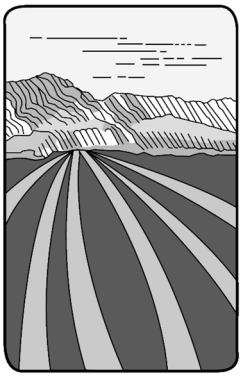

Oregon
Department
of Agriculture

Klamath Headwaters Agricultural Water Quality Management Area Plan

Developed by the:

Oregon Department of Agriculture

With assistance from the:
Klamath Headwaters Local Advisory Committee

and

Klamath Soil and Water Conservation District

Date: July 30, 2015

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Acronyms and Terms Used in this Document

Ag Water Quality Program – Agricultural Water Quality Management Program
Area Plan – Agricultural Water Quality Management Area Plan
Area Rules – Agricultural Water Quality Management Area Rules
BMP – Best Management Practices
BOD – Biological Oxygen Demand
CAFO – Confined Animal Feeding Operation
CBOD – Carbonaceous Biochemical Oxygen Demand
CFS – Cubic Feet Per Second
CRP – Conservation Reserve Program
CREP – Conservation Reserve Enhancement Program
CWA – Clean Water Act
DEQ – Oregon Department of Environmental Quality
DO – Dissolved Oxygen
EPA – Environmental Protection Agency
EQIP – Environmental Quality Incentives Program
FLT – Federally Listed Threatened
FOTG – Field Office Technical Guide
GWMA – Groundwater Management Area
HUC – Hydrologic Unit Code
LAC – Local Advisory Committee
Management Area – Agricultural Water Quality Management Area
MOA – Memorandum of Agreement
NBOD – Nitrogenous Biochemical Oxygen Demand
NOAA – National Oceanic and Atmospheric Administration
NPDES – National Pollution Discharge Elimination System
NRCS – Natural Resources Conservation Service
OAR – Oregon Administrative Rules
ODA – Oregon Department of Agriculture
ODFW – Oregon Department of Fish and Wildlife
ORS – Oregon Revised Statute
OWEB – Oregon Watershed Enhancement Board
PMP – Pesticides Management Plan
PSP – Pesticides Stewardship Partnership
Regulations – Agricultural Water Quality Management Area Regulations
RUSLE – Revised Universal Soil Loss Equation
SLS – State Listed Sensitive
SOD – Sediment Oxygen Demand
SWCD – Soil and Water Conservation District
T – Soil Loss Tolerance Factor
TMDL – Total Maximum Daily Load
USDA – United States Department of Agriculture
USLE – Universal Soil Loss Equation
US EPA – United States Environmental Protection Agency
WQPMT – Water Quality Pesticides Management Team

An Open Letter to the Klamath Basin Landowners and Readers of this Plan

Before you get into the legal language and references to arcane rules and statutes, we want you to know that we, the Klamath Headwaters Local Advisory Committee (LAC), are your neighbors and friends. We are affected by the same things that are happening in this basin as you are. We chose to be involved in this statewide process to speak up for our interests and our livelihoods.

The state of Oregon is under court order to control and prevent water pollution wherever it occurs and by whatever source. The Oregon Department of Environmental Quality (DEQ) is required to generate a list of streams, or stream segments, which do not meet the state standards for protecting the "beneficial uses" of those waters. We have a mandate from the Oregon legislature and the Oregon Department of Agriculture (ODA) to develop a plan that is based on reason, common sense, and peer-reviewed science to explain how our agriculture might potentially impact water quality and how we can reduce or eliminate any negative impact.

However, the mandate is not just from some government bureaucrats. We have taken this task for ourselves. We in agriculture need to be proactive to let the urban public know that we are doing our part. We honestly feel that we are the true environmentalists and have a deep connection with the resources we use and the land that we love. We believe we have a good opportunity of answering critics of agriculture about the scope and scale of our contribution. This is a great opportunity to show them what we have done and are doing for the land. There is also recognizable stewardship showing long-term voluntary landowner commitment. Private interests have a number of partnerships with the Oregon Department of Fish and Wildlife (ODFW) on fish screens, fish ladders, and extensive riparian fencing.

We have tried to make this Plan as locally based and achievable as possible. We included language that takes local conditions and climate into account. We are even recommending that the Klamath Soil and Water Conservation District (SWCD) take a proactive role in the implementation of this Plan and the associated Rules by setting up a local "appeals board" to help resolve conflicts with ODA. The point being, we want our input and advice to go on beyond the development of the Plan. We want to have a forum for you to voice your thoughts about implementation as well.

The 468B language is current law. This has been inserted into our plan and rules by ODA. A majority of the LAC members voted against the insertion of the language into the rules.

This Plan is a "living document" appointed, by law, to be reviewed by us, the LAC, for adequacy every two years. It has the capacity to change over time to meet any problems we missed or to reflect a change in our priorities. As you read this, we hope you will be able to see the amount of time and effort that went into this product. We are eager for your input and ready to hear your comments.

Sincerely,
The members of the Klamath Headwaters Local Advisory Committee

Foreword

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

The provisions of this Area Plan do not establish legal requirements or prohibitions, as described in Oregon Revised Statute (ORS) 568.912(1).

Required Elements of Area Plans

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

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

Plan Content

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

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

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

Chapter 4: Local Implementation, Monitoring, and Adaptive Management. ODA and the Local Advisory Committee (LAC) will work with partners to summarize land condition and water quality status. Trends are summarized to assess progress toward the goals and objectives in Chapter 3.

Chapter 1: Agricultural Water Quality Management Program Purpose and Background

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

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

The provisions of this Area Plan do not establish legal requirements or prohibitions (ORS 568.912(1)). Each Area Plan is accompanied by OAR regulations that describe local agricultural water quality regulatory requirements. ODA will exercise its regulatory authority for the prevention and control of water pollution from agricultural activities under the Ag Water Quality Program's general regulations (OARs 603-090-0000 to 603-090-0120) and under the regulations for this Management Area (OARs 603-095-3840). The Ag Water Quality Program's general OARs guide the Ag Water Quality Program, and the OARs for the Management Area are the regulations that landowners must follow.

This Area Plan and its associated regulations apply to all agricultural activities on non-federal and non-Tribal Trust land within the Management Area, including:

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

1.2 History of the Ag Water Quality Program

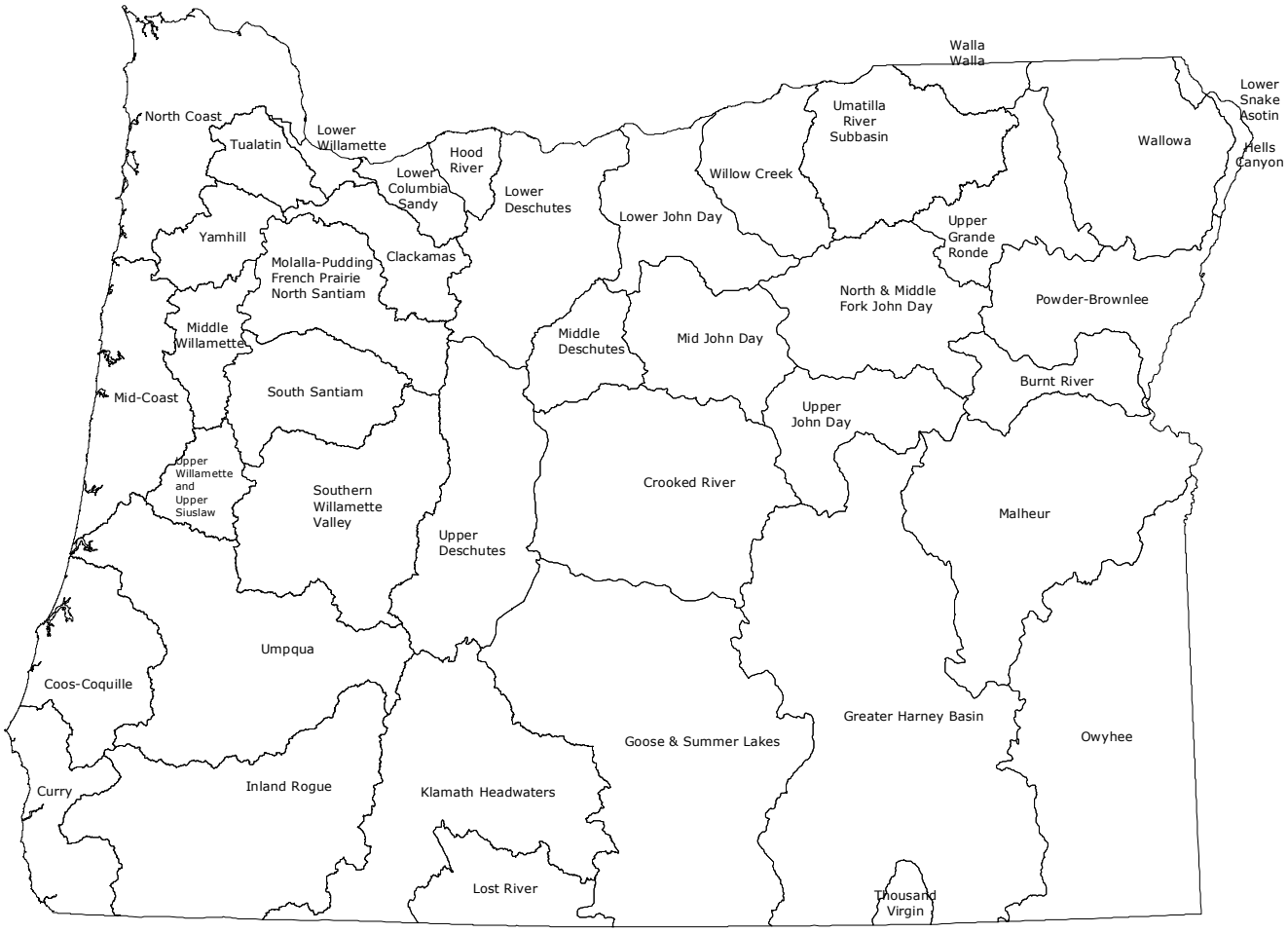
In 1993, the Oregon Legislature passed the Agricultural Water Quality Management Act, directing ODA to develop plans to prevent and control water pollution from agricultural activities and soil erosion, and to achieve water quality standards (ORS 568.900 through ORS 568.933). Senate Bill 502 was passed in 1995 to clarify that ODA regulates agriculture with respect to water quality (ORS 561.191). This Area Plan and its associated regulations were developed and subsequently revised pursuant to these statutes.

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

- Providing education, outreach, and technical assistance to landowners.
- Implementing projects to improve agricultural water quality.
- Investigating complaints of potential violations of regulations.

- Conducting biennial reviews of Area Plans and regulations.
- Monitoring, evaluation, and adaptive management.
- Developing partnerships with SWCDs, state, federal, and tribal agencies, watershed councils, and others.

Figure 1: Map of 38 Agricultural Water Quality Management Areas



1.3 Roles and Responsibilities

1.3.1 Oregon Department of Agriculture (ODA)

ODA is the agency responsible for implementing the Ag Water Quality Program (ORS 568.900 to 568.933, ORS 561.191, OAR 603-090, and OAR 603-095). The Ag Water Quality Program is intended to meet the needs and requirements related to agricultural water pollution, including:

- State water quality standards.
- Load allocations for agricultural nonpoint source pollution assigned under Total Maximum Daily Loads (TMDLs) issued pursuant to the Clean Water Act (CWA), Section 303(d).
- Approved management measures for Coastal Zone Act Reauthorization Amendments (CZARA).

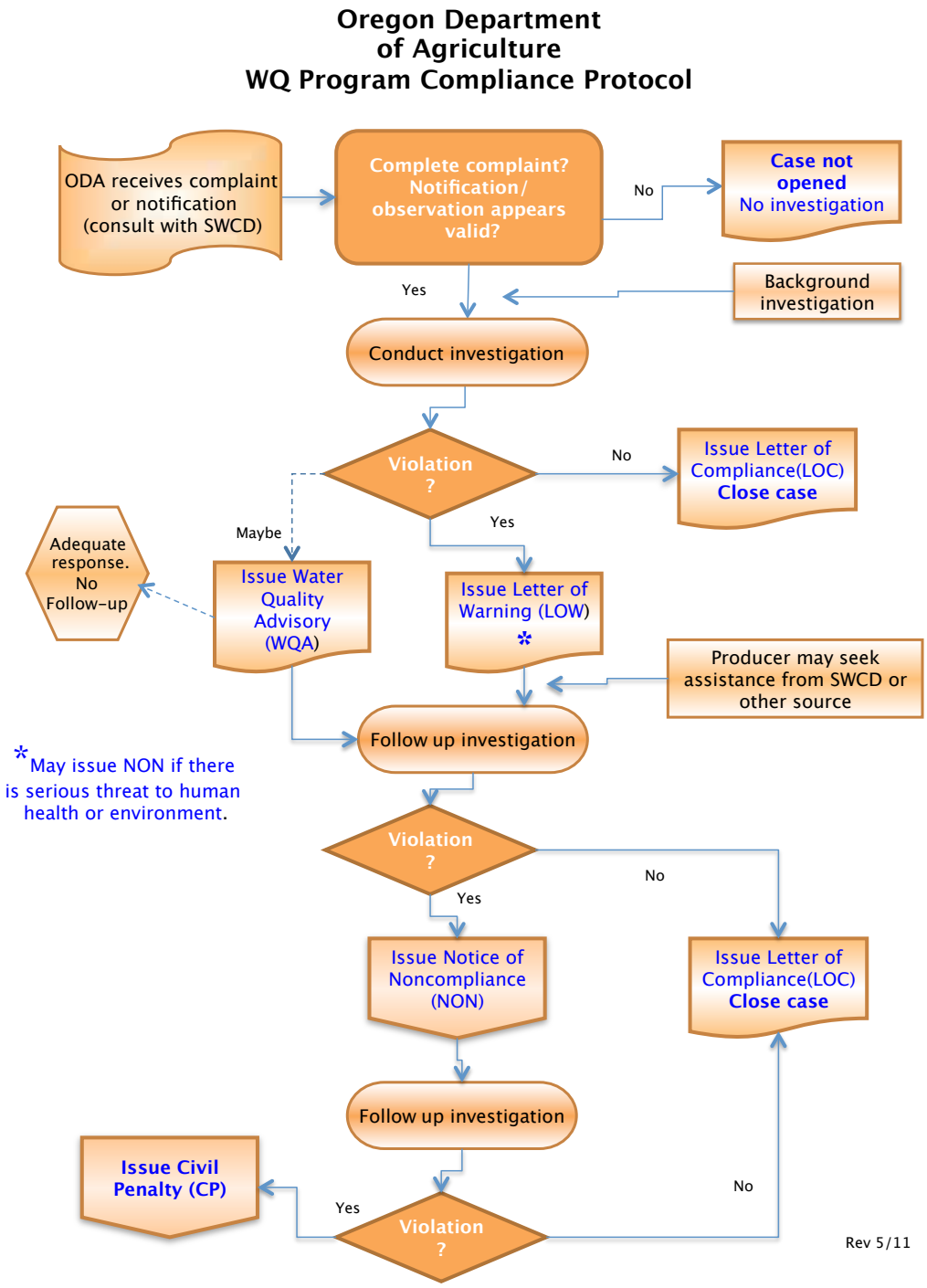
- Agricultural activities detailed in a Groundwater Management Area (GWMA) Action Plan (if a GWMA has been established and an Action Plan developed).

