OREGON DEPARTMENT OF AGRICULTURE

Sandy Subbasin Agricultural Water Quality Management Area Plan

October 2024

Developed by the

Oregon Department of Agriculture

and the

Sandy Subbasin Local Advisory Committee

with support from the

Clackamas Soil and Water Conservation District and the East Multnomah Soil and Water Conservation District

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

Website: oda.direct/AgWQPlans

Sandy Subbasin Management Area Contacts:

Clackamas Soil and Water Conservation District
22055 S. Beavercreek Road
Beavercreek, OR 97004
(503) 210-6000
www.conservationdistrict.org

East Multnomah Soil and Water Conservation District
5211 N. Williams Ave.
Portland, OR 97217
(503) 222-7645
www.emswcd.org

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Acronyms and Terms

Ag Water Quality Program – Agricultural Water Quality Program
Area Plan – Agricultural Water Quality Management Area Plan
Area Rules – Agricultural Water Quality Management Area Rules
CAFO – Confined Animal Feeding Operation
CWA – Clean Water Act
DEQ – Oregon Department of Environmental Quality
GWMA – Groundwater Management Area
HUC – Hydrologic Unit Code
LAC – Local Advisory Committee
LMA – Local Management Agency
Management Area – Agricultural Water Quality Management Area
NRCS – Natural Resources Conservation Service
OAR – Oregon Administrative Rules
ODA – Oregon Department of Agriculture
ORS – Oregon Revised Statute
OWEB – Oregon Watershed Enhancement Board
OWRI – Oregon Watershed Restoration Inventory
PSP – Pesticide Stewardship Partnership
SIA – Strategic Implementation Area
SWCD – Soil and Water Conservation District
TMDL – Total Maximum Daily Load
US EPA – United States Environmental Protection Agency

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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)). The Area Plan refers to associated Agricultural Water Quality Management Area Rules (Area Rules). The Area Rules are Oregon Administrative Rules (OARs) and are enforced by the Oregon Department of Agriculture (ODA).

Required Elements of Area Plans

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

Plan Content

Chapter 1: Agricultural Water Quality Program Purpose and Background. Presents consistent and accurate information about the Ag Water Quality Program.

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

Chapter 3: Implementation Strategies. Describes activities to make and track progress towards the goals of the Area Plan. Presents goals, measurable objectives, strategic initiatives, proposed activities, and monitoring efforts.

Chapter 4: Progress and Adaptive Management. Describes progress toward achieving Area Plan goals and measurable objectives by summarizing accomplishments and monitoring results.

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Chapter 1: Agricultural Water Quality Program

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

As part of Oregon's Agricultural Water Quality Program (Ag Water Quality Program), the Area Plan guides landowners and partners such as Soil and Water Conservation Districts (SWCDs) in addressing water quality issues 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 Local Advisory Committee (LAC), with support and input from the SWCD and the Oregon Department of Environmental Quality (DEQ). The Area Plan is implemented using a combination of outreach, conservation and management activities, compliance with Area Rules, 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 through 603-095-1380). The general regulations guide the Ag Water Quality Program, and the Area Rules for the Management Area are the regulations with which landowners must comply. Landowners are encouraged through outreach and education to implement conservation and 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 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 land in Oregon is regulated by DEQ and on Tribal Trust land by the respective tribe, with oversight by the United States Environmental Protection Agency (US EPA).

1.2 History of the Ag Water Quality Program

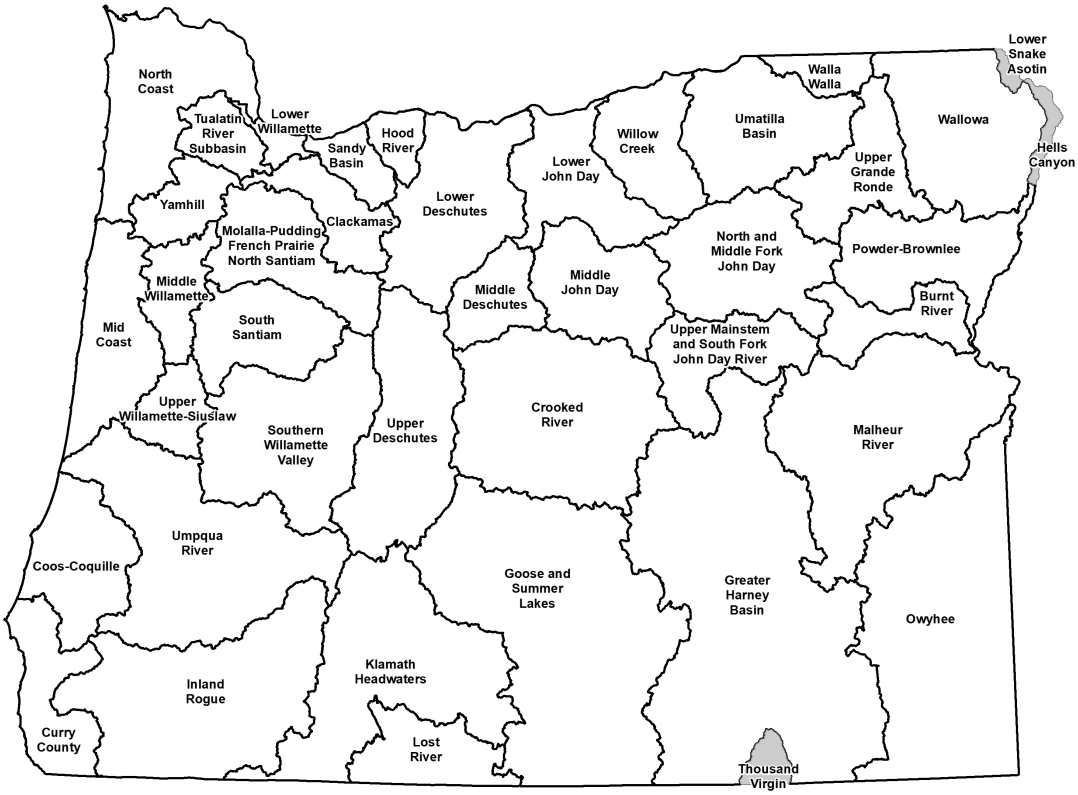
In 1993, the Oregon Legislature passed the Agricultural Water Quality Management Act directing ODA to develop plans to prevent and control water pollution from agricultural activities and soil erosion and achieve water quality standards and to adopt rules as necessary (ORS 568.900 through ORS 568.933). The Oregon Legislature passed additional legislation in 1995 to clarify that ODA is the lead agency for regulating agriculture with respect to water quality (ORS

561.191). The Area Plan and Area Rules were developed and subsequently revised pursuant to these statutes.

Between 1997 and 2004, ODA worked with LACs and SWCDs to develop Area Plans and Area Rules in 38 watershed-based Management Areas across Oregon (Figure 1.2). Since 2004, ODA, LACs, SWCDs, and other partners have focused on implementation including:

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

Figure 1.2 Map of 38 Agricultural Water Quality Management Areas*



*Gray areas are not included in Ag Water Quality Management Areas

1.3 Roles and Responsibilities

1.3.1 Oregon Department of Agriculture

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 implement water quality management plans for the prevention

and control of water pollution from agricultural activities and soil erosion. State and federal laws that drive the establishment of an Area Plan include:

- State water quality standards,
- Load allocations for agricultural or nonpoint source pollution assigned under Total Maximum Daily Loads (TMDLs) issued pursuant to the federal 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 in the Management Area and an Action Plan has been developed).

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. If and when other governmental policies, programs, or rules conflict with the Area Plan or Area Rules, ODA will consult with the appropriate agencies to resolve the conflict in a reasonable manner.

