OREGON DEPARTMENT OF AGRICULTURE

Klamath Headwaters Agricultural Water Quality Management Area Plan

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Developed by the

Oregon Department of Agriculture

and the

Klamath Headwaters Local Advisory Committee

with support from the

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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 603-095-3840). 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

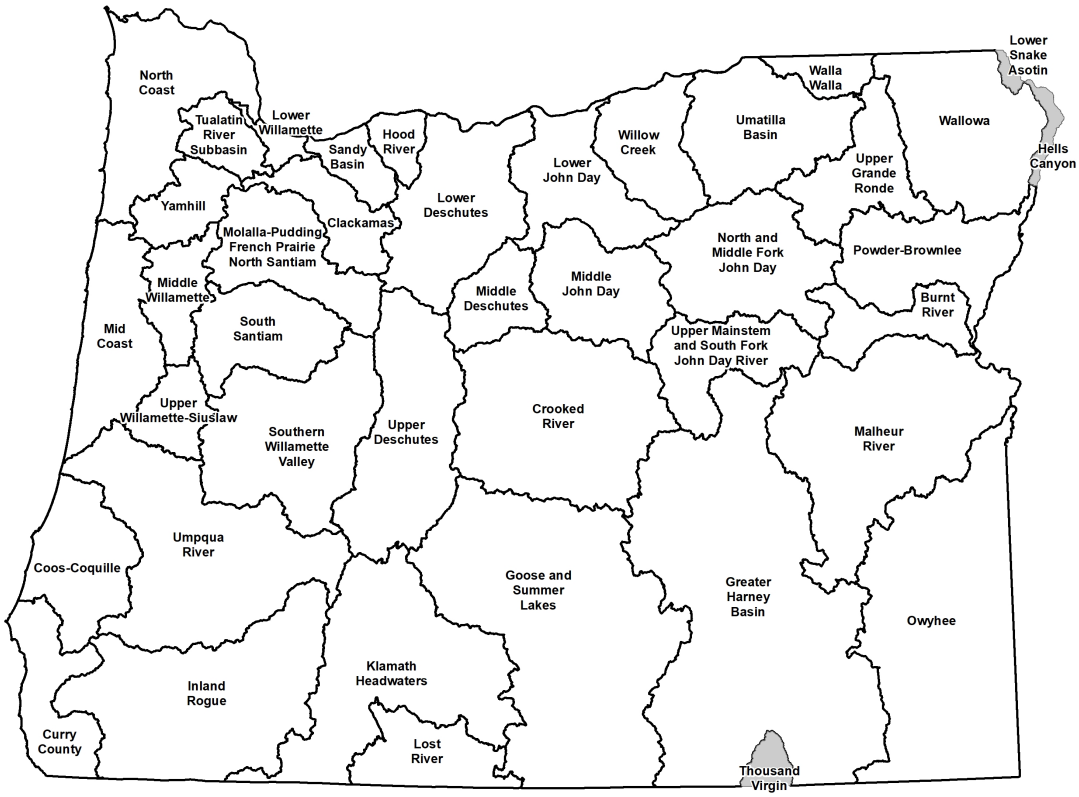
In 1993, the Oregon Legislature passed the Agricultural Water Quality Management Act directing ODA to develop plans to prevent and control water pollution from agricultural activities and soil erosion and achieve water quality standards and to adopt rules as necessary (ORS 568.900 through ORS 568.933). 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.

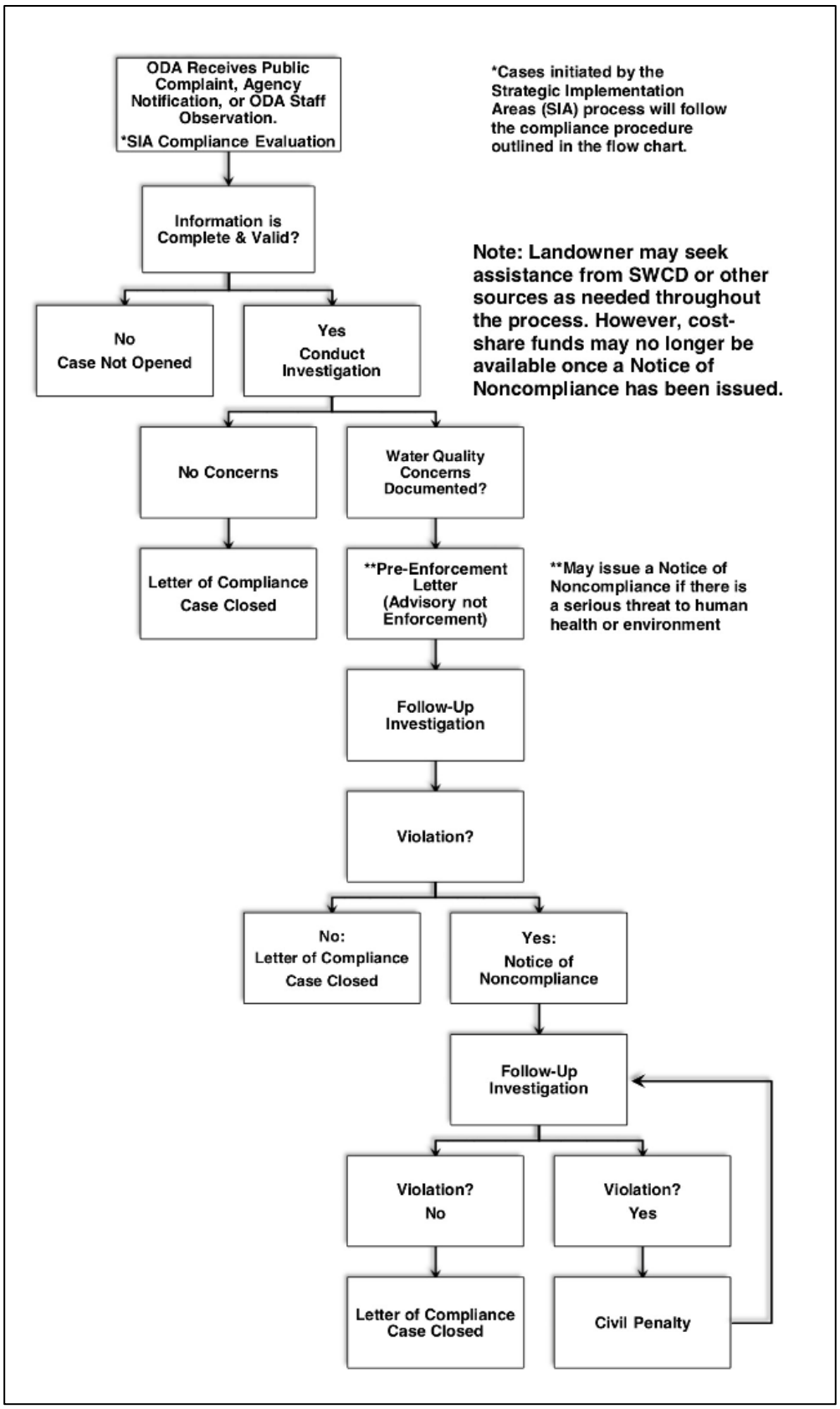
1.3.1.1 ODA Compliance Process

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.

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. 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.

As part of the TMDL process, DEQ identifies Designated Management Agencies and Responsible Persons, which are parties responsible for submitting TMDL implementation plans. TMDLs designate ODA as the lead agency responsible for implementing the TMDL on agricultural lands. ODA uses the applicable Area Plan(s) as the implementation plan for the agricultural component of the TMDL. Biennial reviews and revisions to the Area Plan and Area Rules must 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 canary grass, grow in streamside areas. This type of vegetation has established throughout much of Oregon due to historic and human influences and may provide some of the water quality functions of site-capable vegetation. ODA's statutory authority does not require the removal of invasive, non-native plants, however, ODA 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/conservation-basics/natural-resource-concerns/soil

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 2012 and reviewed and confirmed it in 2018, and 2023. (https://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 other agencies' and organizations' efforts 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.

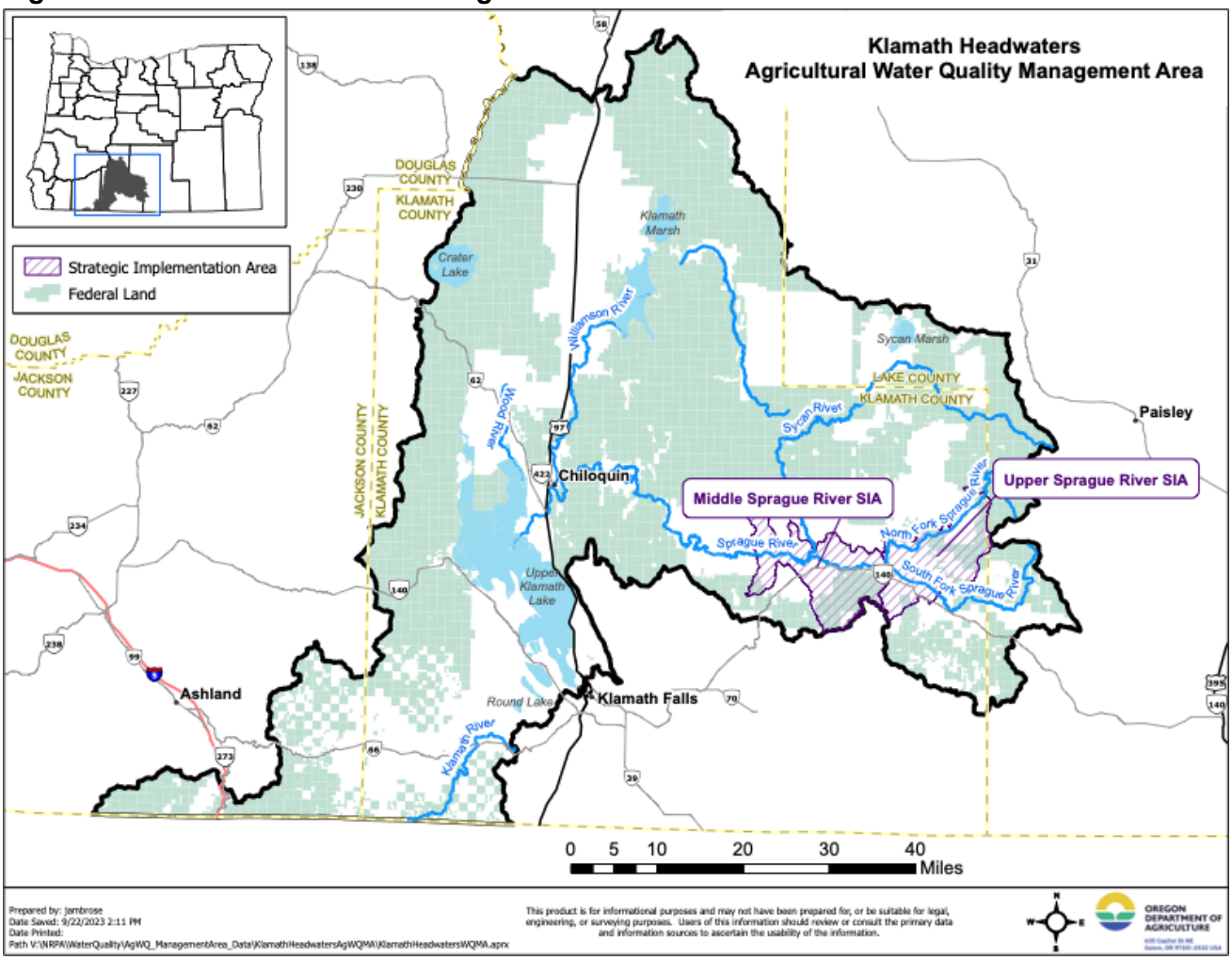
Water quality monitoring efforts in this Management Area are described in Chapter 3, and the data are summarized in Chapter 4.