ODA has the legal authority to develop and implement Area Plans and associated regulations for the prevention and control of water pollution from agricultural activities and soil erosion, where such plans are required by state or federal law (ORS 568.909 and ORS 568.912). ODA will base Area Plans and regulations 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 associated regulations. ODA has responsibility for any actions related to enforcement or determination of noncompliance with regulations (OAR 603-090-0080 through OAR 603-090-0120). ORS 568.912(1) and ORS 568.912(2) give authority to ODA to adopt regulations that require landowners to perform actions necessary to prevent and control pollution from agricultural activities and soil erosion.

The emphasis of this Area Plan is on voluntary action by landowners or operators to control the factors effecting water quality in the Management Area. The regulations are outlined as a set of minimum standards that must be met on all agricultural or rural lands. Landowners and operators who fail to address these regulations may be subject to enforcement procedures, which are outlined below.

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

Figure 2: Compliance Flow Chart



1.3.2 Local Management Agency

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

The day-to-day implementation of the Area Plan is accomplished through an intergovernmental agreement between ODA and each SWCD. Each SWCD implements the Area Plan by providing outreach and technical assistance to landowners. SWCDs also work with ODA and the LAC to establish implementation priorities, evaluate progress toward meeting Area Plan goals and objectives, and revise the Area Plan and associated regulations as needed.

1.3.3 Local Advisory Committee (LAC)

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

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

- Participate in the development and ongoing revisions of the Area Plan.
- Participate in the development and revisions of regulations.
- Recommend strategies necessary to achieve goals and objectives in the Area Plan.
- Participate in biennial reviews of the progress of implementation of the Area Plan and regulations.
- Submit written biennial reports to the Board of Agriculture and the ODA director.

1.3.4 Agriculture's Role

Each individual landowner or operator in the Management Area is required to comply with the regulations, which set minimum standards. However, the regulations alone are not enough. To achieve water quality standards, individual landowners also need to attain land conditions that achieve the goals and objectives of the voluntary Area Plan. Each landowner or operator is not individually responsible for achieving water quality standards, agricultural pollution limits, or the goals and objectives of the Area Plan. These are the responsibility of the agricultural community collectively.

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

Area regulations only address impacts that result from agricultural activities. A landowner is responsible for only those conditions caused by activities conducted on land managed by the landowner or occupier. Conditions resulting from unusual weather events or other circumstances not within the reasonable control of the landowner or operator are considered when making compliance decisions. Agricultural landowners may be responsible for some of the above impacts under other legal authorities.

Under the Area Plan and associated regulations, agricultural landowners and operators are not responsible for mitigating or addressing factors that do not result from agricultural activities, such as:

- Hot springs, glacial melt water, extreme or unforeseen weather events, and climate change.
- Septic systems and other sources of human waste.
- Public roadways, culverts, roadside ditches and shoulders.
- Dams, dam removal, hydroelectric plants, and non-agricultural impoundments.
- Housing and other development in agricultural areas.

1.3.5 Public Participation

The public was encouraged to participate when ODA, LACs, and SWCDs initially developed the Area Plans and associated regulations. ODA and the LAC in each Management Area, held public information meetings, a formal public comment period, and a formal public hearing. ODA and the LACs modified the Area Plans and regulations, as needed, to address comments received. The director of ODA adopted the Area Plans and regulations in consultation with the Board of Agriculture.

ODA, LACs, and SWCDs conduct biennial reviews of the Area Plans and regulations. Partners, stakeholders, and the general public are invited to participate in the process. Any future revisions to the regulations will include a public comment period and a public hearing.

1.4 Agricultural Water Quality

1.4.1 Point and Nonpoint Sources of Water Pollution

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

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

1.4.2 Beneficial Uses and Parameters of Concern

Beneficial uses of clean water include: public and private domestic water supply, industrial water supply, irrigation, livestock watering, fish and aquatic life, wildlife and hunting, fishing, boating, water contact recreation, aesthetic quality, hydropower, and commercial navigation and transportation. The most sensitive beneficial uses are usually fish and aquatic life, water contact recreation, and public and private domestic water supply. These uses are generally the first to be impaired as a water body is polluted, because they are affected at lower levels of pollution. While there may not be severe impacts on water quality from a single source or sector, the combined effects from all sources contribute to the impairment of beneficial uses in the Management Area. Beneficial uses that have the potential to be impacted in this Management Area are summarized in Chapter 2.

Many water bodies throughout Oregon do not meet state water quality standards. These water bodies may or may not have established water quality management plans documenting needed reductions. The most

common water quality concerns related to agricultural activities are temperature, bacteria, biological criteria, sediment and turbidity, phosphorous, algae, pH, dissolved oxygen, harmful algal blooms, nitrates, pesticides, and mercury. These parameters vary by Management Area and are summarized in Chapter 2.

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

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

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

TMDLs generally apply to an entire basin or subbasin, and not just to an individual water body on the 303(d) list. Once a TMDL is developed for a basin, the basin's impaired water bodies are removed from the 303(d) list, but they remain on the list of impaired water bodies. When data show that water quality standards have been achieved, water bodies will be identified on the list of water bodies that are attaining water quality standards.

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

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

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

Senate Bill 502 was passed in 1995, authorizing ODA as the state agency responsible for regulation of farming activities for the purpose of protecting water quality. A Department of Justice opinion dated July 10, 1996, states that "...ODA has the statutory responsibility for developing and implementing water quality programs and rules that directly regulate farming practices on exclusive farm use and agricultural lands." In addition, this opinion states, "The program or rule must be designed to achieve and maintain Environmental Quality Commission's water quality standards."

To implement Senate Bill 502, ODA incorporated ORS 468B into all of the Area Plans and associated regulations in the state. A Department of Justice opinion, dated September 12, 2000, clarifies that ORS 468B.025 applies to point and nonpoint source pollution.

ORS 468B.025 states that:

> "(1) ...no person shall:
>
> (a) Cause pollution of any waters of the state or place or cause to be placed any wastes in a location where such wastes are likely to escape or be carried into the waters of the state by any means.
>
> (b) Discharge any wastes into the waters of the state if the discharge reduces the quality of such waters below the water quality standards established by rule for such waters by the Environmental Quality Commission.
>
> (2) No person shall violate the conditions of any waste discharge permit issued under ORS 468B.050."

The aspects of ORS 468B.050 that apply to the Ag Water Quality Program, state that:

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

Definitions (ORS 468B.005)

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

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

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

1.4.5 Streamside Vegetation and Agricultural Water Quality

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

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

- Streamside vegetation improves water quality related to multiple pollutants, including: temperature (heat), sediment, bacteria, nutrients, toxics, and pesticides.
- Streamside vegetation provides fish and wildlife habitat.
- Landowners can improve streamside vegetation in ways that are compatible with their operation.
- Streamside vegetation condition can be monitored readily to track the status and trends of agriculture's progress in addressing water quality concerns.

The Ag Water Quality Program uses the concept of "site-capable vegetation" to describe the vegetation that agricultural streams can provide to protect water quality. Site-capable vegetation is the vegetation that can be expected to grow at a particular site, given natural site factors (e.g., elevation, soils, climate, hydrology, wildlife, fire, floods) and historical and current human influences (e.g., channelization, roads, invasive species, modified flows, past land management). Site-capable vegetation can be determined for a specific site based on: current streamside vegetation at the site, streamside vegetation at nearby reference sites with similar natural characteristics, Natural Resources Conservation Service (NRCS) soil surveys, and 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 all streams flowing through agricultural lands. The agricultural water quality regulations for each Management Area require that agricultural activities provide water quality functions consistent with what the site would provide with site-capable vegetation.

In some cases, for narrow streams, mature site-capable vegetation may not be needed. For example, shrubs and grass may provide shade, protect streambanks, and filter pollutants. However, on larger streams, mature vegetation is important. Limited exceptions include:

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

1.5 Other Water Quality Programs

1.5.1 Confined Animal Feeding Operation (CAFO)

ODA is the lead state agency for the CAFO Program. The CAFO Program was developed to ensure that operators and producers do not contaminate ground or surface water with animal manure. Since the early 1980s, CAFOs have been registered to a general Water Pollution Control Facility permit designed to protect water quality, while allowing the operators and producers to remain economically viable. A properly maintained CAFO does not pollute ground or surface water. To assure continued protection of ground and surface water, ODA was directed by the 2001 Oregon State Legislature to convert the CAFO Program from a Water Pollution Control Facility permit program to a federal National Pollutant Discharge Elimination System (NPDES) program. ODA and DEQ jointly issued a NPDES CAFO Permit in 2003 and 2009. The 2009 permit will expire in May 2014, and it is expected that a new permit will be issued at that time. The NPDES CAFO Permit is compliant with all Clean Water Act requirements for CAFOs; it does allow discharge in certain circumstances as long as the discharge does not violate Water Quality Standards.

Oregon NPDES CAFO Permits require the registrant to operate according to a site-specific, ODA approved, Animal Waste Management Plan that is incorporated into the NPDES CAFO Permit by reference. CAFO NPDES Permits protect both surface and ground water resources.

1.5.2 Drinking Water Source Protection

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

1.5.3 Groundwater Management Areas (GWMAs)

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

Oregon has designated three GWMAs because of elevated nitrate concentrations in groundwater. These include the Lower Umatilla Basin GWMA, the Northern Malheur County GWMA, and the Southern Willamette Valley GWMA. Each GWMA has a voluntary Action Plan to reduce nitrate concentrations in groundwater. If after a scheduled evaluation point DEQ determines that the voluntary approach is not effective, then mandatory requirements may become necessary.

1.5.4 Pesticide Management and Stewardship

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

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

Through the PSP Program, state agencies and local partners work together to monitor pesticides in streams and to improve water quality (www.deq.state.or.us/wq/pesticide/pesticide.htm). DEQ, ODA, and Oregon State University Extension Service work with landowners, SWCDs, watershed councils, and other local partners to voluntarily reduce pesticide levels while improving water quality and crop management. There has been noteworthy progress since 2000 in reducing pesticide concentrations and detections.

ODA led the development and implementation of a Pesticides Management Plan (PMP) for the state of Oregon (www.oregon.gov/ODA/PEST/water_quality.shtml). The PMP, completed in 2011, strives to protect drinking water supplies and the environment from pesticide contamination, while recognizing the important role that pesticides have in maintaining a strong state economy, managing natural resources,

and preventing human disease. The PMP sets forth a process for preventing and responding to pesticide detections in Oregon's ground and surface water resources by managing the pesticides that are currently approved for use by the U.S. EPA and Oregon in both agricultural and non-agricultural settings.

1.5.5 The Oregon Plan for Salmon and Watersheds

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

1.6 Partner Agencies and Organizations

1.6.1 Oregon Department of Environmental Quality (DEQ)

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

DEQ designated ODA as the Designated Management Agency for water pollution control activities on agricultural and rural lands in the state of Oregon to coordinate meeting agricultural TMDL load allocations. A Memorandum of Agreement (MOA) between DEQ and the ODA recognizes that ODA is the agency responsible for implementing the Ag Water Quality Program established under ORS 568.900 to ORS 568.933, ORS 561.191, and OAR Chapter 603, Divisions 90 and 95. The MOA between ODA and DEQ was updated in 2012 and describes how the agencies will work together to meet agricultural water quality requirements.

The MOA includes the following commitments:

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

The Environmental Quality Commission, which serves as DEQ's policy and rulemaking board, may petition ODA for a review of part or all of any Area Plan or its associated regulations. The petition must

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

1.6.2 Other Partners

ODA and SWCDs work in close partnership with local, state, and federal agencies and organizations, including: DEQ (as indicated above), the United States Department of Agriculture (USDA) NRCS and Farm Service Agency, watershed councils, Oregon State University Extension Service, livestock and commodity organizations, conservation organizations, and local businesses. As resources allow, SWCDs and local partners provide technical, financial, and educational assistance to individual landowners for the design, installation, and maintenance of effective management strategies to prevent and control agricultural water pollution.

1.7 Measuring Progress

Agricultural landowners and operators have implemented effective conservation projects and management activities throughout Oregon to improve water quality for many years. However, it has been challenging for ODA, SWCDs, and LACs to measure this progress. ODA is working with SWCDs, LACs, and our partners to develop and implement objectives and strategies that will produce measurable outcomes for agricultural water quality.

1.7.1 Measurable Objectives

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

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

- Increase the percentage of lands achieving compliance with the regulations.
- Increase the percentage of lands meeting desired land conditions outlined in the Area Plan.

1.7.2 Land Condition and Water Quality

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

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

- Landowners can see land conditions and have direct control over them.
- It can be difficult to separate agriculture's influence on water quality from other land uses.
- It requires extensive monitoring of water quality at an intensive temporal scale to evaluate progress; it is expensive and may fail to demonstrate short-term improvements.
- Improved land conditions can be documented immediately, but there may be a significant lag time or a need for more extensive implementation before water quality improves.
- Agricultural improvements in water pollution are primarily through improvements in land and management conditions.

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

1.7.3 Focused Implementation in Small Geographic Areas

Focus Areas

A Focus Area is a small watershed with significant water quality or land condition concerns that are associated with agriculture. ODA's intent in selecting Focus Areas is to deliver systematic, concentrated outreach and technical assistance in small geographic areas ("Focus Areas") through the SWCDs. A key component of this approach is measuring conditions before and after implementation to document the progress made with available resources. The focused implementation approach is consistent with other agencies' and organizations' efforts to work proactively in small geographic areas, and is supported by a large body of scientific research (e.g., Council for Agricultural Science and Technology, 2012).

Systematic implementation in Focus Areas can provide the following advantages:

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

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

Working within a Focus Area is not intended to prevent implementation within the remainder of the Management Area. The remainder of the Management Area will continue to be addressed through general outreach and technical assistance.

Strategic Implementation Areas

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

1.8 Implementation, Monitoring, Evaluation, and Adaptive Management

Implementation of the Area Plan and associated regulations will be assessed by evaluating the status and trends in agricultural land conditions. Measurable objectives will be assessed across the entire Management Area and within the Focus Area. ODA conducts land condition and water quality monitoring at the statewide level and will analyze this and other agencies' and organizations' local monitoring data. The results and findings will be summarized in Chapter 4 for each biennial review. ODA, DEQ, SWCDs, and LACs will examine these results during the biennial review and will revise the goal(s), objectives, and strategies in Chapter 3, as needed.

1.8.1 Statewide Aerial Photo Monitoring of Streamside Vegetation

Starting in 2003, ODA began evaluating streamside vegetation conditions using aerial photos acquired specifically for this purpose. ODA focuses on land condition monitoring efforts on streamside areas because these areas have such a broad influence over water quality. Stream segments representing 10 to 15 percent of the agricultural lands in each Management Area were randomly selected for monitoring. ODA examines streamside vegetation at specific points in 90-foot bands along the stream from the aerial photos and assigns each sample stream segment a score based on ground cover. The score can range from 70 (all trees) to 0 (all bare ground). The same stream segments are re-photographed and re-scored every five years to evaluate changes in streamside vegetation conditions over time. Because site capable vegetation varies across the state, there is no one correct riparian index score. The main point is to measure positive or negative change. The results are summarized in Chapter 4 of the Area Plan.

1.8.2 Agricultural Ambient Water Quality Monitoring Assessment

ODA currently evaluates water quality data from monitoring sites in DEQ's water quality database that reflects agricultural influence on water quality. These data are also published in the DEQ water quality database and evaluated at the statewide level to determine trends in water quality at agricultural sites statewide. Results from monitoring sites in the Management Area, along with local water quality monitoring data, are described in Chapter 4.