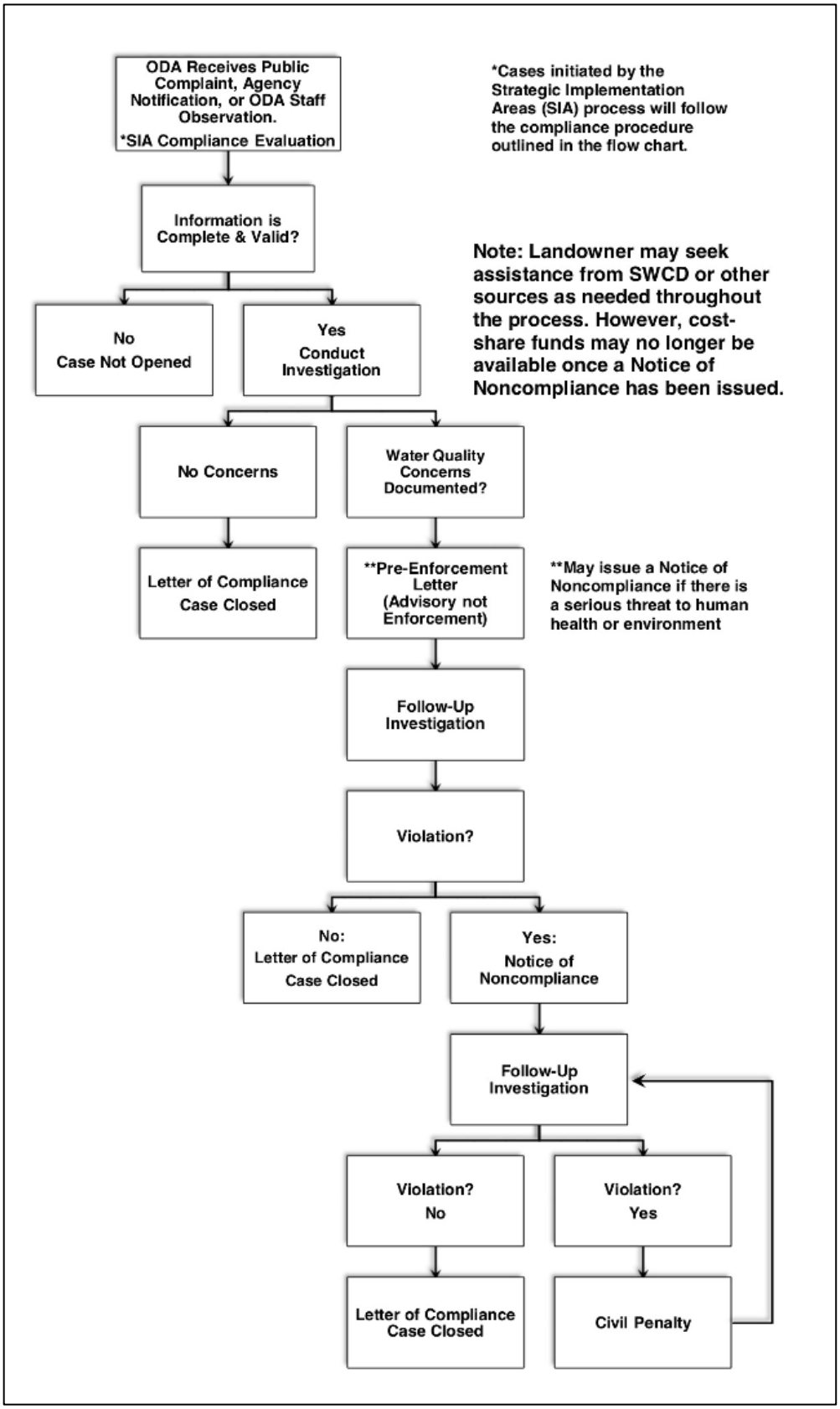
1.3.1.1 ODA Compliance Process

ODA is responsible for any actions related to enforcement or determination of noncompliance with Area Rules (OAR 603-090-0080 through OAR 603-090-0120). ORS 568.912(1) and ORS 568.912(2) give ODA the authority to adopt rules that require landowners to perform actions necessary to prevent and control pollution from agricultural activities and soil erosion.

The Area Rules are a set of standards that landowners must meet on all agricultural or rural lands. “Landowner” includes any landowner, land occupier, or operator per OAR 603-95-0010(24). All landowners must comply with the Area Rules. ODA will use enforcement where appropriate and necessary to achieve compliance with Area Rules. Figure 1.3.1 outlines ODA’s compliance process. ODA will pursue enforcement action only when reasonable attempts at voluntary solutions have failed (OAR 603-090-0000(5)(e)). If a violation is documented, ODA may issue a pre-enforcement notification or an enforcement order such as a Notice of Noncompliance. If a Notice of Noncompliance is issued, ODA will direct the landowner to remedy any conditions through required corrective actions under the provisions of the enforcement procedures outlined in OAR 603-090-060 through OAR 603-090-120. If a landowner does not implement the required corrective actions, ODA may assess civil penalties for continued violation of the Area Rules.

Any member of the public may file a complaint, and any public agency may file a notification of a potential violation of the Area Rules. ODA also may initiate an investigation based on its own observation or from cases initiated through the Strategic Implementation Area process (See Figure 1.3.1.1).

Figure 1.3.1.1 Compliance Flow Chart



1.3.2 Local Management Agency

A Local Management Agency (LMA) is an organization designated by ODA to assist with the implementation of an Area Plan (OAR 603-090-0010). The Oregon Legislature intended that SWCDs 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

For each Management Area, the director of ODA appoints an LAC (OAR 603-090-0020) with up to 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 the development, implementation, and biennial reviews of the Area Plan and Area Rules. The LAC's primary role is to advise 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 its responsibilities, which include but are not limited to:

- Participate in the development and subsequent revisions of the Area Plan and 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. In addition, 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 an appropriate suite of measures. The actions of each landowner will collectively contribute toward achievement of water quality standards.

Technical assistance, and often financial assistance, is available to landowners who want to work with SWCDs or other local partners, such as watershed councils, to achieve land conditions that contribute to good water quality. Landowners 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:

- Hot springs, glacial melt water, unusual weather events, and climate change,
- Wildfires and other natural disasters,
- Septic systems and other sources of human waste,
- Public roadways, culverts, roadside ditches, and shoulders,
- Dams, dam removal, hydroelectric plants, and non-agricultural impoundments,
- Housing and other development in agricultural areas,
- 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 Plan and Area Rules. In each Management Area, ODA and the LAC held public information meetings, a formal public comment period, and a formal public hearing. ODA and the LACs modified the Area Plan and Area Rules, as needed, to address comments received. The director of ODA adopted the Area Plan and Area Rules in consultation with the Board of Agriculture.

ODA, LACs, and LMAs conduct biennial reviews of the Area Plan 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 federal 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. 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 all permitted CAFOs are subject to ODA's CAFO Program requirements. Irrigation return flow from agricultural fields may drain through a defined outlet, but is exempt under the CWA and does not currently require a permit.

Nonpoint-source 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 for each basin. 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 2.4.1.1.

Many waterbodies throughout Oregon do not meet state water quality standards. The most common water quality concerns statewide related to agricultural activities are temperature, bacteria, biological criteria, sediment, turbidity, phosphorous, nitrates, algae, pH, dissolved oxygen, harmful algal blooms, pesticides, and mercury. Water quality impairments vary across the state; they are summarized for this Management Area in Chapter 2.4.

1.4.3 Impaired Waterbodies and Total Maximum Daily Loads

Every two years, DEQ is required by the CWA to assess water quality in Oregon, resulting in the "Integrated Report." CWA Section 303(d) requires DEQ to identify "impaired" waters that do not meet water quality standards. The resulting list is commonly referred to as the "303(d) list" (http://www.oregon.gov/deq/wq/Pages/WQ-Assessment.aspx). In accordance with the CWA, DEQ must establish TMDLs for pollutants on the 303(d) list. For more information, visit www.oregon.gov/deq/wq/tmdls/Pages/default.aspx.

DEQ has issued TMDLs for a portion of these waterbodies that identify pollutant reductions needed to meet Oregon's water quality standards. The associated water quality management plans identify responsible entities and document management strategies needed to meet pollutant reduction targets.

A TMDL includes an assessment of conditions (based on water quality data, land condition data, and/or computer modeling) and describes a plan to achieve water quality standards. TMDLs specify the daily amount of pollution a waterbody can receive and still meet water quality standards. TMDLs generally apply to an entire basin or subbasin, not just to an individual waterbody on the 303(d) list. Water bodies are categorized as achieving water quality standards when data show the standards have been consistently attained.

In the TMDL, point sources are assigned waste load allocations that are then incorporated into National Pollutant Discharge Elimination System permits. Nonpoint sources (agriculture, forestry, and urban) are assigned a load allocation to achieve. 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.

As part of the TMDL issuance process, DEQ identifies Designated Management Agencies and Responsible Persons, which are parties responsible for submitting TMDL implementation plans. ODA is the Designated Management Agency for the agricultural sector. ODA will either utilize existing Area Plans or develop TMDL Implementation Plans to address agricultural or nonpoint source load allocations from relevant TMDLs.

The 303(d) list, the TMDLs, and the agricultural load allocations for the TMDLs that apply to this Management Area are summarized in Chapter 2.4.1.

1.4.4 Oregon Water Pollution Control Law – ORS 468B.025 and 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 38 sets of 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. Streamside vegetation can provide three primary water quality functions: shade to reduce stream temperature warming from solar radiation, streambank stability, and filtration of pollutants. Other water quality functions from streamside vegetation include water storage in the soil for cooler and later season flows, sediment trapping that can build streambanks and floodplains, narrowing and deepening of channels, and biological uptake of sediment, organic material, nutrients, and pesticides. In addition, streamside vegetation provides habitat for numerous species of fish and wildlife. Streamside vegetation conditions can be monitored to track progress toward achieving conditions that support water quality.

Site-Capable Vegetation

The Ag Water Quality Program uses the concept of "site-capable vegetation" to describe the streamside 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 streamside vegetation 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 along narrow streams. For example, shrubs and grass may provide shade, protect streambanks, and filter pollutants. However, on larger streams, mature site-capable vegetation is needed to provide the water quality functions.

In many cases, invasive, non-native plants, such as introduced varieties of blackberry and reed canarygrass, grow in streamside areas. This type of vegetation has established throughout much of Oregon due to historic and human influences and may provide some of the water quality functions of site-capable vegetation. ODA's statutory authority does not require the removal of invasive, non-native plants; however, ODA encourages landowners to remove these plants voluntarily. In addition, the Oregon State Weed Board identifies invasive plants that can impair watersheds. Public and private landowners are responsible for eliminating or intensively controlling noxious weeds, as described in state and local laws. For more information, visit www.oregon.gov/ODA/programs/weeds.

1.4.6 Soil Health and Agricultural Water Quality

An increasingly important concept in Oregon and across the United States is soil health. The Ag Water Quality Program promotes soil health to reduce erosion and keep sediment out of surface waters, thereby helping to maintain and improve water quality. Healthy soils have relatively high organic matter and well-formed soil structure. These characteristics may resist erosion and increase water infiltration, leading to less surface runoff and greater groundwater recharge; the resultant groundwater flows in some cases can help moderate stream water temperatures. (Note that the beneficial effects on water quality vary based on factors such as soil type and ecoregion.) According to the NRCS and others, there are four soil health principles that together build highly productive and resilient soils: minimize disturbance; and maximize cover, continuous living roots, and diversity above and below the surface.

Building soil health increases resiliency to extreme weather, protects water quality, and helps keep farms and ranches viable. Incorporating soil health practices can help landowners adapt and reduce risks. For more information, visit www.nrcs.usda.gov/wps/portal/nrcs/detail/or/soils/health.

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

ODA is the lead state agency for the CAFO Program, which was developed to ensure that operators do not contaminate ground or surface water with animal manure or process wastewater. The CAFO Program coordinates with DEQ to issue permits. These 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, visit oda.direct/CAFO.

1.5.2 Groundwater Management Areas

Groundwater Management Areas (GWMAs) are designated by DEQ where groundwater is polluted from, at least in part, nonpoint sources. After designating a GWMA, DEQ forms a local groundwater management committee comprised of affected and interested parties. The committee works with and advises the state agencies that are required to develop an action plan to reduce groundwater contamination in the area.

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

Any GWMA in this Management Area is described in Chapter 2.4.1.5. Any Measurable Objectives for the GWMA will be described in Chapter 3.1.5.