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.

Located in the south-central part of Oregon, the Klamath Headwaters Management Area includes all tributaries to Upper Klamath/Agency Lakes and the Klamath River in Oregon with the exception of the Lost River Subbasin. Geographic boundaries include the 2002 Upper Klamath Lake Drainage TMDL and the mainstem Klamath River and western tributaries that are in the 2019 Upper Klamath and Lost River Subbasins nutrient and temperature TMDLs.

Figure 2 Klamath Headwaters 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
Bob Sanders	Sprague River	Cattle, hay
Mark Buettner	Management Area	Klamath Tribes; Ambodat director)
Kelley Delpit	Wood River	Cattle; Klamath Basin Rangeland Trust; Sustainable Northwest
Cameron Duncan	Sprague River	Sheep, cattle, hay
Becky Hatfield Hyde	Sprague River	Ranching
Margaret Jacobs	Bly	Cattle, hay
Bill Lehman	Management Area	Klamath Watershed Partnership
Kevin Newman	Bly	Cattle, hay
Michelle Sharp	Middle Sprague River	Cattle, hay
Megan Skinner	Management Area	U.S. Fish & Wildlife Service
Cary Denison	Sprague River + UKL	Cattle
Nell Scott (alternate)	Management Area	Trout Unlimited
Vacant		

2.1.2 Local Management Agency

SWCDs implement Area Plans through OWEB capacity grants, with details negotiated between ODA and each SWCD. The resulting Scope of Work documents define the SWCDs as the LMAs for implementation of the Ag Water Quality Program in specific Management Areas. The LMA for this Management Area is Klamath SWCD. This SWCD was also involved in development of the Area Plan and Area Rules.

The LMA implements 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 Area Plan and Area Rules in 2004.

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

With the opening of the Applegate trail in 1846 and the subsequent arrival of substantial numbers of Euro-Americans, the land and water use in the Klamath River watershed were changed forever. Just 20 years later, in 1866, the McCornack family began running cattle on

part of what is now the Running Y Ranch and built the first dike for water control and irrigation in 1890. Reclamation projects in the form of dikes on the west side of Upper Klamath Lake and upper Klamath River occurred mostly following World War I and in the 1920s. These diking systems drained marshes and swamps to create pastures, hay fields, and limited acreage of row crops.

Principal urban centers are Klamath Falls, Keno, Beavermarsh, Pinehurst, Chiloquin, Sprague River, Rocky Point, Bly, Beatty, and Fort Klamath. Elevation above sea level ranges from 4,050 to more than 9,000 feet and averages about 4,500 feet.

Annual average temperature and precipitation data is available for a 20-year period (2003-2023) from a variety of snotel and weather stations that represent the Management Area and its subbasins (https://agacis.rcc-acis.org/?fips=41035).

Table 2.3 Annual average temperatures and precipitation in the Management Area

Station Name	Area Represented	Average Daily Max (temp, F)	Average Daily Min (temp, F)	Average Annual Precipitation (inches)
Crater Lake NPS HQ	Wood River	48.6	28.6	66.00
Crazyman Flat Snotel	Sprague River	55.9	25.5	34.11
Sevenmile Marsh Snotel	Wood River	52.3	35.7	59.85
Taylor Butte Snotel	Williamson River	59.5	30.9	19.89
Klamath Falls Ag Station	Upper Klamath Lake	61.6	32.8	10.17

Principal water bodies include:

- Upper Klamath/Agency lakes with surface area of approximately 80,000 acres,
- Williamson River, including major tributaries of Sprague and Sycan rivers,
- Wood River, Seven Mile, and minor streams on the west side of the lake,
- Lake Ewauna and the Klamath River within Oregon,
- Spencer Creek, Jenny Creek, Cottonwood Creek, and Beaver Creek,
- Major wetlands at Sycan Marsh, Klamath Marsh National Wildlife Refuge, and Upper Klamath National Wildlife Refuge.

Most of the soil is of volcanic origin, which equates to high clay. Soils vary from well-drained to poorly drained. Agricultural soils can be quite droughty during the hot, dry summer months and so require irrigation during the growing season. Soils in drained wetlands are very productive and a limited amount of row crop agriculture including seed potatoes is located on the east side of Upper Klamath Lake. However, climate limits the crops grown, and most commercial agriculture is south of Upper Klamath Lake. See soil surveys for details on soils and climate throughout the Management Area (https://nrcs.app.box.com/s/taycqfsrlbxjocs6ck4a68y96gqsvd76/file/982540205965)

Land Ownership

Within the boundaries of the Management Area the percent land ownership (rounded) breaks down as follows:

(BLM Ownership GIS layer (https://gbp-blm-egis.hub.arcgis.com/datasets/BLM-EGIS::blm-or-management-ownership-polygon-hub/about))

- 48% Federal Forest (1,337,351 acres)
- 38% Private Individual or Company (1,054,120 acres)
- 7% Federal Agency (203,246 acres)
- 3% National Park (96,222 acres)
- 2% Water (67,409 acres)
- 0.6% State Forest (17,013 acres)
- 0.2% Tribal (6,608 acres)
- 0.2% State Agency (5,992 acres)
- <0.1% State Park (211 acres)
- <0.1% Undetermined Owner (257 acres)

Fish
Species of special concern are redband trout (State Sensitive), bull trout (Federally Threatened), and shortnose and Lost River suckers (Federally Endangered). Although shortnose and Lost River suckers are currently endangered, they were historically harvested and used commercially. Detailed fish information is found in the Klamath River Basin, Oregon: Fish Management Plan (https://kbifrm.psmfc.org/file/klamath-river-basin-oregon-fish-management-plan).

2.3.1 Mainstem Klamath River below Link River

Land and Water Use
Areas such as the Spencer Creek, Jenny Creek, and Aspen Lake watersheds as well as Long and Round lakes were historically grazed in an uncontrolled and excessive fashion.

As early as 1869, water users diverted water out of Spencer Creek to sustain irrigation, milling, and mining. Water was diverted from Aspen Lake for catfish farming and raising muskrat. Water was lifted into ditches out of the Klamath River south of Linkville (historical name for what is now the city of Klamath Falls) to be used for agricultural purposes at about this same time. Most of these diversions have been discontinued or highly modified due to modern agricultural practices. Grazing on private and public lands in this area is strictly controlled; not only to restore the grazed grasses and shrubs, but also to protect and restore the riparian areas. The reduction of sedimentation is a prime concern from a water quality standpoint.

Native Fish
Lost River sucker, shortnose sucker, Klamath largescale sucker, Klamath smallscale sucker, speckled dace, blue chub, Tui chub, marbles sculpin, Klamath River Lamprey, Klamath Lake lamprey, redband trout, Jenny Creek suckers (Jenny Creek), and steelhead (Cottonwood Creek).

Non-native Fish
Largemouth bass, white crappie, black crappie, Sacramento perch, bluegill, pumpkinseed sunfish, green sunfish, yellow perch, brown bullhead, goldfish, fathead minnow, brown trout, and brook trout (Spencer Creek).

2.3.2 Sprague River

The Sprague River Valley consists of 1,580 square miles in Klamath County in lower southeastern Oregon. The North and South Forks of the Sprague River originate in the Gearhart Mountain Wilderness Area discharging into the Williamson River downstream of Chiloquin. Because the Sprague River descends only 65 feet from the town of Bly to Cave Rock (a few miles east of the town of Chiloquin), this section is low gradient. Peak river flows normally occur in spring during high elevation snowmelt and diminish throughout the summer to their low points in August or September. Elevations range from 4,000 to 8,364 feet at the top of Gearhart Mountain.

Land and Water Use

The Sprague River Valley consists mainly of rangeland and small farms surrounded by mountains and wooded areas. The land was originally hunted, gathered, fished, and inhabited by Klamath, Modoc, and Yahooskin Native Americans. From 1843-1880 early settlers arrived to a landscape of mountains covered with forests, native grasses, sage, and bitterbrush covering the plateau lands, and riparian bottoms thick with willows interspersed with marshes and grass meadows. These early settlers pursued an agrarian lifestyle, primarily raising livestock, with limited crop production.

During the 1860s, these early settlers obtained adjudicated water rights for flood irrigating in creek valleys. While not all adjudications on the Sprague River are complete, everything east of Ivory Pine Road has been adjudicated. The Klamath Indian Reservation was established in 1864 encompassing much of the Sprague River basin but was terminated in 1954 leaving much of the unallocated land base to become the Winema National Forest. Digging of diversion ditches and temporary dams started as early as 1890. Extensive ditch and dike networks were later engineered to control flow and by 1968 all of the Sprague reaches had substantial lengths of ditches and levees. Most construction was done between 1940 and 1968 due in part to a U.S. Army Corps of Engineers channelization program. (O'Connor, McDowell et al). Further detail on the geomorphology of the basin can be found here through USGS Oregon Water Science Center. https://or.water.usgs.gov/proj/Sprague/report/section_7.html

Within the boundaries of the Sprague HUC8 the percent land ownership (rounded) breaks down as follows:
(BLM Ownership GIS layer (https://gbp-blm-egis.hub.arcgis.com/datasets/BLM-EGIS::blm-or-management-ownership-polygon-hub/about))

- 56% Federal Forest (579,824 acres)
- 43% Private Individual or Company (442,544 acres)
- 0.5% Federal Agency (4,897 acres)
- 0.2% State Agency (2,108 acres)
- 0.1% State Forest (1,258 acres)
- <0.1% Water (205 acres)
- <0.1% Tribal (184 acres)
- <0.1% Undetermined Owner (41 acres)

Privately owned Campbell Reservoir and Obenchain Reservoir were created for irrigation; recreation is secondary. Historically, there have been numerous dams at various points along

the Sprague River. The Sprague River is the most channelized watershed in the Klamath Basin upstream of Klamath Falls (The Upper Klamath Basin Watershed Action Plan Team. 2021.)

