with a surrogate of effective shade)
***TMDL Documents for the Sandy Subbasin Management Area** **Sandy River – Bacteria and Temperature**: Approved March 2005 Available Online at: https://www.oregon.gov/deq/wq/tmdls/Pages/TMDLs-Sandy-Basin.aspx

Loading capacity provides a reference for calculating the amount of pollutant reduction needed to bring water into compliance with water quality standards. The load allocation represents the amount of pollutant that can be added to a waterbody and still achieve water quality standards. In order for TMDL to guide implementation efforts, allocations for temperature are also expressed in terms of percent effective shade.

Non-point source (agricultural) load allocations apply all year-round to all perennial and fish-bearing intermittent waters within the Sandy Subbasin Management Area. The load allocations are summarized below for only those water quality parameters with a TMDL:

It is recognized that, despite the best and most earnest efforts, natural events may interfere with or delay attainment of the TMDL and/ or its associated surrogates. Such events could be but are not limited to flood, fire, insect infestations, and drought. Under the prevention and control measures in the Sandy Subbasin Management Area Rules (OAR 603-095-1340), landowners and operators are not responsible for mitigating or dealing with factors that do not result from agricultural practices.

2.5 Prevention and Control Measures

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 OARs for the Management Area (OAR 603-095-1340). Producers who fail to address these prevention and control measures may be subject to enforcement procedures based upon the Area Rules. Enforcement procedures are outlined in Section 1.3.3 and in Figure 2; page 7. The Prevention and Control Measures relate directly to water quality issues identified on the 303(d) list in the Management Area. The issues addressed are:

- Temperature
- Bacteria

The focus of the Agricultural Water Quality Management Program is on voluntary and cooperative efforts by landowners, SWCDs, ODA, and others to protect water quality. The Area Plan contains voluntary, incentive based approaches to water quality management and is not enforceable. However, the AgWQMA authorizes ODA, in cooperation with a local advisory committee, to develop Agricultural Water Quality Management Area Rules (Area Rules) that can be enforced to ensure prevention and control of water pollution from agricultural sources.

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. Area Rules are goal-oriented and describe conditions that should be achieved or avoided on agricultural lands, rather than practices that must be implemented.In this section, there are two Prevention and Control Measures that appear with a border around

the text. These measures are the enforceable Area Rules for the Sandy Subbasin. **Agricultural landowners (commercial and noncommercial) should review the Area Rules--cited in the boxes--**and evaluate their operations to determine if they are in compliance. Indicators of non-compliance are included to describe landscape conditions that should be avoided on agricultural land. A review of the information provided in this document may provide ideas on how to improve water quality through management activities.

Based upon this self-evaluation, landowners should develop or seek assistance to develop their own site-specific adaptive management strategy to meet required conditions. The Prevention and Control Measures are intended to be flexible enough for landowners to develop feasible and affordable approaches to meet water quality standards. Landowners are encouraged to seek technical assistance and management plans from their local SWCD, USDA NRCS or cooperative extension service. See Appendix A for contact information.

Many of the pollution sources cited here affect water quality and are beyond the scope and influence of agricultural landowners/operators. Under the Prevention and Control Measures in the Sandy Subbasin Management Area Rules (OAR 603-095-1340), landowners and operators are not responsible for mitigating or dealing with factors that do not result from agricultural practices. These factors include but are not limited to:

- Glacial till from glacial runoff, natural sediment transport, and landslides,
- Septic systems 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.

The referenced Area Rules address water temperature and bacteria concerns in the Management Area, for water bodies included in the DEQ 2012 Integrated Report to EPA. The Agricultural Waste Control rule incorporates an existing law that limits waste access to the waters of the state. By adopting this rule, the primary authority over agricultural waste in the Management Area will rest with ODA. The following rules were adopted in 2001.

Streamside Area Condition
OAR 603-095-1340

(2) Streamside Area Condition. Effective upon rule adoption.

(a) Streamside vegetation management shall allow the establishment, growth, control, and/or maintenance of riparian vegetation (for example: grasses, sedges, shrubs, and trees) appropriate to the site capability that is sufficient to provide shade and protection to the streamside area such that it maintains its integrity during high stream flow events up to and including those expected to occur during or following a 25-year, 24 hour storm event.

(b) Management strategies in the streamside area shall not reduce the control of erosion, lessen filtering of sediment and nutrients, or decrease the infiltration of water into the soil profile.

Agricultural Waste Control
OAR 603-095-1340

(3) Agricultural Waste Control. Effective upon rule adoption.

(a) No person subject to these rules shall violate any provision of ORS 468B.025 or ORS 468B.050.

(b) Access to natural waterways for livestock watering and stream crossings are allowed such that livestock use is limited to only the amount of time necessary for watering and/or crossing the waterway.

2.6 Voluntary Measures and Strategies

The aim of agricultural waste prevention and control is to minimize the transport of nutrients, pesticides, pathogens, irrigation tail-water, and sediment into waters of the state (Refer to Definitions Section 1.4.4). Because agricultural waste includes a broad range of substances, there are numerous voluntary conservation strategies that may be taken to minimize waste inputs into waters of the state. A discussion of these strategies, broken down by pollutant, follows.

2.6.1 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 running off or leaching into waters of the state. This may cause nuisance algal growth, high pH, bacterial contamination, and a decrease in dissolved oxygen. Landowners and operators are encouraged to adopt sound agronomic strategies to guide crop nutrient applications and to ensure that nutrient applications do not lead to contamination of drinking water wells. Sound agronomic strategies include:

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

2.6.2 Pesticides

Always apply chemicals in accordance with the label requirements in order to minimize crop damage, buildup of chemicals in the soil, 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 non-restricted 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: https://www.oregon.gov/deq/wq/programs/Pages/Pesticide.aspx).

- Calibrate, maintain, and correctly operate application equipment. It is recommended that spray rigs should be calibrated at least annually or as needed when there is a change in product and/or application rate. Nozzles need to be replaced often, particularly if an abrasive pesticide formulation (such as wettable powders) is used. Sprayers need to be operated in the correct pressure range (dictated by the material and nozzle combination used) to prevent excess drift to non-target areas (e.g. waters of the state). Always follow the manufacturer's direction on maintenance of parts and equipment.
- Adopt integrated pest management (IPM) strategies. IPM promotes a diverse, multi-faceted approach to pest control. This strategy establishes an economic threshold for control actions, to guide the manager to use a variety of field/orchard sanitation and cultural practices, field scouting, beneficial insects, and other biological controls, and the use of properly selected chemical pesticides. While IPM does not

exclude the use of chemical pesticides, it does seek to optimize their use and minimize off-target movement into the environment.

- Establish appropriate vegetative buffer strips. Buffer strips will help to retain soil and stabilize streambanks (many legacy pesticides persist in the environment and adhere to soil particles) and surface runoff (which may have dissolved pesticides) from making contact with waters of the state.
- Control erosion to minimize sediment entry into waterways.
- Store and handle pesticide materials correctly. Storage and handling facilities should be secure and include a leak-proof pad with curbing for mixing and loading. An alternative to a permanent, concrete pad is to always mix pesticides in the field, frequently moving sites to prevent chemical buildup. Wash/rinse water should be directly applied to the appropriate crop. Empty liquid pesticide containers should be triple rinsed, then punctured and disposed of in an approved manner. Dry chemical bags should be emptied completely. Bundle and store paper bags until they can be disposed of in an approved manner.
- Watch for a pesticide waste collection day in your area. These events allow individuals to safely and anonymously drop off unwanted, unused, or out of date agricultural pesticides, along with some empty containers.

2.6.3 Livestock Waste

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 provides for livestock crossing and water access such that livestock do not loiter in riparian vegetation and natural waterways. There are many different conservation strategies a landowner or operator can take to help minimize animal waste reaching waters of the state such as:

- Vegetative buffer strips, which can minimize the effects of runoff by catching pollutants before reaching a stream.
- Waste management systems are clean water diversions; waste collection, storage, and utilization; and facilities operation and maintenance. Composting waste.
- 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.
- Pasture management and/or prescribed grazing can help maintain the integrity of pastures, thus decreasing waste runoff.
- Through the management of livestock access to riparian areas, the effects of animal waste can be reduced. Some examples of techniques to achieve this may be off-stream watering, seasonal grazing, and exclusion (temporary or permanent). It is also important to ensure that the storage or application of manure does not contaminate drinking water wells.