1.5.3 The Oregon Plan for Salmon and Watersheds

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

1.5.4 Pesticide Management and Stewardship

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

In 2007, Oregon formed the interagency Water Quality Pesticide Management Team to expand efforts to improve water quality in Oregon related to pesticide use. This team facilitates and coordinates activities such as monitoring, analysis and interpretation of data, effective response measures, and management solutions. The team relies on monitoring data from the Pesticide Stewardship Partnership (PSP) program and other federal, state, and local 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 (www.oregon.gov/ODA/programs/Pesticides/Water/Pages/PesticideStewardship.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.

Any PSPs in this Management Area are described in Chapter 3.1.4.

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

1.5.5 Drinking Water Source Protection

Oregon implements its drinking water protection program through a partnership between DEQ and the Oregon Health Authority. The program provides individuals and communities with

information on how to protect the quality of Oregon's drinking water. DEQ and the Oregon Health Authority encourage preventive management strategies to ensure that all public drinking water resources are kept safe from current and future contamination. For more information, visit www.oregon.gov/deq/wq/programs/Pages/dwp.aspx.

1.6 Partner Agencies and Organizations

1.6.1 Oregon Department of Environmental Quality

The US EPA delegated authority to DEQ to implement the federal CWA in Oregon. DEQ is the lead state agency with overall authority to implement the CWA in Oregon. DEQ works with other state agencies, including ODA and the Oregon Department of Forestry to meet the requirements of the CWA. 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 National Pollutant Discharge Elimination System permits for point sources, the CWA Section 319 grant program, the Source Water Protection Program (in partnership with the Oregon Health Authority), the CWA Section 401 Water Quality Certification, and Oregon's Groundwater Management Program. DEQ also coordinates with ODA to help ensure successful implementation of Area Plans.

A Memorandum of Agreement between DEQ and ODA recognizes that ODA is the state agency responsible for implementing the Ag Water Quality Program. ODA and DEQ updated the Memorandum of Agreement in 2023 (www.oregon.gov/oda/shared/Documents/Publications/NaturalResources/WaterQualityGoalsMOA.pdf).

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

1.6.2 Other Partners

ODA and SWCDs work in close partnership with local, state, and federal agencies and other organizations, including: DEQ (as described above), the NRCS and United States Department of Agriculture 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 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 toward improved water quality. ODA is working with SWCDs, LACs, and other partners to develop and implement

strategies that will produce measurable outcomes. ODA is also 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 and progress needed to achieve the measurable objective.

The Ag Water Quality 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 developed for focused work in small geographic areas (Chapter 1.7.3). ODA's longer-term goal is to develop measurable objectives, milestones, and monitoring methods at the Management Area scale.

The State of Oregon continues to improve its ability to use remote-sensing technology to measure current streamside vegetation conditions and compare these to the conditions needed to meet stream shade targets. 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 voluntary incentive programs.

At each biennial review, ODA and its partners will evaluate progress toward measurable objectives and 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 the measurable objective(s) and will revise strategies to address obstacles and challenges.

The measurable objective(s) and associated milestone(s) within the Management Area are in Chapter 3.1 and progress toward achieving the measurable objective(s) and milestone(s) is summarized in Chapter 4.1.

1.7.2 Land Conditions and Water Quality

Land conditions can serve as useful surrogates (indicators) for water quality parameters. For example, because shade blocks solar radiation from warming the stream, streamside vegetation, or its associated shade, generally is used as a surrogate for water temperature. In some cases, sediment can be used as a surrogate for pesticides or phosphorus, which 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,
- Water quality impairments 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 expensive and may not 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 slower to document changes than land condition monitoring.

1.7.3 Focused Implementation in Small Geographic Areas

Focus Areas
A Focus Area is a small watershed with water quality concerns associated with agriculture. The Focus Area process is SWCD-led, with ODA oversight. The SWCD delivers systematic, concentrated outreach and technical assistance. A key component is measuring conditions before and after implementation to document the progress made with available resources. The Focus Area approach is consistent with the efforts of other agencies and organizations to work proactively in small watersheds.

Focus Areas have the following advantages: a proactive approach that addresses the most significant water quality concerns, multiple partners that coordinate and align technical and financial resources, a higher density of projects that may lead to increased connectivity of projects, and a more effective and efficient use of limited resources.

Any Focus Areas in this Management Area are described in Chapter 3.1.2. SWCDs 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 consultation 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. The Oregon Watershed Enhancement Board (OWEB) and other partners make funding and technical assistance available to support conservation and restoration projects. These efforts should result in greater ecological benefit than relying solely on compliance and enforcement. 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 in the SIA.

Any SIAs in this Management Area are described in Chapter 3.1.3.

1.8 Progress and Adaptive Management

1.8.1 Biennial Reviews

The ODA, LAC, LMA, and partners evaluate progress of Area Plan implementation through the biennial review process. At each biennial review, they discuss: 1) Progress toward meeting measurable objectives and implementing strategies, 2) Local monitoring data from other agencies and organizations, including agricultural land conditions and water quality, and 3) ODA

compliance activities. As a result of these discussions, ODA and partners revise implementation strategies and measurable objectives in Chapter 3 as needed.

ODA provides information from the Oregon Watershed Restoration Inventory (OWRI) on restoration project funding and accomplishments at biennial reviews and uses the information for statewide reporting. The majority of OWRI entries represent voluntary actions of private landowners who have worked in partnership with federal, state, and local groups to improve aquatic habitat and water quality conditions. OWRI is the single largest restoration information database in the western United States. For more information, visit www.oregon.gov/oweb/data-reporting/Pages/owri.aspx.

1.8.2 Agricultural Water Quality Monitoring

In addition to monitoring land conditions, ODA relies on water quality monitoring data where available. These data may be provided by other state or federal agencies or local entities; ODA seldom collects water quality samples outside of compliance cases.

As part of monitoring water quality status and trends, DEQ regularly collects water samples every other month throughout the year at more than 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). Parameters measured include alkalinity, biochemical oxygen demand, chlorophyll a, specific conductance, dissolved oxygen, bacteria (*E. coli)*, ammonia, nitrate and nitrite, pH, total phosphorus, total solids, temperature, and turbidity.

DEQ provides status and trends reports for selected parameters in relation to water quality standards. ODA will continue to work with DEQ to summarize the data results and how they apply to agricultural activities.

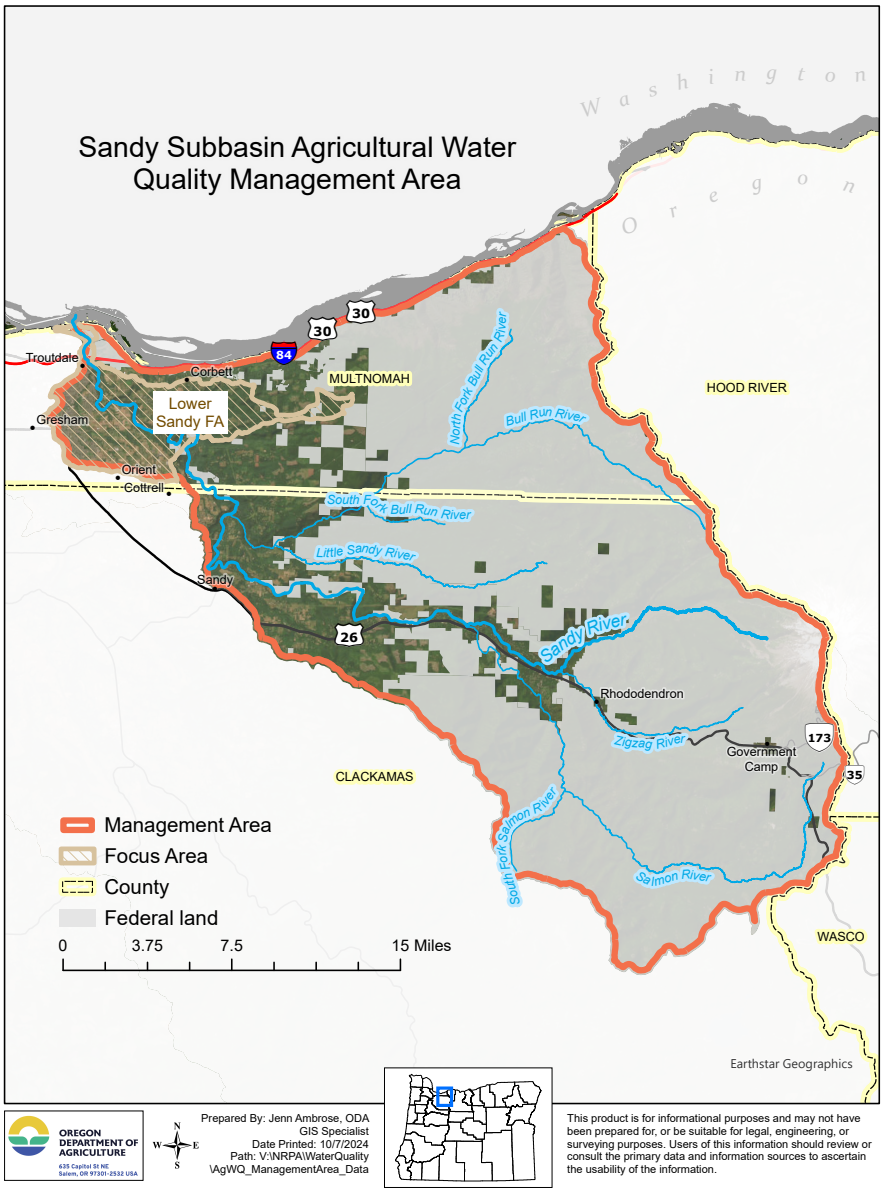
Water quality monitoring efforts in this Management Area are described in Chapter 3, and the data are summarized in Chapter 4.

Chapter 2: Local Background

Chapter 2 provides the local geographic, water quality, and agricultural context for the Management Area. It also describes the water quality issues, Area Rules, and potential practices to address water quality issues.