Native Fish
Lost River sucker, shortnose sucker, Klamath largescale sucker, speckled dace, blue chub, Tui chub, marbled sculpin, slender sculpin, Klamath Lake lamprey, Pit-Klamath brook lamprey, and Miller Lake lamprey, redband, and bull trout.

Non-native Fish
Largemouth bass, yellow perch, pumpkinseed sunfish, bluegill, brown bullhead, fathead minnow, brown trout, and brook trout.

2.3.3 Sycan River Watershed

The Upper Sycan watershed elevation ranges from 6,800 feet above sea level at Winter Rim to 4,982 feet in the Sycan Marsh. The non-forested lowland areas of the watershed consist of the following vegetative communities: dry, moist, and wet meadows, floodplain and wetland complexes, and sagebrush steppe. Uplands are forested with conifers. The Scyan Fire (2021) and the Bootleg Fire (2021) greatly impacted this watershed, burning a total of 414,415 acres.

Land and Water Use
The Sycan Marsh encompasses approximately 30,000 acres of wet meadow and irrigated native pasture in private ownership. The surrounding upland bluegrass and mixed conifer lands make up another 209,300 acres in the watershed with the majority managed by the Fremont-Winema National Forest and the remainder owned by private timber companies. The Sycan land use percentages are represented in the Sprague HUC8 (previous page). From May through October, cattle are rotationally grazed on the uplands.

Homesteaders in the early 1900s grazed sheep, cattle, horses, and pigs on much of what is now managed as the Fremont-Winema National Forest. The ZX Ranch of Paisley developed the irrigation system in the marsh from 1910 to 1920, creating the capability to harvest and preserve forage for winter feeding. During the 1940s, Frederick Weyerhaeuser moved into the Sycan watershed and began logging activities along with constructing a railroad along the Native American treaty boundary through the marsh itself to transport logs to the towns of Bly and Klamath Falls. The Nature Conservancy and US Timberlands are now the major private landowners in the watershed. The Sycan Marsh and The Nature Conservancy portion of the Sycan is excluded from cattle grazing today.

Logging by private operators, salvage logging by Fremont-Winema National Forest, and cattle grazing are the major renewable economic resources in the watershed.

Native Fish
Klamath largescale sucker, speckled dace, blue chub, Tui chub, marbled sculpin, slender sculpin, Klamath Lake lamprey, Pit-Klamath brook lamprey, and Miller Lake lamprey, redband, and bull trout.

Non-native Fish
Largemouth bass, yellow perch, pumpkinseed sunfish, bluegill, fathead minnow brown bullhead, brown trout, and brook trout.

2.3.4 Williamson River

The Williamson River is the largest single tributary to Upper Klamath Lake. Soils vary from high organic matter soils near the mouth of the river to coarse, well-drained soils in the mountains, all of which are influenced by volcanic ash. The elevation varies from 4,150 feet to more than 7,000 feet in the mountains.

The growing season varies considerably in this basin. The warmer parts of the basin around Modoc Point have a growing season of about 90 to 120 days and are suited for irrigated crops such as alfalfa, grass, wheat, oats, barley, potatoes, and sugar beets. The northern part of the basin has a shorter growing season of about 50 to 70 days. The primary crops are grass hay and pasture. Sheep and cattle grazing were the initial agricultural endeavors dating back to the 1860s.

Land and Water Use

Within the boundaries of the Williamson HUC8 the percent land ownership (rounded) breaks down as follows:
(BLM Ownership GIS layer (https://gbp-blm-egis.hub.arcgis.com/datasets/BLM-EGIS::blm-or-management-ownership-polygon-hub/about))

- 58% Federal Forest (534,093 acres)
- 30% Private Individual or Company (272,052 acres)
- 7% National Park (65,587 acres)
- 4.5% Federal Agency (41,126 acres)
- 0.5% Tribal (4,661 acres)
- 0.2% State Agency (1,723 acres)
- 0.1% State Forest (763 acres)
- 0.1% Water (423 acres)
- <0.1% State Park (211 acres)
- <0.1% Undetermined Owner (101 acres)

Private landowners consist primarily of private logging companies, notably private timber operators, several large ranches, and numerous small residential parcels. The incorporated town of Chiloquin is in the watershed.

The combined flow of the Williamson and Sprague rivers below the confluence ranges from about 400,000 to 1,000,000 acre-feet annually with a mean flow of about 650,000 acre-feet. In 1903, the Modoc Point irrigation system was established with a flow of 56 to 60 cubic feet per second (cfs) currently covering 5,222 acres with 80 patrons. There are countless private irrigation systems throughout this basin.

Native Fish

Klamath largescale sucker, speckled dace, blue chub, Tui chub, marbled sculpin, slender sculpin, Klamath River lamprey, Klamath Lake lamprey, Pit-Klamath brook lamprey, and redband trout.

Non-native Fish

Fathead minnow, brown bullhead, largemouth bass, yellow perch, brown bullhead, brook trout, and brown trout.

2.3.5 Upper Klamath Lake

Upper Klamath Lake is the largest lake in Oregon at approximately 130 square miles and has a drainage area of almost 3,800 square miles. Upper Klamath Lake averages 8 feet in depth. Historically, the lake was eutrophic (i.e., productive), but changes in land use and associated increases in the mobilization of volcanic-derived sediment from the watershed resulted in a shift in the trophic status of the lake to hypereutrophic (i.e., highly productive) during the 20th century (as summarized in ODEQ 2002, Bradbury et al. 2004, Eilers et al. 2004). Nutrient release from lake sediment (primarily occurring in early summer) is tied directly to nutrients entering the lake from the watershed in the previous winter period (November-April), rather than legacy nutrient deposits in the lake sediment (Walker and Kann 2020).

External nutrient loading has contributed to massive summer cyanobacteria blooms for decades, and volumes of technical data and studies document various aspects of the lake's hydrology, biology, etc. Upper Klamath Lake supports a health supplement industry for the harvested and dried cyanobacteria.

Historically, Upper Klamath Lake was surrounded by thousands of acres of fringe wetlands. However, more than half were drained or otherwise impaired during the late 19th and 20th centuries (Snyder and Morace 1997). More recently, approximately 45,000 acres of wetlands have been or are being restored or conserved (Megan Skinner, US Fish and Wildlife Service (USFWS), 2020, per communication).

Land and Water Use

The Klamath Tribes, who have lived in the region of Upper Klamath Lake since time immemorial retain traditional hunting, gathering, and fishing rights and are interested in acquiring some of their former land base to augment their cultural and economic self-sufficiency.

Within the boundaries of the Long Lake Valley-Upper Klamath Lake HUC10 the percent land ownership (rounded) breaks down as follows:
(BLM Ownership GIS layer (https://gbp-blm-egis.hub.arcgis.com/datasets/BLM-EGIS::blm-or-management-ownership-polygon-hub/about))

- 42% Private Individual or Company (112,114 acres)
- 25% Water (66,023 acres)
- 24% Federal Forest (63,842 acres)
- 10% Federal Agency (25,332 acres)
- 0.3% State Agency (665 acres)
- 0.1% Tribal (291 acres)
- 0.1% State Forest (204 acres)
- <0.1% Undetermined Owner (115 acres)

The production of native grass hay and alfalfa supports a summer cattle industry. Much of the land adjacent to the lake is in state and federal wildlife refuges and state and national forests; county and private land account for the rest. Most productive lands are flood irrigated, with some being converted to wheel or center pivot irrigation.

The waters of Upper Klamath Lake have been utilized for agriculture since the mid-1800s. With the development of the Klamath Project by the Bureau of Reclamation in 1905 and the construction of the Link River Dam in the 1920s, this use increased dramatically for both

irrigation and hydropower. The result of the dam and diversion at the “A” canal is a lake which no longer functions in its natural state but is managed at various artificial levels for agriculture and hydropower and recovery of endangered species.

Native Fish
Lost River suckers, shortnose suckers, Klamath largescale suckers, speckled dace, blue chub, Tui chub, marbled and slender sculpin, Klamath Lake and Klamath River lamprey. Bull trout are present in Threemile Creek on the west side of Upper Klamath Lake.

Non-native Fish
Largemouth bass, pumpkinseed sunfish, yellow perch, brown bullhead, white sturgeon, and fathead minnow.

2.3.6 Wood River

Within the boundaries of the Wood River HUC10 the percent land ownership (rounded) breaks down as follows:
(BLM Ownership GIS layer (https://gbp-blm-egis.hub.arcgis.com/datasets/BLM-EGIS::blm-or-management-ownership-polygon-hub/about))

- 31% Federal Forest (37,282 acres)
- 28% Private Individual or Company (34,162 acres)
- 25% National Park (30,635 acres)
- 10% State Forest (12,794 acres)
- 3% Federal Agency (3,042 acres)
- 1.2% State Agency (1,496 acres)
- 1.2% Tribal (1,473 acres)
- <0.1% Water (120 acres)

Over 7,700 years ago, Mt. Mazama (now known as Crater Lake National Park) erupted, spewing volcanic ash and debris in all directions. One of the larger glacial valleys, presently referred to as Annie Creek Canyon, filled to the brim with volcanic sediment then spilled several hundred feet of phosphorus-rich material over the ancient forests of the Wood River Valley. Mountain springs joined to form Annie Creek. The stage was set for an annual infusion of thousands of tons of very fertile sediment to the valley below and the lake beyond. Since that time, Annie Creek has conveyed a portion of melt water every spring from the annual snowfall in excess of 450 inches per year through a 3,500-foot drop in elevation into the Wood River, which then flows to Agency Lake.

As a result of these combined factors, the Wood River Valley has become a unique and diverse ecosystem that contributes significantly to the economy. It is also an example of holistic compatibility between nature and livestock grazers. This valley provides forage for thousands of cattle (including the Upper Lake Klamath area herds) for six months every year. This livestock grazing creates jobs, supports the tax base, and stimulates related businesses. Nutrient contributions to waterways are primarily associated with particle movement in surface flows or direct deposition in waterways. The Wood River Valley has a unique system of gravity flow flood irrigation on untilled, unfertilized, managed meadows.

Native Fish
Shortnose sucker, lost river suckers, Klamath lake lamprey, pit-Klamath brook lamprey, redband trout, and bull trout.

Non-native Fish
Fathead minnow, yellow perch, brook trout, and brown trout.

2.4 Agricultural Water Quality

2.4.1 Water Quality Issues

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 are listed in Table 2.4.1.1. The condition and availability of water is affected by both natural and human activities.