1.8.3 Biennial Reviews and Adaptive Management

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

Chapter 2: Local Background

2.1 Local Roles and Responsibilities

2.1.1 Local Advisory Committee (LAC)

This Area Plan was developed with the assistance of a LAC. The LAC was formed in 2002 to assist with the development of the Area Plan and regulations and with subsequent biennial reviews. Members are:

Name	Location	Description
Chair: Tom Mallams*		
Vice-Chair:		
Linda Long*	Chiloquin	
John Hyde*	Chiloquin	
Sue Mattenberger*	Klamath Falls	Fish and Wildlife Biologist
Bob Sanders	Sprague River	
Greg Bulkley	Bly	
Ed Vieira	Sprague River	

* Denotes members at time of approval of initial Plan
Jim Creswell*, Elwood Miller*, Jim Gallagher*, Ambrose McAuliffe*, Linda Rexroat*, Chris Sokol*, Bill Rust, Jim Carpenter*

2.1.2 Local Management Agency

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

2.2 Area Plan and Regulations: Development and History

The Area Plan and regulations were approved by the director of ODA in 2004.

Since approval, the LAC met in 2007, 2009, 2011, 2013, and 2015 to review the Area Plan and regulations. The review process included assessment of the progress of Area Plan implementation toward achievement of plan goals and objectives.

A summary of dates and major changes from each biennial review can be included in this section.

2.3 Geographical and Physical Setting: Location, Water Resources, Land Use, Land Ownership, Agriculture

Located in the south central part of Oregon, the Klamath Headwaters Subbasin includes all tributaries to Klamath/Agency Lakes and the Klamath River to the Oregon border with the exception of the Lost River Subbasin. Geographic boundaries are consistent with Klamath Headwaters "Total Maximum Daily Load" (TMDL) completed in August of 2002 by the DEQ. Principal urban centers include Klamath Falls, Keno, Beavermarsh, Pinehurst, Chiloquin,

Sprague River, Rocky Point, Bly, Beatty, and Fort Klamath. Elevation above sea level ranges from 4,050 to over 9,000 feet and averages about 4,500 feet.

Klamath Falls' long-term records from the official National Oceanic and Atmospheric Administration (NOAA) weather station show average annual precipitation of about 13.5 inches with about one-third occurring during the April through October growing season and two-thirds occurring from November through March. Since the establishment of an NOAA station at Klamath Falls in 1949, total annual precipitation has ranged from 6.72 inches in 1959 to 23.91 inches in 1996. Higher elevation areas receive considerably more precipitation. Annual average snowfall at 7,000 feet elevation at Crater Lake National Park exceeds 450 inches with over 600 inches recorded in 1998-99.

Average annual air temperature at Klamath Falls is about 46^{O} F with daily highs averaging 61^{O}F and lows averaging 32^{O}F. The daily maximum air temperature in July and August averages 82^{O}F, while the daily minimum temperatures in January and February average 19^{O}F. Lower temperatures are generally experienced in higher elevation areas.

Principal water bodies include:

- 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 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 Forest National Wildlife Refuge, and Upper Klamath National Wildlife Refuge.

Klamath River Area [a]

With the opening of the Applegate trail in 1846 and the subsequent arrival of substantial numbers of Euro-Americans, the land and water uses in the Klamath River watershed were changed forever. Just twenty 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.

Areas such as the Spencer Creek, Jenny Creek, and Aspen Lake watersheds as well as Long and Round lakes were 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 to be used for agricultural purposes at about this same time. Most of these diversions have been discontinued or highly modified in light of modern agricultural practices. Grazing on private as well as 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.

Reclamation projects in the form of dikes on the west side of Klamath Lake and upper Klamath River occurred mostly following World War I and in the 1920's. These diking systems drained marshes and swamps to create pastures, hay fields, and a limited acreage of row crops.

Soils

Most of the soil is of volcanic origin, which equates to high clay. The following well-drained soil series are located in the Klamath River area: Bly, Capona, Deter, Lobert, Lorella, Ponina, and Woodcock. Poorly drained soil series in this area include Dilman, Klamath, Lather, Ontko, Pit, and Tulana. For more information on soil series and climate see the Soil Survey of Klamath County. The soils in the Colestine Valley/Cottonwood Creek are all fairly young soils, moderate to well drained. The agricultural lands in the bottoms generally consist of soils from the Carney-Coker series, which is deep, cobbley to gravelly clays. These soils can be quite droughty during the hot, dry summer months and so require irrigation during the growing season. These soils are best suited to native pasture as the alluvium parent material makes the soils hard to till. The area outside the relatively flat bottoms include the more severe sloped, sandy and rocky soils like the Heppsie-McMullin-McNull complex which is very well drained, shallow to moderately deep, and on slopes ranging from 20 to 60 percent. The south-facing slopes typically have grasses such as tall fescue, shrubs such as manzanita and hardwoods such as black oak as the dominant plant species. The north-facing slopes typically support Douglas fir and Ponderosa pine. This section of the Klamath Basin, which is in Jackson County, averages between 18 and 35 inches of annual precipitation (USDA 1976).

Fish

Fish populations present in the Klamath River area include non-game fish and warm water game fish. The Klamath River and its tributaries support the following warm water game fish: largemouth bass, white crappie, black crappie, Sacramento perch, bluegill perch, pumpkinseed sunfish, green sunfish, yellow perch, and brown bullhead. The Klamath River and tributaries support the following non-game fish: Lost River sucker, shortnose sucker, Klamath large-scale sucker, Klamath small scale sucker, Klamath speckled dace, blue chub, Tui chub, marbled sculpin, Pacific lamprey, Klamath lamprey, and fathead minnow. Although shortnose and Lost River suckers are currently listed under non-game species due to endangered species status, they were historically harvested and used commercially. Cold water species in the Klamath River and its tributaries include brown trout, brook trout, and State Listed Sensitive (SLS) redband trout. These watersheds also exhibit Jenny Creek suckers. Cottonwood Creek contains steelhead. The fish species present vary from site to site. For more detailed information on fish populations and habitat, see the Klamath River Basin, Oregon Fish Management Plan (ODFW 1999).

Sprague River Area [b]

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 below the town 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 a very slow moving body of water. Precipitation in this area is approximately 14 to 18 inches annually. Peak river flows normally occur in the spring with high elevation snowmelt and diminish throughout the summer to their low points in August or September. Elevations range from 4,000 to 5,000 feet.

Soils
Characteristics of the soil and the materials from which it formed are described in detail in the Soil Survey of Klamath County, Oregon. Climate information by soil type is also listed. Deep, well-drained soils in the Sprague River area include the Bly and Crume series. Also present is the shallow, well-drained Choptie series and the very deep, moderately well drained, Chiloquin series (USDA 1976).

Fish
The Sprague River supports warm water game fish including largemouth bass, yellow perch, and brown bullhead. The North Fork supports brown bullhead; whereas, the Lower South Fork supports brown bullhead and yellow perch. The Sprague and Sycan rivers support populations of non-game fish including Lost River sucker, shortnose sucker, Klamath large-scale sucker, Klamath speckled dace, blue chub, Tui chub, marbled sculpin, Pacific lamprey, Klamath lamprey, and Klamath-Pit brook lamprey. Cold-water species include SLS redband trout, brown trout, brook trout and Federally Listed Threatened (FLT) bull trout. Historically, shortnose and Lost River suckers were harvested and used commercially. The fish species present vary from site to site. For more detailed information on fish populations and habitat, see the Klamath River Basin, Oregon Fish Management Plan (ODFW 1999).

Land Use
The Sprague River Valley consists mainly of rangeland and small farms surrounded by mountains and wooded areas. Historically (1843-1880), early settlers arrived to mountains covered with forests and native grasses covering the plateau lands. 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 completed, everything east of Ivory Pine Road has been adjudicated.

Approximately 40 percent of the Sprague River Valley is in private ownership by 150 ranching families. Based on a survey of ranchers in October 1999, there are about 28,000 cattle, 70 sheep, and 400 horses. Approximately 8,000 tons of hay, including grass-hay, alfalfa, and grain-hay are harvested annually.

The Sprague River area includes recreation areas at Campbell Reservoir, Obenchain Reservoir, Sprague River Park, and Drews Park. Historically, there have been numerous dams at various points along the Sprague River. Some channelization of the Sprague River also occurred.

Sycan Marsh Watershed[c]
The Upper Sycan Watershed Council was organized in October of 1998 and was formally recognized as such by the Lake County Commissioners in February of 1999. 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. From May through October, cattle are rotationally grazed on the marsh and uplands. Approximately 8,200 head of beef cattle visit the watershed every year, which is a decline from the 12,000 head in historic times. J.M. Small homesteaded the area in the early 1900's grazing sheep, cattle, horses, and pigs. Many other

ranching families utilized the forage available on much of what is now managed by the Fremont Forest Service. The ZX ranch of Paisley, Oregon 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 Indian 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 Upper Sycan watershed receives approximately 20-25 inches of precipitation a year with the majority of moisture in the form of snow. The average high temperature is 59° F while the average low is 29° F. The 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: blue grass dry meadow, hair grass sedge moist meadow, sedge wet meadow, low sage brush\blue grass – one spike oat grass, juniper\low sage brush\fescue, low sage brush\fescue – squirrel tail, mountain big sage brush\bunch grass. The forested areas of the uplands in the watershed consist of the following vegetative communities: lodge pole pine\strawberry – fescue, lodge pole pine\squirrel tail – long stolen sedge, ponderosa pine\bitter brush\fescue, ponderosa pine\mountain big sage\blue grass, ponderosa pine – quaking aspen\bluegrass, white fir – lodge pole pine\long stolen sedge – needle grass.

The following wildlife are found in the upper Sycan watershed: elk, mule deer, brown bear, cougars, bobcat, antelope, big horn sheep, and many waterfowl species. SLS redband trout, FLT bull trout, and brook trout inhabit Sycan, Coyote, and Long creeks in the watershed. Recreational activities in the area include hunting, fishing, hiking, snow mobiling, cross country skiing, hang gliding, and bird watching.

Logging by US Timberlands, salvage logging by Fremont/Winema National Forest and cattle grazing are the major renewable economic resources in the watershed. The Fremont/Winema Forest operates numerous gravel pits to maintain the roads in the area and the Bonneville Power Administration has a major electric transmission line that runs through the upper Sycan. Prescribed burning by the Fremont Forest is used as a tool to manage understory vegetation to prevent a devastating wildfire and to promote beneficial vegetation growth. The Nature Conservancy has constructed a research facility in the Sycan Marsh and is researching topics such as native plant communities, grazing impacts and benefits, fish habitat and movements, surface and groundwater hydrology, water temperatures, wildlife, and macroinvertebrates.

Williamson River Area [d]

The Williamson River Basin is located east of the Cascade Mountain Range in Klamath County in south central Oregon. The Williamson River is the largest single 'in-flow' into Upper Klamath Lake. The soils vary from high organic matter soils near the mouth of the river to coarse, well-drained soils in the mountains. All of these soils are influenced by volcanic ash. The elevation varies from 4,150 feet to more than 7,000 feet in the mountains.

Annual precipitation ranges from 10 to 35 inches. 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 such irrigated crops 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. In the early 1860s, sheep and cattle grazing were the initial agricultural endeavors as in most of Eastern Oregon.

Land Management Allocation

Lands included in the Williamson River Basin presently comprise a patchwork of different ownerships and managements including federal, state, private, city, and tribal lands. Lands under federal management include those managed by the Freemont/Winema National Forest (532,316 acres), which accounts for most of the federal lands in the basin (59 percent of the total basin lands), wildlife refuge (37,906 acres), and Crater Lake National Park (51,574 acres). State lands account for only 8,079 acres and include those managed by Collier State Park and those located within Sun Pass State Forest. Private lands comprise a significant percentage (30 percent) of the area within the basin, with 275,552 acres total, distributed among private logging companies, notably US Timberlands (formerly Weyerhaeuser) and Cavenham (formerly Crown Pacific), several large ranches and numerous small residential parcels. Recent purchases of Tulana and Goose Bay Farms by The Nature Conservancy have taken the majority of the farming area of the Williamson River Delta out of individual private ownership. The incorporated town of Chiloquin is located in the basin.

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 different individuals irrigating. There are countless private irrigation systems throughout this basin.

Water-related recreational usage in the Williamson River basin includes angling in the Williamson River and Spring, Larkin, Sunnybrook, Scott, and Sand creeks. Most of the active fisheries upstream from the Klamath Marsh are on private lands. Public access for recreational uses is available through Freemont/Winema National Forest lands. Below Klamath Marsh, access is permitted through Collier State Park as well as county parks and private marinas.

Waterfowl hunting occurs in wetland areas and on grain lands, as well as around ponds, drains, and streams. Boating is limited to small boats and canoes. Usually only electric motors are used on the watercraft, except in the wider, deeper water at the mouth of the Williamson River. Numerous other recreational activities take place including big game hunting, cross-country skiing, hiking, and camping.

Soils

The following moderate-to-very-deep, well-drained soil series are located in the Williamson River area: Shanahan-Lapine-Steiger and Maset-Yawhee. Soil series in this area, which are shallow-to-very-deep and excessively drained on terraces and low hills, include Fordney-Calimus and Lobert-Bly. Poorly drained soil series in this area include Henley-Poe-Laki, Tulana-Algoma-Teeters, Kirk-Chock, and Lathero-Histosols. For more information on soil series and climate, see the Soil Survey of Klamath County (USDA 1976).

Fish

The Williamson River below the falls exhibits non-game species including Klamath large-scale sucker, Klamath speckled dace, blue chub, Tui chub, marbled sculpin, slender sculpin, Pacific

lamprey, Klamath lamprey, and fathead minnow. Below the confluence with the Sprague River, the Williamson River also contains Lost River and shortnose suckers. The game fish present in the Williamson River above the falls include trout, while below the falls, largemouth bass, yellow perch, brown bullhead and trout are present. The Lost River and shortnose suckers, currently non-game fish due to endangered species status, historically were harvested and used commercially. Cold-water fish species in the Williamson River include SLS redband trout, brook trout, and brown trout. The fish species present vary from site to site. For more detailed information on fish populations and habitat, see the Klamath River Basin, Oregon Fish Management Plan (ODFW 1999).

Upper Klamath Lake Area[e]

Upper Klamath Lake, the largest in Oregon at approximately 130 square miles, receives the waters of an area of almost 3,800 square miles. Even so, Upper Klamath Lake is a shadow of its former self. Ancient Lake Modoc was vastly larger and deeper (up to 200 feet). Upper Klamath Lake now averages eight feet in depth and is classified as eutrophic or hypereutrophic due to the high nutrient loading from the mobile volcanic soils in the watershed and the huge sediment deposits in the lake itself which, due to its shallow nature, are often re-suspended in the water column by wind and wave action.

This nutrient loading has contributed to massive summer algae blooms for decades, if not centuries, and volumes of technical data and studies document various aspects of the lake's hydrology, biology, etc. Only recently has the algae been studied for its benefits and now supports a $100,000,000 annual health supplement industry for the harvested and dried algae.

Historically surrounded by marshes, about 35,000 acres are being restored to wetlands. Precipitation is limited, averaging 12 inches per year and can be localized. The north end of the lake due to the proximity of Crater Lake has a more severe climate than the south end, only 30 miles away. Most productive lands are flood irrigated, with some being converted to wheel or center pivot irrigation.