2.6.4 Irrigation Tail-water

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

Landowners and operators are encouraged to have an irrigation water management plan. The type of irrigation system chosen should be appropriate for factors such as field slope, soil infiltration rates, water supply, and the type of crop. Irrigation water management should consider how long and how often the water is applied, plus how often wearable components (such as sprinkler nozzles, filter media, pump impellers, etc.) are replaced or serviced. Costly or complex irrigation systems are not a guarantee of success, particularly if they are managed or maintained incorrectly.

Irrigation scheduling decisions based on arbitrary considerations, such as calendar flood irrigation, should be avoided. 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 tail-water reaching waters of the state are:

- Adopting an irrigation water management plan with irrigation soil moisture monitoring,
- Planting and irrigating crops on a contour,
- Planting sloping field edges to grasses,
- Installing sediment basins at field edges and in swales,
- Using drip irrigation when appropriate to crop type,
- Recycling return flows,
- Conservation tillage.

2.6.5 Sediment

Erosion prevention means keeping soil particles from detaching and moving with water, wind, ice, or gravity and limiting sediment movement off the property. Erosion prevention starts at the "top" of the hill. Erosion prevention is not simply placing straw bales at the bottom of a swale to catch sediment - the erosion has already occurred.

Erosion that results in sediment entering waters of the state could lead to excessively turbid water, sedimentation of the water body, and an increase in toxins due to the fact that many pesticide materials and pathogens attach to soil particles. 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 could potentially disrupt a fish's respiratory process by way of entering a fish's gills.

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

2) **Construct and Maintain Agricultural Access Roads.** Roads and road-related structures (e.g. stream crossings, bridge abutments, cut slopes, etc.) have been identified in many watersheds as being significant sources of sediment input to streams. Many management methods are available for constructing and maintaining roads to increase their stability and reduce erosion. Some conservation strategies that can be used to minimize runoff from roads and staging areas are to design and construct an appropriate culvert, maintain a grass cover where appropriate, and construct water bars and/or grading roads.

    While agricultural operations do not always have extensive road networks, a single poorly maintained road can comprise the vast majority of one farm's sediment output. Consultation on conservation measures for

road construction and maintenance is encouraged, especially for roads built on steeper terrain and for roads close to or crossing streams. Landowners may be held liable for water pollution from roads constructed on their property and should review the wording of any easement agreements.

3) **Implement Irrigation Water Management** (Described in Section 2.5.4).

2.6.6 Streamside Area Management

Adequate streamside vegetation provides three primary water quality functions (Council for Agricultural Science and Technology, 2012; National Council for Air and Stream Improvement, 2000; State of Oregon, 2000). Local agricultural water quality Area Rules require that agricultural activities provide these functions:

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

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 vegetation along the smaller stream areas will help maintain cooler temperature, benefiting fish and providing cooler water to larger streams and rivers. Adequate streamside vegetation also provides additional water quality functions (see references listed in paragraph above):

- Water storage that provides cooler and longer duration late season flows,
- Sediment trapping that builds streambanks and floodplains,
- Infiltration of water into the soil profile,
- Narrowing and deepening of channels,
- Biological uptake of sediment, organic material, nutrients, and pesticides,
- Maintenance of streamside integrity during high flow storm events.

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

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 for the streamside vegetation management rule could include:

- Active streambank sloughing/erosion in conjunction with tillage, grazing, or destruction of vegetation by humans or livestock;
- Stream not protected by appropriate filter strip/vegetated buffer.

There are many examples of management strategies that may be taken to protect and/or restore ecological functions in riparian and wetland areas to improve watershed health. Some common examples would be the control of invasive vegetation and the planting of native trees and shrubs. Although native vegetation provides benefits over exotic species, it is not always necessary to remove exotic, non-invasive species in order to replant an area with native plants. Native species may be more resistant to diseases and pests and are best suited to the natural ecosystem. Non-native species in the near stream area, however, may also provide valuable shade, stabilize the streambank, and provide cover for wildlife. Invasive species should be removed near streams. A list of invasive species can be found at http://www.oregon.gov/ODA/programs/Weeds/OregonNoxiousWeeds/Pages/AboutOregonWeeds.aspx.

With appropriate information, time, and hard work, landowners have the authority and ability to develop flexible streamside vegetation management strategies while also providing the important functions required. Management strategies shall allow the establishment, growth, control, and maintenance of riparian vegetation appropriate to the site that is sufficient to provide shade and protection to the streamside area. Some strategies that can help reduce the impacts of erosion and sedimentation to riparian areas - establish buffer zones, establish grassed waterways, or protect streambanks with vegetation. The above can be achieved by allowing marginally productive lands in floodplains, or poorly drained riparian areas to revert to riparian or wetland status. Landowners can also thin riparian species, especially alders, to promote the establishment of new understory tree and shrub species while maintaining and improving required functions without degrading the riparian area. Planting sites need to be evaluated for appropriate species. After planting, restoration projects need to be monitored and maintained to ensure survival. The East Multnomah SWCD (EMSWCD) can provide valuable technical assistance.

Habitat can be provided for wildlife by allowing snags (dead trees) to remain standing, unless safety factors indicate otherwise. Another way to improve 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.

As a way to assist landowners in the implementation of conservation measures like these, the USDA and the State of Oregon administer the Conservation Reserve Enhancement Program (CREP). CREP is a voluntary program that pays producers an annual rental rate to set aside pasture and cropland areas that are adjacent to streams or wetlands. CREP will also cover up to 75 percent of the cost to establish conservation strategies on those areas set aside. The Clackamas or East Multnomah SWCD or USDA Natural Resources Conservation Service can conduct site visits to further describe this state and federal partnership program. Contact phone numbers are provided in Appendix E.

2.6.7 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. There will always be erosion and unstable streambanks. The point is to try to achieve normal/natural disturbance levels, not eliminate them. Limit sediment movement off the property. Once applied, certain pesticide and nutrient materials attach to soil particles. If soil is moving off the property and into waters of the state, pesticides, bacteria, and nutrients will likely accompany it. To minimize the mobilization of sediment into waters of the state, growers are encouraged to:

2.6.8 Agricultural Pond Management

Agricultural ponds, both in-stream and off-stream should be managed to minimize pollutant entry into waterways (e.g. runoff of pesticides, nutrients, and bacteria). Consider the following measures and strategies below when managing your agricultural ponds for water quality.

- Outflow from agricultural ponds should be monitored periodically to identify potential downstream water quality impairments.

- Manage soil erosion from berms. Be sure that berms are stable.
- Outflow from agricultural ponds should be timed to prevent water quality impairment downstream.
- Avoid emptying pond water to streams or ditches year round and apply pond water to areas of vegetation such as adjacent croplands or pasturelands.
- Reuse and apply pond water agronomically.
- In-stream ponds are part of the stream network and should be managed to allow for the growth and establishment of site capable vegetation to provide the functions of shade, bank stability, and filtering of sediment and pollutants.

Taking care to ensure that agricultural ponds are proactively maintained and operating at peak efficiency not only prevents negative water quality impacts, but also helps protect the bottom line by eliminating costly repairs.

2.6.9 Warning Signs That Agricultural Waste May Be Reaching Water

Landowners often want ideas about what conditions or situations they should watch for on their land that could cause water quality problems or violations. Some things to watch for 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 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 waters of the state.
- Chemigated waters flowing into or ponding around wells, well pits, cisterns, or other direct conduits to ground water.
- Runoff flowing through areas of high livestock usage and being deposited in waters of the state.
- Livestock waste located in drainage ditches or areas of flooding.

Chapter 3: Strategic Initiatives

Goal
The goal of this Area Plan is to prevent and control water pollution from agricultural activities and soil erosion on agricultural and rural lands, and to achieve applicable water quality standards and agricultural load allocations in the Sandy Subbasin Management Area. This Area Plan will promote sound conservation practices on agricultural and rural lands within a framework of economic profitability and agricultural viability.