The Sandy Subbasin Management Area consists of the drainage area of the Sandy River and all its tributaries from the headwaters to the confluence with the Columbia River. The operational boundaries of this Area Plan include all agricultural and rural lands in Oregon that contribute to the Sandy River and its tributaries that drain directly into the Columbia River except federally managed land and lands subject to the Oregon Forest Practices Act.

Figure 2 Sandy Subbasin Management Area



2.1 Local Roles

2.1.1 Local Advisory Committee

The LAC was formed to assist with the development of the Area Plan and Area Rules and with subsequent biennial reviews. Table 2.1.1 lists the current members of the LAC.

Table 2.1.1 Current LAC Members

Name	Geographic Representation	Description
John Bergan	Troutdale	Hay, vegetables
Susan Fry	Corbett	Pasture, horses
Roy Iwai	Portland	Multnomah County (Transportation Division)
Dave Tobie	Corbett	Hay, vegetables
Deniece Tucker	Troutdale	Nursery
David Zeller	Troutdale	Vegetables, row crops

2.1.2 Local Management Agency

SWCDs implement Area Plans through OWEB capacity grants, with details negotiated between ODA and each SWCD. The resulting Scopes of Work define the SWCDs as the LMAs for implementation of the Ag Water Quality Program in specific Management Areas. The LMAs for this Management Area are Clackamas SWCD and East Multnomah SWCD. These SWCDs were also involved in development of the Area Plan and Area Rules.

The LMAs implement the Area Plan by conducting activities detailed in Chapter 3, which are intended to achieve the goals and objectives of the Area Plan.

2.2 Area Plan and Area Rules: Development and History

The director of ODA approved the initial Sandy Subbasin Area Plan and Area Rules in 2001.

Since approval, the LAC has met biennially to review the Area Plan and Area Rules. The biennial review process includes an assessment of progress toward achieving the goals and objectives in the Area Plan.

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.

The predominant land use in the Management Area is forest (Table 2.3.1a; Figure 2). 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 nonfederal forests are regulated under the Oregon Forest Practices Act.

Table 2.3.1a Land Use in the Sandy Subbasin Management Area by State Zoning (Acres)
Data: Oregon Department of Land Conservation and Development 2023 (ODLCD 2017 values)
See Figure 2: Map of the Sandy Subbasin Management Area

Zones	Sandy Subbasin MA (Acres)
Farm Use	12,456 (14,897)
Mixed Farm Forest	6,910 (426)
Forest Private and Federal	299,331 (305,776)
Rural Residential	14,222 (13,538)
Commercial	960 (837)
Industrial	161 (224)
Public Use, Parks and Open Space	23,782 (23,771)
Low to Very High Density Residential	5,892 (4,247)

The westernmost portion of the Management Area is predominantly agricultural, with the urban areas quickly expanding (Table 2.3.1b). Comparing the 2020 U.S. Census to 2016, Gresham and Sandy experienced the greatest population growth. The populations of Troutdale, Corbett, and the Villages of Mt. Hood showed small declines.

Table 2.3.1b Populations of Cities, Towns and Unincorporated Communities in the Management Area
Data: 2020 U.S. Census (2016 U.S. Census)

Locations	Population
Corbett (Unincorporated)	3,947 (3,951)
Gresham	114,247 (110,553)
Villages of Mt. Hood	4.663 (5,057)
Sandy	12,953 (10,664)
Troutdale	16,300 (16,631)

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 3 to 8 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 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.

Farming practices in the Management Area have undergone changes over the past century. Until around the 1930s, the primary land use was timber. Dairies were also very common. In the 1920s and 1930s, some of the more intensive agriculture focused on row crops, bulb farms, and strawberries, often employing horse and plow to cultivate extremely steep land.

World War II compelled many people to move to Portland for factory work. Small "hobby farms" became prevalent with this change, resulting in a reduction of agricultural activity on the steeper slopes of the area and many acres converted to pastures or reverting to a more "wild state." Many of the dairies disappeared from the area, although livestock were common and remain so today. In recent decades, the development of nursery stock has become a prominent contributor to agricultural activity.

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. Table 2.3.2 provides an overview of the agricultural production in the Clackamas and Multnomah counties

Table 2.3.2 Agricultural Production in Clackamas and Multnomah Counties (2022)

2022 US Census of Agriculture: https://www.nass.usda.gov/Publications/AgCensus/2022/index.php (last accessed 7/10/2024). Data in parentheses are comparison values from the 2017 U.S. Census: https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Census_by_State/Oregon/.

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.

Production	Clackamas County	Multnomah County
Total Land in Agricultural Production (acres)	157,937 (162,667)	27,983 (29,983)
Number of Farms	4,156 (3,745)	680 (598)
Average Size of Farms (acres)	38 (43)	41 (50)
Irrigated Land (acres)	25,790 (22,150)	8,379 (4,637)
Total Cropland (acres)	81,794 (83,738)	18,543 (17,441)
Land in Pasture-All Types (acres)	NA (45,342)	NA (7,728)
# of permitted †Confined Animal Feeding Operations	NA (8)	NA (2)
# Farms in the USDA National Organic Program	48	21
# Farms enrolled in USDA ††Conservation Programs	*30	*2
Livestock (# farms with:)		
# farms: with Beef Cows	819 (986)	101 (111)
Milk Cows	37 (35)	3 (3)
Equine: Horses, Ponies, Mules, and Donkeys	949 (1,005)	96 (102)
Layers/Poultry/Turkey	1,090 (683)	195 (122)
Goats: Milk/Angora/Meat	430 (250)	68 (34)
Sheep and Lambs	332 (267)	42 (39)
Hogs and Pigs	169 (104)	14 (20)
Llamas and Alpacas	114 (165)	*21
Total Bee Colonies	*9,365	363 (830)
Crops (acres)		
Field Seeds, Grass Seeds, Hay, Forage, Silage	23,082 (26,236)	*1,270
Vegetable Row Crops	3,097 (3,996)	2,139 (2,505)
Orchards and Berries (acres)		
Land in Orchards	9,741 (6,234	192 (259)
Land in Christmas Trees	18,517 (15,951)	1004 (272)
Land in Berries	3,311 (3,401)	610 (1,003)
Greenhouse/Nurseries		
All Greenhouse and Nursery Types (in acres of growing square footage)	1,374,938 (2,380,184)	628,703 (480,600)

* 2017 U.S. Census value; 2022 value unavailable

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

†† Conservation Reserve, Wetlands Reserve, Farmable Wetlands, and CREP

2.3.3 Water Resources

The 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 10 inches of snow per 1 inch of rain. 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, 1991). 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 several 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.

The Oregon Water Resources Department (WRD) has designated (OAR 690-502-0160) 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 2.3.3 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 2.3.3 Sandy River Surface Water Records Period of record from 1910-2023 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 July 26, 2024)		
Winter Monthly Mean Peak Discharge	December at 3,328 cfs	January at 3,582 cfs
Summer Monthly Mean Low Discharge	August at 486 cfs	September at 496 cfs
Maximum Discharge on Record	December 22, 1964 at 57,800 cfs	
Minimum Discharge on Record	September 26, 1962 at 63 cfs	
Highest Annual Average Flow	1996 at 3,456 cfs	
Lowest Annual Average Flow	2001 at 1,334 cfs	
2023 Average Annual Flow = 1,742 cfs (2018 Average Annual Flow = 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 1 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 stormwater 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

Several 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 100 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, stabilizing streambanks, and providing 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 several 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 sublethal 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 2.3.4.

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-spined stickleback (*Gasterosteus aculeatus*)
- White sturgeon (*Acipenser transmontanus*)
- Sculpins (*Cottus* spp.)
- Suckers (*Catostomus* spp.)
- Dace (*Rhinichthys* spp.)

Table 2.3.4 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 clarkii)*	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	Oregon	Not Listed	Vulnerable

(*Lampetra richardsoni)*			
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 Agricultural Water Quality

2.4.1 Water Quality Issues

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

2.4.1.1 Beneficial Uses

Multiple beneficial uses in the Management Area require clean water, including drinking water, recreational activities, aquatic life, and agriculture (www.oregon.gov/deq/wq/Pages/WQ-Standards-Uses.aspx).

Beneficial uses in the Sandy Subbasin Management Area 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, and hydropower (OAR 340-041-0286, Table 286A).

While there may not be severe impacts on water quality from a single source or activity, the combined effects from all sources contribute, along with impacts from other land uses and activities, to the impairment of beneficial uses of the Sandy River and tributaries.

2.4.1.2 Water Quality Parameters of Concern

There are several water quality concerns for agriculture listed in the 2022 Integrated Report (https://www.oregon.gov/deq/wq/Pages/epaApprovedIR.aspx). They are as follows:

Nutrients
Nutrients can occur naturally in streams and rivers, but elevated concentrations are often the result of pollution due to human activities. Phosphorus and nitrates have been nationally

identified as the most important nutrients to prevent from reaching surface waterbodies and groundwater. Nitrate is the primary form of nitrogen in surface water and groundwater because it readily dissolves in water and is easily transported. Studies conducted by the U.S. Geological Survey (USGS) National Water Quality-Assessment (NAWQA) Program estimate that about 90 percent of nitrogen and 75 percent of phosphorus originates from nonpoint sources; the remaining percentages are from point sources.

Excess nutrients can promote the growth of algae, which can reduce beneficial uses of the stream. Biological processes (such as algal production) in surface waters are controlled by the availability of temperature, light, and nutrients. Abundant algae cause wide fluctuations in pH and dissolved oxygen, impacting aquatic life. Nuisance algae and plant growth impair aesthetics and can cause odor problems.

Temperature
Water temperature is primarily a summer concern, a season characterized by low flow and high air temperature. The sublethal effects associated with higher than optimum temperatures are disease, reduced metabolic energy for feeding, and reduced growth or reproductive behavior due to avoidance of areas with high temperatures.

Determining whether the stream temperature is above or below the temperature standard is based on the average of the maximum daily water temperatures for the stream's warmest, consecutive seven-day period during the year. Water temperature measurements must be taken with continuous recording temperature sensors, in well-mixed and representative locations of streams.

A one-time measurement above the standard is not a violation of the standard. When stream flow is exceptionally low, or air temperature is exceptionally high, the temperature criteria are waived.