The production of native grass hay and alfalfa supports a summer stocking cattle industry of 35,000 head including the Fort Klamath area. 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 of the property.

The Klamath Tribes, who have lived in the region of Upper Klamath Lake for thousands of years, 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.

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.

Upper Klamath Lake is used extensively for recreation. One can enjoy bird watching, sport fishing, and some of the finest sailing found in the Northwest due to the size of the lake and the fair winds.

Soils

Soils in these drained wetlands are very productive and a limited amount of row crop agriculture including important seed potato ground 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. The predominant land use is forestry, followed by ranching. The area is ideal for irrigated pasture and hay. Well-drained soil series in this area include Lorella and Woodcock-Nuss-Royst. Poorly drained soil series in this area include Tulana-Algoma-Teeters, Klamath-Ontko-Yonna, and Lather-Histosols. For more information on soil series and climate, see the Soil Survey of Klamath County (USDA 1976).

Fish

Crystal, Thomas, and Recreation Creeks have yellow perch present. These three creeks also have non-game fish including Lost River sucker, shortnose sucker, blue chub, Tui chub, marbled sculpin, slender sculpin, Klamath Lake sculpin, and Pacific lamprey. Upper Klamath Lake and Agency Lake contain Lost River suckers, shortnose suckers, Klamath small and large-scale suckers, Klamath speckled dace, blue chub, Tui chub, marbled and slender sculpin, Pacific and Klamath lamprey, and fathead minnow. Game fish in these two lakes include largemouth bass, pumpkinseed sunfish, yellow perch, brown bullhead, and SLS redband trout. FLT bull trout are present in Three-Mile Creek on the west side of Upper Klamath Lake**.** Lost River and shortnose suckers were historically harvested and used commercially, but due to their endangered species status they are currently listed as non-game fish. The fish species present vary from site to site. For more detailed information on fish populations and habitat, see the Klamath River Basin, Oregon Fish Management Plan (ODFW 1999).

Wood River Area[f]

Over 7,700 years ago, Mt. Mazama (now known as Crater Lake National Park) erupted, spewing volcanic ash and pyroclastic debris[1] 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 phosphorous 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 533 inches of average annual snow fall though a drop in elevation of over 3,500 feet 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 the forage for 35,000 head (ODA 2003) of cattle (including the Upper Lake Klamath area herds) for six months every year. These cattle provide a ripple effect on the local economy of well over $30,000,000. This livestock grazing creates jobs, supports the tax base, and stimulates related businesses.

[1] Rock debris blasted into the air during volcanic eruption; such as magma bombs, cinder, and ash.

Furthermore, cattle benefit the ecosystem because of their ability to extract phosphorous from the watershed in an environmentally sound manner. Animal nutrition data indicate that 35,000 head of cattle grazing on these unfertilized pastures for 6 months and gaining 250 pounds per head will remove over 200 tons of phosphorus from the Wood River Valley annually (Rykbost, 1998). Livestock organic wastes are dispersed throughout the expanse of grazing land. Natural dispersal by cattle is further facilitated by mechanical dragging of pastures. Much of the nitrogen content from manure and urine is lost through volatilization. High organic matter content of the soils absorbs much of the phosphorus. Nutrient contributions to waterways are primarily associated with particle movement in surface flows or direct deposition in waterways. Landowners in the Wood River Valley have recently constructed extensive riparian fencing, reducing direct access to waterways by cattle. Other long-term voluntary landowner stewardship is evident in partnerships with the ODFW on installation of fish screens and fish ladders.

On a different note, the origins of nutrient background levels are the subject of intense debate. Measurements by Martin and Rice (1981) indicate the sedimentation rate dramatically increased in parts of Agency-Klamath Lake between 100 and 200 years ago due to climate change prior to any agricultural presence. Other natural phenomenon such as wind speeds and air temperature contribute to more background impacts. Harrison (1967) determined that owing to the shallow depth in the lake even moderate wind speeds of 10 mph are capable of moving extremely rich upper sediments into the water column supporting the excessive algae blooms. Water temperature was influenced largely by air temperature; the lakes did not appear to warm or cool more slowly at higher lake levels (Harrison, 1967).

Rykbost (1998) provides additional data on effects from background sources. Several major springs and numerous artesian wells that feed tributaries to Agency Lake, including the Wood River, Fort Creek, and Crystal Creek, were sampled at their source. All were at a level of phosphorus that exceeds standards established for other regions. These levels were more than adequate to support algae blooms according to data reported by Miller and Tash (1967) and represent additional background nutrient loading to Agency-Klamath Lake. Over 30,000 acres of government wetlands and refuge "buffer zone" separates private property from Agency Lake (though the Sevenmile Canal is a direct connection). Recent retirement of properties adjacent to Upper Klamath Lake from agricultural use and conversion to wetlands and/ or water storage have undoubtedly reduced the potential for agricultural contributions of sediments and nutrients to the lake (though pumping from the wetlands is still practiced). The Wood River Valley enjoys a unique system of gravity flow flood irrigation on untilled, unfertilized, managed meadows.

Soils

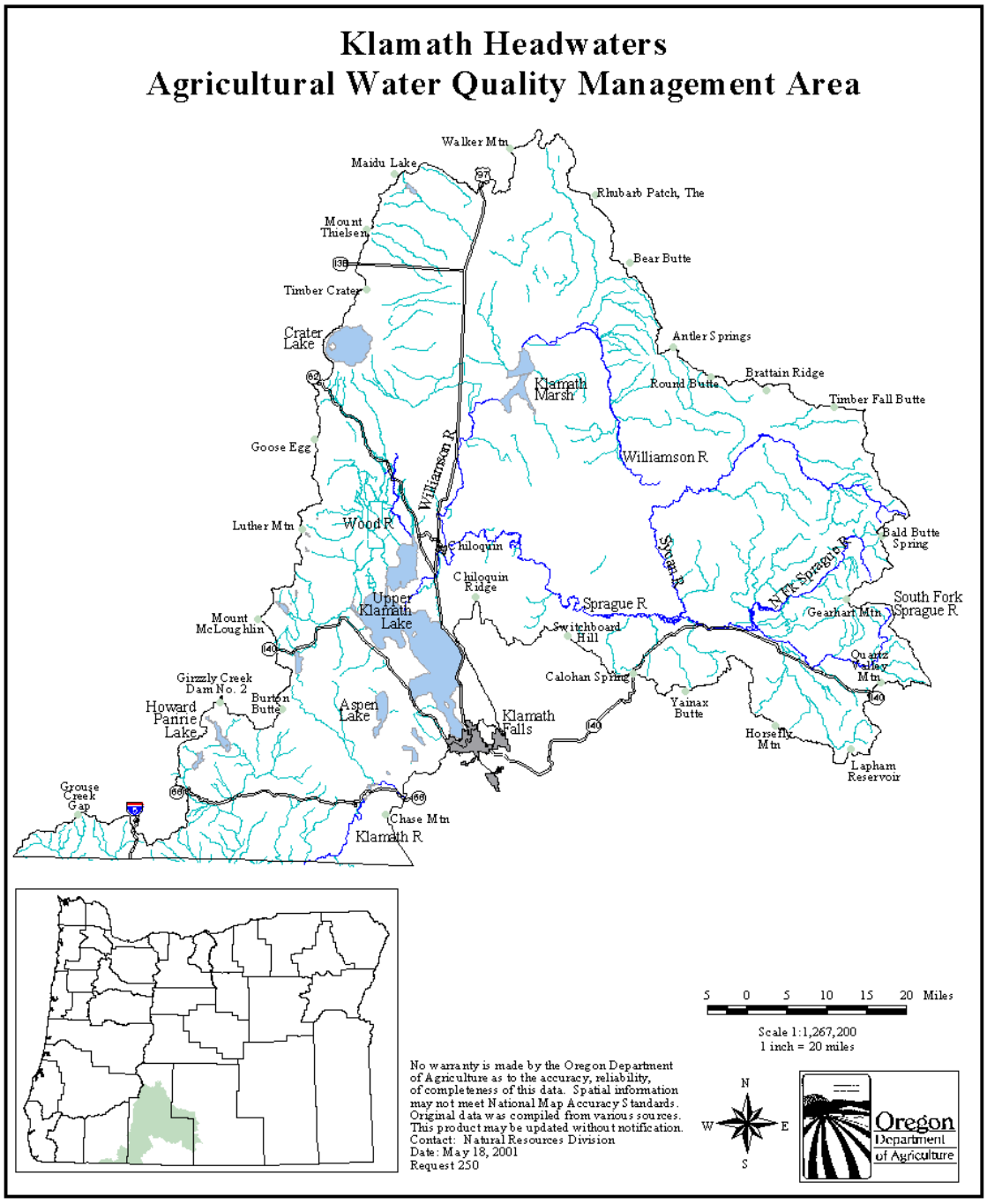
The soils in this area are both well drained and poorly drained series. The poorly drained series in the Wood River Valley include Henley-Poe-Laki, Tulana-Algoma-Teeters, and Lather-Histosols. The moderately to well -drained soil series include Lobert-Bly, Shanahan-Lapine-Steiger, and Maset-Yawhee. For more information on soil series and climate, see the Soil Survey of Klamath County (USDA 1976).

Fish

Lost River and shortnose suckers are present in the Wood River. Lost River and shortnose suckers were historically harvested and used commercially, but due to their endangered species status they are currently listed as non-game fish. The Wood River does not contain warm water

game fish. The Wood River exhibits cold-water fish species including SLS redband trout, brook trout, and brown trout. World-class trout have been present since the 1800s. The fish species present vary from site to site. The Wood River and adjacent wetlands offer an assortment of macroinvertebrates estimated at over 300 species by Anderson (1993). This diverse habitat is indicative of a healthy ecosystem. For more detailed information on fish populations and habitat, see the Klamath River Basin, Oregon Fish Management Plan (ODFW 1999)

Map of the Management Area



2.4 Agricultural Water Quality in the Management Area

2.4.1 303(d) List of Impaired Water Bodies

The Clean Water Act requires that each state designate beneficial uses, decide which parameters to measure to determine whether beneficial uses are being met, and set standards for those parameters. The Environmental Protection Agency (EPA) delegates Section 303(d) of the Clean Water Act responsibilities to the state to develop a list of water quality limited streams, i.e.: streams that violate federal water quality standards and do not support their beneficial uses.

Currently, the most prevalent water quality issue in the Klamath Basin is the violation of the water temperature criteria for the rearing of anadromous fish. The table below is a summary of water quality limited Klamath Basin stream segments, including Upper Klamath Lake, listed on the 2004/2006 Integrated Report that exceed the federal Clean Water Act standards for temperature and other parameters for which valid data sets are available. The table includes both 303(d) listed streams and those streams removed from the 303(d) list after the EPA approved the 2002 Klamath Headwaters TMDL. 303(d) listed streams addressed in the Upper Klamath and Lost River Subbasins TMDL will be removed from the list when the EPA approves the TMDL. A full listing of water quality limited streams, their affected parameter and their status can be found in Appendix E.

Watershed	Parameter	# of Streams on 303(d) List	# of Streams with TMDL Approved
Sprague	Temperature		19
Sprague	Dissolved Oxygen		2
Sprague	PH		1
Sprague	E Coli	1	
Williamson	Temperature		3
Williamson	Dissolved Oxygen	1	
Upper Klamath Lake	Temperature		2
Upper Klamath	Temperature	13	2
Upper Klamath	Sedimentation	3	
Upper Klamath	Biological Criteria	1	
Upper Klamath	pH	1	
Upper Klamath	Chlorophyll-a	1	
Upper Klamath	Ammonia Toxicity	1	
Upper Klamath	Dissolved Oxygen	1	

The above table accomplishes two purposes. First, it is a guide for the LAC and residents of the area to understand that temperature is the main reason for a stream being listed in the planning area. The more reduction efforts are focused on the contributors to temperature, the sooner these streams can be taken off the list. Second, it is intended to show that there are very few other listings aside from temperature. With some concentrated effort on the part of the agriculture community, the potential contributions from our activities can be easily eliminated. Agriculture is not responsible for all the contribution to water pollution so agriculture meeting its

responsibilities will not entirely solve the problem. This plan is a reasonable attempt to address a realistic goal.

DEQ is not developing a TMDL for a number of stream segments impaired by sedimentation or for biological criteria. The LAC has concerns about the development of the TMDL for sedimentation in the Upper Klamath Lake based on Eihlers' 2001 study using only one core sample from Upper Klamath Lake (See Appendix K).

2.4.2 Basin TMDLs and Agricultural Load Allocations

For the Williamson, Sprague, and Upper Klamath Lake watersheds, Total Maximum Daily Loads (TMDLs) were established by Oregon DEQ in early 2002. In December 2010, DEQ submitted the Upper Klamath and Lost River Subbasins TMDLs to EPA for approval. Upper Klamath River TMDLs are included in this Area Plan because the Klamath Headwaters management area includes portions of the Upper Klamath subbasin. It is the responsibility of ODA, through the Agricultural Water Quality Management Program, to address the parameters listed in the TMDL document 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 TMDL 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.

Historic vegetation is not required along streams. Native trees such as pine, which may have historically lined management area streams, may not be desirable in some areas. Smaller native vegetation, such as willow, sedges, and cattails may provide sufficient shade along smaller streams to attain the shade targets. Also, there will be some sites where woody vegetation will not establish at all. This is to be expected. As a general guideline, maintain the most effective band or buffer of vegetation along the stream that you can tolerate because of the many corollary benefits to the landowner. Streamside vegetation buffers also absorb manure runoff, reduce streambank erosion, and filter sediment during high flow events, additionally reducing potential phosphorus loading as an indirect benefit.

ODA will monitor progress towards meeting shade targets. It is recommended that the Klamath SWCD provide reference sites and photographic examples to landowners who wish to visualize these targets.

All interested parties must understand that these targets may not be appropriate for all areas. For instance, streams at road crossings and road right-of-ways may not be shaded for visibility/safety reasons. Site capability will restrict or enhance the species, structure, and density of vegetation communities expected on Klamath Headwaters streambanks. A landowner is 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 water quality management plan to help landowners become aware of the targets and manage their agricultural activities so as to prevent unintentional suppression of self-recruiting riparian plant communities.

TMDLs were also developed for parameters that are generally phosphorus-driven listings. Lack of dissolved oxygen, excessive chlorophyll-a populations, and excessive pH are identified in the management plans. While DEQ acknowledges extremely high background loads of phosphorus in the Upper Klamath Lake watershed, 40 percent of the load over the standard is attributed to anthropogenic sources. The LAC believes that background loading exceeds these loads due to the natural process of erosion of the high phosphorus parent materials in the upper reaches of the Upper Klamath Lake watershed. Agricultural activities are identified as the primary non-point source contributors. The majority of the LAC disputes that percent allocation and that agricultural activities are the primary non-point source contributors and asks the DEQ to reconsider the load. The LAC draw this conclusion from peer reviewed work by Rykbost and Charlton (2001) and studies by Shapiro and Associates (2000) that deal either directly (Shapiro in the Wood River) or indirectly (Rykbost in the Klamath Project and adjacent lands) with agriculture's net gain or loss of nutrients from the system into waters of the state.