3.1 Measurable Objectives

3.1.1 Management Area

A measurable objective (MO) is a numeric long-term desired outcome to achieve by a specified date. Milestones are the interim steps needed to make progress toward the measurable objective and consist of numeric short-term targets to reach by specific dates. Together, the milestones define the timeline needed to achieve the measurable objective. Section 1.7.1.

The Oregon Department of Agriculture, LAC, and LMA has established two MOs with associated milestones for the Sandy Subbasin Area Plan: Measurable Objective #1 and #2. Progress toward MOs are discussed in section 4.1.1.1. Research and development of additional measurable objectives related to the Area Plan strategies will occur overtime as new data, information, and methods become available.

3.1.1.1 Measurable Objectives

Strategy: Prevent runoff of agricultural waste: Manure from livestock and horse operations.
Waterbody: Beaver Creek
Pollutant: Bacteria
Water Quality Criteria: Bacteria (*E. coli*). Beaver Creek is listed as an impaired stream for bacteria and has an approved TMDL.
Data: Sampling and data provided by East Multnomah SWCD. Available data collected from November 2012 to December 2018.
Timeframe 2019 to 2029: Milestones chosen based on two year increments (biennial reviews) over a ten year period.

Measurable Objective #1 Water Quality Sampling Site: South Fork @ 302nd (Figure 4). One sample taken monthly approximately 12 times a year. The sampling site was chosen because of its relevancy to agricultural lands.

2019 Current Condition: Water samples taken from South Fork Beaver Creek at 302nd from November 2012 to December 2018 resulted in 83% (62/74) of the observations meeting the water quality standard for bacteria (*E.coli*). Table 14.

Measurable Objective #1: By 2029, water samples collected for bacteria monitoring from January 2019 to December 2029 will meet water quality standards or meet at least 91% of the time.

- **Milestone 1:** By 2021, water samples will meet water quality standards or at least 83% of the time.
- **Milestone 2:** By 2023, water samples will meet water quality standards or at least 83% of the time.
- **Milestone 3:** By 2025, water samples will meet water quality standards or at least 88% of the time.
- **Milestone 4:** By 2027, water samples will meet water quality standards or at least 89% of the time.
- **Milestone 5:** By 2029, water samples will meet water quality standards or at least 91% of the time.

Measurable Objective #2 Water Quality Sampling Site: Water samples taken from North Fork Beaver Creek near Division (Figure 4). One sample taken monthly approximately 12 times a year. The sampling site was chosen because of its relevancy to agricultural lands.

2019 Current Condition
Monitoring samples taken from North Fork near Division from November 2012 to December 2018 resulted in 77% (49/64) of the observations meeting the water quality standard for bacteria (*E.coli*).
Table 14.

Measurable Objective #2: By 2029, water samples collected for bacteria monitoring from January 2019 to December 2029 will meet water quality standards or at least 89% of the time.

- **Milestone 1:** By 2021, water samples will meet water quality standards or at least meet 79% of the time.
- **Milestone 2:** By 2023, water samples will meet water quality standards or at least meet 82% of the time.
- **Milestone 3:** By 2025, water samples will meet water quality standards or at least meet 85% of the time.
- **Milestone 4:** By 2027, water samples will meet water quality standards or at least meet 88% of the time.
- **Milestone 5:** By 2029, water samples will meet water quality standards or at least meet 89% of the time.

Note:

- Measurable Objective (MO) #1 and applicable water quality data is to be used for the evaluation of progress toward achieving the Area Plan's goal and for making informed decisions regarding adaptive management.
- Bacteria found in Beaver Creek water samples are from unknown sources. *E.coli* bacteria live in soil or vegetation and in the gastrointestinal tract of animals such as humans, wildlife, and livestock. *E.coli* enters surface water from the direct disposal of waste into streams or lakes. Bacteria could be in runoff from wooded areas, pastures, feedlots, septic tanks, manure piles, dog runs, and sewage plants.
- An exceedance of an observation only indicates that bacteria is present in the water sample in an amount that is above the water quality standard.
- Each sample represents a single snapshot in time.
- Data at these sites can be variable and interpretation of results will require knowledge of local conditions known to affect the observed water quality conditions at individual sites.

Recommended activities for bacteria reduction from agricultural activities:

- Livestock operators and horse owners are responsible for implementing agricultural practices that prevent and control water pollution from livestock and horse operations.
- The LMA can provide technical assistance to agricultural landowners and operators in the Beaver Creek subbasin regarding the prevention and control of water pollution from livestock and horse operations.
- The ODA and the LMA should engage in partnership activities to accomplish water quality monitoring.
- ODA's Strategic Initiatives: Lower Sandy Focus Area and Strategic Implementation Areas.

During biennial reviews of the Area Plan, the MO and associated milestones can be modified as needed and are to be adapted and updated to reflect new data, information and methods as they come about. See sections 4.1 and 4.1.1.1 for progress toward measurable objective/s.

3.1.2 Focus Areas

The Lower Sandy Focus Area (section 1.7.3) boundary matches the 6th field Beaver Creek-Sandy HUC (watershed boundary). The area is 22,848 acres with rural land uses in the majority of that area. In addition to 15

miles of the main stem of the Sandy River, this area includes approximately 36 miles of tributaries. Agriculture in the Lower Sandy Focus Area includes livestock, horses, vegetables, berries, and nurseries. Other rural land uses include private forest and rural residential. See Figure 3 for location.

Beaver Creek is one of the tributaries in the Lower Sandy Focus Area, and it has a TMDL for bacteria. Livestock and horses have access to the tributaries. The EMSWCD will conduct outreach along Beaver Creek to identify landowners that are interested in protecting near stream areas. EMSWCD will provide assistance to willing landowners to install exclusion fencing and/or to plant native riparian vegetation. See sections 4.1.2 and 4.1.2.1 and Tables 10 and 11 for progress on the Lower Sandy Focus Area and milestone.

2015-2019 The Lower Sandy Focus Area Current Milestone and Timeline

2017 Condition:	As of June 30, 2018, there are 1,231 total acres in Class II and Class III; 18% of the total assessed area.
Milestone:	By June 30, 2019: Decrease Class II and Class III acreage by 12 acres (10% of Class II and Class III total acreage) to achieve 1,219 Class II and Class III acres; a decrease of around 1% of the assessed area.

3.1.3 Strategic Implementation Areas

Currently there is not a SIA in the Sandy Subbasin MA.

3.2 Strategies and Activities

3.2.1 Strategies

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

3.2.2 Activities

The activities provided in the following sections were determined by the ODA, the LAC, and the LMA as a means to achieving the goal and strategies of the Area Plan. The activities outlined are to be carried out typically by the ODA and the LMA (SWCD). In the Sandy Subbasin Management Area the East Multnomah Soil and Water Conservation District is the primary LMA and local expert and they work in collaboration with the ODA in achieving the goal and strategies of the Sandy Subbasin Area Plan. Agricultural landowners and operators are highly encouraged to participate in the listed activities on their own farms and or in cooperation with the SWCDs, watershed councils, and Management Area partners or through their different grower groups or agribusiness associations. See Appendix A for contact information.

Every two years, with recommendations from the LAC (provided during biennial reviews) and in consultation with ODA, the LMA will select from the activities outlined in sections 3.2.2.1 through 3.2.2.4 and section 3.3 that best suit the capability, priorities, and resources of the LMA (SWCD). The LMA details the specific tasks they will implement in their Scope of Work and Focus Area Action Plan, which are submitted to the ODA every two years to receive funding for Area Plan implementation. It is also important that the ODA, the LMA, and Management Area partners consider working together to implement the activities in the Area Plan as

opportunities, funding, and resources allow. See Chapter 4 for accomplishments and progress towards implementing these activities.

3.2.2.1 Community and Landowner Engagement

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

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

Focus of Community and Landowner Engagement Activities

- **a.** The Sandy Subbasin Area Plan has identified bacteria and stream temperature as priority water quality parameters of concern (Table 7). Events and activities related to agricultural water quality management should have a focus on these water quality concerns whenever possible.
- **b.** The Sandy Subbasin Area Rules (PCMs in section 2.5) specify fundamental conditions for streamside areas and the management of agricultural waste. Emphasis, when conducting events and activities related to agricultural water quality management, should include information regarding these management objectives whenever possible.