Table 2.4.1.1 Beneficial Uses of water in the Klamath Basin (OAR 340-041-0180)

Beneficial Uses		
Public Domestic Water Supply - [1] w/adequate filtration and disinfectant; and natural quality to meet drinking water standards.	Livestock Watering	Fishing
Private Domestic Water Supply[1]	Fish and Aquatic Life	Boating
Industrial Water Supply	Hydro Power	Water Contact Recreation
Irrigation	Wildlife and Hunting	Aesthetic Quality

2.4.1.2 Water Quality Parameters of Concern

According to Oregon's 2022 Integrated Report (www.oregon.gov/deq/wq/Pages/epaApprovedIR.aspx) the primary water quality concerns in this Management Area are temperatures too warm for anadromous fish, low dissolved oxygen, and issues related to high phosphorus levels (Table 2.4.1.2).

Table 2.4.1.2 Water quality limited parameters in the Management Area
Because of geographic boundaries of existing TMDLs, some parameters are in both lists.

Subbasin	Approved TMDL	303d Listed Impaired
Williamson	Dissolved oxygen Phosphorus Temperature	Biocriteria Sedimentation
Sprague	Dissolved oxygen Temperature	*E. coli* Methylmercury
Upper Klamath Lake	Dissolved oxygen pH	Biocriteria Harmful Algal Blooms Methylmercury Sedimentation
Upper Klamath		Arsenic Biocriteria Methylmercury Sedimentation

The more effort put toward reducing inputs to temperature and phosphorus, the sooner these streams can be taken off the list 303d list. Contributions to water pollution from agricultural activities can be easily minimized through concentrated efforts by agricultural communities. Agriculture is not responsible for 100 percent of the non-point source contributions to water pollution, therefore, the problem isn't completely solved once agriculture meets the goals set by TMDLs. DEQ has identified other non-point sources that are discussed in depth in the TMDLs for this area. This Area Plan seeks to outline reasonable methods to control agricultural inputs to the non-point source load allocation.

2.4.1.3 TMDLs and Agricultural Load Allocations

For the Williamson, Sprague, and Upper Klamath Lake and Agency Lake watersheds, the Upper Klamath Lake Drainage TMDL was approved by EPA in 2002. In 2019, EPA approved DEQ's Nutrient and Temperature TMDL for the Upper Klamath and Lost River Subbasins, which includes the Klamath River from Link River Dam to the Oregon/California border and its tributaries. It is the responsibility of ODA, through the Agricultural Water Quality Program, to address the parameters listed in the TMDL documents and implement an action plan for agricultural and rural lands to achieve TMDL targets. This action plan does not establish numeric targets of water column parameters but instead facilitates the development of conditions on the land that, according to the best available research, will reduce loads identified in the TMDL.

One of the most widely applicable TMDLs developed by DEQ addresses high stream temperatures. The goal of the TMDLs is to reduce the amount of solar radiation that reaches the waterway. The amount of "load" of solar radiation is measured by DEQ in langleys per day. For the non-scientist, these loads have been translated into a surrogate, or substitute, measure called percent effective shade targets. Landowners will not be required to exceed pre-1900 densities.

The TMDL contains percent effective shade targets for the Management Area. Landowners may use these targets as a guide to determine if they have sufficient riparian vegetation. Percent effective shade is the amount of shade that reaches the stream. For example, 30 percent effective shade means that shade has kept 30 percent of the sunshine on an August day from reaching the stream.

The TMDLs do not require restoration of specific historically occurring plant types and species along streams. Rather, as a general guideline, landowners should maintain the most effective band or buffer of vegetation along the stream that their operation can accommodate. Streamside vegetation buffers absorb manure runoff, reduce streambank erosion, and facilitate sediment deposition during high-flow events. They also serve to reduce potential phosphorus loading to surface waters.

Site capability may restrict or enhance the species, structure, and density of vegetation communities expected on Management Area streambanks. Landowners are not subject to enforcement of the temperature standard if they are in compliance with Area Rules and are meeting the goals of the Area Plan. It is the intent of this Area Plan to help landowners become aware of the targets and manage their agricultural activities to prevent unintentional suppression of self-recruiting riparian plant communities.

TMDLs were developed for parameters that are generally driven by high phosphorus: low dissolved oxygen concentrations, excessive chlorophyll-*a* concentrations (a proxy measurement

for algae and cyanobacteria), and excessive pH. DEQ recognizes extremely high background loads of phosphorus in the Upper Klamath Lake watershed and has calculated that 40 percent of the load above the standard is attributed to human activities because phosphorus levels are 40 percent higher than they were historically. Agricultural activities/agricultural runoff are identified in the TMDL as the primary non-point source contributor. The TMDL identifies the following additional non-point source contributors for total phosphorus:

- Forestry runoff
- Rural runoff
- Urban runoff
- Instream and near-stream erosion
- Wastewater treatment plants and sanitary sewer systems
- Failing septic systems
- Permitted sites other than publicly owned treatment works

Non-point source contributors for temperature in the Upper Klamath Lake Drainage TMDL are:

- Disconnected floodplains
- Riparian vegetation disturbance
- Reduced flow volumes
- Channel widening

Accumulation of non-point source pollution from all the source contributors create the water quality impairments of the Management Area. High levels of phosphorus in native soils are mobilized into surface waters through erosion of stream banks and sheet wash off the uplands. Even though DEQ has not determined numeric target reductions for pollutants like temperature and sediment, ODA's riparian and waste (sediment) rules in this Plan serve to regulate agricultural activities that contribute excess phosphorus to surface waters. These rules aim to ensure that agricultural communities are doing everything in their power to reduce their portion of the non-point source load allocation.

2.4.1.4 Drinking Water

DEQ summarizes drinking water issues in each Management Area prior to biennial reviews. This section was provided by DEQ in 2023. DEQ's full report is available at: https://www.oregon.gov/deq/wq/programs/Pages/Nonpoint-Implementation.aspx.

Eighty-two active public water systems obtain domestic drinking water from groundwater sources in the Klamath Headwaters Agricultural Water Quality Management Area (WQMA). There are no public water systems using surface water sources in the WQMA.

Bacteria
One community public water system in the management area, the Sprague River Water Association, has alerts for detections of *E. coli* in the past 10 years with no violations during the past five years. Forty-seven systems have alerts for total coliform in the past 10 years, and none has violations in the past five years.

Nitrates
There was one nitrate alert (generated when nitrate exceeds 5 mg/L) for a public water system in the past 10 years at R & D Market. R & D Market had a nitrate test result of 9.2 mg/L in 2021, but there have not been any nitrate detections at the water system since suggesting the 2021 detection is an anomaly. The drinking water maximum contaminant level (MCL) for nitrates is 10

mg/L. Nitrate detections are often related to animal and cropland agriculture but can also be the result of local septic systems or other wastewater discharges.

Of the soils assessed in the management area, most have high nitrate leaching potential, according to the National Cooperative Soil Survey, based on slope, precipitation, and land use. Nitrate from fertilizers, animal waste, and septic systems can readily penetrate to the aquifers used for drinking water when leaching potential is high, and bacteria removal through soil filtration can be less effective in sandy soils.

DEQ only addresses drinking water issues identified for public water systems. A query of Oregon Water Resources' water rights database for private domestic points of diversion (using a threshold of 0.005 cfs for domestic surface water rights that are household use only, not irrigation) identified 138 private domestic water rights in the Klamath Headwaters WQMA. Private owners of domestic water rights are responsible for water testing and treatment to be sure the water is safe to drink. There is no state requirement or program for testing so water quality concerns for domestic users of surface water bodies are not known. There are also numerous private groundwater wells for domestic use. The Domestic Well Testing Act database (real estate transaction testing data) for 1989-2018 indicates one significant detection of nitrate (>7mg/L) in private wells out of 351 total results included in the database for this area. Of those private wells, eight results are ≥5 mg/L, and zero are ≥10mg/L.

Overall, the beneficial use of groundwater for drinking water does not appear to be regionally impacted by potential agricultural nitrate sources.

It is difficult to determine how much of an impact agriculture is having on groundwater sourced for drinking in this Management Area. Landowners should always properly manage manure and fertilizer to minimize leaching of nitrates and *E. coli* to groundwater.

2.4.2 Sources of Impairment

There are many natural and created conditions in this Management Area that contribute to impaired water quality. Things like volcanic soils, historic wildfires, drained wetlands, and floodplains disconnected by engineered levees and dikes all play a role in diminishing the water quality conditions seen today. The culmination of water quality pollutants entering waterways from natural and legacy conditions combined with current day land uses are to be defined as nonpoint source pollution.

Nonpoint source pollution is pollution that emanates from landscape scale sources and cannot be traced to a single point. Nonpoint source pollution in the Klamath Headwater Management Area comes from land uses like forestry, agriculture, and rural residential uses and is affected by natural and legacy conditions mentioned above. No individual landowner or land use type is solely responsible for water quality impairments. It is the cumulative impact from ongoing and legacy activities combined with natural levels of background pollutants that can limit water quality on a watershed scale.

In the Klamath Headwaters it is especially important to note that the volcanic soils of the Management Area contain high levels of phosphorus that contribute to total phosphorus levels in the water column when soils are mobilized into surface waters. The background concentrations have been considered in the creation of TMDLs in the Management Area. Landowners and operators are not responsible for achieving total phosphorus concentrations

below the designated background levels. Common agricultural practices that can potentially contribute to elevated phosphorus levels in surface waters include:

- Bare ground in or near surface water
- Livestock manure deposition in or near surface water
- Flood irrigation that may carry waste to surface water
- Tillage of peat soils

Other impairment of landscape features that facilitate sediment (and therefore phosphorus) deposition in the watershed, including functioning and connected wetlands and floodplains (e.g., draining wetlands, diking floodplains, removing native riparian or floodplain vegetation).

Pollutants from nonpoint sources such as pesticides, sediment, nutrients, and bacteria are carried to the surface water or groundwater through the action of rainfall, snowmelt, direct deposition, erosion, irrigation, urban runoff, and seepage.

The following narrative, tables, and lists focus on the mandate of the Ag Water Quality Program legislation. Agricultural activities are a portion of the land use in Klamath Headwaters. The conditions identified by the farmers and ranchers of the LAC will meet the stewardship and conservation needs on private agricultural lands to help alleviate the cumulative effects of human impacts in Klamath Headwaters basins.

2.5 Regulatory and Voluntary Measures

2.5.1 Area Rules

Text in boxes below quote the relevant Area Rule. The riparian rule currently being reviewed for amendment and will be updated to reflect the changes made in the next review of this document in 2026.

OAR 603-095-3840
(1) All landowners or operators conducting activities on lands in agricultural use will comply with the following criteria. A landowner is responsible for only those conditions resulting from activities caused by the landowner. A landowner is not responsible for conditions resulting from actions by another landowner on other lands. A landowner is not responsible for conditions resulting from unusual weather events or other exceptional circumstances that could not have been reasonably anticipated. A landowner is not responsible for natural increases in nutrient or temperature loading. Limited duration activities may be exempt from these conditions subject to prior written approval by the department.