Even so, the management measures outlined in the plan will provide a significant reduction in potential agricultural contributions of phosphorus (P). The very high background levels of P in native soils is exacerbated in surface waters with extensive introductions of sediments from eroding banks or sheet wash off the uplands. The riparian and sediment rules in this plan will reduce or eliminate the agricultural component of the P introduction. There remains, however, other drivers of the P levels from Upper Klamath Lake tributaries that are beyond the scope or authority of this plan.

An expanded description and explanation of the TMDLs in the Klamath Headwaters Management Area are available in Appendix F.

2.4.3 Beneficial Uses and Parameters of Concern

Beneficial uses of water in the Klamath Basin include drinking water, irrigation, livestock watering, aquatic life, boating and fishing, water contact recreation, and aesthetics.

There are 12 beneficial uses listed in the Klamath Basin as identified in the chart below. After each stream's beneficial uses are identified, its water quality is evaluated against the standards set for these particular uses and the 303(d) listing criteria by DEQ. The condition and availability of water in the Klamath Headwaters Area is affected by both natural and human activities.

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

Beneficial Use
Public Domestic Water Supply[1]
Private Domestic Water Supply[1]
Industrial Water Supply
Irrigation
Livestock Watering
Fish & Aquatic Life
Hydro Power
Wildlife & Hunting
Fishing
Boating
Water Contact Recreation
Aesthetic Quality

[1] With adequate pretreatment (filtration & disinfectant) and natural quality to meet drinking water standards.

2.4.4 Sources of Impairment

Point and non-point sources of pollution in the area include runoff and erosion from agricultural and forest lands, eroding stream banks, and runoff from roads and urban areas. Re-routing of runoff via road building, construction, and land surfacing such as parking areas can lead to excessive erosion or pollutant transport. Pollutants from non-point sources can be carried to the surface water or groundwater through the actions of rainfall, snowmelt, irrigation returns, urban runoff, and seepage. A major nonpoint source of water quality impairment is increased heat input due to vegetation removal, seasonal flow reduction, changes in channel shape, and alteration to the floodplain. Channelization and bank instability may alter gradient, width to depth ratio, and sinuosity, causing undesirable changes in sediment transport regime, erosional and depositional characteristics, and temperature.

In October 2003, an independent multidisciplinary science team (jointly appointed by the Oregon Governor, President of the Senate, and the Speaker of the House per ORS 541.409) issued a report related to management in the Klamath Reclamation Project (IMST 2003). In this report, the team concluded that the nutrient loading into the lake from human actions in the watershed and destruction of wetlands around the lake directly and indirectly increased the potential and extent of phytoplankton blooms. Pinpointing the numeric contributions from non-point sources, however, is difficult. The accumulation of non-point source pollution contributes to water quality impairments. The DEQ has not yet assigned non-point sources a numeric target for reduction in pollutants (e.g. degrees of temperature or tons to acre of sediment). Water Quality Plans, such as this one for agriculture, are intended to assume responsibility to manage non-point source contributions to help meet water quality goals and objectives.

2.5 Unacceptable Conditions

(Text in boxes will appear verbatim in associated rules)

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 which 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. It should be noted that the 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 plan, events exceeding the 20-year event or 5 percent probability level will be considered unusual.

The quality criteria target as identified in the FOTG (Section III) for streambank erosion is: The land user's management activities do not contribute to the streambank erosion problem.

Conditions to be addressed under this plan may be initially monitored by photographic record. Video and/or still photography with time log taken at representative photo points will provide baseline data of current conditions, and indicate changes over time. (See Oregon Watershed Enhancement Board (OWEB) publication titled "Photo Plots" for photo plot monitoring guidance). More detailed and site specific monitoring may be designed and implemented with the help of the Klamath Watershed Council's Technical Assistance Committee, which draws on the expertise of many of the Klamath Basin's agencies, institutions and landowners, to assist local people in restoration activities requiring more professional help.

Violations of the unacceptable conditions 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 conditions listed below is unlikely if the affected landowner has made a good faith effort to develop and implement an effective pollution control program. An effective pollution control program shall provide assurance that within five years after the adoption of the plan reasonable steps have been taken to lessen and control unacceptable conditions which may include application for grants, development of a farm or conservation plan, or active consultation with experts (for example): the SWCD, the NRCS, or the Watershed Council's Technical Assistance Committee. As new problems arise, a reasonable amount of time will be allowed for the landowner to address them.

2.5.1 Nutrients and Manure Management

Nutrients from agricultural sources may enter the surface waters of the State through the introduction of animal waste into the stream or from sources through shallow groundwater flow and surface runoff. The unacceptable conditions related to the nutrient related standards are designed to reduce movement of waste by surface water from the uplands. Nutrient related standards in the Klamath Headwaters 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. Filter strips or flow controls can effectively prevent nutrient-laden sediments from reaching waterways. Streamside areas planted to dense grass or properly functioning riparian areas can act as filters preventing contaminated surface flows from reaching vulnerable waterways.

High Background Phosphorus Levels

Based on geologic history and recent quantification as cited in the TMDL, the Klamath Headwaters LAC is convinced that much phosphorus loading into upper Klamath Lake tributaries is related to phosphorus rich sediments rather than animal waste. The riparian rule proposed in this plan will greatly reduce but not eliminate the streambank instability associated with uncontrolled animal access.

2.5.2 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. Properly Functioning Conditions guidelines in Literature Citation (see Appendix D).

The intent of the plan's riparian zone recommendations is to draw attention to the multiple beneficial functions of healthy and diverse riparian zones. A variety of activities can take place within riparian zones if those activities are carefully managed to protect the beneficial functions of the vegetation and soil structure.

There are many discernable factors that 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 few physical factors landowners have any control over.

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 and irrigation return flows through the riparian area. 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 not within the control of the land manager are high flow events, bed material composition, and off-property upland/upstream conditions. However, some channel morphology factors are within the control of the land manager. Riparian buffers act as sediment traps from adjacent lands and for stream suspended sediments during high water. A well-managed riparian area, whether excluded or properly grazed, will enhance stream bank stability and will contribute to improved over-all riparian condition. The conditions outlined in this Area Plan describe riparian conditions known to increase age, species, and structural diversity of the riparian vegetation for the purpose of limiting bank loss, adding large woody debris where appropriate, and encouraging a narrower and deeper channel profile.

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 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. Several innovative Klamath Headwaters producers are experimenting with tailwater capture and recycling which will virtually eliminate any surface returns, accentuating the subsurface return influence, potentially cooling local waterways. We encourage 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.

2.5.3 Soil Erosion Prevention and Control

Sheet and Rill Erosion (excluding streambank erosion)

OAR 603-095-3840
(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 waste movement into listed waters of the state to reduce nutrient and sediment loading.

2.5.4 Upland Vegetation to Prevent and Control Pollution

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

Healthy upland areas provide several important ecological functions, including:

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

2.5.5 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 (WRD) 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. Water rights are not addressed in this Area Plan; they are under the jurisdiction of the WRD (refer to WRD rule OAR 690-300-0010(26) for more details).

Irrigation in this management area is primarily by flooding and sprinkler application. Water usually is diverted from a surface source (stream or pond) but may also be from groundwater sources. Irrigation water is often used more than once as it returns to the stream and is available for instream uses or by other irrigators.

Irrigation management that results in extensive surface return flows to waters of the state can lead to degradation of water quality as a result of the transport of nutrients and bacteria, and increased temperature. Extensive return flows can occur from activities such as not changing irrigation sets in a timely manner. It is possible to manage both flood irrigation and sprinkler irrigation and 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 do not carry sediment, farm chemicals, or excess nutrients 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 unacceptable amounts.

Constructed irrigation delivery systems, borrow pits, and drainage ditches that have no hydraulic connection to live streams are not expected to support riparian vegetation. 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: Goals, Objectives, and Strategies

ODA and the LAC will review this chapter at each biennial review and may update it if needed.

3.1 Goal

The goal is to prevent and control potential water pollution from agricultural activities and to work towards achieving water quality standards.

3.2 Objectives

Improved Water Quality:

- Control pollution as close to the source as possible.
- Promote improvement of health of aquatic system.
- Promote water use efficiency.

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.

Funding:

- Identify sources of funding for on-the-ground projects and to implement the plan.

3.3 Schedule for Implementation

The following is the schedule for implementing this Area Plan:

1. Plan Period: Avoidance of Unacceptable Conditions (except for 468B.025 and .050, which was effective upon adoption) was required by January 1, 2005.
2. Monitoring: Monitoring shall begin immediately upon approval and adoption of this plan with cooperation and assistance from the SWCD, the LAC, and the DEQ as funds are available.
3. Amendment: This Area Plan will be reviewed at two-year intervals and amended as necessary.

3.4 Focus Area

The current Focus Area for this Management Area is the Sprague River Watershed. An Action Plan for the current biennium has been developed and approved by ODA outlining the key components of the process.

- Conduct a pre-assessment of current land conditions.
- Identify areas of concern.
- Conduct education and outreach to landowners.
- Offer technical assistance to landowners and financial assistance, if needed.
- Conduct a post-assessment after project implementation.
- Report progress to ODA and the LAC.

The Klamath SWCD Focus Area within the Sprague River Watershed is approximately 111,964 acres. The Focus Area encompasses four 6 field HUCs. The SWCD staff are working throughout the area with many landowners, therefore selecting a smaller Focus Area was not appropriate for this situation. Land use in the watershed is approximately 30% agriculture, 27% mixed farm/forest use, 26% forest, and 7% rural residential. There are approximately 769 taxlots zoned as Essential Farm Use (EFU) and 1209 listed as mixed agricultural/forest. There are 97 miles of perennial streams, 172 miles of seasonal streams, and 24 miles of streams categorized as ephemeral.

The Klamath SWCD selected the Focus Area based on the current needs of agricultural landowners in the area and the opportunity to assist with the allocation of a substantial amount of cost-share funding available from NRCS. Water quantity concerns have led to water use restrictions on irrigated agricultural land in the Focus Area. Water quality parameters including temperature, dissolved oxygen, pH, nutrients, and e.coli are driving concerns. 4.5 million dollars of Farm Bill funding for conservation was made available in 2014 to assist landowners. The Klamath SWCD staff are collaborating with NRCS by meeting with landowners, creating conservation plans, and developing projects. The main conservation practices eligible for NRCS cost-share funding include conversion to dryland pasture, riparian buffers, offstream watering, pasture management, and juniper removal.

Other agency and non-profit partners are also working in the Focus Area. The SWCD plans to work together with partners in order to maximize benefits to local agricultural producers.

Results of the assessments and targeted assistance are reported to the LAC at the Biennial Review and are summarized in Chapter 4.

3.5 Focus Area Measurable Objectives, Milestones (Targets), and Timelines

To achieve the Area Plan goal, the following measurable objectives, strategies, milestones, and timelines were developed:

Appropriate Measurable Objectives for the Sprague River Focus Area will be determined following the completion of the pre-assessment of the Focus Area and analysis of available technical and financial resources.

The following milestones and timelines were developed in cooperation with ODA, DEQ, the LAC, and the SWCDs. Focus Area Action Plans are developed as a tool with milestones and timelines for implementation of the Area Plan within a defined geographic area.

Focus Area Measurable Objectives: Outputs

- January 1, 2015, the Sprague River Focus Area was identified in the Management Area. The Klamath SWCD will focus outreach and technical assistance work in this area for the next biennium.
- By January 1, 2016, ODA and/or the SWCD will complete a pre-assessment in the Focus Area that identifies the current streamside vegetation conditions, in total acres or stream/streambank miles of each vegetation classification.

- By June 30, 2017, ODA and/or the SWCD will complete a post-assessment in the Focus Area that identifies the change in acres or stream / streambank miles of each vegetation classification over the two year period.
- By June 30 2017, ODA and the SWCD will compile information about the number, and size of water quality improvement projects completed in the Focus Area since Area Plan and Rules adoption, as resources allow.
- By June 30, 2017, the SWCD will have offered technical assistance to all landowners in the Focus Area with lands where agricultural activities do not appear to allow streamside vegetation to provide WQ functions.
- By June 30, 2017, the SWCD will report on the amount of lands where landowners accept voluntary assistance to establish streamside vegetation that provides WQ functions.

Outcomes:
Measurable Objective: By June 30, 20__, 80% of the agricultural areas in the Focus Area will have streamside vegetation that likely provides the water quality functions (shade, bank stability, and filtration of overland flow) of the area's site-capable vegetation.

- Current Conditions: In 2015 - __% (from pre-assessment)
- Milestone 1: By June 30, 2017 - __%
  _____ stream miles where people are working toward streamside vegetation improvements
- Milestone 2: By June 30, 2019 – __%
  _____ stream miles where people are working toward streamside vegetation improvements
- Milestone 3: By June 30, 2021 – __%
  _____ stream miles where people are working toward streamside vegetation improvements
- Milestone 4: By June 30, 2023 – __%
  _____ stream miles where people are working toward streamside vegetation improvements
- Milestone 5: By June 30, 2025 - __%
  _____ stream miles where people are working toward streamside vegetation improvements

3.6 Strategies for Area Plan Implementation

To achieve clean water, an effective strategy must increase awareness of the problem and the range of potential solutions, motivate appropriate voluntary action, and provide for technical and financial assistance to plan and implement effective conservation practices. The following strategies will be employed at the local level by the SWCD in cooperation with landowners, and other agencies and organizations:

1. Work to improve the quality of water in the management area through planning and implementation of technically sound and economically feasible conservation practices which contribute to meeting plan objectives.
   A. Limit soil erosion and pollution caused by agricultural activities, as close to the source as possible, by achieving soil erosion and sediment control.

B. Show progress in reducing point and nonpoint sources of pollution from agricultural and rural lands through periodic surveys of stream reaches and associated lands.
C. Implement successful practices for stream bank stabilization, reduction in high summer water temperatures, restoration and enhancement of wetlands and riparian areas, and avoid adverse fish habitat modification.
D. Implement conservation practices to improve irrigation water use and conveyance efficiency to reduce the impact of seasonal flow modifications on streams resulting from water withdrawals.

2. Create a high level of awareness and an understanding of water quality issues among the agricultural community and rural public in a manner that minimizes conflict and encourages cooperative efforts through education and technical assistance activities.
   A. Promote implementation of the Area Plan by incorporating implementation as a priority element in the SWCD's Annual Work Plan and Long-Range Plan with support from partner organizations.
   B. Showcase successful practices and systems and conduct annual tours for landowners and media.
   C. Recognize successful projects and practices through appropriate media and newsletters.
   D. Promote cooperative on-the-ground projects to solve critical problems identified by landowners/operators and in cooperation with partner organizations.
   E. Conduct educational programs to promote public awareness of water quality issues and their solutions.

3. Encourage active participation by the agricultural community and rural public in the process of solving our water quality problems.
   A. Encourage development of individual conservation plans by providing planning and implementation assistance.
   B. Promote the continued development, evaluation, and adoption of practices and technologies that enhance water quality in an efficient, effective, economic manner, by reviewing research and development needs with agriculture assistance agencies and consultants.
   C. Promote incentive and cost-share programs to assist implementation of conservation plans and related practices, by annually identifying water quality funding needs with agencies providing cost-share and technical assistance to agricultural operations.

4. Encourage adequate funding and administration of the program to achieve plan goals and objectives by systematic, long-range planning and focusing of coordinated efforts on full-scale, watershed-based approaches, identifying needs, developing projects, actively seeking funding, and ensuring successful implementation of funded projects.