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

- **a.** Develop an outreach strategy to inform the agricultural community of issues and events related to agricultural water quality prevention and control. This includes but is not limited to the distribution of informational material, interactions on social media, hosting a web page, creating a quarterly newsletter, and submitting public service announcements to local sources of news and communications.
- **b.** Develop, promote, and conduct events or activities (connect, inform, and engage) that function to:
  - Increase awareness of agricultural water quality concerns related to the Sandy Subbasin MA. Chapter 2: Tables 6 and 7.
  - Inform agricultural landowners and operators of the availability of technical assistance and farm planning public services available in the Management Area. Appendix A.
  - Inform agricultural landowners and operators of the availability of cost-share and programs available in the Management Area. Appendix E.
  - Inform agricultural landowners and operators of their responsibilities toward preventing and controlling water pollution and soil erosion from agricultural activities. Sections 2.5 and 2.6.
- **c.** Develop, promote, and conduct events or activities (instruct and educate; see sections 2.5 and 2.6) that function to strengthen the knowledge and capacity of agricultural landowners and operators to:
  - Prevent and control water pollution from agricultural activities.
  - Prevent and control soil erosion from agricultural activities.
  - Self-evaluate their agricultural operation and their impacts to water quality from agricultural activities.

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

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

3.2.2.2 Technical Assistance

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

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

Implementing farming practices that prevent and control water pollution from agricultural activities by the agricultural community is crucial to the success of the Area Plan. Agricultural landowners and operators are encouraged to participate in technical assistance activities by supporting and participating in the activities outlined in section 3.2.2 as well as providing guidance and direction on local agricultural water quality concerns and solutions to ODA, the LMA, agribusiness associations, and Management Area partners. Serving as an LAC member or on an SWCD or watershed council board and participating in local grower groups and agribusiness associations are ways to contribute. The Sandy Subbasin agricultural community is the best resource for local and specialized technical information related to agricultural management practices. Agricultural landowners and operators are encouraged to share their practical working knowledge of farming practices that work toward the prevention and control of water pollution with others who would benefit. Sections 2.5 and 2.6 provide basic guidelines for preventing and controlling water pollution from agricultural activities. Appendix A provides contact information for educational and technical guidance related to natural resources and farm management.

Scope of Technical Assistance

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

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

Listed below are recommendations for technical assistance activities:

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

b. Provide on-site evaluations for agricultural landowners and operators to identify potential water quality concerns and recommend solutions that prevent and control water pollution and soil erosion from agricultural activities. Sections 2.5 and 2.6.
c. Provide assistance to agricultural landowners and operators who would like to develop and implement a conservation farm or ranch plan that may include, but not limited to nutrient management plans, pasture management plans, soil health management, and irrigation water management.
d. Provide technical assistance for the development, implementation, and maintenance of on-the-ground projects that prevent and control water pollution and soil erosion from agricultural activities. Section 2.6.
e. Assist agricultural landowners and operators by providing information on funding opportunities as well as assistance in applying and enrolling in cost-share programs as needed. Appendix E.
f. Develop, promote, and conduct events or activities (instruct and educate; see sections 2.5 and 2.6) that function to strengthen the knowledge and capacity of agricultural landowners and operators to:
    - Prevent and control water pollution from agricultural activities.
    - Prevent and control soil erosion from agricultural activities.
    - Self-evaluate their agricultural operation and their impacts to water quality from agricultural activities.

3.2.2.3 Biennial Review of the Sandy Subbasin Area Plan

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

a) Adapt and modify the Area Plan to accommodate recently identified challenges, new data, new information, and shifting priorities.
b) Convene the LAC members and recruit new members as needed.
c) Compile and report the most recent results of ODA's compliance actions in the Sandy MA.
d) Review progress and achievements toward the Area Plan's goals and objectives by ODA, the LMA, and Management Area partners by tracking outputs and reporting accomplishments.
e) Analyze available water quality monitoring data and report the status and trends indicated.
f) Evaluate and measure progress toward achieving the Area Plan's goals and objectives by setting and evaluating milestones, describing outcomes, and developing measurable objectives.
g) Deliberate and troubleshoot impediments to achieving the goals and objectives of the Area Plan

3.2.2.4 Partnerships

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

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

3.3 Monitoring and Evaluation

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

Water quality monitoring must be performed using quality assurance procedures and specialized equipment that takes funding, time, and resources to accomplish. Monitoring water quality and landscape conditions, for the purposes of the Area Plan, is recommended as an activity to be carried out and collaborated on by the ODA, the LMA and Management Area partners. Currently water quality monitoring is occurring throughout the Sandy MA. Refer to sections 4.4, 4.4.1, 4.4.2, 4.4.3, and Table 14 for a description of monitoring and evaluation efforts and results for the Sandy Management Area.

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

a) Develop a water quality-monitoring plan that works to achieve long-term baseline data collection and allows for ease in sharing data with partners and collaborating with other monitoring efforts.
b) Develop quality control plans to guarantee that data collected can be used for the intended purposes and analysis with confidence.
c) Perform water quality monitoring for a set of selected water quality parameters to establish a baseline of water quality data.
d) Evaluate Light Detection and Ranging (LiDAR) information to understand vegetative conditions along streams in agricultural areas
e) Identify data gaps that are needed to fully understand influences and changes in water quality.
f) Consider applying for grants or partnering with others to fund and implement monitoring efforts.
g) Consider a monitoring project that seeks to innovate or sample new approaches to measuring water quality conditions or generates new technology or software to monitor environmental changes related to water quality.

3.3.1 Status and Trend Monitoring and Evaluation

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

Water quality data were retrieved from DEQ, EPA and USGS databases. DEQ's volunteer monitoring database was not included, however some volunteer data is queried from EPA's database. Many organizations provided data used in this report. Data collected between January 01, 2000 and December 01, 2018 within the Sandy Subbasin Management Area were included in this report. Parameters included in the data query were temperature, pH, dissolved oxygen, total suspended solids, and bacteria (*E. coli*). Monitoring stations which had at least two years of recent data and/or at least 8 years of data fit the criteria to assess status and trends. The report will be updated for future biennial reviews. The report is summarized in section 4.4 and Table 14 and can be found at: https://www.oregon.gov/deq/wq/programs/Pages/wqstatustrends.aspx

Chapter 4: Implementation, Monitoring, and Adaptive Management

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

Table 9: Framework for Measuring and Evaluating Progress Toward the Goal and Strategies of the Sandy Subbasin Management Area Plan

Goal: Prevent and control water pollution from agricultural activities and soil erosion and to achieve applicable water quality standards.
Strategies: See Section 3.2 for strategies**.**

Activities to Achieve the Goal and Strategies of the Area Plan		
Strategic Initiatives	**Clackamas MA Implementation**	**Water Quality Monitoring**
• Section 3.1.1: Measurable Objective/s (MO) • 3.1.2: Focus Areas (FA) • 3.1.3: Strategic Implementation Areas (SIA)	• Section 2.5: Prevention & Control Measures. • Section 2.6: Voluntary Measures and Strategies. • 3.1.1-3.1.4: Strategic Initiatives • 3.2.2.1 - 3.2.2.4 Activities	• Section 3.3: Water Quality Monitoring • 3.3.1: Status & Trend Monitoring & Evaluation • 3.2.2.4: Partnerships
Progress Indicators for:		
Strategic Initiatives	**Clackamas MA Implementation**	**Water Quality Monitoring**
• (MO) evaluation and results. • (FA) milestone/s, tracked outputs and applied farming practices • (SIA) evaluation and compliance results	• Applied farming practices. • Tracked outputs and reporting for activity sections 3.2.2.1 - 3.2.2.4	• Water quality status & trend data, analysis, and reporting. • Partner water quality monitoring data, analysis, & reporting
Activity Progress and Accomplishments – Tracking and Reporting		
Strategic Initiatives	**Clackamas MA Implementation**	**Water Quality Monitoring**
• (MO) 4.1.1 & 4.1.1.1 • (FA) 4.1.2 & Table 10 • (SIA) 4.1.3	• 4.2, 4.2.1, 4.3, & 4.5 • Tables 11 & 12	• 4.4, 4.4.1, 4.4.2, & 4.4.3 • Table 13. Figure 4.