Conditions that are part of natural or background conditions or which result from unusual weather events or other exceptional circumstances, or which could not have been reasonably anticipated, are not the responsibility of the landowner. Typically, for optimum cost-effectiveness and practicality, structural conservation practices are designed to handle the 10-year, 24-hour weather event (a 10-year event has a 10 percent probability of occurring in any given year). Most agronomic practices can handle a 2- to 5-year event. An unusual weather event is considered an event equaling or exceeding the 10-year storm event. Climatological data enables determination of 2-, 5-, 10-, 25-, 50- and 100-year events. Riparian systems in healthy condition are expected to withstand the 20-year event with minimal damage. For purposes of

this Area Plan, events exceeding the 20-year event or 5 percent probability level will be considered unusual.

The quality criteria target in the NRCS Field Office Technical Guide for streambank erosion is that land users' management activities do not contribute to the streambank erosion problem.

Conditions to be addressed under this Area Plan may be initially monitored by photographic record. Video and/or still photography with time log taken at representative photo points will provide baseline images of current conditions and indicate changes over time. More detailed and site-specific monitoring may be designed and implemented with the help of the SWCD and other local conservation partners.

Violations of the conditions described in the Area Rules are least likely to occur where an effective program for the identification and control of those conditions is in place. One such effective program is an individual farm Conservation Plan designed to reduce pollution by incorporating and actively applying resource management systems. Violation of the Area Rules listed below is unlikely if the landowner has made a good faith effort to develop and implement an effective pollution control program.

Many agricultural landowners are living on a very narrow margin. Financial incentives are essential to encourage basin-wide adoption of sound and sustainable management practices.

The following practices can be part of an effective pollution control program. The SWCD and other conservation partners can recommend others. Practices are most effective when implemented as integral parts of a comprehensive resource management plan and are based on natural resource inventories and an assessment of management practices. The conservation planning process used by the NRCS and by SWCDs should produce an effective, systems approach to resource management tailored for a specific land area and type of operation.

- **Provide alternatives to streams and canals for stock watering**
  Providing alternate stock water systems is an activity that will improve water quality. Technical and financial assistance is likely available for off stream water systems that include riparian fencing and restoration planting. Costs for well drilling and associated infrastructure has risen in recent years and may be a limiting factor.

  Consultation with OWRD, SWCD, ODA, or other local knowledgeable organizations can help determine the best fit for a specific situation.

- **Increase dispersion of cattle in pastures**
  Discourage cattle from gathering in one place; provide multiple locations for insecticide application, scratching devices, and watering locations. It is more desirable to have cattle dispersed and randomly defecating and urinating on the pastures. This is also beneficial to pasture grasses and reduces the potential for wintertime movement of waste products off the site.

- **Rest grazing units**
  In the Management Area, pastures are rested from late fall through early spring when cattle are not on the pastures. After cattle reduce grass height in one area through grazing, they are moved to other areas, and the grazed area is irrigated. This practice is valuable in a variety of ways.

- **Manage irrigation practices more carefully to minimize water quality impacts**
    - Review irrigation practices to develop measures to minimize water use.
    - Move cattle to high ground before flooding; let water saturate soil before reintroducing cattle if feasible.
    - Flood irrigation should be managed to eliminate movement of waste and soil (erosion) off the site.
    - Develop provisions for drought years regarding water withdrawals that leave water in the streams to satisfy in-stream water rights.

- **Consider additional restoration and conservation work to increase sediment deposition in the watershed above Upper Klamath Lake**

2.5.1.1 Nutrients and Manure Management

Nutrients from agricultural sources may enter surface waters through the introduction of animal waste into the stream or from sources through shallow groundwater flow and surface runoff. The unacceptable conditions outlined in the nutrient-related water quality standards are designed to reduce movement of waste by surface water from the uplands. Nutrient-related standards in the Management Area include limits on pH, chlorophyll-a, dissolved oxygen, and ammonia toxicity.

Direct Deposition
Livestock that loaf in riparian areas or constructed water conveyances are likely to defecate directly into the waterway or onto adjacent riparian areas. By encouraging practices that move livestock through riparian pastures quickly, direct animal introduction of manure will be minimized. Manure spreading, designed to distribute feedlot and dairy manure, should never be done near waters of the state. Harrowing larger pastures to distribute concentrations of manure is recommended. Disposing of dry manure directly into or placing it where it is likely to enter waters of the state is already prohibited under ORS 468b: Waste Discharge.

Indirect Deposition
Improper storage of livestock manure can be an agricultural source of nutrients into the water. Precipitation on a manure pile or surface flows contacting the manure can carry nutrients and bacteria. Overland flows can transport animal wastes from upland or heavily stocked areas, especially if the slope is poorly vegetated or highly erodible. Streamside areas planted to dense grass or properly functioning riparian areas with site capable wetland vegetation can act as filters preventing contaminated surface flows from reaching vulnerable waterways.

2.5.1.2 Riparian/Streamside Area Management

Degraded Riparian Vegetation

OAR 603-095-3840
(3) Nonfunctional Riparian Conditions: Effective January 1, 2007
(a) Agricultural activities must not create riparian conditions that are downward-trending according to Technical Reference 1737-15, 1998, United States Department of Interior, Bureau of Land Management (Proper Functioning Condition) guidelines or that degrade stream shading consistent with site capability.
(b) Agricultural activities must not prevent riparian areas rated as non-functional by Proper Functioning Condition Guidelines from improving consistent with site capability.
(c) Exemptions from OAR 603-095-3840 3(a) and (b).

(A) Limited duration agricultural activities such as pump installation or livestock crossings provided they do not compromise achieving the conditions described in 603-095-3840(3)(a) and (b).
(B) Constructed irrigation delivery systems, dikes, borrow pits, drainage ditches, and ponds not hydraulically connected to waters of the State.
(d) This rule is not intended to prohibit riparian grazing where it can be managed to meet water quality standards.

Intent: Riparian areas shall be managed to minimize any negative effects of solar radiation, soil loss, and nutrient input. Riparian grazing is not prohibited where it can be managed to meet water quality objectives. ODA encourages landowners and restoration practitioners to reference the Upper Klamath Basin Watershed Action Plan (UKBWAP) Appendix A "Considerations for riparian fencing, planting, and grazing management in the Upper Klamath Basin of Oregon" for guidance regarding buffer width for riparian areas.
https://www.ukbwap.com/_files/ugd/910ab0_fca8e534e41c454f9cbb94ed18aaeebf.pdf
This Area Plan's recommendations draw attention to the multiple beneficial functions of healthy and diverse riparian areas. A variety of activities can take place within riparian areas if those activities are carefully managed to protect the beneficial functions of the vegetation and soil structure. Many factors influence surface water temperature including elevation, air temperature, aspect, exposure to solar radiation, channel shape, and volume of flow. The undesirable conditions for both riparian vegetation and irrigation return flows in this Area Plan are designed to address the physical factors landowners can control.

Exposure to Solar Radiation
The two major agriculturally related conditions that contribute heat to surface waters are inadequate shading from riparian vegetation and inflows of warmed irrigation surface returns. Agricultural activities that eliminate the possibility of natural regeneration of trees and shrubs are to be avoided. Limiting near-stream riparian management to seasons and practices that enhance growth of native grasses, shrubs, and trees (canopy vegetation) is encouraged. The increased shade reduces direct solar exposure of stream water. Any irrigation surface return flowing through a properly sized and functioning riparian area has a greater opportunity for infiltration and sub-surface return to the stream. The conditions described in this Area Plan are designed to encourage appropriate management of riparian areas to facilitate healthy riparian structure and function and to minimize surface irrigation returns.

Channel Shape
Some channel morphology processes that are outside the control of the land manager are high-flow events, original bed material composition, legacy condition dikes and levees, and off-property upland/upstream conditions. However, land managers can control some factors and may need to adjust management practices to accommodate for site conditions. Riparian buffers trap sediment from adjacent lands and sediments suspended instream during high flows. A well-managed riparian area, whether excluded from grazing or properly grazed, will enhance streambank stability, and will contribute to improved overall riparian condition.

Volume of Flow
Simple management activities such as tailwater capture and recycling, and improved irrigation application efficiency can enhance water quality and reduce overuse of irrigation water decreasing the detrimental impacts of unmanaged surface return flows. The conditions described in this Area Plan are designed to encourage appropriate application of irrigation waters and water conservation by the landowners to minimize inputs of temperature, sediment, and nutrients carried into the waters of the state by surface irrigation returns. Tailwater capture

and recycling will virtually eliminate any surface returns, thereby increasing subsurface return flows that may cool receiving streams. The LAC encourages funding for this type of work.

Also, properly functioning riparian areas act as sponges with the capacity to store water from high-flow events and release it slowly back to the stream during low flow times. Riparian management focuses on seasons and practices that reduce consumption and trampling of grasses, shrubs, and trees and will enhance the function of the riparian area to capture, store, and release cool groundwater in the summer.

2.5.1.3 Soil Erosion Prevention and Control

OAR 603-095-3840: Sheet and Rill Erosion
(2) Excessive Sheet and Rill Erosion: Effective January 1, 2007. Combined sheet, rill and wind erosion of soil averaged through a crop rotation period shall not be greater than the soil-loss tolerance value (T).

Intent: Minimize soil and livestock waste movement into listed waters of the state to reduce nutrient and sediment loading. This section is particularly relevant to the Upper Klamath basin considering that soils in the area have naturally high phosphorus content, and mobilization of such soils is a major contributor of phosphorus to Upper Klamath Lake.

2.5.1.4 Upland Vegetation to Prevent and Control Pollution

Uplands are the rangelands, forests, and croplands located upslope from streamside areas; they 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
- Plant growth that increases root mass, utilizes nutrients, and stabilizes soil to prevent erosion

2.5.1.5 Irrigation Management

Diversion of water from a water body to be applied on land to grow crops is a recognized beneficial use of water. Irrigation water use is regulated by the Oregon Water Resources Department in the form of water rights, which specify the rate and amount of water that can be diverted for application on a particular parcel of land (OAR 690-300-0010(26)). Water rights are not addressed in this Area Plan.

Irrigation in this Management Area is primarily by flooding and sprinklers. Water usually is diverted from a surface source (stream or pond) but may also be from groundwater. Irrigation water is often used more than once before and after it returns to the stream and is available for instream uses or by other irrigators.

Irrigation management that results in surface return flows inconsistent with TMDLs and restoration goals to waters of the state can degrade water quality via the transportation of nutrients and bacteria, and increased temperature. Such return flows can occur from activities such as not changing irrigation sets in a timely manner or poor management of irrigation water application. It is possible to manage both flood irrigation and sprinkler irrigation to avoid extensive surface return flows.