For nonpoint sources of stream heating (e.g., vegetation disturbance, stream channel alteration) attributed to agriculture and rural lands, the temperature TMDL establishes thermal goals for on-the-ground conditions that would lead to more natural stream temperature patterns. The TMDL recovery targets call for natural shade-producing vegetation along all streams in the plan area and the removal of stressors that are impeding that attainment of a natural vegetative and channel geometry conditions. In certain areas, shade producing riparian vegetation may not be appropriate due to local site conditions. Site-specific determinations will be made by ODA.

pH and Dissolved Oxygen
Extremes in water pH and low levels of dissolved oxygen can harm fish and other aquatic life. Both conditions can be caused by the availability of nutrients, warm temperatures, and light, all of which stimulate aquatic plant or algae growth. Excessive aquatic plant growth can increase water pH, which may harm fish. Plant and algal growth, and the death and subsequent decomposition of aquatic plants and algae can deplete the water of dissolved oxygen resulting in the death of fish and other aquatic animals. These conditions are usually aggravated by low stream flow. The water quality standard for pH (hydrogen ion concentrations) values range from 6.5 to 9.0 (OAR 340-041-0315(1)).

Bacteria
Bacteria counts are used to determine the safety for human contact, recreation, and domestic water supplies. High levels of *E. coli* bacteria can cause severe gastric illness and even death. Potential sources of bacteria include animal manure and septic systems. Streams may be listed

as violating this criterion during the summer period (the highest use period for water contact recreation), or for the fall-winter-spring period. The DEQ standard sets a maximum level allowable over a 90-day period, as well as a single sample maximum of 406 *E. coli* organisms per 100 ml (OAR 340-041-0009).

Sediment
Sediment includes fine silt and organic particles suspended in the water column, settled particles, and larger gravel and boulders that move at high flows. Sediment movement and deposition is a natural occurrence, but high levels of sediment can degrade fish habitat by filling pools, creating a wider and shallower channel, and covering spawning gravels. Suspended sediment or turbidity in the water can cause physical damage to fish and other aquatic life, modify behavior, and increase temperature by absorbing incoming sunlight. Sediment comes from erosion on range, forestland and croplands, erosion from streambanks and streambeds, and runoff from roads and developed areas. Nutrients, pesticides, and toxic substances can also be attached to sediment particles.

Biological Criteria
Biological criteria refer to the support of plants and animals that live at least part of the life cycle in water. Factors that affect biological criteria are stream disturbances, excessive heat inputs, and excessive sediment. The biologic condition is assessed through sampling of streambed insects and fish counting.

Waters of the state shall be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities (OAR 340-041-0011).

Aquatic Weeds and Algae
Both rooted aquatic plants and algae are a natural part of stream systems. They grow by taking in nutrients from the water column and sunlight. When water temperatures are warm enough and sufficient nutrients are present, excessive growth can occur; this can be a problem for both aquatic life and recreational beneficial uses. Excessive growth can affect aquatic life in several ways. During sunlight hours, plants and algae remove carbon dioxide from the water column as part of photosynthesis. With excessive growth, this can result in increased pH (alkaline conditions). During the night, plant growth removes oxygen from water and releases carbon dioxide, resulting in both low pH (acidic conditions) and low dissolved oxygen. In addition, when algae die and decompose, they remove oxygen from the surrounding water. Low dissolved oxygen can lead to decreased fish habitat and even fish kills. Additionally, low dissolved oxygen levels can lead to changes in water chemistry that allow mercury to be more able to enter the food chain. Algal blooms also often create odors and coloration that are objectionable to recreational users.

Harmful algal blooms (HABs) occur when excessive amounts of the naturally occurring blue-green algae, cyanobacteria, reach levels that create toxins that can be dangerous to animals and humans.

Cyanobacterial blooms cause taste and odor problems, decreased aesthetics, depleted dissolved oxygen and harmful toxins. Physical factors that contribute to the creation of HABs include the availability of light, meteorological conditions, alteration of water flow, vertical mixing, and temperature. Chemical factors include pH changes, nutrient loading (principally in various forms of nitrogen and phosphorus), and trace metals.

2.4.1.3 TMDLs and Agricultural Load Allocations

Table 2.4.1.3: Pollutants with Approved TMDLs and Load Allocations for the Management Area
Bacteria: Applies to all waterbodies in the Sandy Subbasin. **Load Allocation:** 86 percent reduction compared to average loads in 2005. **Surrogate:** *E.coli* organisms entering streams per runoff. **Current TMDL:** Sandy River Basin – Bacteria and Temperature (DEQ; approved 2005) For more information: https://www.oregon.gov/deq/FilterDocs/sandytmdlwqmp.pdf
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. **Surrogate:** Effective shade, the percent of potential daily solar radiation flux that is blocked by vegetation and topography. **Current TMDL:** Sandy River Basin – Bacteria and Temperature (DEQ; approved 2005) • For more information: https://www.oregon.gov/deq/FilterDocs/sandytmdlwqmp.pdf
Columbia-Sandy Temperature: Applies to most waterbodies in the Sandy Subbasin as defined in the TMDL. **Load Allocation:** The rule requires that wasteload and load allocations restrict all NPDES point sources and nonpoint sources to a cumulative increase of no greater than 0.30°C (0.5°F) above the applicable criteria after complete mixing in the waterbody, and at the point of maximum impact. **Surrogate:** Effective shade, the percent of potential daily solar radiation flux that is blocked by vegetation and topography. **Current TMDL:** Temperature TMDLs for the Lower Columbia-Sandy Subbasin **TMDL Revisions:** Approved by EPA on Sept. 12, 2024. For more information: https://www.oregon.gov/deq/rulemaking/Pages/sandytempTMDL.aspx

2.4.1.4 Drinking Water

DEQ summarizes drinking water issues in each Management Area prior to biennial reviews. DEQ's full report is available at: https://www.oregon.gov/deq/wq/programs/Pages/Nonpoint-Implementation.aspx.

There are 69 public water systems using groundwater and surface water sources in the plan area serving approximately 717,691 people. Total coliform bacteria and *E. coli* alerts for public water systems are generated by the Oregon Health Authority when detected in sample results. Within the management area, 43 public water systems have had recent alerts for exceeding the Maximum Contaminant Level Goal (MCLG) for total coliform bacteria. The MCLG for total coliforms is zero. Seven of the water systems have had more than 20 alerts in the past 10 years for total coliform and none of the public water systems received violations. Within the Management Area, five public water systems had alerts for detection of *E. coli* bacteria in the past 10 years. One public water system had a violation for *E. coli* in the past five years.

An alert for elevated nitrate concentrations is generated by the Oregon Health Authority when nitrate sample results for public water systems exceed 5 mg/L. Within the Management Area, none of the public water systems had an alert for elevated nitrate results in the past 10 years or an MCL violation in the past five years (the MCL for nitrate is 10 mg/L). The Domestic Well Testing Act database includes submitted records of real estate transaction testing data from 1989 to 2018. There are 307 records of private domestic well samples within the Management Area. Of these 307 records, eight measured nitrate concentrations ≥3 mg/L, four measured nitrate concentrations ≥5 mg/L, one measured nitrate concentrations ≥7mg/L, and none of the records measured nitrate concentrations ≥10mg/L.

DEQ recommends that ODA develop measurable objectives throughout the Management Area for strategies that protect drinking water source areas.

2.4.2 Sources of Impairment

Nonpoint sources of pollution in the Management Area include eroding agricultural, and forest lands; eroding streambanks; glacial runoff and landslides; runoff and erosion from roads and urban areas; runoff from livestock and other agricultural operations; and septic systems. Re-routing of runoff via road building, construction, and land surfacing such as parking areas can lead to excessive erosion or pollutant transport. Pollutants from nonpoint sources are carried to the surface water through the action of rainfall, snowmelt, irrigation and urban runoff, and seepage. A major nonpoint source of water quality impairment is heat input, which has increased due to vegetation removal, seasonal flow reduction, changes in channel shape, alteration to the floodplain and climate change. Channelization alters gradient, width/depth ratio, and sinuosity, causing sediment and temperature increases.

2.5 Regulatory and Voluntary Measures

2.5.1 Area Rules

All landowners or operators conducting activities on lands in agricultural use must be in compliance with the Area Rules. A landowner is responsible for only those conditions caused by activities conducted on land managed by the landowner or occupier. Conditions resulting from unusual weather events or other circumstances not within the reasonable control of the landowner or operator are considered when making compliance decisions. An example of reasonable control of the landowner means that technically sound and economically feasible measures are available to address conditions described in prevention and control measures. ODA may allow temporary exceptions when a specific integrated pest management plan is in place to deal with certain weed or pest problems. The Area Rules will be applied with consideration of agronomic and economic impacts.

Sandy Subbasin
OAR 603-095-1340
Prevention and Control Measures
(1) All landowners or occupiers conducting activities on lands in agricultural use shall be in compliance with the following criteria. A landowner or occupier shall be responsible for only those violations of the following prevention and control measures caused by activities conducted on land managed by the landowner or occupier. Criteria do not apply to conditions resulting from unusual weather events or other exceptional circumstances which could not have been reasonably anticipated.

Streamside Area Condition
(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
(3) Agricultural Waste Control. Effective upon rule adoption.

(a) (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. (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.

2.5.2 Voluntary Measures

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 Chapter 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.

2.5.2.1 Streamside Areas

A landowner or operator's responsibility under this Area Plan is to implement measures that prevent and control water pollution from agricultural activities. Areas near waterbodies are especially important to water quality and sensitive to management activities.

The streamside area is defined as the area near the stream where management practices can most directly influence the conditions of the water. This area usually ranges from 10 feet to 100 feet from the water, depending on the slope, soil type, stream size, and morphology.

The riparian area, as defined in OAR 690-400-0010(14), is a zone of transition from an aquatic to a terrestrial system, dependent upon surface or subsurface water, that reveals through the zone's existing or potential soil-vegetation complex the influence of such surface or subsurface water. A riparian area may be located adjacent to a lake, reservoir, estuary, pothole, spring, bog, wet meadow, muskeg, slough, or ephemeral, intermittent, or perennial stream.