4.1 Progress Toward Strategic Initiatives location

4.1.1 Measurable Objectives

The ODA, LAC, and LMA has established two measurable objectives (MO) and associated milestones for the Area Plan: Measurable Objective #1 and #2. See section 1.7.1, 3.1.1, and 3.1.1.1 for background information on Measurable Objective #1 and #2. Section 4.1.1.1 will be used to report initial results in the 2021 Area Plan.

4.1.1.1 Measurable Objectives

Measurable Objective #1: By 2029, water samples collected for bacteria monitoring from January 2019 to December 2029 will meet water quality standards or meet at least 91% of the time.

- **Milestone 1:** By 2021 water samples will meet water quality standards or at least 83% of the time. Progress toward achieving Milestone #1 will be evaluated in 2021.

Measurable Objective #2: By 2029, water samples collected for bacteria monitoring from January 2019 to December 2029 will meet water quality standards or at least 89% of the time.

- **Milestone 1:** By 2021 water samples will meet water quality standards or at least meet 79% of the time. Progress toward achieving Milestone #2 will be evaluated in 2021.

Progress Discussion: Was Milestone #1 and #2 achieved?
Tracking and reporting of activities (outputs) for bacteria reduction between 2019 to 2021: Insert reported and tracked activities for the 2021 Biennial Review.
Adaptive Management: Insert recommendations from the LAC to adapt management if necessary.

4.1.2 Focus Areas

Oregon Department of Agriculture approved the Lower Sandy Focus Area Action Plan (FAAP) implemented by the East Multnomah SWCD in the Sandy Subbasin MA. The FAAP outlines key components of the Focus Area approach. The SWCD reports the results to ODA at the end of the fiscal biennium. Section 4.1.2.1 provide results and progress of the Lower Sandy Creek Focus Area including a milestone and timeline. Table 10 presents a summary of the SWCD's assessment results. Table 11 provides a cumulative summary of the SWCD's tracked outputs and accomplishments. These numbers reflect all the work completed and reported by the SWCDs from January 1, 2017 to December 31, 2018. Figure 3 (located in Chapter 2) displays where the Lower Sandy Focus Area is located. For Focus Area project descriptions refer to sections 3.1.2 and 3.1.2.4.

4.1.2.1 The Lower Sandy Focus Area 2015-2019 (Open)

2015-2019 The Lower Sandy Focus Area Current Milestone and Timeline

2017 Condition:	As of June 30, 2018, there are 1,231 total acres in Class II and Class III; 18% of the total assessed area.
Milestone:	By June 30, 2019: Decrease Class II and Class III acreage by 12 acres (10% of Class II and Class III total acreage) to achieve 1,219 Class II and Class III acres; a decrease of around 1% of the assessed area.

Progress: During the last biennium the SWCD completed the pre-assessment and drafted the milestone. They are now focused on working with landowners to implement projects and complete more outreach. The SWCD will continue with the Lower Sandy Focus Area during the upcoming 2019-2021 biennium. See Table 10.

4.1.3 Strategic Implementation Areas

Currently there is not a SIA in the Sandy Subbasin Management Area.

4.2 Activities and Accomplishments

The Area Plan's LMAs (SWCDs) track activities that have been implemented through quarterly reports to ODA. Below is a summary of the LMAs work during the last biennium and Table 11 is an approximate summary of the LMA's outputs toward implementing the activities lined out in sections 3.2.2.1 to 3.2.2.4. Data is provided by East Multnomah and Clackamas SWCDs.

Table 10: The Lower Sandy Focus Areas (Open) Summary of Assessment Results			
Class	**Pre-Assessment 2017**	**Post Assessment 2019**	**Progress to 2019**
Class I	5,623.3	TBD	TBD
Class II	927.4	TBD	TBD
Class III	303.7	TBD	TBD

Assessment Classes		
Class I	**Class II**	**Class III**
Not a livestock operation; or farm animals are excluded from near-stream area; or little to no collected manure; or manure piles are located away from waterways and covered.	Manure piles are placed away from waterways, but not covered; or manure piles are located near waterways and covered.	Manure or uncovered manure piles are located near waterways and/or are being carried into waterways; animals are not excluded from near-stream area.

Summary of Activities and Accomplishments July 1, 2015 – December 31, 2018	
Activity	**Accomplishments**
Landowners Contacted (*mailings*)	**1,189**
Landowner & Community Engagement Events, Displays	**4**
Total Attendees to all Events	**85**
Landowners Provided with Technical Assistance	**0**
On-Site Evaluations	**31**
Fund Applications for Landowner Projects	**0**
Water Quality Projects Implemented	**0**
Conservation Plans	**0**
Total Acres in Conservation Plans	**0**

4.2.1 Local Management Agency Activities and Accomplishments

East Multnomah Soil and Water Conservation District

One of the goals of the District's riparian re-vegetation program is to protect and improve water temperatures. Between 2009 and 2018, EMSWCD removed weeds, planted native trees and shrubs, and controlled weeds to reduce competition on 204 acres of agricultural land along 6.4 miles of Beaver, Big, and Smith Creeks (Table 11). The District partnered with Clackamas and Tualatin SWCDs to tend a booth at the Oregon Association of Nurseries Far West Shows. In 2017, the booth focused on cover crops and for 2018, the focus was on erosion prevention products. For the 2017 Northwest Agricultural Show, the District partnered with NRCS as well as Clackamas and Tualatin SWCDs on a booth. The focus was on using beneficial insects for pest control. Unfortunately, this event is no longer held in the area.

In support of a new program area called Erosion Solutions, the EMSWCD held a listening session to get input from nurseries in 2017. In addition, they partnered with ACF West to demonstrate the installation of erosion prevention products.

Materials were created for all of the outreach events described. Topics included cover crops, beneficial insects to reduce the need for pesticides and erosion prevention. In addition, an article about soil and water conservation districts was included in the December 2017 issue of the Oregon Association of Nurseries Digger Magazine. The EMSWCD uses social media to spread the word about the District's outreach events. The District's website has a lot of information about agricultural water quality as well as the District's program offerings. The best projects are often the result of farmers who were recommended to the District by a peer.

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

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

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

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

January 2017- August 2018 Events:

- Oregon Association of Nurseries Far West Show 2017 and 2018
- Northwest Agricultural Show 2017
- Erosion Solutions Listening Sessions 2017
- Erosion Prevention Products with ACF West Demonstration 2017

Clackamas Soil and Water Conservation District
Agricultural water quality technical assistance and on-site evaluations most often requested from the Clackamas SWCD was related to soil erosion from fields and streambanks and manure management from livestock and horse operations. The District found that the most challenging water quality concerns they faced in the last biennium were related to invasive weeds displacing native riparian vegetation and finding contractors to do small projects (install practices) for a reasonable price.

The District's Facebook page is where the District posts information regarding pasture and manure management, workshops, native plant sales, riparian planting information, etc. The District also posts numerous times per month on the District's webpage, which is then wrapped up into a monthly e-newsletter and sent to those who subscribe.

The District also published Conservation on Steep Slopes, which explains how to evaluate your slope, provides best management practice for living on a slope, signs of soil movement, and when to call a specialist. The District's partnerships with the watershed council, water providers, and other local organizations and government have all been valuable to implement our tasks and activities.