In addition to these voluntary strategies, regulatory measures are included as a possible implementation strategy. ODA will use enforcement where appropriate and necessary to gain compliance with unacceptable conditions. Any enforcement action will be pursued only when

reasonable attempts at a voluntary solution have failed. (See Resolution of Complaints and Enforcement Action sections)

3.7 Public Participation

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

- Providing educational programs to raise public awareness and understanding of water quality issues and solutions.
- Providing incentives for the development and implementation of Conservation Plans.
- Offering technical assistance for the development and implementation of Conservation Plans.
- Encouraging funding sources to prioritize on-the-ground projects on agricultural lands.
- Inventory and survey of the watershed for potential water quality problems.
- Following up on any water quality complaints to offer assistance in solving identified problems.

3.8 Conservation Planning and Best Management Practices

3.8.1 Conservation Plans

A Conservation Plan is a comprehensive management plan that addresses site-specific problems through the selection of individual management practices or systems of practices. In order to adequately address water quality issues, conservation plans should outline specific measures necessary to limit soil erosion and pollution of streams.

Conservation Plans may contain any of the following elements or additional elements not listed here, depending on the site and the condition for which preventive or corrective measures are being implemented:

- Soil Erosion and Sediment Control
- Nutrient Management
- Streamside Area Management
- Irrigation Management
- Livestock Management
- Channel and Drain Management

Landowners have flexibility in choosing management approaches and practices to address water quality issues on their lands. They may develop management systems to address problems on their own or they may choose to develop a Conservation Plan to address applicable water quality issues that affords them limited "safe harbor" protection against immediate enforcement action by ODA if prevention and control measures are not yet fully in place.

Landowners are encouraged to develop and implement Conservation Plans and have the option of seeking planning assistance from their conservation district, NRCS, or any other agency. Conservation Plans developed by SWCD or NRCS personnel may be reviewed by the appropriate SWCD. These plans can provide limited assurance against regulation if they address potential water quality problems on the site.

3.8.2 Best (or Better) Management Practices (BMPs)

Agricultural Best Management Practices (BMPs) for pollution control are those management practices and structural measures which are determined to be the most effective, practical and economical means of controlling and preventing pollution from agricultural activities. BMPs are actions taken by individual agricultural operations for the achievement of production and water quality goals.

The appropriate BMP for an individual farm may vary with the specific cropping, topographical, environmental, and economic conditions existing at a given site. There is no uniform or universal BMP for all areas or all agricultural activities within the management area. BMPs 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.

As examples, a list of BMPs typically used in the management area for effective prevention and control of soil erosion, sediment delivery to streams, and water pollution from agricultural activities is included in Appendix B.

A detailed listing of specific practices that can be employed to control or reduce the risk of agricultural pollution is contained in other documents such as the NRCS Field Office Technical Guide (FOTG). The standards in the FOTG will be used throughout this Area Plan. The FOTG is available for reference at the USDA Service Center. Copies of sections of the FOTG can be requested from the NRCS or the SWCD.

3.9 Funding

Sometimes the cost of conservation measures do not fit well with 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 their land, it is the responsibility of the landowner or operator to request technical and/or financial assistance and to develop a reasonable time frame for addressing potential water quality problems.

As resources allow, the SWCD, NRCS, and other natural resource agency staff is 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.

Technical and financial assistance may be available through current USDA conservation programs. Other programs that stand ready to partner for conservation include the U.S. EPA's nonpoint source implementation grants ("319 funds"), or state programs such as the Oregon Watershed Enhancement Board (OWEB) grant programs, the Riparian Tax Incentive Program, and the Wildlife Habitat Conservation and Management Program.

The SWCDs will seek funding to implement the Area Plan. Funding is necessary in four main areas:

- Education: to fund workshops, tours, and development of published materials.
- Technical assistance: to hire staff to work with landowners to develop and implement solutions to agricultural water quality concerns.
- Financial assistance: to provide cost-share dollars to assist landowners to implement agricultural water quality conservation activities.
- Monitoring: to monitor land conditions and water quality and evaluate how agricultural activities are impacting streams in the Management Area.

For sources of financial assistance, see Appendix D: Public Funding Sources for Landowner Assistance.

Chapter 4: Implementation, Monitoring, and Adaptive Management

4.1 Implementation and Accomplishments

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

Outreach and Education:
Klamath SWCD: Landowners contacted: 265, Workshops/presentations: 5, Newsletters distributed: 314, Newspaper articles: 4

NRCS/SWCD: Conducted 4 outreach workshops and one pasture walk to promote the dryland conversion practices.

Technical Assistance:
Klamath SWCD: Landowners provided with technical assistance: 450, Site Visits: 200

Plans:
NRCS/SWCD:

- 48 conservation plans/EQIP contract associated with Farm Bill programs
- Obligated $4.5 million for a planned 33 miles of riparian fencing, 2800 acres of dryland conversion (which will reduce water consumption from the tributaries), and over 80 livestock watering facilities planned.

Projects implemented to improve water quality on ag lands:
Klamath SWCD:

- No-till planting: 596 acres
- Prescribed Grazing: 758 acres

NRCS:
Practices/Units:

- 300 acres converted from irrigated pasture to dryland pasture
- 2 miles of riparian livestock exclusion fence installed
- 3 offstream watering systems installed
- Pasture Fence: 5000 ft
- Livestock Pipeline: 500 ft
- Pumping Plant: 5
- Water Well: 5
- Watering Facility: 5

Funding and Grants:
Klamath SWCD:

- 40 grant applications submitted
- ODA support to LMA: $100,000

Partnerships:
Klamath SWCD:
Presentations for partners: 24 with 392 attendees, 8 tours

4.2 Water Quality Monitoring—Status and Trends

As of 2015 the Williamson River site had water quality index scores of 89 for both 2013 and 2014. In 2013 this site continued to have some problems with TP (total phosphorous) and BOD (biological oxygen demand) concentrations. Water quality index scores for TS (total solids), nitrogen compounds, E. coli, dissolved oxygen, and temperature however all ranked in the "excellent" scale. The 2014 data for this site showed a declining trend in BOD, along with continuing problems with TP. The same analytes as in 2013 were considered to have "excellent" WQI scores.

Besides the Williamson River site, DEQ also added a new monitoring site on the Sprague River at Sprague River Road in 2012. Water quality data for this site in 2013 showed an overall WQI score of 85. The only water quality problems with this site were for pH (WQI score of 72), BOD (score of 76), and TP (score=76). The 2014 data for this site was essentially the same, except pH had improved slightly.

4.3 Progress Toward Measurable Objectives

Appropriate Measurable Objectives will be determined following the completion of the pre-assessment of the Focus Area and analysis of available technical and financial resources.

4.4 Aerial Photo Monitoring of Streamside Vegetation

As part of ODA's statewide monitoring & assessment of landscape condition, ODA completes aerial photo monitoring every five-years in randomly selected areas within Agricultural Water Quality Management Areas. As of 2015, this process has analyzed 2006 and 2011 aerial photos of 10-15% of agricultural riparian areas throughout the state. In the Klamath Headwaters Management Area eight streams have been assessed. From 2006 to 2011 there was no significant change in riparian condition detected by this analysis. Extensive work has been completed to improve riparian condition by agricultural landowners and cooperating conservation organizations in the Klamath Headwaters Management Area. It is possible that this assessment process has not captured the areas where improvement projects have been completed, or that improvements (such as planted trees in riparian areas) have not grown enough in this short amount of time to be detectable by this assessment method.

Haven't captured the areas where projects have been implemented on the ground. Areas haven't been large enough to influence our data. ODA plans to continue to conduct aerial photo monitoring every 5 years.

4.5 Biennial Reviews and Adaptive Management

The Klamath Headwaters Local Advisory Committee (LAC) and interested parties met on July 30, 2015 for a Biennial Review of the Klamath Headwaters Plan and Rules. The primary changes discussed during the meeting were the conversion of the Plan to the Chapter Format, and the addition of draft Measurable Objectives. The LAC approved the proposed changes with a few edits and recommendations. Those changes have been incorporated into the current Plan. Additionally, the LAC discussed the need to use GIS capabilities to capture progress implementing agricultural water quality improvements across the management area since the initiation of the TMDL and/or the Plan. NRCS stated that 2004 GIS aerial photography is likely available for this task. The LAC also recognized the need for additional outreach and education to agricultural landowners regarding the Plan and Rules.

APPENDIX A - Literature Cited

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APPENDIX B - Area Water Quality Plan Glossary

Agricultural Use: the use of land for the raising or production of livestock products, poultry or poultry products, milk or milk products, fur-bearing animals; or for the growing of crops such as, but not limited to, grains, small grains, fruit, vegetables, forage grains, nursery stock, Christmas trees; or any other agricultural or horticultural use or animal husbandry or any combination thereof. Wetlands, pasture, and woodlands accompanying land in agricultural use are also defined as in agricultural use. (OAR 603-095-0010(4)).

Channel Morphology: shape of the stream channel. (Example: wide and shallow vs. narrow and deep).

Field Office Technical Guide (FOTG): The localized document currently used by the soil and water conservation district and developed by the United States Department of Agriculture, Natural Resources Conservation District that provides:

- soil descriptions
- sound land use alternatives
- adequate conservation treatment alternatives
- standards and specifications of conservation practices
- conservation cost-return information
- practice maintenance requirements
- soil erosion procedures and
- a listing of local natural resource related laws and regulations

Formal Complaint: a complaint against a landowner or operator alleging a violation of a requirement of any agricultural water quality management area plan adopted pursuant to ORS 568.900 through 568-933 at a specific site. The complaint shall be submitted in writing stating the nature and location of the violation and shall be filed with the department, or by agreement with the department, with the Local Management Agency with jurisdiction over the site in question. (OAR 603-095-0010(19)).

Macroinvertebrates: aquatic insects that spend part of their life cycle on the bottom of a stream or perennial waterway.

Non-point source: pollutants discharged from diffuse sources such as runoff from a farm. Diffuse pollution sources (i.e., without a single point of origin or not introduced into a receiving stream from a specific outlet).

Point source: pollutants discharged from any discernible, confined, and discrete conveyance such as a pipe.

Riparian Vegetation: plants and plant communities dependent upon or tolerant of saturated soil near the soil surface for a least part of the year. (Example: Willows, sedges and rushes can grow in saturated soils).

Riparian Setback: the purposefully designated or protected area away from the stream's normal flow mark back to a point where riparian functions for that site will not be adversely affected by land management practices.

Sinuosity: how much a stream meanders-calculated by dividing stream length by valley length.

"T" or soil loss tolerance factor: the maximum average annual amount of soil loss from erosion, as estimated by the Universal Soil Loss Equation (USLE) or the Revised Universal Soil Loss Equation (RUSLE), and expressed in tons per acre per year, that is allowable on a particular soil. This represents the tons of soil (related to the specific soil series) that can be lost through erosion annually without causing significant degradation of the soil or potential for crop production. (OAR 603-095-0010(45)).

Streambank: the boundary of protected waters and wetlands. Or the land abutting a channel at an elevation delineating the highest water level that has been maintained for a sufficient period of time to leave evidence upon the landscape, commonly that point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial. For perennial streams or rivers, the streambank shall be at the ordinary high-water mark. (OAR 603-095-0010(46)).

Volatilization: pass off as a vapor; evaporate quickly.

Waters of the state: ORS 468B.005(8): "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 effect a junction with natural surface or underground waters), which are wholly or partially within or bordering the state or within its jurisdiction.

APPENDIX C - Some Recommendations of Study by Shapiro & Associates

Provide alternatives to streams and canals for stock watering
Alternate stock watering **is included** as another activity that will improve water quality. For this reason, ranchers in the valley have installed many artesian wells. Excluding cattle from sources of water in streams and canals means providing alternative water sources. Limited and restricted stream or canal entry for cattle watering has been associated with fencing projects in Eastern Oregon to minimize damage to riparian areas. The availability of groundwater in the valley makes artesian well development perhaps more attractive than limited and restricted stream entry, and funding for these projects could stimulate an increased interest in fencing.

Increase dispersion of cattle in pastures
Discourage cattle from gathering in one place; provide multiple loci 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 more beneficial to pasture grasses and reduces the potential for wintertime movement of waste products off the site.

Allow grazing units to be rested
In the valley, the pastures are rested from late fall through early spring when cattle are not on the pastures. Resting grazing units is a valley practice now. 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. For example, as vegetation quality increases, fiber content in manure decrease, which speeds manure decomposition and reduces pollution potential. In view of potential runoff during winter from pasture lands transporting wastes into waters of the state, ending the grazing season with pasture areas on the lowest areas of private grazing lands with healthy stands of pasture grasses would provide filtering through winter. This strategy may be as effective as terminal wetland interception basins.

Manage irrigation practices more carefully to minimize water quality impacts

1. Review irrigation practices to develop measures to minimize water use.
2. Move cattle to high ground before flooding; let water saturate soil before reintroducing cattle if feasible.
3. Observe flood irrigation to eliminate movement of waste off the site.
4. Develop provisions for drought years regarding water withdrawals that leave water in the streams to satisfy in-stream water rights.

APPENDIX D – Technical and Financial Assistance

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. Watershed Council Working Groups and the Klamath Soil and Water Conservation District should be your primary resources for technical and financial assistance.

Technical Assistance

Klamath Soil and Water Conservation District 2316 South 6th Street Suite C Klamath Falls, OR 97601	(541) 883-6932, Ext. 117
Klamath Watershed Partnership 205 Riverside Dr. Suite C Klamath Falls OR 97601	(541) 850-1717
Jackson Soil and Water Conservation District 573 Parsons Dr. Suite 102 Medford, OR 97501	(541) 776-4270
Natural Resources Conservation Service 2316 S. Sixth Street Klamath Falls, OR 97601	(541) 883-6932, Ext.113
Oregon Department of Fish & Wildlife 1850 Miller Island Road W. Klamath Falls, OR 97603	(541) 883-5732

Financial Assistance Programs

CRP—Conservation Reserve Program (541-883-6932) is a broad USDA based funding program focused on cropland conservation with an emphasis on sites with Highly-Erodible Lands designation. Eligible land is taken out of production and leased for conservation on a yearly basis.

CREP—The Conservation Reserve Enhanced Program (541-883-6932) is also a USDA program with a similar objective to the CRP program described above. The emphasis in this program, however, is on pasturelands and riparian corridors. Over 250 million dollars has been made available to the state of Oregon for CREP contracts.

EPA—The EPA administers the 1972 Clean Water Act section 319 grants through the DEQ (541-388-6146) to help meet their water quality mandates. Projects the EPA likes to fund are those with directly measurable benefits for water quality and endangered species. Check out the EPA's Ag Info Center website- http://es.epa.gov/oeca/ag/index.html.

EQIP—Environmental Quality Incentives Program (541-883-6932) pays landowners a majority cost-share for on-farm projects that protect natural resources and improve wildlife (including

fish) habitat. EQIP information can be obtained from the Farm Service Agency in Klamath Falls.

Freshwater Trust (503-222-9091 in Portland) offers lease and buy-out options for abandoned or unused water rights. This market-based approach to increasing stream flow may also be used to fund irrigation system changes in watersheds identified as priorities for Freshwater Trust.

Klamath Falls Fish and Wildlife Office—(541-885-8481) offers grants in their watershed restoration program. Many on-the-ground projects have been accomplished to date in the Klamath Basin with money from this program.

OWEB—Oregon Watershed Enhancement Board (541-923-7353) provides funding for watershed enhancement projects under the general categories of education/public awareness, monitoring, management, and assessment/action planning.