Water is the distinguishing characteristic of riparian areas, but soil, vegetation, and landform also exert strong influence on these systems. In a healthy riparian ecosystem, these four components interact to produce a wide variety of conditions.

Healthy riparian vegetation provide three primary water quality functions:

- Stream temperature moderation (riparian vegetation blocks direct solar radiation),
- Reduction of streambank erosion (roots stabilize banks and dissipate stream energy),
- Filtration of pollutants transported by overland surface runoff, such as bacteria, nutrients, pesticides, sediment and mercury.

Streamside vegetation provides vital ecological benefits as well, such as providing riparian and instream habitat and developing diverse channel characteristices for fish production.

Strategies to enhance and protect riparian vegetation include:

- Employ rotational grazing in riparian area a time when growth is palatable and soils are not saturated,
- Fence out livestock except to give them access for water,
- Establish off-stream water facilities,
- Assist in riparian development by planting perennial vegetation along streams.

2.5.2.2 Agricultural Waste Control

A landowner or operator's responsibility under this Area Plan is to prevent the introduction of waste materials into waters of the state. There are existing statutes and rules that regulate water quality that remain in effect and are enforced by other designated management agencies.

Wastes include excess soil, manure, fertilizers, and other substances. Indicators of noncompliance include but is not limited to:

- Runoff flowing through areas of high livestock usage and carrying wastes into waters of the state,
- Livestock waste accumulated in drainage ditches or areas of flooding,
- Fecal coliform (*E. coli*) counts that exceed state water quality standards,
- Runoff of excess nutrients (including fertilizers, manure, and other additives) when applied above amounts that crops can uptake,
- Surface transport of excess pesticides into waters of the state or leaching into groundwater.

2.5.2.2.1 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 and infections since many pesticide materials and pathogens attach to soil particles. The sediment will also act to fill and widen streams, resulting in temperature increases and silting of gravel spawning grounds for fish. Suspended sediments could potentially disrupt fish respiration by collecting upon gill surfaces and blocking gas exchange.

Erosion Management Strategies:

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, grass-lined waterways, vegetative filter strips, straw bales, vegetated buffers, and other methods to prevent erosion can be very effective. Covering exposed soil and controlling runoff before it develops into an erosive force, retains sediment to prevent sediment transport along streams and ditches designed to convey stormwater.

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 vegetative buffers 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 Chapter 2.5.2.3).

2.5.2.2.2 Livestock Waste: Nutrients and Bacteria

Manure can be an important nutrient source for crop and pasture production. Effective waste management can reduce nutrient and bacterial contamination of surface and groundwater. Waste should be properly collected, stored and used so that surface transport to streams and leaching into groundwater is limited. Stocking of pastures should not exceed the capacity of the soil to absorb and process waste deposition.

Beneficial strategies include but are not limited to:

- Vegetative buffer strips can capture pollutants and bacteria before they enter streams,
- Store manure away from streams,
- Pile manure on an impervious surface and cover,
- Apply manure at agronomic rates of nitrogen and phosphorus based on soil and/or crop tissue tests.

2.5.2.2.3 Crop Nutrients

Crop nutrients are elements taken in by a plant that are essential to its growth and which are used by the plant in the production of its food and tissue. These elements include carbon,

hydrogen, oxygen, nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, zinc, iron, manganese, copper, boron, molybdenum, and chlorine. Sources of crop nutrients include, but are not limited to irrigation water, chemical fertilizers, animal manure, compost, bio-solids, and leguminous and non-leguminous crop residues.

Over application of crop nutrients may result in nutrients 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.

2.5.2.2.4 Pesticides

Always apply chemicals in accordance with the label requirements 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 nonrestricted use pesticides. DEQ now requires a permit for pesticide applications in, over, or within 3 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 the area. These events allow individuals to safely and anonymously drop off unwanted, unused, or out of date agricultural pesticides, along with some empty containers.

2.5.2.2.5 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 either directly or by way of agricultural and road ditches.
- 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.

2.5.2.3 Irrigation Management

A landowner or operator's responsibility under this Area Plan is to implement measures that prevent and control water pollution from irrigation, this includes pollution to groundwater and surface water. Diversion of water for irrigation or other uses and the return of that water to the surface or groundwater are activities that have potential for contributing to water quality problems.

Irrigated lands are lands either riparian, floodplain, or upland upon which water is applied for the purpose of growing crops. Diversion of water from a water body to be applied on land for the purpose of growing crops is a recognized beneficial use of water. Irrigation water use is regulated by the OWRD in the form of water rights, which specify the rate, duty, and season that water can be applied to a particular parcel of land. Refer to OWRD Rules (OAR 690 and ORS 536 through 543) for more details.

Irrigation in this basin is done by flooding, drip, or sprinkler application. Water usually is diverted from surface sources (stream or pond) and from groundwater sources. Water withdrawals influence stream flows and thus, indirectly affect water quality. Over-irrigating can leach agricultural chemicals (including nitrate) to groundwater, directly affecting water quality. Subject to legal water rights, water withdrawals (dependent on surface water characteristics and method of diversion) should be made in a manner to minimize the adverse impacts on stream flows. The efficacy of irrigation water application is generally enhanced by assuring the quantity and timing of application based on the needs of the crop, as determined by soil moisture levels, crop water use budgets or other monitoring tools. Irrigation water, if not managed, will carry valuable fertilizers and nutrients past the root zone to where it is not available for beneficial use and will eventually be carried down into groundwater. This is in violation of ORS 468B, described in Chapter 1.4.4.

An irrigation management plan should consist of:

- Soil types and map,
- Crop types, acreage, schedules, and critical moisture period,
- Irrigation system types, efficiencies,
- Estimated water use (evapotranspiration-ET) and peak ET, weekly,
- Irrigation rate, frequency and total, weekly.

Characteristics of an irrigation system that has minimal effect on water quality include:

- Operation based on an irrigation and nutrient management plan,
- Delivery of water efficiently to the land within legal water rights,
- Minimal overland return flows,
- Return flow routing that provides for settling, filtering, and infiltration,
- Minimal effect on stability of streambanks and minimal soil erosion,
- Scheduling of water application appropriate to the site including consideration of soil conditions, crop needs, climate, and topography,
- Installation and management of diversion structures that control erosion and sediment delivery and protect the stability of streambanks,
- Diversions that are adequately screened and which provide for fish passage. (Refer to ORS 498.268 for screening requirements),
- Sediment is captured from irrigation runoff before it enters rivers and streams.

2.5.2.4 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 ridgetops 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.

All landscapes and waterways are naturally transformed by precipitation, surface flow, and erosional processes. Bare ground is particularly sensitive to these processes and plants serve to reduce the effect of these actions by way of their root mass and organic matter their roots

emit that aggregates the soil. In short, plants can help land managers limit erosional processes and retain the soil for crop cultivation. Moreover, the protective cover of crops and crop residue, grasses, forbs, shrubs, and/or trees will capture, store, and safely release moisture. Because certain pesticide and nutrient materials attach to soil particles, soil moving off the property into waters of the state transport pesticides, bacteria, and nutrients into those waters. To minimize the mobilization of sediment into waters of the state, growers are encouraged to:

- Reduce topsoil disturbance, such as by reduced or no tillage;
- Maintain vegetative cover as much as possible; consider employing cover crops to protect soil during non-growing season;
- Cultivate crops along contours; and
- Maintain permanent vegetative buffers on both sides of waterways.

2.5.2.5 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). In-stream ponds can pose a challenge to establishing sufficient vegetation for shading. Studies have shown human-built in-stream ponds serve as locations of heat loading leading to increased downstream temperatures. The vegetation density and height sufficient for a small stream may not be enough to provide cover with the widening and increased solar-exposed surface area of in-stream ponds.
Consider the following measures and strategies below when managing your agricultural ponds for water quality.

- Outflow from agricultural ponds should be tested 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.
- Vegetation beyond what is site capable may be needed to adequately shade in-stream ponds.

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.

Chapter 3: Implementation Strategies

Chapter 3 describes efforts to make and track progress toward the goals of the Area Plan. It presents the goals, measurable objectives, strategic initiatives, proposed activities, and monitoring efforts.

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.

The LAC established the following objectives to achieve the Area Plan goal and contribute to good water quality in this Management Area:

- Establish site-capable streamside vegetation along streams on agricultural properties to provide streambank stability, filtration of overland flow, and moderation of solar heating.
- Limit livestock access to streams to time required for watering and crossing, and to prevent overgrazing near streams.
- Control active channel erosion to protect against sediment delivery to streams.
- Prevent the runoff of agricultural wastes into waters of the state and its placement where such runoff could occur.
- Prevent and control upland and cropland soil erosion by reducing tillage and/or keeping ground covered throughout the year with either production crops, crop residues or cover crops.

3.1 Measurable Objectives and Strategic Initiatives

Measurable objectives allow the Ag Water Quality Program to evaluate progress toward meeting water quality standards and TMDL load allocations. Any measurable objectives are stated here. Progress is reported in Chapter 4.1.

3.1.1 Management Area

The Oregon Department of Agriculture, LAC, and LMA has established three measurable objectives with associated milestones for the Sandy Subbasin Area Plan: Measurable Objectives #1 and #2 address bacteria and Measurable Objective #3 addresses temperature. Due to resource constraints and data quality concerns, bacteria sampling by EMSWCD for Measurable Objectives #1 and #2 will cease. To sustain a focus on bacteria-impaired waterways in the Management Area and to identify areas of greatest concern, an alternative measurable objective for bacteria was developed. For clarity, this is identified as “Measurable Objective – Bacteria Proxy” in this area plan iteration. Research and development of additional measurable objectives related to the Area Plan strategies will occur overtime as new data, information, and methods become available.

Bacteria

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 were chosen based on two-year increments (biennial reviews) over a 10-year period.