Table 11: Sandy Subbasin Agriculture Water Quality Management Area's Reporting of Activities and Accomplishments January 1, 2017 to December 31, 2018 *Accomplishments completed by East Multnomah and Clackamas Soil and Water Conservation Districts*				
Community and Landowner Engagement Events and Activities.		**July 2015 to December 2016**	**January 2017 to December 2018**	**Cumulative Total 2015 to 2018**
Community and Landowner Events and Activities		**11**	**9**	**20**
Total Attendees to all Events and Activities		**1,435**	**466**	**1,901**
Fact Sheets/ Brochures Developed		**0**	**4**	**4**
Technical Assistance		**July 2015 to December 2017**	**January 2017 to August 2018**	**Cumulative Total 2015 to 2018**
Landowners Provided with Technical Assistance		**11**	**31**	**42**
On-Site Evaluations		**24**	**35**	**59**
Cost Share/ Funding Applications Submitted		**1**	**2**	**3**
Voluntary Conservation Plans Prepared		**0**	**2**	**2**
Total Acres in Conservation Plans		**0**	**20.9**	**20.9**
2017-2018 Applied Farming Practices	**Units**	**Watershed**		
Access Road – Sediment Runoff Control	3,390 ft.	EMSWCD – Lower Sandy River		

January 2017- December 2018 Events:

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

4.3 Partnership Efforts and Accomplishments in the Sandy Subbasin

4.3.1 East Multnomah SWCD StreamCare Program

East Multnomah SWCD has been focusing outreach and restoration throughout the Sandy Subbasin through the District's StreamCare program. The StreamCare program provides eligible landowners with 5 years of weed control, native tree and shrub plantings, and maintenance free of charge. East

Multnomah SWCD staff evaluated the area along the creek and determines the weed control needs and recommended plantings. The benefits to the landowner include:

- Free weed control
- Increased shade along the creek
- Reduced risk of erosion and flooding
- Increased property value
- EMSWCD will pay for permits, labor, plants, materials, and maintenance

Currently, the StreamCare program is offered in the Big Creek, Smith Creek, and Beaver Creek watersheds in the Sandy Subbasin. The following accomplishments in Table 12 were completed on agricultural properties under the StreamCare riparian re-vegetation program.

Table 12: East Multnomah SWCD StreamCare Accomplishments on Agricultural Lands January 1, 2017 – December 31, 2018				
StreamCare Riparian Treatments	**Beaver Creek**	**Big Creek**	**Smith Creek**	**Totals**
Acres of buffer added in 2017 to 2018	0	5	0	5
Linear feet of stream added 2017 to 2018	0	1,068	0	1,068
StreamCare Program Totals (2008 to 2018)				
Total Acres	81	110	14	204
Total Stream Miles Treated	3	3	0.4	6.4

4.4 Monitoring—Status and Trends

4.4.1 Water Quality

Water quality data were retrieved from DEQ's AWQMS Database which may include data submitted to DEQ from many other organizations. Data were also retrieved from the U.S. EPA (WQX/Storet) and USGS National Water Information System databases via the Water Quality Portal). Data collected between January 01, 2000 and December 01, 2018 within the Sandy Basin agricultural water quality management area were included in this report. Parameters included in the query were temperature, pH, dissolved oxygen, total suspended solids, total phosphorus, and bacteria (*E. coli*).

Refer to Table 14 for a summary of the status and trends report. See Appendix B for information related to the water quality pollutants. Figure 4 illustrates location of water quality monitoring sites summarized in Table 13. For the full report go online to: https://www.oregon.gov/deq/wq/programs/Pages/wqstatustrends.aspx

Figure 4: Sandy Subbasin Water Quality Monitoring Locations Summarized in Table 13

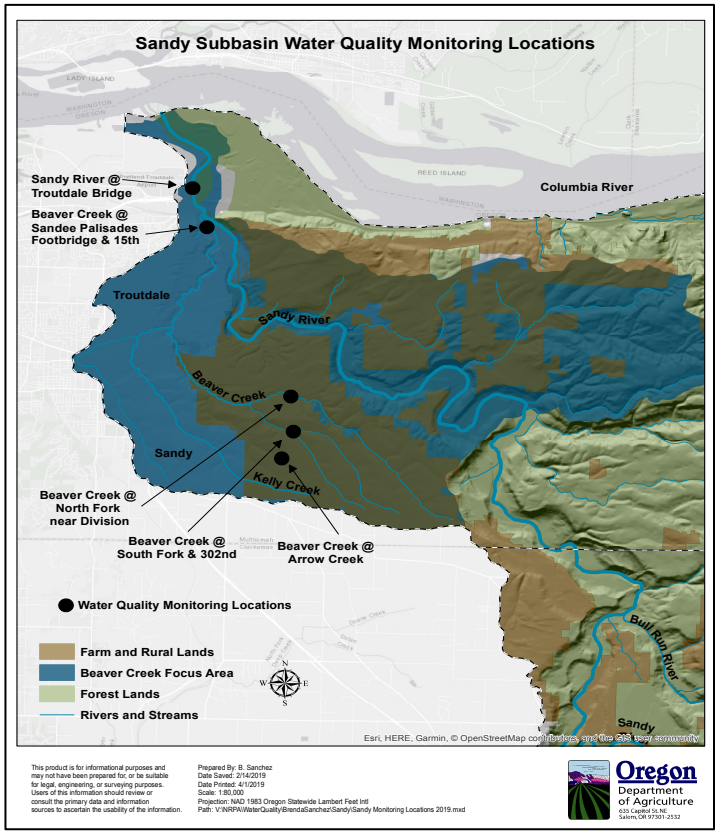

Table 13: Water Quality Status and Trends at Monitoring Locations in the Sandy Subbasin Management Area (See Figure 4 for locations)

Status

(1) ODEQ Data from 2019 Status and Trend Report (individual samples)

(2) EMSWCD Data from November 2012 to December 2018 (individual samples)

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

Monitoring Locations	(1) Sandy River @Troutdale Bridge		(1) Beaver Creek @ Sandee Palisades		(2) Beaver Creek @ North Fork near Division		(2) Beaver Creek @ South Fork & 302nd		(2) Beaver Creek @Arrow Creek	
Pollutants	**2016**	**2018**	**2016**	**2018**	**2016**	**2018**	**2016**	**2018**	**2016**	**2018**
+ Temperature	-	-	-	-	-	-	-	-	-	-
Bacteria: *E. coli*	-	1/107 0.9%	-	0/14 0%	10/47 21.3%	13/64 20.3%	8/49 16.3%	12/74 16.2%	12/50 24%	19/74 25.7%
pH	-	1/110 00.9%	-	-	-	-	-	-	-	-
Dissolved Oxygen	-	10/110 9.1%	-	1/14 7.1%	-	-	-	-	-	-
± Total Suspended Solids (TSS)	-	0/102 0%	-	0/2 0%	-	-	-	-	-	-

Trending Status

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

Monitoring Locations	(1) Sandy River @Troutdale Bridge		(1) Beaver Creek @ Sandee Palisades		(2) Beaver Creek @ North Fork near Division		(2) Beaver Creek @ South Fork @302nd		(2) Beaver Creek @Arrow Creek	
Pollutants	**2017**	**2018**	**2017**	**2018**	**2017**	**2018**	**2017**	**2018**	**2017**	**2018**
Temperature	-	-	-	-	-	-	-	-	-	-
Bacteria: *E. coli*	-	↑	-	-	-	-	-	-	-	-
pH	-	↓	-	-	-	-	-	-	-	-
Dissolved Oxygen	-	↓	-	-	-	-	-	-	-	-
Total Suspended Solids	-	NT	-	-	-	-	-	-	-	-

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

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

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

4.4.2 East Multnomah SWCD Beaver Creek Base-Line Monitoring

The East Multnomah SWCD has been collecting monthly water samples at four locations in the upper Beaver Creek watershed since November 2012. Samples are analyzed for pH, conductivity, total dissolved solids, total suspended solids, bacteria, nitrate, and phosphorus. Beginning in 2014, continuous temperature monitoring was conducted during the summer at three sites in upper Beaver Creek. The data will be tracked over time to identify improvements or other changes. At the time of the 2019 biennial review only bacteria data was available. See Table 13.

4.4.3 Oregon Water Quality Toxics Monitoring in the Sandy Subbasin

(Excerpted from the 2015 Statewide Water Quality Toxics Assessment Report. For the full report go online at: https://www.oregon.gov/deq/FilterDocs/WQToxicsAssessmentReport.pdf

Table 14: Detected Pesticides in the Sandy Subbasin and Their Uses	
Current Use Pesticides	**Use**
Prometon	Non-selective herbicide for bare ground weed control on industrial sites and non-crop areas.
Diuron	Ag and non-ag use herbicide for herbaceous weeds and annual and perennial grasses.
Simazine	Ag and non-ag use herbicide to control herbaceous weeds and annual and perennial grasses.
Esfenvalerate	Restricted Use Pesticide. For agricultural use only. Insecticide for field crops, fruits, tree nut crops, vegetable crops, and specialty uses such as Christmas trees and forest tree nursery stock.
Legacy Pesticides	**Use**
Endulsafan	All registered Use was cancelled in 2016. Unlawful to use after July 31, 2016. Was a Restricted Ag and Commercial Use Only Insecticide.
Note: None of these detected chemicals exceeded applicable EPA benchmarks or water quality criteria. Current research has not shown that the detection of these chemicals is a *threat* to human and ecological health. However, research does show that there is a *risk* and additional research is necessary to identify the potential impacts of low amounts of and or a mix of chemicals in our surface and groundwater.	