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

- Delivery of water efficiently to the land within legal water rights
- Minimal overland return flows that prevent increased sediment, farm chemical, or excess nutrient loads to a stream
- Scheduling of water application appropriate to the site including consideration of soil conditions, crop needs, climate and topography
- Applied nutrients do not leach to groundwater in amounts inconsistent with water quality standards and restoration goals.

Constructed irrigation delivery systems, borrow pits, and drainage ditches that have no hydraulic connection to live streams are exempt from the riparian rule. Although exempt from the riparian rule, livestock waste must still be prevented from entering the irrigation system. Also, an irrigator is not required to improve the quality of the water above the background condition at the source of the diversion.

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

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

The following conditions on agricultural lands contribute to water quality consistent with TMDL criteria in this Management Area:

1. Riparian areas are enhanced: Sufficient site-capable vegetation is established along streams to stabilize streambanks, filter overland flow, and moderate solar heating.
2. Soil erosion and sedimentation is minimized.
3. Streambanks are stable, high summer water temperatures are reduced.
4. Wetlands are enhanced: increased size and number of wetlands that effectively filter sediment and contaminants out of water.
5. Irrigation tailwater returns decrease or are managed to be consistent with TMDLs, and less water is removed from streams.

The LAC established these strategies to achieve the Area Plan goal:

1. Improved Water Quality:
    - Control pollution as close to the source as possible
    - Promote improvement of aquatic system health
    - Promote water use efficiency

2. Education and Public Involvement:
    - Describe existing water quality issues
    - Promote education regarding water quality in the Klamath Basin
    - Identify conditions related to agricultural management activities that adversely affect water quality
    - Identify management practices leading to improvement of water quality

3. Funding:
    - Identify sources of funding for on-the-ground projects and to implement the area plan

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

As resources allow, the SWCD, NRCS, USFWS, Sustainable Northwest, Klamath Watershed Partnership, and other natural resource agency staff are available to help landowners evaluate

approaches for reducing runoff and soil erosion on their farms and incorporate these into voluntary conservation or water quality plans. Personnel in these offices can also design and assist with project implementation and help identify sources of cost sharing or grant funding. Funding resources are often changing. See Appendix A for contact information and funding source information that is most up to date at the time of this writing. Local organizations will be able to provide updates as things change in Appendix A.

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

ODA is working with SWCDs and LACs throughout Oregon toward establishing long-term measurable objectives to achieve desired conditions. Currently, ODA and the Klamath SWCD are using Upper Klamath Lake agricultural pumping measurable objectives and the Sprague River SIAs to show progress in this Management Area. These are described below.

3.1.2 Focus Areas and Other Coordinated Efforts in Small Watersheds

Upper Klamath Lake Agricultural Pumping

The Upper Klamath Lake Agricultural Pumping coordinated effort concluded monitoring in June 2023. ODA will continue to maintain communication and case-by-case water quality monitoring with farms around Upper Klamath Lake to ensure water quality standards are being met in scenarios where pumping is necessary for agricultural operations. ODA will conduct monthly observations from public roads to document on-farm conditions in winter months (November-April) for at least the next two years. These conditions will be photographed and used to determine if follow up with individual farms is needed.

Beginning in March 2018, ODA worked with landowners and local partners to monitor water quality and develop and implement water quality improvement projects around Upper Klamath Lake. This work was in response to concerns about endangered sucker species in the lake and the detrimental effect of poor water quality and cyanobacteria blooms on the species. The goal was to substantially reduce phosphorus contributions from agricultural operations to Upper Klamath Lake. The Upper Klamath Lake Drainage TMDL states that 11.6 percent of the external phosphorus loading to the lake is from the pumps directly contributing to the lake.

Assessment Method:
Pump outlets and associated upland sites were monitored on a weekly or bi-weekly basis when active. Water from the monitoring sites was analyzed for total phosphorus, ortho phosphate, total nitrogen, TKN, nitrate-nitrite, ammonia nitrogen, total suspended solids, and turbidity.

Flow meters were installed at many of the outlet pump sites in 2019 and 2020 to measure flows and calculate nutrient loading from most of the pump sites to the lake. ODA was not able to capture the flow at all pump sites at all times due to the lack of installed flow meters to capture

baseline 2018 and 2019 conditions or flow meter breakage. Several of the flow meters were installed after landowners had chosen to reduce their flooding and pumping.

Due to this lack of flow volume data, the 2018 baseline total phosphorus loading at each pump site was calculated using the average of all total phosphorus sample results from the ODA monitoring from 2018-2021 for that site. Between 2018 and 2021 the acreage of flooded farm and pasture fields was reduced from 9,262 to 2,780 acres, a 70 percent reduction.

GIS mapping was used to calculate the 2018 flooded acreage. This was based on ODA staff observations and knowledge of 2018 conditions, as well as from photos from that time.

A flood water volume level of 1-acre foot, 2-acre feet, and 3-acre feet was calculated. Many water rights around the lake allow for a 3-acre-foot flood level on the fields for the flooding practice. Some landowners stated in 2018 that they flooded the fields closer to a 2- or 1-acre-foot flood level.

Pump-off levels of 25 percent, 50 percent, and 75 percent were then used to estimate the range of volume of water pumped off from the various levels of possible flooding. With this method, ODA calculated total phosphorus loading reductions. The results are included in Chapter 4.1.2. Additionally, for properties where all pump off locations had functional flow meters, ODA calculated more accurate phosphorus loads, using weekly grab samples collected by ODA staff. The analysis is limited by the fact that the samples are grab samples taken once per week if the pump was actively pumping. Overall, the loading calculations using this method show baseline loads and load reductions to be on the higher end of the range calculated using the methods above. The results for this method are also included in Chapter 4.1.2.

The winter of 2022-2023 was the final season of the coordinated effort to sample agricultural pump off around Upper Klamath Lake farms. While pump off activity and the associated phosphorus loading to Upper Klamath Lake is still of concern to ODA, the Department thinks that it can effectively regulate these activities directly with farms that continue to pump in the future. ODA plans to sample outflow on these farms as needed to determine compliance with the acceptable concentration set by DEQ. See Chapter 4.1.2 for discussion on results.

Measurable Objective and Associated Milestones:
By the 2025 Biennial Review, a 20 percent reduction of total phosphorus loading from agricultural activities at pump sites around Upper Klamath Lake. See Chapter 4.1.2 for discussion regarding Measurable Objective results.

3.1.3 Strategic Implementation Areas (SIA)

SIA Compliance Evaluation Method:
ODA evaluated all agricultural tax lots within the SIA to identify opportunities to improve water quality and ensure compliance with Area Rules. The evaluation considered the condition of streamside vegetation, areas of bare ground, and potential livestock impacts (including manure management). The process involved both a remote evaluation and field verification from publicly accessible areas. For further information see: https://www.oregon.gov/oda/shared/Documents/Publications/NaturalResources/SIAProgressReport.pdf

Opportunity levels:

- **Likely in Compliance (LC):** ODA identified no likely agricultural water quality regulatory concerns.
- **Restoration Opportunity (RO):** ODA identified no likely agricultural water quality regulatory concerns, but there may be an opportunity for improvement through voluntary measures to reach the goals of the Area Plan.
- **Compliance Opportunity (CO)**: ODA identified that agricultural activities may impair water quality or evaluation was inconclusive.
- **Potential Violation (PV):** ODA observed during the Field Evaluation a potential violation of the Area Rules.

3.1.3.1 Upper Sprague River SIA (Initiated 2018)

Three sub-watersheds in the Upper Sprague watershed were chosen as a Strategic Implementation Area in 2018. The sub-watersheds include the Lower North Fork Sprague River, Lower South Fork Sprague River, and Deming Creek. Agriculture in the Upper Sprague River SIA is primarily cattle grazing and hay operations. ODA evaluated 35,936 acres on 332 tax lots of agricultural land. Local water quality concerns include elevated bacteria (E.coli), chlorophyll-*a*, stream temperatures, pH, and low dissolved oxygen concentrations. Elevated phosphorus levels are the primary water quality concern in this watershed. Agricultural operations may be contributing to poor water quality from unmanaged livestock access to streamside areas, runoff from flood irrigated pastures, and lack of streamside vegetation. There are also legacy hydrologic alterations including straightening and diking of stream channels, as well as naturally high background phosphorus levels. See Chapter 4 for progress information.

Measurable Objective:
By April 18, 2023, all 13 tax lots identified as a PV or CO will be downgraded to RO or LC. The categories of RO and LC are used as a surrogate for water quality improvement, due to the lack of resources for adequate water quality monitoring. To downgrade tax lots to RO or LC, ODA staff must assess conditions after initial classification. This occurs via site visits or conversations with landowners or restoration partners depending on the original classification level. A PV can only be downgraded after a site visit, but a CO may be downgraded through the latter methods.

3.1.3.2 Middle Sprague River SIA (Initiated 2019)

Two sub-watersheds (Knot Tableland and Flu Pond) in the Middle Sprague watershed were chosen as a Strategic Implementation Area in 2019. The Middle Sprague River SIA is adjacent to, and downstream of, the Upper Sprague River SIA. Agriculture in the Middle Sprague River SIA is primarily cattle grazing and hay operations. ODA evaluated 41,971 acres on 1,170 tax lots of agricultural land. Local water quality concerns include elevated bacteria (E.coli), chlorophyll-*a*, stream temperatures, pH, and low dissolved oxygen concentrations. Elevated phosphorus levels are the primary concern in this watershed. Agricultural operations may be contributing to poor water quality from unmanaged livestock access to streamside areas, runoff from flood irrigated pastures, and lack of streamside vegetation. There are also legacy hydrologic alterations including straightening and diking of stream channels, as well as naturally high background phosphorus levels. See Chapter 4 for progress information.

Measurable Objective:
By September 28, 2026, all 43 tax lots identified as a PV or CO will be downgraded to RO or LC. The categories of RO and LC are used as a surrogate for water quality improvement, due to

the lack of resources for adequate water quality monitoring. To downgrade tax lots to RO or LC, ODA staff must assess conditions after initial classification. This occurs via site visits or conversations with landowners or restoration partners depending on the original classification level. A PV can only be downgraded after a site visit, but a CO may be downgraded through the latter methods.

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 2024-2025 throughout the Management Area by Klamath SWCD, Klamath Watershed Partnership, Trout Unlimited, and other partners.

Activity	2-year Target	Description
Landowner Engagement		
# events that actively engage landowners (workshops, demonstrations, tours)	15	
# landowners participating in active events	200	
Technical Assistance (TA)		
# landowners provided with TA (via phone/walk-in/email/booth/site visit)	500	
# site visits	150	
# conservation plans written*	10	
On-the-ground Project Funding		
# funding applications submitted	50	
* 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

3.3.1 Water Quality

This section describes water quality monitoring in the Management Area relevant to agricultural water quality goals.