3.1.1.1 Measurable Objective #1

Measurable Objective: 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.
Assessment Method: Water samples were taken at South Fork @ 302nd. One sample was taken monthly approximately 12 times a year. The sampling site was chosen because of its relevancy to agricultural lands.
Milestones: • By 2021, water samples will meet water quality standards or at least 83% of the time. • By 2023, water samples will meet water quality standards or at least 83% of the time. • By 2025, water samples will meet water quality standards or at least 88% of the time. • By 2027, water samples will meet water quality standards or at least 89% of the time. • By 2029, water samples will meet water quality standards or at least 91% of the time.

3.1.1.2 Measurable Objective #2

Measurable Objective: 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.
Assessment Method: Water samples were taken from North Fork Beaver Creek near Division. One sample was taken monthly approximately 12 times a year. The sampling site was chosen because of its relevancy to agricultural lands.
Milestones: • By 2021, water samples will meet water quality standards or at least meet 79% of the time. • By 2023, water samples will meet water quality standards or at least meet 82% of the time. • By 2025, water samples will meet water quality standards or at least meet 85% of the time. • By 2027, water samples will meet water quality standards or at least meet 88% of the time. • By 2029, water samples will meet water quality standards or at least meet 89% of the time.

Bacteria

Strategy: Prevent runoff of agricultural wastes, specifically manure from livestock and horse operations, and limiting livestock access to waterways.
Waterbody: Beaver Creek and Cedar Creek Watersheds
Pollutant: Bacteria

Water Quality Criteria: Bacteria (*E. coli*). Beaver and Cedar Creeks are listed as an impaired streams for bacteria and have an approved TMDL.
Data: Data will be collected by EMSWCD using ODA's Ag Inventory Tool. Baseline data will be used to establish measurable objectives
Timeframe: 2026 – 2050

3.1.1.3 Measurable Objective – Bacteria Proxy

Prevent runoff of agricultural wastes

Livestock and horse operations along streams with an approved TMDL for bacteria are evaluated for likelihood of pollution from bacteria and sediment. The assessment method consists of looking for likely sources (manure piles and heavy use areas) with remote and field surveys.

Measurable Objective: By June 30, 2050, eliminate the contribution of pollution from livestock and horse operations that were identified as likely to pollute surface water.
Milestones: • By 2026, complete an inventory of livestock and horse operations that are likely to pollute surface water from bacteria and sediment. • By 2030, determine the baseline percentage of livestock and horse operations likely to pollute surface water. • Establish additional milestones.

Temperature

Strategy: Provide adequate riparian vegetation for stream shading and streambank stability consistent with site capability.
Waterbody: All perennial and intermittent streams in the Columbia-Sandy Subbasin.
Pollutant: Temperature
Water Quality Criteria: Temperature (solar radiation as identified by the shade gap analysis). All perennial and intermittent streams in the Lower Columbia-Sandy Subbasin are listed as impaired for temperature and have an approved TMDL.
Data: Shade gap analysis and stream evaluation will be provided by DEQ and ODA. Overlay assessment will be completed by the East Multnomah Soil and Water Conservation District.
Timeframe: Additional temperature measurable objectives and milestones will be analyzed and developed after ODA's TMDL Implementation Plan is completed and published. The implementation plan will be done by 18 months from rule adoption of the Willamette River Mainstem and Major Tributaries Temperature TMDL replacement (August 2026).

3.1.1.4 Measurable Objective #3

Measurable Objective: By 2026, assess the extent of alignment between the agency shade-gap and streamside evaluation analyses and the locations of EMSWCD's completed riparian revegetation projects to identify areas of concern.
Assessment Method: Once the agency shade-gap analysis and streamside evaluations are complete, the district will overlay its completed riparian vegetation project map to identify areas in need of riparian enhancement.

Milestones:

- By 2025, obtain the shade gap analysis from DEQ and ODA.
- By 2026, complete the overlay assessment to determine baseline.

3.1.2 Focus Areas and Other Coordinated Efforts in Small Watersheds

3.1.2.1 Lower Sandy Focus Area

The Lower Sandy Focus Area is part of ODA's Focus Area strategic initiative. It was closed on June 30, 2021. Beaver Creek is a tributary to the Sandy River within the Focus Area. It has a TMDL for bacteria.

Measurable Objective:
By June 30, 2021: Decrease Class II and Class III acreage by 12 acres (1% of Class II and Class III total acreage) to achieve 1,219 Class II and Class III acres; a decrease ~1% of the assessed area.

3.1.2.2 StreamCare

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 five 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

3.1.3 Strategic Implementation Areas (SIA)

There are currently no SIAs in this Management Area.

3.1.4 Pesticide Stewardship Partnerships (PSP)

There are no PSPs in this Management Area.

3.1.5 Groundwater Management Area (GWMA)

There is no GWMA in this Management Area.

3.2 Proposed Activities

ODA, the LAC, the LMA, and other partners have identified the following priority activities to track progress toward meeting the goals and objectives of the Area Plan (Table 3.2).

Table 3.2 Planned Activities for 2024-2029 throughout the Management Area by East Multnomah SWCD (bolded targets) and Clackamas SWCD (italicized targets).

Activity	6-year Target	Description
Landowner Engagement		
# events that actively engage landowners (workshops, demonstrations, tours)	**12** *10*	Farmer to farmer opportunities; tabling at events; Workshops and field days that focus on pasture, manure, and mud management and riparian restoration. Soil health and erosion control are also possible topics.
# landowners participating in active events	**120** *20*	Usual topics include: pasture, manure, and mud management and riparian restoration. Soil health and erosion control are also popular topics.
Technical Assistance (TA)		
# landowners provided with TA (via phone/walk-in/email/booth/site visit)	**96** *50*	
# site visits	**72** *25*	
# conservation plans written*	**50** *3*	Probably plans for heavy use areas or riparian planting.
On-the-ground Project Funding		
# funding applications submitted	**18** *4*	

* Definition: Any written management plan to address agricultural water quality concerns, such as nutrients, soil health, grazing, irrigation, and streamside vegetation. Can include farm and ranch plans (including small acreages) and NRCS-certified plans. Excludes projects with weak connection to agricultural water quality.

3.3 Additional Agricultural Water Quality and Land Condition Monitoring

The progress and success of implementation efforts will be assessed through determination of changes in land management systems and the measurement of water quality improvement over time. Monitoring activities are integral components of the Area Plan.

3.3.1 Water Quality

3.3.1.1 DEQ Monitoring

DEQ monitors water quality in the Management Area as part of its ambient monitoring network.

3.3.1.2 SWCD Monitoring

EMSWCD was conducting monthly monitoring of *E. coli* and fecal coliform bacteria in the North and South Forks of Beaver Creek. However, due to resource constraints and concerns about data quality, the district ceased in August 2024. The district is working with ODA and DEQ to find a way to restart this important monitoring work.

3.3.2 Land Conditions

There is no additional land condition monitoring.

Results of these additional monitoring activities are presented in Chapter 4.3.

Chapter 4: Progress and Adaptive Management

Chapter 4 describes progress toward achieving Area Plan goals and measurable objectives by summarizing accomplishments and monitoring results.

4.1 Measurable Objectives and Strategic Initiatives

The following tables provide the assessment results and progress toward measurable objectives and milestones in the past five years (January 2019-December 2023). See Chapter 3.1 for background and assessment methods.

4.1.1 Management Area

4.1.1.1 Measurable Objective #1

Measurable Objective: 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.
Milestones: • By 2021, water samples will meet water quality standards or at least 83% of the time. • By 2023, water samples will meet water quality standards or at least 83% of the time.
Assessment Results: • 2021: Water samples collected 2019-20 met the water quality standards 95% of the time. • 2023: Water samples collected 2021-23 met the water quality standard for bacteria 86% of the time. Sampling ceased in August 2024.

4.1.1.2 Measurable Objective #2

Measurable Objective: 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.
Milestones: • By 2021, water samples will meet water quality standards or at least meet 79% of the time. • By 2023, water samples will meet water quality standards or at least meet 82% of the time.
Assessment Results: • 2021: Water samples collected in 2019-20 met the water quality standard for bacteria 85% of the time. • 2023: Water samples collected in 2022-23 met the water quality standard for bacteria 80% of the time. Sampling ceased in August 2024.

4.1.1.3 Measurable Objective – Bacteria Proxy

Measurable Objective: By June 30, 2050, eliminate the contribution of pollution from livestock and horse operations that were identified as likely to pollute surface water.
Milestones: • By 2026, complete an inventory of livestock and horse operations that are likely to pollute surface water from bacteria and sediment.

• By 2030, determine the baseline percentage of livestock and horse operations likely to pollute surface water. Establish additional milestones.
Assessment Results: Assessment results will be presented during the next biennial review.

4.1.1.4 Measurable Objective #3

Measurable Objective: By 2026, assess the extent of alignment between the agency shade-gap and streamside evaluation analyses and the locations of EMSWCD's completed riparian revegetation projects to identify areas of concern.
Milestones: By 2025, obtain the shade gap analysis from DEQ and ODA. By 2026, complete the overlay assessment to determine baseline.
Assessment Results: Assessment results will be presented during the next biennial review.

4.1.2 Focus Areas and Other Focused Efforts in Small Watersheds

4.1.2.1 Lower Sandy Focus Area

Table 4.1.2.1 Lower Sandy Focus Area

Measurable Objective: By June 30, 2021: Decrease Class II and Class III acreage by 12 acres to achieve 1,219 Class II and Class III acres; a decrease of around 1% of Class II and Class III total acreage.	
Current Conditions or Assessment Results: Reduced area in Class II by 45.5 acres, amounting to a 3.7% reduction of Class II and Class III total acreage by June 30, 2021. Measurable objective achieved.	
Status: Focus Area was closed on June 30, 2021.	
Activities and Accomplishments	
Community and Landowner Engagement	
# active events that target landowners/ operators	0
# landowners/operators participating in active events	0
Technical Assistance (TA)	
# landowners/operators provided with TA	14
# site visits	27
# conservation plans written	3
Ag Water Quality Practices Implemented in the Focus Area	
Heavy use area protection	2
Fencing	1
Adaptive Management Discussion	
Of 6,854 agricultural acres, 5,623 had no livestock/manure issues and 1,231 (18%) had issues. From 2019 to 2021, 45.5 acres were upgraded from Class II to Class I (no concern), which is an overall improvement of about 1% of ag lands, or a 3.7% upgrade of degraded lands. Focus Area was closed on June 30, 2021.	