In April of 2015 DEQ released its first Statewide Water Quality Toxics Assessment Report. The data was evaluated where appropriate as part of the Integrated Report (303(d) listing process). In 2012, DEQ staff collected seasonal water samples at five locations; Sandy River at Troutdale Bridge, Gordon Creek, Camp Creek at campground downstream of Bruin Run Creek, Beaver Creek at river mile 0.9 north of Otto Park, Kelly Creek at Kane Road.

Summary
Fourteen unique current use pesticides including degradates were detected in the Sandy Basin. Beaver Creek and Kelly Creek accounted for the majority of these detections. Samples from Beaver Creek contained seven herbicides; one insecticide, one fungicide and one herbicide degradate. Similarly, samples from Kelly Creek contained six herbicides, one insecticide, and one herbicide degradate. Some detection occurred during each season at both sites. Every sample collected from these two sites contained measurable amounts of the herbicides, diuron, and simazine. In addition, the herbicide, prometon, occurred in every sample from Kelly Creek. Though common, none of these detected chemicals exceeded applicable EPA benchmarks or water quality criteria. (DEQ Toxics Assessment 2015).

4.5 Biennial Reviews and Adaptive Management

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

- A review of projects, demonstrations, and tours used to showcase successful management practices and systems;
- An evaluation of outreach and education programs designed to provide public awareness and understanding of water quality issues;
- An evaluation of the effectiveness of technical and financial assistance sources available to the agricultural community;
- Documentation of violations of the prevention and control measures and subsequent corrections;
- An evaluation of available current water quality monitoring data and sources of pollution in the Sandy Subbasin; and

- A review of load allocations as found in any completed Sandy Subbasin TMDL and the anticipated effectiveness of this Area Plan in meeting the load allocations as described in the TMDLs for the Sandy Subbasin.

Based on these assessments, ODA, the Sandy Subbasin LMAs, the LAC, and the State Board of Agriculture will consider making appropriate modifications to the Sandy Subbasin Area Plan and the associated administrative Rules. The Sandy Agricultural Water Quality Management Area Plan was adopted in 2001. Since then Biennial Reviews have been completed in 2005, 2008, 2010, 2012, 2015, and 2017.

2017 to 2019 Compliance Actions

Pre-Enforcement Actions: 2 – Letters of Compliance were issued.

Case 18-0046 was a public complaint regarding waste from pigs flowing off property that could impact Beaver Creek. ODA contacted and determined that the pigs are setback over 100 feet from the creek and that there was adequate vegetation along the creek. Conditions were in compliance with Area Rules. Case closed.

Case17-0104 was a public complaint regarding soil erosion causing sediment to fill up a nearby pond. ODA completed a site inspection and issued a water quality advisory with recommendations. Landowner worked actively to improve conditions so that soil erosion was controlled. Conditions were brought into compliance with Area Rules. Case closed.

Enforcement Actions: 0

2018 Summary of impediments

The Sandy LAC did not distinguish any new impediments. They recognized that the Sandy still needs continued outreach regarding Area Rules. One committee member was concerned that the new soil health initiatives and outreach efforts arrived without any funding for items such as cover crop seeds and alternative tilling methods. The LAC also observed that they need more LAC members and more representation from the agricultural community. ODA and the SWCDs will work together to recruit additional LAC members over the next biennium.

2018 Recommendations for modifications

The Sandy LAC expressed they were satisfied with the revisions of the Area Plan as well as the progress achieved over the last biennium. The development of the measurable objective resulted in a productive discussion of bacteria in Beaver Creek and will help the District determine how the next biennium will move forward regarding livestock management outreach and technical assistance.

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Appendix A: Educational and Technical Services

Soil and Water Conservation Districts (Local Management Agency for Area Plan/ SWCDs)
Assist landowners in identifying and implementing land management activities and coordinate with other technical experts in natural resources.
East Multnomah SWCD: 503-222-7645/ Portland
Clackamas SWCD: 503-210-6000/ Oregon City

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

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

Sandy River Basin Watershed Council
Partnership of people who live, work, or recreate in the Sandy River Basin as well as agencies and organizations that have an interest in the area, working cooperatively to improve the health of the watershed for fish, wildlife, and people.
Executive Director
503-622-9134/ Gresham

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

Oregon Department of Fish and Wildlife (ODFW)
Works with landowners to balance protection of fish and wildlife with economic, social, and recreational needs. Advises on habitat protection. Offers technical and educational assistance for habitat and restoration projects. Provides plan review for special property tax assessment for wildlife habitat projects.
Ocean Salmon and Columbia
River Program: 971-673-6000/ Sandy
Headquarters: 503-947-6000/ Salem

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 Unit Office: 503-829-2216
North Cascade District
Stewardship Forester: 503-829-2216

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

Oregon State University Extension Service (OSU Extension)
Offers educational programs, seminars, classes, tours, and publications to guide landowners in managing their resources.
Clackamas County: 503-655-8631/ Oregon City
Portland Metro Area Office: 971-361-9620

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

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

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: 503-655-3144

USDA – Farm Service Agency (FSA)
Maintains agricultural program records and administers various cost share programs. Their offices also provide up-to-date aerial photography of farm and forestland.
Clackamas County FSA Service Center
503-655-3144/ Oregon City

Appendix B: Common Agricultural Water Quality Parameters of Concern

Bacteria: *Escherichia coli (E. coli)* is measured in streams to determine the risk of infection and disease to people. *E.coli* bacteria live in soil or vegetation and in the gastrointestinal tract of animals such as humans, wildlife, and livestock. *E.coli* enters surface water from the direct disposal of waste into streams or lakes or by seeping into groundwater. Bacteria could be in runoff from wooded areas, pastures, feedlots, septic tanks, manure piles, dog runs, and sewage plants.

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

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.

Chlordane/ Heptachlor epoxide (degradate of Chlordane); Insecticide cancelled in 1988**.** Chlordane is a chemical compound and also part of a similarly named pesticide mixture resulting from synthesis (main components- heptachlor, chlordane, and nonachlor). These highly chlorinated cyclodienes were classified as organic pollutants hazardous for human health.

DDT and Dieldrin: DDT and dieldrin are toxic organochlorinated pesticides that were commonly used as agricultural insecticides and to control disease-causing insects, such as mosquitoes. Both pesticides tend to bind to soil, rather than dissolve in water. Although these pesticides have since been cancelled in the U.S., they can still be found in the environment.

- DDT criterion of 0.000022 ng/L
- Dieldrin criterion 0.0000053 ng/L
- DDE criterion of 0.000022 ug/L

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

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

pH: Is a scale of acidity from 0 to 14. It tells how acidic or alkaline a substance is. More acidic solutions have lower pH. More alkaline solutions have higher pH. Substances that aren't acidic or alkaline (that is, neutral solutions) usually have a pH of 7. Acids have a pH that is less than 7. Alkalis have a pH that is greater than 7. pH is a measure of the concentration of protons (H^+) in a solution.

Polychlorinated Biphenyls (PCBs) and Dioxin: PCBs, including dioxin are highly bio-accumulative toxic compounds that have been found in fish tissue in the Columbia River. Many products contain PCBs, including electrical transformers, hydraulic fluids, and printing inks. Although these compounds have mostly been banned, small amounts are still allowed in many products.

Stream Water Temperature: Temperature is a critical water quality and environmental parameter because it governs the kinds and types of aquatic life, regulates the maximum dissolved oxygen concentration of the water, and influences the rate of chemical and biological reactions.

- **Criteria:** The seven-day average maximum temperature of a stream identified as having salmon and trout rearing and migration use may not exceed numeric criteria. Rearing is approximately June through September. Spawning is generally September through May.