OSU Cooperative Extension—(882-7131 in Klamath County) Oregon State University offers a wide variety of levels of technical assistance and planning help. OSU has been instrumental in the Oregon Cattlemen's Association's extremely successful WESt Program. Since its inception, it has grown into several distinct natural resource-related workshops that are offered to ranchers and farmers free of charge. The WESt Program workshops help ranchers and farmers understand their watersheds and stream function better through assessments and monitoring. OSU has also been providing Proper Functioning Condition (PFC) workshops and assessments with landowners. PFC assessment should be a major component of a conservation plan. Website address: http://osu.orst.edu/extension/klamath.

ODFW—Oregon Department of Fish & Wildlife (541 883-5732 in Klamath County) processes applications available at the ODFW offices for the Access & Habitat (A&H) and Restoration & Enhancement (R&E) funding programs. Call your local office for assistance with these programs.

APPENDIX E - Water Quality Limited Streams, Affected Parameters/Status

Watershed	Name and River Mile	Parameter	Season	Affected Parameters	Status
Sprague	Boulder Creek 0 to 4.8	Temperature	Summer	Bull Trout: 53.6 F	TMDL Approved
Sprague	Brownsworth Creek 0 to 3.2	Temperature	Summer	Rearing: 64.0 F	TMDL Approved
Sprague	Brownsworth Creek 3.2 to 8.8	Temperature	Summer	Bull Trout: 53.6 F	TMDL Approved
Sprague	Buckboard Creek 0 to 5	Temperature	Summer	Rearing: 64.0 F	TMDL Approved
Sprague	Calahan Creek 0 to 7	Temperature	Summer	Rearing: 64.0 F	TMDL Approved
Sprague	Coyote Creek 0 to 10.4	Temperature	Summer	Rearing: 64.0 F	TMDL Approved
Sprague	Deming Creek 0 to 6.7	Temperature	Summer	Rearing: 64.0 F	TMDL Approved
Sprague	Deming Creek 6.7 to 12.5	Temperature	Summer	Bull Trout: 53.6 F	TMDL Approved
Sprague	Fishhole Creek 0 to 25.6	Temperature	Summer	Rearing: 64.0 F	TMDL Approved
Sprague	Fivemile Creek 0 to 19.3	Temperature	Summer	Rearing: 64.0 F	TMDL Approved
Sprague	Leonard Creek 0 to 3.1	Temperature	Summer	Bull Trout: 53.6 F	TMDL Approved
Sprague	Long Creek 0 to 15.6	Temperature	Summer	Rearing: 64.0 F	TMDL Approved
Sprague	North Fork Sprague River - 0 to 33.5	Temperature	Summer	Rearing: 64.0 F	TMDL Approved
Sprague	Paradise Creek 0 to 8.6	Temperature	Summer	Rearing: 64.0 F	TMDL Approved
Sprague	Pothole Creek 0 to 6.1	Temperature	Summer	Rearing: 64.0 F	TMDL Approved
Sprague	South Fork Sprague River – 0 to 27.7	Temperature	Summer	Rearing: 64.0 F	TMDL Approved
Sprague	Sprague River 0 to 79.2	Dissolved Oxygen	Summer	Cold water; not less than 8.0 mg/l or 90% of saturation	TMDL Approved
Sprague	Sprague River 0 to 45.7	Dissolved Oxygen	Year Round	Cold water; not less than 8.0 mg/l or 90% of saturation	TMDL Approved
Sprague	Sprague River 0 to 79.2	pH	Summer	pH 6.5 to 9.0	TMDL Approved
Sprague	Sprague River 0 to 79.2	Temperature	Summer	Rearing: 64.0 F	TMDL Approved
Sprague	Sycan River 0 to 64.1	Temperature	Summer	Rearing: 64.0 F	TMDL Approved
Sprague	Trout Creek	Temperature	Summer	Rearing 64.0 F	TMDL Approved
Sprague	South Fork Sprague River – 0 to 31.3	E Coli	Summer	30 day log mean of 126 *E. Coli* organisms per 100 ml.	303(d) Listed

Williamson	Williamson River 0 to12.5	Temperature	Summer	Rearing: 64.0 F	TMDL Approved
Williamson	Williamson River 12.5 to 35.6	Temperature	Summer	Rearing: 64.0 F	TMDL Approved
Williamson	Williamson River 35.6 to 94.6	Temperature	Summer	Rearing: 64.0 F	TMDL Approved
Williamson	Williamson River 0 to 94.6	Dissolved Oxygen	January 1 – May 15	Spawning: not less than 11.0 mg/L or 95% of saturation	303(d) Listed
Upper Klamath	Four Mile Creek 0 to 1	Temperature	Summer	Rearing: 64.0 F	TMDL Approved
Upper Klamath	Rock Creek 0 to 5.7	Temperature	Summer	Rearing: 64.0 F	TMDL Approved
Upper Klamath	Beaver Creek 0 to 5.5	Temperature	Year Round	Redband/Lahontan 68.0 F	303 (d) Listed
Upper Klamath	Clover Creek 0 to 8.4	Sedimentation	Undefined	Formation of appreciable bottom or sludge deposits deleterious to fish and aquatic life	303(d) Listed
Upper Klamath	Grizzly Creek 0 to 3	Temperature	Summer	Rearing: 64.0 F	303 (d) Listed
Upper Klamath	Hoxie Creek 0.8 to 4.4	Temperature	Summer	Rearing: 64.0 F	303 (d) Listed
Upper Klamath	Jenny Creek 0 to 17.8	Temperature	Summer	Rearing: 64.0 F	303(d) Listed
Upper Klamath	Johnson Creek 0 to 9.4	Temperature	Summer	Rearing: 64.0 F	303 (d) Listed
Upper Klamath	Keene Creek 0 to 7.2	Temperature	Summer	Rearing: 64.0 F	303 (d) Listed
Upper Klamath	Keene Creek 7.5 to 9.7	Temperature	Summer	Rearing: 64.0 F	303 (d) Listed
Upper Klamath	Mill Creek 0 to 3.9	Temperature	Summer	Rearing: 64.0	303(d) Listed
Upper Klamath	Miners Creek 0 to 4.3	Sedimentation	Undefined	Formation of appreciable bottom or sludge deposits deleterious to fish and aquatic life	303 (d) Listed
Upper Klamath	South Fork Keene Creek – 0 to 3.1	Temperature	Summer	Rearing: 64.0 F	303(d) Listed
Upper Klamath	Spencer Creek 0 to 18.9	Biological Criteria	Undefined	Insufficient quality to support aquatic species	303 (d) Listed
Upper Klamath	Spencer Creek	Sedimentation	Undefined	Formation of appreciable bottom or sludge deposits deleterious to fish and aquatic life	303 (d) Listed
Upper Klamath	Spencer Creek 0 to 18.9	Temperature	Year Around	Redband/Lahontan 68.0 F	303(d) Listed
Upper Klamath	Klamath River Upper Klamath Lake to Keno Reservoir 250 - 251	pH	Summer	pH 6.5 to 9.0	303(d) Listed
Upper	Klamath River Upper	Chlorophyll-a	Summer	0.015 mg/l	303(d)

Klamath	Klamath Lake to Keno Reservoir 250 - 251				Listed
Upper Klamath	Klamath River Upper Klamath Lake to Keno Reservoir 250 - 251	Temperature	Summer	Under EPA review	303(d) Listed
Upper Klamath	Klamath River Keno Reservoir 231-250	Ammonia Toxicity	Winter Summer	pH and temperature dependent	303(d) Listed
Upper Klamath	Klamath River Keno Reservoir 231 – 250	Dissolved Oxygen	Spring Summer Fall	> 6.5 mg/l	303 (d) Listed
Upper Klamath	Klamath River Keno Reservoir 231 – 250	Temperature	Summer	Under EPA review	303(d) Listed
Upper Klamath	Klamath River Keno Dam to Stateline	Temperature	Summer	Redband/Lahontan 68.0 F	303(d) Listed

APPENDIX F - TMDLS IN THE KLAMATH HEADWATERS MANAGEMENT AREA

It is the responsibility of the Oregon Department of Agriculture, through the Agricultural Water Quality Management Program, to address the parameters listed in the TMDL document 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.

UPPER KLAMATH LAKE DRAINAGE TMDLS

For the Williamson, Sprague, and Upper Klamath Lake watersheds, TMDLs were established by DEQ in early 2002.

UPPER KLAMATH LAKE AND AGENCY LAKE NUTRIENT TMDL

Upper Klamath Lake and Agency Lake are hypereutrophic - high nutrient loading promotes correspondingly high production of algae. This modifies physical and chemical water quality characteristics that can directly diminish the survival and production of fish populations. Year to year variations in the timing and development of algal blooms during late spring and early summer are strongly water temperature dependent. The Upper Klamath Lake and Agency Lake TMDL examines total phosphorous loading targets as the primary method of improving lake water quality. Statistical analysis and deterministic modeling demonstrates that pH levels are reduced to levels that benefit aquatic life when total phosphorus loading rates are reduced.

STREAM TEMPERATURE TMDL

The stream temperature TMDL targets the defined thermal pollutant: heat from human sources. There are two sources of pollutants: increased solar radiation heat loading and heat from point source warm water discharge. Other factors considered in the analysis of stream heating are land cover type and condition, channel morphology and instream flows. The loading capacity is the total allowable daily heat loading. Load allocations are developed for human and background nonpoint sources of heat. Waste load allocations are developed for all point sources. There is no explicit numeric margin of safety provided in the temperature TMDL. Effective shade and channel morphology targets are used as a surrogate measure for nonpoint source pollutant loading offering straightforward parameters to monitor and measure. Attainment of TMDL surrogate measures (i.e. effective shade and channel morphology targeted conditions) ensures attainment of the nonpoint source allocations. A landowner is 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.

SPRAGUE RIVER DISSOLVED OXYGEN TMDL

The Sprague River is listed as impaired due to insufficient concentrations of dissolved oxygen (DO). Dissolved oxygen in water bodies may fall below healthy levels for a number of reasons including carbonaceous biochemical oxygen demand (CBOD) within the water column, nitrogenous biochemical oxygen demand (NBOD, also known as nitrification), algal respiration, zooplankton respiration and sediment oxygen demand (SOD). Increased water temperatures will also reduce the amount of oxygen in water by decreasing its solubility and increasing the rates of

nitrification, respiration rates and the decay of organic matter. Depth of streambed, sediments, algal populations, phosphorus, and turbidity can impact levels of DO. DO fluctuation is directly related to the changes in any of these parameters, either individually or in combination. It was determined by the DO modeling of the Sprague River that achieving the load allocations and temperature reductions established in the stream temperature TMDL would reduce periphyton growth and lead to the attainment of the water quality standards.

Sprague River pH TMDL

Algae production is the principle cause of wide pH fluctuations in the Sprague River. The algae of concern are periphyton. As periphyton obtains carbon dioxide for cell growth the bicarbonate present in the water is decreased. Removal of the bicarbonate from the water will generally increase the pH. High pH is stressful to fish. This daily increase in pH is associated with algal photosynthesis, which is maximized by mid-day light and warmth. The pH standard has been exceeded during the warmest part of the day from about river mile 50.1 to the mouth. It was determined by pH modeling of the Sprague River that achieving the load allocations established for stream temperature will reduce periphyton growth and lead to the attainment of the water quality standards for pH.

Summary of Nonpoint Source Allocations

Phosphorus

Load Allocations (Non-Point Sources): 107,510 kg external total phosphorus per year, which represents a 40 percent reduction from 2002 conditions.

While DEQ acknowledges extremely high background loads of phosphorus in the management area, 40 percent of the load over the standard is attributed to human sources. Agricultural activities are identified as the primary non-point source contributors. The majority of the LAC disputes that percent allocation and asks the DEQ to reconsider the load. The LAC draw this conclusion from peer reviewed work by Rykbost and Charlton (2001) and studies by Shapiro and Associates (2000) that deal either directly (Shapiro in the Wood River) or indirectly (Rykbost in the Klamath Project and adjacent lands) with agriculture's net gain or loss of nutrients from the system into waters of the state.

Even so, the management measures outlined in the Plan will provide a significant reduction in potential agricultural contributions of phosphorus. The very high background levels of phosphorus in native soils is exacerbated in surface waters with extensive introductions of sediments from eroding banks or sheet wash off the uplands. The riparian and sediment rules in this Plan will reduce or eliminate the agricultural component of the phosphorus introduction. There remains, however, other drivers of the phosphorus levels from Upper Klamath Lake tributaries that are beyond the scope of this Plan.

Temperature

Load Allocations (Nonpoint Sources): The temperature standard targets system potential (i.e., no measurable temperature increases from human sources). To meet this requirement the system potential solar radiation heat load (46,025,933,728 kcal/day) is allocated to background nonpoint sources.

Site specific effective shade surrogates are developed to help translate the nonpoint source solar radiation heat loading allocations. Effective shade is defined as the percent reduction of potential solar radiation load delivered to the water surface. For example, 30 percent effective shade means that shade has kept 30 percent of the sunshine on an August day from reaching the stream. Landowners may use these targets as a guide to determine if they have sufficient riparian vegetation. Attainment of the effective shade surrogate measures is equivalent to attainment of the nonpoint source load allocations.

Historic vegetation may not be required along streams. Native trees such as pine, which may have historically lined management area streams, may not be desirable in some areas. Smaller native vegetation, such as willow, sedges, and cattails may provide sufficient shade along smaller streams to attain the shade targets. Also, there will be some sites where woody vegetation will not establish at all. This is to be expected. As a general guideline, maintain the band or buffer of vegetation along the stream that is consistent with site capability. Site capability is the ability of a site to provide for the development of potential structural and functional properties. Structural properties include, among other things, vegetation and soil characteristics. Functional properties include processes such as energy and nutrient flow. Capabilities to produce and sustain these properties are not the same for all sites, but are site specific. Streamside vegetation buffers also absorb manure runoff, reduce streambank erosion, and filter sediment during high flow events, additionally reducing potential phosphorus loading as a direct benefit.

ODA will monitor progress towards meeting shade targets. It is recommended that the Klamath SWCD provide reference sites and photographic examples to landowners who wish to visualize these targets.

All interested parties must understand that these targets may not be appropriate for all areas. For instance, streams at road crossings and road right-of-ways may not be shaded for visibility/safety reasons. Site capability will enhance the species, structure, and density of vegetation communities expected on Klamath Headwaters stream banks. It is the intent of this water quality management plan to help landowners become aware of the targets and manage their agricultural activities so as to prevent unintentional suppression of self-recruiting riparian plant communities. TMDLs were also developed for parameters that are generally phosphorus-driven listings. Lack of dissolved oxygen, excessive chlorophyll-a populations, and excessive pH are identified in the management plans.

Upper Klamath and Lost River Subbasins TMDLs

In December 2010, DEQ submitted the Upper Klamath and Lost River Subbasins TMDLs to EPA for approval. EPA approval is expected in 2011. Upper Klamath River TMDLs are included in this Area Plan because the Klamath Headwaters management area includes portions of the Upper Klamath subbasin.

Klamath River TMDLs

The Klamath River TMDL includes impoundents and riverine sections of the Klamath River from the outlet of Upper Klamath Lake to the state border with California. Pollutants responsible for water quality impairments included phosphorus, nitrogen, biochemical oxygen demand and temperature. Because these TMDLs (and their load and waste load allocations) are being developed by Oregon as part of a comprehensive multistate analysis of pollutant loadings to the

Klamath River, they are also being designed to meet California water quality standards at the state line.