4.1.2.2 StreamCare

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 4.1.2.2 were completed on agricultural properties under the StreamCare riparian re-vegetation program.

Table 4.1.2.2 East Multnomah SWCD StreamCare Accomplishments on Agricultural Lands

StreamCare Riparian Treatments	Beaver Creek	Big Creek	Smith Creek	Bonnie Brook	Buck Creek	Totals
Acres of buffer added in 2017 to 2018	0	5	0	0	0	5
Linear feet of stream added 2017 to 2018	0	1,068	0	0	0	1,068
Acres of buffer added in 2019 to 2024	0	6	12	10.5	1.7	30.2
Linear feet of stream added 2019 to 2024	0	2,112	20,671	2,936	399	26,118
StreamCare Program Totals on Agricultural Land (2008 to 2024)						
Total Acres	81	116	26	10.5	1.7	235
Total Stream Miles Treated	3	3.4	3.9	0.5	0.08	10.9

4.1.3 Strategic Implementation Areas

There are currently no SIAs in this Management Area.

4.1.4 Pesticide Stewardship Partnerships

There are no PSPs in this Management Area.

4.1.5 Groundwater Management Area

There is no GWMA in this Management Area.

4.2 Activities and Accomplishments

ODA, the LAC, the LMA, and other partners identified the following priority activities to track progress toward meeting the goals and objectives of the Area Plan.

Future Area Plans will compare results and targets in Table 4.2a.

Table 4.2a Activities conducted in 2019-2023 throughout the Management Area by East Multnomah SWCD and Clackamas SWCD.

Activity	5-year results	Description
Landowner Engagement		
# events that actively engage landowners (workshops, demonstrations, tours)	12	Workshops, displays at events.
# landowners participating in active events	887	Estimate of landowners from Sandy Basin.
Technical Assistance (TA)		
# landowners provided with TA (via phone/walk-in/email/booth/site visit)*	68	Included soil health, erosion prevention, and reducing mud in horse/livestock areas.
# site visits	101	
# conservation plans written**	13	Included practice recommendations for heavy use areas, managing runoff, preventing erosion.
On-the-ground Project Funding		
# funding applications submitted	8	
# funding applications awarded	5	Practices installed included heavy use areas, manure composting structure, farm road improvements to reduce erosion, and a grassed waterway to manage runoff.

* Number reported likely double-counts some landowners due to tracking methods.

** Definition: any written management plan to address agricultural water quality concerns, such as: nutrients, soil health, grazing, irrigation, and streamside vegetation. Can include farm and ranch plans (including small acreages) and NRCS-certified plans. Excludes projects with weak connection to agricultural water quality.

Table 4.2b and 4.2c summarize information from the OWRI on restoration project funding and accomplishments on agricultural lands in the Management Area. The majority of OWRI entries represent voluntary actions of private landowners who have worked in partnership with federal, state, and local groups to improve aquatic habitat and water quality conditions. OWRI results are provided annually in January after a year of proofing and GIS management.

Table 4.2b Implementation funding (cash and in-kind) for projects on agricultural lands reported 1997-2022 (OWRI data include most, but not all projects, implemented in the Management Area.)

Landowners	OWEB	DEQ	NRCS*	NOAA[1]	BPA[2]	LCREP[3]	All other sources**
46,287	2,519,345	0	0	960,660	686,055	451,154	3,071,790
							TOTAL
							$7,735,291

*This table may not include all NRCS funding due to privacy concerns.

**Includes city, county, tribal, other state and federal programs, and non-profit organizations. There were too many entities to list.

[1] National Oceanic and Atmospheric Administration

[2] Bonneville Power Administration

[3] Lower Columbia River Estuary Partnership

Table 4.2c Miles and acres treated on agricultural lands reported 1997-2022 (OWRI data include most, but not all projects, implemented in the Management Area.)

Activity Type*	Miles	Acres	Count**	Activity Description
Upland		0		
Road	0		0	
Streamside Vegetation	604	8,402		Treatment of non-native or noxious plants, tree plantings, planting/reseeding of herbaceous vegetation.
Wetland		0		
Instream Habitat	7			Anchored structures placed, stream channel modified/created, trees planted.
Instream Flow	0		0 cfs	
Fish Passage	8		2	Culverts with log wiers installed below outlet, boulders placed.
TOTAL	**619**	**8,402**		

* This table may not include all NRCS projects due to privacy concerns.
** # hardened crossings, culverts, etc.

4.3 Additional Agricultural Water Quality and Land Condition Monitoring

4.3.1 Water Quality

DEQ analyzed data for dissolved oxygen, *E. coli*, pH, total phosphorus, temperature, and total suspended solids in the Management Area. (DEQ. 2022. Oregon Water Quality Status and Trends Report; https://www.oregon.gov/deq/wq/programs/Pages/wqstatustrends.aspx).

Data are from DEQ, US EPA, and USGS databases for 2001 through 2020. DEQ determined status for stations in five-year periods and trends for stations with at least eight years of data collected at the same time of year.

The following locations have sufficient data to calculate recent status and trends and are most likely to help characterize agricultural water quality (Table 4.3.1). These locations are part of DEQ's ambient monitoring network.

Table 4.3.1 Attainment of water quality standards from DEQ. 2022 Oregon Water Quality Status and Trends Report

Site Description	Parameter					
	E. coli	**pH**	**Dissolved Oxygen**	**Temp.**	**Total Phosphorus (mg/L)**	**Total Suspended Solids (mg/L)**
	Attainment Status and Trend				median; maximum[1]	median; maximum[2]
Sandy River at Troutdale Bridge (10674-ORDEQ)	Yes↑	Yes–	Yes↑		0.01↑; 0.22	3→; 124
Beaver Cr at Sandee Palisades IV Greenway Footbridge nr SE 15th St (38538-ORDEQ)	Yes↑	Yes–	Yes↑		0.07; 0.07	2; 47

Beaver Cr NF above Division Dr nr 302nd Ave (40368-ORDEQ)	No	Yes	Yes	No		2; 364
Beaver Cr SF below MF at 302nd Ave (40369-ORDEQ)	No	Yes	Yes	No		1; 333

[1] DEQ has no benchmark for total phosphorus in this Management Area; ODA benchmark for potential water quality concerns = 0.08 mg/L
[2] DEQ has no benchmark for total suspended solids in this Management Area
↑ Statistically significant improving trend
↓ Statistically significant degrading trend
→Steady
– No significant trend

There is very little basinwide data collected for Status and Trend, mostly consolidated around the City of Sandy. Temperature and the related dissolved oxygen are the predominant overall concerns. Beaver Creek continues to be a problem area for *E. coli*. EMSWCD monitored for *E. coli* and fecal coliform bacteria in the North and South Forks of Beaver Creek on a monthly basis from 2012 to 2018 to establish a baseline. Progress had been measured on a monthly basis from 2019 to 2023, but due to resource constraints and data quality concerns, monthly bacteria monitoring ceased in August 2024.

4.3.2 Land Conditions

There is no additional land condition monitoring

4.4 Biennial Reviews and Adaptive Management

ODA, the LAC, the LMA, and other partners met on October 30, 2024, to review implementation of the Area Plan and provided recommendations for the future (Tables 4.4a and 4.4b).

Table 4.4a Summary of biennial review discussion

Progress
Clackamas SWCD • Provided technical assistance to 15 landowners and eight site visits in the Sandy. • Conducted several outreach events in the Sandy subbasin (workshops and field days). Clackamas and East Multnomah partnered on many workshops and field days. • Clackamas produces videos as a supplement to the events they have which benefits East Multnomah as well. • Met community growers' groups, Farm Bureau, etc. to get the work out about agricultural water quality. **East Multnomah SWCD** • Displays, eat and greets with farmers (listening to them and their needs and tell them about what the district offers). The eat and greets results in a lot of projects. • Soil health workshop and producing mailings to promote its StreamCare, a riparian enhancement cost share program on Beaver, Smith, Buck, Bonnie Brook, and Big Creeks. • Conducted 85 site visits and implemented five cost-share projects. The interest is growing after a slowdown during the pandemic.
Impediments
• Bacteria may not be from agricultural activity and may be coming from the national forest or septic systems.

- Landowners don't always realize that water from irrigation ditches end up in rivers. They don't know the Area Rules.
- Agricultural operations often drag soil, mud, waste onto county roads and there is a lack of regulation on preventing that.
- In-stream ponds are sources of high temperatures, and they haven't been addressed in a meaningful way.
- Bacteria sampling on Beaver Creek ceased in August 2024 due to lack of staff time and resources, and due to uncertainties about data quality. Department of Environmental Quality (DEQ) didn't accept East Multnomah SWCD's sampling and analysis plan (SAP).
- Meeting only every two years makes it difficult to form strong relationships and keep on top of issues in the area.

Recommended Modifications and Adaptive Management

- Need DNA *E.coli* sampling to determine where the bacteria is coming from.
- Inform landowners that wastes discharged into ditches end up in the river in most cases.
- More outreach is needed to inform agricultural landowners of agricultural water quality rules.
- Need more regulation on cleaning farm equipment of soil, mud, and waste before taking it on county roads.
- Address in-stream pond contribution to heat loading of streams. Look at the effectiveness of the shade gap analysis on in-stream ponds (upper part of Beaver Creek, for example, dam up small tributaries in the headwaters where there are springs).
- Work with designated management agency partners to help conduct bacteria sampling in the future. Explore the use of eDNA analysis to determine the source of bacteria (agriculture, humans, deer, elk, etc.). Work with Multnomah County and DEQ to conduct an intensive study, if needed.
- Maybe do frequent meet and greets to keep things moving along more quickly.

Table 4.4b Number of ODA compliance activities in 2019-2023

Location	Cases		Site Visits	Agency Actions				
				Letter of Compliance		Pre-Enforcement Notification	Notice of Noncompliance	Civil Penalty
	New	Closed		Already in compliance	Brought into compliance			
Outside SIA	7	6	14	2	2	4	2	0
Within SIA	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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