Many entities conduct monitoring efforts in the Management Area. A few are detailed below but others include USGS, The Klamath Tribes, Trout Unlimited, and Klamath Watershed Partnership. Klamath Basin Monitoring Program (KBMP) house a lot of this metadata here: https://kbmp.net/stewardship/monitoring.

3.3.2 Land Conditions

Klamath SWCD flew the Sprague River and collected aerial photo documentation. This documentation is scheduled to continue but not until 2028. The Upper Klamath Basin Watershed Action Plan (UKBWAP) has an Interactive Reach Prioritization Tool (IRPT) that houses layers scoring land condition along streams in the Management Area. (https://trout.maps.arcgis.com/apps/webappviewer/index.html?id=92a7112de1cb44bb9231cee57268c446)

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. Tracking activities is straightforward; monitoring water quality or land conditions takes more effort; relating changes in land conditions to changes in water quality is important but more challenging.

4.1 Measurable Objectives and Strategic Initiatives

The following tables provide the assessment results and progress toward measurable objectives and milestones in the past two years (2022-2023). See Chapter 3.1 for background and assessment methods.

4.1.1 Management Area

There are no Management Area-wide Measurable Objectives.

4.1.2 Focus Areas and Other Focused Efforts in Small Watersheds

Table 4.1.2 Upper Klamath Lake Pumping

Measurable Objective
By the 2025 Biennial Review, a 20 percent reduction of total phosphorus loading from agricultural activities at pump sites around Upper Klamath Lake compared with 2018 baseline conditions.
Current Conditions
Progress Toward Measurable Objectives and Milestones ODA began work in 2018 with the nine primary landowners around Upper Klamath Lake that have contributions to agricultural pumps that pump directly to the lake. The work focused on reducing or eliminating phosphorus-laden water pumped from agricultural operations to the Lake. ODA worked with landowners to measure water quality and quantity at the outgoing pumps, upland contributing sites, and background level sites. Landowners provided access to their properties and pump sites for the monitoring. The monitoring was funded by the Oregon Legislature through June 2023. The total acreage for the drainage areas contributing to the pump sites is 75,500 acres, of which 9,262 acres were regularly flooded prior to and including 2018. Through landowner actions and decisions, in cooperation with ODA, the flooded acreage was reduced to approximately 2,782 acres in 2021. All nine landowners changed their farm management strategies to improve water quality and reduce the volume of water pumped from their land to the lake. Owners of properties with identified water quality concerns worked with conservation organizations to develop and implement projects to improve the quality, and reduce the quantity, of water pumped to the lake. Landowners continue to actively work with the Klamath Watershed Partnership, USFWS, Klamath SWCD, Trout Unlimited, the Klamath Tribes, and NRCS. Funding for implementation has come from OWEB, the Klamath Tribes, USFWS, and NRCS. Projects focused on improved water and soil management to reduce the phosphorus pumped to the lake. Project types included tailwater recovery, treatment of wetlands, land leveling, water control structures, cover cropping, winter cropping, and livestock fencing and water systems, as well as the elimination of the flooding practice. Concern about reduced migratory bird habitat from reducing the flooding practice led to an innovative solution that allows for agricultural production, improved water quality for fish in the lake, and migratory

waterfowl habitat. Several landowners have implemented or in the process of implementing projects that turn agricultural land into a receiving treatment wetland for excess flood and precipitation water. The landowners can flood their fields and then divert excess water, that would have previously been pumped to the lake, to a dedicated wetland that provides food and resting water for migratory bird populations. USFWS Refuge staff are the primary consultants for these projects.

Assessment Results (2019-2021)

The following results were generated from an analysis of the ODA data completed by Megan Skinner (USFWS Water Quality Specialist) and Olivia Stoken (former DEQ Klamath Basin Specialist) for the data up to 2021.

"*From 2019 – 2021, median annual total phosphorus load for all farms decreased by 62 percent. Annual median total phosphorus load for all sites ODA monitored, combined, decreased by 2.4 metric tons (range: 1.51 – 11.2), or 5,295 lbs (range: 3,339 – 24,692) from 2019 –2021. There was, on average, an 87 percent decrease in the water volume pumped from areas ODA monitored to UKL during the same time period. Note the wide range in calculated median load decreases; this arises from the wide range in total phosphorus concentrations during the monitoring period. More frequent monitoring would provide more certainty around calculated decreases.*"

Assessment Results (2022-2023)

During the winter of 2022-2023 five farms were sampled. None of the farms were sampled more than three times due to greatly reduced pump-off activity and management decisions to turn off pumps based on phosphorus levels in outflow from farm pumps. The season was particularly wet compared to the past several winters and many of the farm experienced flooding due to precipitation.

Adaptive Management Discussion

Agricultural landowners around Upper Klamath Lake continue to work independently and with conservation partners to adjust management strategies and implement projects to improve water quality in the lake. ODA will continue to monitor water quality with individual farms as needed, instead of in a concentrated monitoring effort. ODA will conduct monthly observations from public roads to document on-farm conditions in winter months (November-April) for at least the next two years. These conditions will be photographed and used to determine if follow up with individual farms is needed.

4.1.3 Strategic Implementation Areas

Focused efforts with agricultural landowners by ODA, Klamath SWCD, Klamath Watershed Partnership, Trout Unlimited, USFWS, the Klamath Tribes restoration staff, OSU Extension, Sustainable Northwest, NRCS, and others are ongoing in the two Sprague SIAs to improve water quality.

Ongoing efforts in both SIAs during 2022 and 2023 have been impeded by reticent landowner response to ODA attempts to contact them regarding compliance issues. Landowners are wary of additional restrictions; they have had irrigation water curtailed since 2013. In 2022 and 2023, they were unable to divert water from rivers for livestock watering due to water rights regulation. The Bootleg Fire posed another great challenge to landowners as it burned much of their federal grazing allotments.

OWEB funding and USBR through The Klamath Tribes provided financial resources for partners to provide landowners with livestock water wells. This work is continually becoming more and more expensive. Wells are needed to ensure long-term livestock exclusion from waterways and riparian areas. More funding sources need to be found to ensure this option is available to landowners.

ODA outreach and compliance efforts are continuing and evolving to adapt to the unique conditions in this watershed. Efforts are ongoing to seek solutions to protect water quality.

Table 4.1.3a 2018 Upper Sprague River SIA

Evaluation Results		
As of April 18, 2019, 13 tax lots were identified as either a Potential Violation or a Compliance Opportunity. PV = 2, CO = 11, RO = 23, LC = 296		
Measurable Objective		
By April 18, 2023, all 13 tax lots identified as a Potential Violation or a Compliance Opportunity will be downgraded to Restoration Opportunity or Likely in Compliance.		
Post Evaluation		
As of September 8, 2023, 6 tax lots identified as a Potential Violation or a Compliance Opportunity were downgraded to Restoration Opportunity or Likely in Compliance. PV = 0, CO = 7, RO = 29, LC = 296. The measurable objective was not achieved. ODA was unable to contact multiple landowners after several attempts. Those tax lots remain classified as Compliance Opportunity.		
Adaptive Management Discussion		
The SIA is closed and work in compliance completed. ODA and partners did not meet their measurable objective. Challenges in this SIA included nonresponsive landowners, SWCD staff turnover, Covid, and landowners dealing with difficulties related to drought, wildfires, and irrigation shutoffs.		
Activity	**Accomplishment**	**Description**
ODA		
# acres evaluated	35,936	
# stream miles evaluated	158	
# landowners at Open House	7	
# landowners receiving outreach materials	126	Outreach materials including the Rules were sent to all agricultural landowners in the SIA. Additionally, phone calls were made to all PV and CO landowners. Letters and certified letters were sent to PV and CO landowners. Communication with partners was also utilized in attempts at establishing communication with landowners.
# of ODA Site Visits	0	(conducted one site visit with a new landowner recently)
# of ODA Compliance Cases	3	
SWCD and Conservation Partners: Multiple partners are working with landowners in the SIA. Their accomplishments are unknown due the large number of partners working with landowners and privacy policies of these partners.		
# landowners provided with technical assistance	300	KSWCD: mailings, phone calls
# site visits	75	
# conservation plans written	unknown	
SIA and Project Funding		
# funding applications submitted	1	$125,000 SIA Technical Assistance, Outreach, Monitoring grant to Klamath SWCD
# funding applications awarded	1	
# of cooperative funding agreements	0	

Table 4.1.3b 2019 Middle Sprague River SIA

Evaluation Results		
As of September 28, 2020, 43 tax lots were identified as either a Potential Violation or a Compliance Opportunity. PV = 7, CO = 36, RO = 64, LC = 1,063		
Measurable Objective		
By September 28, 2024, all 43 tax lots identified as a Potential Violation or a Compliance Opportunity will be downgraded to Restoration Opportunity or Likely in Compliance.		
Adaptive Management Discussion		
1 PV actively working with partners. 4 PV tax lots downgraded to ROs based on current conditions. ODA attempted contact with 13 COs. 4 COs downgraded to ROs based on phone conversations. Ongoing work includes additional attempts to contact landowners and set up site visits to understand current land condition on evaluated tax lots.		
Activity	**Accomplishments**	**Description**
ODA		
# acres evaluated	41,971	
# stream miles evaluated	124	
# landowners at Open House	0	Covid restrictions did not allow for Open House meetings.
# landowners receiving outreach materials	90	Outreach delayed to COVID and wildfire. Outreach materials including the Rules were sent to all agricultural landowners in the SIA. Additionally, phone calls were made to all PV and CO landowners. Letters and certified letters were sent to PV and CO landowners. Communication with partners was also utilized in attempts at establishing communication with landowners.
# of ODA Site Visits	3	
# of ODA Compliance Cases	3	3 Potential Violation Landowners
SWCD and Conservation Partners: Multiple partners are working with landowners in the SIA. Their accomplishments are unknown due the large number of partners working with landowners and privacy policies of these partners.		
# landowners provided technical assistance	300	KSWCD: mailings, phone calls
# site visits	85	
# conservation plans written	1	USFWS w/ KSWCD
SIA and Project Funding		
# funding applications submitted	0	$125,000 SIA Technical Assistance, Outreach, Monitoring grant to Klamath SWCD
# funding applications awarded	0	
# of cooperative funding agreements	1	USFWS w/ KSWCD

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 2022-2023 throughout the Management Area by Klamath SWCD, Klamath Watershed Partnership, Trout Unlimited, Sustainable Northwest, and USFWS Partners Program

Activity	2-year results	Description
Landowner Engagement		
# events that actively engage landowners (workshops, demonstrations, tours)	18	Producer listening sessions, Forestry outreach, bull sale at fairgrounds
# landowners participating in active events	65	Rough estimate, ranging from 20-50 per event
Technical Assistance (TA)		
# landowners provided with TA (via phone/walk-in/email/booth/site visit)*	500	Many field visits, phone calls, and group discussions to provide support, this is a rough estimate in that area
# site visits	65	Direct landowner meetings on their property
# conservation plans written**	19	11-year landowner agreements and work plans
On-the-ground Project Funding		
# funding applications submitted	21	Grant applications and contract agreements
# funding applications awarded	19	11-year landowner agreements, minimum

* 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 1995-2021 (OWRI data include most, but not all projects, implemented in the Management Area.)