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

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

468B.025 Prohibited activities.

(1) Except as provided in ORS 468B.050 or 468B.053, no person shall:
  (a) Cause pollution of any waters of the state or place or cause to be placed any wastes in a location where such wastes are likely to escape or be carried into the waters of the state by any means.
  (b) Discharge any wastes into the waters of the state if the discharge reduces the quality of such waters below the water quality standards established by rule for such waters by the Environmental Quality Commission.
(2) No person shall violate the conditions of any waste discharge permit issued under ORS 468B.050.
(3) Violation of subsection (1) or (2) of this section is a public nuisance. [Formerly 449.079 and then 468.720; 1997 c.286 §5]

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

(1) Except as provided in ORS 468B.053 or 468B.215, without holding a permit from the Director of the Department of Environmental Quality or the State Department of Agriculture, which permit shall specify applicable effluent limitations, a person may not:
  (a) Discharge any wastes into the waters of the state from any industrial or commercial establishment or activity or any disposal system.
  (b) Construct, install, modify or operate any disposal system or part thereof or any extension or addition thereto.
  (c) Increase in volume or strength any wastes in excess of the permissive discharges specified under an existing permit.
  (d) Construct, install, operate or conduct any industrial, commercial, confined animal feeding operation or other establishment or activity or any extension or modification thereof or addition thereto, the operation or conduct of which would cause an increase in the discharge of wastes into the waters of the state or which would otherwise alter the physical, chemical or biological properties of any waters of the state in any manner not already lawfully authorized.
  (e) Construct or use any new outlet for the discharge of any wastes into the waters of the state.
(2) The Department of Environmental Quality or the State Department of Agriculture may issue a permit under this section as an individual, general or watershed permit. A permit may be issued to a class of persons using the procedures for issuance of an order or for the adoption of a rule. Notwithstanding the definition of "order" or "rule" provided in ORS 183.310, in issuing a general or watershed permit by order pursuant to this section, the State Department of Agriculture or Department of Environmental Quality:
  (a) Is not required to direct the order to a named person or named persons; and
  (b) May include in the order agency directives, standards, regulations and statements of general applicability that implement, interpret or prescribe law or policy.
(3) The State Department of Agriculture or the Department of Environmental Quality may define "confined animal feeding operation" by rule for purposes of implementing this section. [Formerly 449.083 and then 468.740; 1997 c.286 §6; 2001 c.248 §4; 2005 c.523 §4]

Appendix D: Sandy Subbasin Drinking Water Sources - Agricultural Lands

Oregon implements its drinking water protection program through a partnership between DEQ and OHA. The program provides individuals and communities with information on how to protect the quality of Oregon's drinking water. Department of Environmental Quality and OHA encourage preventive management strategies to ensure that all public drinking water resources are kept safe from current and future contamination.

Agricultural activities that may impair drinking water resources include:

- Improper storage and management of animal wastes.
- Concentrated livestock and other agricultural practices that contribute to streambank and upland soil erosion and sedimentation to surface water.
- Over application and improper handling of pesticides and fertilizers.
- Excessive irrigation that transports contaminants or sediments to groundwater or surface water.

For more information, see: https://www.oregon.gov/deq/wq/programs/Pages/dwp.aspx

Sandy Subbasin Drinking Water Systems: Surface and Groundwater					
Subbasin	**Watershed**	**County**	**Public Water System**	**Drinking Water Source**	**Population**
Lower Columbia-Sandy	Lower Sandy River	Sandy	Pioneer Mobile Home Park	Groundwater	275
Lower Columbia-Sandy	Lower Sandy River	Sandy	Cottrell Elem SD #107	Groundwater	150
Lower Columbia-Sandy	Lower Sandy River	Multnomah	OPRD Ainsworth State Park	Groundwater	150
Lower Columbia-Sandy	Lower Sandy River	Multnomah	City of Troutdale	Groundwater	15,110
Lower Columbia/Sandy	Lower Sandy River	Multnomah	Corbett Water District	North Fork Gordon Creek	3,300
Lower Columbia/Sandy	Lower Sandy River	Multnomah	Corbett Water District	South Fork Gordon Creek	3,300
Table provided by DEQ from the DEQ Water Quality Source Protection Program. https://www.oregon.gov/deq/wq/programs/Pages/dwp.aspx					

Appendix E: Water Quality and Conservation Programs and Opportunities

The following is a list of some programs available to landowners and organizations in the Sandy Subbasin Management Area. For the most current information please contact the organizations listed below for more information.

Oregon Department of Agriculture

Confined Animal Feeding Operation Program (CAFO)

The Oregon Department of Agriculture issues a Confined Animal Feeding Operation (CAFO) permit to livestock owners so manure does not pollute ground and surface water.

There are three main factors that determine if your farm needs a CAFO permit:

1. How many animals you have.
2. How long the animals are confined in a prepared area (e.g. in a barn, lot, pen).
3. How the manure and wastewater generated by the farm is stored (e.g. do you collect your manure in a tank or do you stack it in a pile).

Go online for more information:
https://www.oregon.gov/ODA/programs/NaturalResources/Pages/CAFO.aspx
or contact the Livestock Water Quality Specialist for Area 3: 503-986-6468 / Salem

Pesticide Management Plan

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

East Multnomah Soil and Water Conservation District Programs

Working Farm Land Protection

We help ensure high quality farmland is available for current and future farmers by entering into voluntary farmland protection agreements which provide cash and other incentives. When our farmland is protected, we all benefit. Are you a farmer or landowner interested in learning more?
Visit our Landowner Options page or contact our Land Legacy Program Manager
at (503) 935-5374 or go online to: https://emswcd.org/landconservation/protecting-farmland/

Erosion Solutions for Nurseries

We work with nurseries to plan and fund custom solutions that will reduce soil erosion without interfering with operations. Free planning is available to nurseries, as well as 75% cost share funding for projects that address soil erosion. To learn more about Erosion Solutions go online to:
https://emswcd.org/on-your-land/erosion-solutions/

Clackamas Soil and Water Conservation District Programs

Sprayer Efficiency Program

The Clackamas Soil and Water Conservation District offers reimbursement up to $500 to replace worn out sprayer tips, pressure regulators, pressure gauges, hoses, valves, and check-valve nozzle bodies.

Replacing worn parts will reduce the amount of pesticides used, improve pesticide coverage, and reduce spray drift. For more information, visit the CSWCD website at: https://conservationdistrict.org/

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

Windsocks Program
The program was created to help agricultural producers apply pesticides without losing chemicals to drift from wind, Clackamas County Soil and Water Conservation District in partnership with Clackamas River Water Providers, is offering calibrated windsocks. These windsocks are calibrated to indicate wind speed from 2 to 12 miles per hour. Windsocks attach directly to the tractor for real time information to make quick, more accurate spraying decisions in the field for reducing drift. For more information, visit the CSWCD website at: https://conservationdistrict.org/

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

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

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

Natural Resources Conservation Service Programs
Agricultural Conservation Easement Program (ACEP)
NRCS provides financial assistance to eligible partners for purchasing agricultural land easements that protect the agricultural use and conservation values of eligible land.
Contact: Natural Resources Conservation Service, Soil and Water Conservation Districts

Conservation Reserve Enhancement Program (CREP)
Provides annual rent to landowners who enroll agricultural lands along streams. Also cost-shares conservation practices such as riparian tree planting, livestock watering facilities, and riparian fencing.
Contact: Natural Resources Conservation Service, Farm Service Agency, Soil and Water Conservation Districts, Oregon Department of Forestry.

Conservation Reserve Program (CRP)
Competitive CRP provides annual rent to landowners who enroll highly erodible lands. Continuous CRP provides annual rent to landowners who enroll agricultural lands along seasonal or perennial streams. Also cost-shares conservation practices such as riparian plantings.
Contact: Natural Resources Conservation Service, Farm Service Agency, Soil and Water Conservation Districts

Environmental Quality Incentives Program (EQIP)
Cost-shares water quality and wildlife habitat improvement activities, including conservation tillage, nutrient and manure management, fish habitat improvements, and riparian plantings
Contact: Natural Resources Conservation Service, Soil and Water Conservation Districts