Landowners	OWEB	DEQ	NRCS*	USFWS	BIA	BOR	All other sources**	TOTAL
487,388	9,297,886	0	3,821,435	8,314,648	8,000,000	5,784,117	9,895,493	$45,600,967

* 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.

Table 4.2c Miles and acres treated on agricultural lands reported 1997-2020 (OWRI data include most, but not all projects, implemented in the Management Area.) These numbers do not necessarily indicate successful restoration to Area Rules criteria, but rather the miles, acres, and number of activities implemented.

Activity Type*	Miles	Acres	Count**	Activity Description
Upland		3,434		
Road	0		12	
Streamside Vegetation	92	3,152		
Wetland		9,995		
Instream Habitat	49			
Instream Flow	123		cfs	
Fish Passage	307		28	
TOTAL	**571**	**16,581**	**40**	

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

Table 4.2d AgWQ subset of practices implemented in 2022-2023 throughout the Management Area by partners This table is to give an example of the types of projects that have occurred in a handful of watersheds during 2022 and 2023. It is in no way a comprehensive list. These numbers do not necessarily indicate successful restoration to Area Rules criteria, but rather the miles, acres, and number of activities implemented.

Watershed	12-Digit HUC Number	Practice	Amount Implemented	Funding Source(s)
Aspen Creek - Williamson River	180102010104	Fence	16848 ft	OWEB
		Livestock Well	6	OWEB
Lobert Draw - Williamson River	180102010605	Fence	400 ft	OWEB
		Livestock Well	1	OWEB
Lower North Fork Sprague River	180102020507	Fence	2,500	USFS
		Beaver Dam Analog	20	USFWS Partners Program
		Stream Habitat Improvement and Management	0.9 miles	USFWS
Knot Tableland - Sprague River	180102020706	Fence	1000 ft	USFWS Partners Program
		Water Gap	1	USFWS Partners Program

		Beaver Dam Analog	10	USFWS Partners Program
		Wetland	90 acres	USFWS Partners Program
		Hardened cattle crossing	1	USFWS Partners Program
		LTPBR structures dropped in the stream	25	OWEB
Crooked Creek - Wood River	180102030105	Wetland	5 acres	USFWS Partners Program
		Fence	555 ft	OWEB
		Livestock Well	1	OWEB

In the future, the Management Area can expect to see a comprehensive digital dataset of practices implemented. This will be especially useful to get a sense of which watersheds have been helped the most and which need additional attention and outreach.

4.3 Additional Agricultural Water Quality and Land Condition Monitoring

4.3.1 Water Quality Monitoring

4.3.1.1 DEQ Monitoring

DEQ analyzed data for dissolved oxygen, *E. coli*, pH, total phosphorus, and temperature in the Management Area. (DEQ. 2022 Oregon Water Quality Status and Trends Report; https://www.oregon.gov/deq/wq/programs/Pages/wqstatustrends.aspx).
Data were from DEQ, EPA, and USGS databases for 2000 through 2022 and include data collected by the Klamath Tribes. DEQ determined attainment of water quality standards for stations in four-year periods and trends for stations with at least eight years of data collected at the same time of year. In many cases, there was insufficient data to determine current attainment of water quality standards.

DEQ Ambient Water Quality monitoring stations across the State that are routinely monitored to provide long-term water quality status and trend information for the area. The three DEQ ambient stations assessed for the Klamath Headwaters Management Area are: Klamath River below Big Bend Powerhouse, Sprague River at Sprague River Road, and Williamson River at Williamson River Store. DEQ analyzed data from stations within the Management Area. (DEQ. 2022 Oregon Water Quality Status and Trends Report). ODA worked with DEQ to select sites that would specifically determine trends in water quality from agricultural lands. The following table displays observations made from the three selected sites to provide general overview of the public monitoring data for these areas that are generally considered to be in agriculturally

influenced areas. The table displays surface waters showing improving, degrading, or steady statistical trends in the Klamath Headwaters Management area (2016-2020). Information is generated from the DEQ 2022 Status and Trends Report for Klamath Headwaters DEQ Ambient Water Quality Monitoring Sites.

Table 4.3.1.1 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]
Klamath River Below Big Bend Powerhouse	Yes	Yes	Yes↑	-	0.12; 0.27	4; 61
Sprague River at Sprague River Road	Yes	Yes↓	Yes	-	0.05; 0.11	2.5, 20
Williamson River at Williamson Store	Yes	Yes	Yes↑	-	0.1; 0.1	2; 21

Dissolved oxygen: The three ambient sites met the standard in the past four years, two of them improving. However, the five sites in Klamath Lake did not, and trends were degrading.

E. coli: The few sites with sufficient data attained the standard.

pH: The ambient sites met the standard in the past four years, one degrading; no other sites had sufficient data for that time period. However, almost all trends throughout the Management Area in the past 20 years were degrading.

Temperature: The standard was only met in headwater streams. All trends in Upper Klamath Lake were degrading.

Total Phosphorus: Trends were degrading in Upper Klamath Lake but improving at the mouth of the Sprague River and in the Klamath River below the Big Bend Powerhouse (although those values are still high). The Williamson River ambient site exceeded the standard; however, values appear to be improving. Unfortunately, phosphorus at the eight sites in Upper Klamath Lake is increasing. The improvements may be related to reduced pollutants in irrigation runoff or simply less runoff due to irrigation water shortages in the last few years.

4.3.2 Land Conditions

The Civil Air Patrol took aerial images of the Middle and Upper Sprague SIA riparian areas to conduct a streamside vegetation assessment (SVA). The SVA is in progress and will be used to assess areas of concern along the SIAs. An additional SVA will be done at the end of the five-year monitoring period to evaluate the improvements and where improvement could still take place.

4.4 Biennial Reviews and Adaptive Management

ODA, the LAC, the LMA, and other partners met on 12/7/23 and 2/1/24 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
• The local community is increasingly aware of the fragility of area ecosystem. • Landowners are sharing knowledge and ways to move forward, while understanding they don't have to improve background levels of pollutants. • Farmer ingenuity is creating an understanding and focus on addressing challenges. • Despite damage from several recent fires, there have been many reforestation and restoration efforts in the burned areas, including on Green Diamond property. • There has been more landowner participation recently, especially in Sustainable Northwest Listening Sessions. • Improved coordination and collaboration between conservation and restoration groups. • There has been a shift in the perception of the usefulness of agencies and what they can provide. • Agencies have also been giving landowners more credit for their efforts, and in turn landowners feel less scrutinized and more part of the solution. • The funding is out there, making the connection between restoration practitioners and landowners to get it on the ground is an ongoing collaborative effort.
Impediments
• Even with restoration efforts in areas affected by the fires, there is still a major potential for these events to affect water quality. There are also concerns on how the monitoring will differentiate between contributions from the fire damage, versus agricultural contributions to water quality. • A lot of people perceive the main ag issue to be manure and livestock waste in the water when the real concern in the Management Area is the erosion that livestock can cause. The phosphorus loading from active erosion and runoff events is the real beast. This could be an opportunity for ODA to refine messaging when explaining the benefits of riparian vegetation and why it is essential to maintain. • U.S. Army Corps of Engineers dikes in the Sprague contribute phosphorus inputs and inhibit restoration goals by disconnecting floodplains. • No comprehensive inventory of implemented practices: may be in the making. • Different perspectives on what practices to recommend and potential unintended consequences. • Detrimental effects of climate change on water quantity and quality. • No delineation of the agricultural contributions (sources and geographic areas) to water quality impairment in the Management Area. • Landowner fear of government regulation. • Difficulty understanding documents like the Klamath Headwaters AqWQ Management Plan. • Many agencies don't have the staffing or capacity to administer available or upcoming funding. • It can be challenging to decipher what regulations come with different funding sources. • It can be challenging to get landowners to want to engage in projects/receive funding/aid. • It can be challenging when funding has a finite timeline. • Historic impacts to the watershed are a huge hang up for restoration and compliance (e.g., disconnected floodplains)
Recommended Modifications and Adaptive Management
• Find a way to track sediment in the watershed coming from the upland burned areas and quantify it in the monitoring data so that it can be differentiated from agricultural contributions. • Smaller work group could be formed to discuss adjustments to SIA monitoring strategy to better understand wildfire influence on water quality. • Modify the language in the compliance letters ODA sends out to be more positive and constructive. The letters can be alarming to landowners and even intimidating, especially for those who have

never worked with anyone from ODA or local agencies. Better to explain the benefits of having a watershed assessed in this way; additional funding for the area.

- More outreach by ODA employees. That way if a landowner does receive a letter, they will be more familiar with agencies and individuals who may be able to help. Ongoing informational presentations about ag water quality, participate in SNW Listening Sessions.
- Develop more handout material to provide landowners with contact info, funding opportunities, and Area Plan information. Provide the existing Executive Summary to LAC members to garner feedback.

Table 4.4b Number of ODA compliance activities 1/1/2022 through 8/31/2023

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	3	1	6	1	0
Within SIA	2	1	2	1	0	0	0	0

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Appendix A: Contact Information and Funding Resources

Sustainable Northwest has created a useful compilation of contact information for landowners to reference in the Upper Klamath Basin. Please use the following link or contact Nina Caldwell at nina.caldwell@oda.oregon.gov or Kelley Delpit at kdelpit@sustainablenorthwest.org to mail you a printed copy.

https://docs.google.com/spreadsheets/d/1RM9CbDwz_yBk0ha7C6hZsKPGZwyjBj337Iw2JyLWwhI/edit#gid=0

The following spreadsheet was compiled to assist Klamath Basin stakeholders to identify funding opportunities for Klamath Basin restoration projects and activities. Please view the spreadsheet as a work-in-progress that will require frequent updates and adjustments.
If you have any questions about the spreadsheet, please contact:
Matt Baun (Matt_Baun@fws.gov)
Bob Pagliuco (bob.pagliuco@noaa.gov).

https://ifrmp.net/funding/

Note that there is ongoing effort to create a live resource for landowners and restoration practitioners to access real time information about funding opportunities in Upper Klamath Basin and will be distributed at the earliest possible time.

Appendix B: Reference Literature

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