The TMDL indicates that reductions in phosphorus, nitrogen and biochemical oxygen demand loading from point and nonpoint sources are necessary to attain water quality standards in Oregon waterbodies and California's water quality standards at the state line.

Temperature TMDLs for Lost River and Klamath River tributaries

The temperature TMDLs for Lost River and Klamath River Tributaries include all perennial and intermittent streams and rivers within Oregon in the Upper Klamath River and Lost River subbasins, with the exception of the Klamath and Lost Rivers. Human caused temperature increases are associated with excessive thermal inputs of solar radiation due to the removal or reduction in streamside vegetation. Reservoirs, irrigation districts and dam operations are considered nonpoint sources that influence the quantity and timing of heat delivery to down stream river reaches. Nonpoint source load allocations use effective shade as a surrogate measure of reduced solar radiation.

Summary of Non-Point Source Allocations

Temperature

The Klamath River temperature allocation for agricultural sources discharging to the Klamath River is no additional thermal input greater than 0.01 degrees Centigrade above ambient river temperatures. The temperature allocation for all other nonpoint sources in the Upper Klamath Subbasin is attainment of system potential effective shade.

Nutrients

The Klamath River nonpoint source TMDL allocations for nutrients are: 0.035 mg/L total phosphorus, 0.45 mg/L nitrogen, and 2.2 mg/L biochemical oxygen demand (BOD). This represents a 92 percent reduction in phosphorus, 87 percent reduction in nitrogen and 92 percent reduction in BOD).

BOD is a response to compounds that consume water column dissolved oxygen (DO), including the decomposition of organic matter in the water column and sediment and the nitrification of ammonia. Oxidation of organic material is the most important type of biochemical oxygen demand. In the most general sense, carbon in organic material is oxidized to its lowest energy state, CO2, through the metabolic action of microorganisms (principally bacteria). This is termed carbonaceous-BOD (CBOD). When nitrogen in the form of ammonia is introduced to natural waters, the ammonia may "consume" dissolved oxygen as nitrifying bacteria convert the ammonia into nitrite and nitrate. This process is called nitrification. The consumption of oxygen during this process is called nitrogenous biochemical oxygen demand (NBOD). To what extent this process occurs, and how much oxygen is consumed, depends on several factors, including residence time, water temperature, ammonia concentration in the water, and the presence of nitrifying bacteria.

Lands used for agriculture can contribute nutrients in a variety of ways. Soil erosion can carry nutrients with it, particularly phosphorus. Animal manure is another potential source of nutrients and particulate organic matter. Particulate organic matter settles to the streambed causing an increase in sediment oxygen demand (SOD) on the receiving water body. Finally, fertilizers run

off and contribute nutrients to the stream. Riparian buffers, where they exist, help to intercept and retain both sediments and nutrients.

There are a number of natural processes that add nutrients to the river: leaching from the soil, degradation of plant material, and fish returning to spawn from the ocean. In the Klamath Basin, springs can contribute significant amounts of phosphorus because of the volcanic origins of the rock and soil.

APPENDIX G – Point Sources

The following sections, 2.8.1 and 3.3.2, are quoted from the Upper Klamath Lake TMDL, DEQ, 2002. Along with the point sources described below, there are many unquantified sources such as residential and commercial areas in Modoc Point, Rocky Point, Forest Service cabins around the lake, and the town of Chiloquin.

2.8.1 Point Sources

There are two point sources of phosphorus that discharge to waters that drain to Upper Klamath Lake: the Chiloquin Sewage Treatment Plant and the Crooked Creek Fish Hatchery. The phosphorus loads that result from discharge are calculated by multiplying the year discharge volume by the yearly discharge phosphorus concentration. **The waste load allocation targets a 40% loading rate reduction, which matches the 40% reduction in external loading as specified in Section 2.6 Phosphorus Reductions Necessary to Meet Water Quality Standards. In the event that background condition concentrations prevent attainment of a 40% loading reduction, the background condition becomes the target.** The allowable phosphorus loads that result from discharge are calculated by multiplying the year discharge volume by the yearly-targeted phosphorus concentration. Equations used in this analysis are presented below. Terms are defined in **Table 2-8**, where flow volume data, phosphorus concentrations, and calculated loading rates are presented.

3.3.2 Point Sources of Heat

The Oregon Department of Environmental Quality maintains a database for point source information. This data was used to place point sources within the Upper Klamath Lake drainage. Five point sources discharge to waters within the Upper Klamath Lake drainage:

- Crooked Creek Hatchery discharges into Crooked Creek at RM 5.6.
- Chiloquin Sewage Treatment Plant discharges into Williamson River at RM 11.8.
- Specialty Fiber Products discharges non-contact cooling water and storm water in Upper Klamath Lake.
- Jeld-Wen also discharges into Upper Klamath Lake.

Waste load allocations are developed for point sources that discharge to temperature impaired waterbodies or discharge into waterbodies that drain to temperature impaired waterbodies. Chiloquin's wastewater treatment plant is the only point source where effluent is discharged into temperature-impaired waterbodies. Simulated system potential stream temperatures during the critical condition in August are estimated by removing anthropogenic sources of heat throughout the Upper Klamath Lake drainage. These system potential temperatures are developed using computer modeling (**see the Upper Klamath Lake Drainage Stream Temperature Analysis-Attachment 1**) and used to assign the waste load allocations to the point sources. Often, there are a number of point sources in a subbasin, some on segments that would be below the numeric criteria at system potential and some for which system potential would be above the numeric criteria. On some small streams, there would likely be complete mix of effluent and the stream within the mixing zone. On larger streams, the mixing zone would be a portion of the river (e.g. 25% or as described through a mixing zone policy).

Heat loading from point sources occurs when waters with differing temperatures are mixed. The temperature standard specifies that point sources cannot produce a temperature increase of greater that 0.250F at the edge of the mixing zone. For computational purposes, ODEQ has defined the zone of dilution as ¼ of the 7Q10 low flow. The design condition for point source is the heat from effluent that produces a 0.25ºF increase (or more) in the zone of dilution. The equations for calculating the heat load from point sources are provided below. Table 3-6 (within the TMDL document) displays the calculated parameters for point source heat loading analysis. Figure 3-7 (within TMDL document) displays the heat loading limits as they apply to the Chiloquin WWTP. The current condition is well below heat limits for standard compliance. There is no reasonable potential that this facility will violate stream temperature standards.

Appendix H - Common Agricultural Water Quality Parameters of Concern

The following parameters are used by DEQ in establishing the 303(d) List and assessing and documenting waterbodies with TMDLs. Note: This is an abbreviated summary and does not contain all parameters or detailed descriptions of the parameters and associated standards. Specific information about these parameters and standards can be found at: www.deq.state.or.us/wq/assessment/assessment.htm or by calling (503) 229-6099.

Parameters

Bacteria: *Escherichia coli (E. coli)* is measured in streams to determine the risk of infection and disease to people. Bacteria sources include humans (recreation or failing septic systems), wildlife, and agriculture. On agricultural lands, E. coli generally comes from livestock waste, which is deposited directly into waterways or carried to waterways by livestock via runoff and soil erosion. Runoff and soil erosion from agricultural lands can also carry bacteria from other sources.

Biological Criteria: To assess a stream's ecological health, the community of benthic macro invertebrates is sampled and compared to a reference community (community of organisms expected to be present in a healthy stream). If there is a significant difference, the stream is listed as water quality limited. These organisms are important as the basis of the food chain and are very sensitive to changes in water quality. This designation does not always identify the specific limiting factor (e.g., sediment, nutrients, or temperature).

Dissolved Oxygen: Dissolved oxygen criteria depend on a waterbody's designation as fish spawning habitat. Streams designated as salmon rearing and migration are assumed to have resident trout spawning from January 1 – May 15, and those streams designated core cold water are assumed to have resident trout spawning January 1 – June 15. During non-spawning periods, the dissolved oxygen criteria depends on a stream's designation as providing for cold, cool or warm water aquatic life, each defined in OAR 340 Division 41.

Harmful Algal Blooms: Some species of algae, such as cyanobacteria or blue-green algae, can produce toxins or poisons that can cause serious illness or death in pets, livestock, wildlife, and humans. As a result, they are classified as Harmful Algae Blooms. Several beneficial uses are affected by Harmful Algae Blooms: aesthetics, livestock watering, fishing, water contact recreation, and drinking water supply. The Public Health Department of the Oregon Health Authority is the agency responsible for posting warnings and educating the public about Harmful Algae Blooms. Under this program, a variety of partners share information, coordinate efforts and communicate with the public. Once a water body is identified as having a harmful algal bloom, DEQ is responsible for investigating the causes, identifying sources of pollution and writing a pollution reduction plan.

Mercury: Mercury occurs naturally and is used in many products. It enters the environment through human activities and from volcanoes, and can be carried long distances by atmospheric air currents. Mercury passes through the food chain readily, and has significant public health and

wildlife impacts from consumption of contaminated fish. Mercury in water comes from erosion of soil that carries naturally occurring mercury (including erosion from agricultural lands and streambanks) and from deposition on land or water from local or global atmospheric sources. Mercury bio-accumulates in fish, and if ingested can cause health problems.

Nitrate: While nitrate occurs naturally, the use of synthetic and natural fertilizers can increase nitrate in drinking water (ground and surface water). Applied nitrate that is not taken up by plants is readily carried by runoff to streams or infiltrate to ground water. High nitrate levels in drinking water cause a range of human health problems, particularly with infants, the elderly, and pregnant and nursing women.

Pesticides: Agricultural pesticides of concern include substances in current use and substances no longer in use but persist in the environment. Additional agricultural pesticides without established standards have also been detected. On agricultural lands, sediment from soil erosion can carry these pesticides to water. Current use agricultural pesticide applications, mixing-loading, and disposal activities may also contribute to pesticide detections in surface water. For more information, see: www.deq.state.or.us/wq/standards/toxics.htm.

Phosphorous/Algae/pH/Chlorophyll a: Excessive algal growth can contribute to high pH and low dissolved oxygen. Native fish need dissolved oxygen for successful spawning and moderate pH levels to support physiological processes. Excessive algal growth can also lead to reduced water clarity, aesthetic impairment, and restrictions on water contact recreation. Warm water temperatures, sunlight, high levels of phosphorus, and low flows encourage excessive algal growth. Agricultural activities can contribute to all of these conditions.

Sediment and Turbidity: Sediment includes fine silt and organic particles suspended in water, settled particles, and larger gravel and boulders that move at high flows. Turbidity is a measure of the lack of clarity of water. Sediment movement and deposition is a natural process, but high levels of sediment can degrade fish habitat by filling pools, creating a wider and shallower channel, and covering spawning gravels. Suspended sediment or turbidity in the water can physically damage fish and other aquatic life, modify behavior, and increase temperature by absorbing incoming solar radiation. Sediment comes from erosion of streambanks and streambeds, agricultural land, forestland, roads, and developed areas. Sediment particles can transport other pollutants, including bacteria, nutrients, pesticides, and toxic substances.

Temperature: Oregon's native cold-water aquatic communities, including salmonids, are sensitive to water temperature. Several temperature criteria have been established to protect various life stages and fish species. Many conditions contribute to elevated stream temperatures. On agricultural lands, inadequate streamside vegetation, irrigation water withdrawals, warm irrigation water return flows, farm ponds, and land management that leads to widened stream channels contribute to elevated stream temperatures. Elevated stream temperatures also contribute to excessive algal growth, which leads to low dissolved oxygen levels and high pH levels.

Appendix I – Klamath Headwaters Management Area Agricultural Water Quality Rules

OREGON ADMINISTRATIVE RULES - OREGON DEPARTMENT OF AGRICULTURE CHAPTER 603, DIVISION 95 - AGRICULTURAL WATER QUALITY MANAGEMENT PROGRAM - Klamath Headwaters Area

603-095-3800 Purpose

(1) These rules have been developed to implement a water quality management area plan for the Klamath Headwaters Agricultural Water Quality Management Area pursuant to authorities vested in the department through ORS 568.900 - ORS 568.933 and ORS 561.190 - ORS 561.191. The area plan is known as the Klamath Headwaters Agricultural Water Quality Management Area Plan.

(2) The purpose of these rules is to outline requirements for landowners in the Klamath Headwaters Agricultural Water Quality Management Area to prevent and control water pollution from agricultural activities and soil erosion. Compliance with Division 95 rules (OARs 603-095- 3800 through 603-095-3860) is expected to aid in the achievement of applicable water quality standards in the Klamath Headwaters Agricultural Water Quality Management Area.
Statutory Authority: ORS 561.190 - 561.191, and ORS 568.912 Statutes Implemented: ORS 568.900 - 568.933

603-095-3820 Geographic and Programmatic Scope

(1) The Klamath Headwaters Agricultural Water Quality Management Area is comprised of the Upper Klamath Lake drainages, the west Klamath River drainages including the headwaters of Spencer Creek in Klamath County and Jenny, Cottonwood and Colstein Creeks in Jackson County, and excludes the entire Lost River Drainage and the Klamath Project lands on the west side of the Klamath River down to the Keno dam. The physical boundaries of the Management Area are indicated on the map included as Attachment 1 of these rules.

(2) Operational boundaries for the land base under the purview of these rules include all lands within the Klamath Headwaters Agricultural Water Quality Management Area in agricultural use, agricultural and rural lands that are lying idle or on which management has been deferred, and forested lands with agricultural activities, with the exception of public lands managed by federal agencies. These rules (OAR 603-095-3800 through OAR 603-095-3860) will affect any lands in agricultural use on all non-Federal and non-Tribal lands in the Klamath Headwaters Agricultural Water Quality Management Area. (a) Agricultural use does not include the use of land for garden plots used for the cultivation of vegetables, flowers, herbs, or fruits for non-commercial, personal use. (b) The provisions of the Klamath Headwaters Agricultural Water Quality Management Area Plan and OARs 603-095-3800 through 603-095-3860 shall not apply to any forest activity subject to the Oregon Forest Practices Act, ORS 527.610.

(3) Current productive agricultural use is not required for the provisions of these rules to apply. For example, highly erodible lands with no present active use are within the purview of these rules.

(4) For lands in agricultural use within other Designated Management Agencies' or state agency jurisdictions, the department and the appropriate Local Management Agency will work with these Designated Management Agencies to assure that provisions of these rules apply, and to assure that duplication of any services provided or fees assessed does not occur. Statutory Authority: ORS 561.190 - 561.191, and ORS 568.912Statutes Implemented: ORS 568.900 - 568.933

603-095-3840 Unacceptable Conditions

(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.

(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).

(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.

(4) Effective upon adoption, no person subject to these rules shall violate any provision of ORS 468B.025 or ORS 468B.050.

Statutory Authority: ORS 561.190 - 561.191, and ORS 568.912 Statutes Implemented: ORS 568.900 - 568.933

603-095-3860 Complaints and Investigations

(1) When the department receives notice of an alleged occurrence of agricultural pollution through a written complaint, its own observation, or through notification by another agency, the department may conduct an investigation. The department may, at its discretion, coordinate inspection activities with the appropriate Local Management Agency.

(2) Each notice of an alleged occurrence of agricultural pollution shall be evaluated in accordance with the criteria in ORS 568.900 to 568.933 or any rules adopted thereunder to determine whether an investigation is warranted.

(3) Any person allegedly being damaged or otherwise adversely affected by agricultural pollution or alleging any violation of ORS 568.900 to 568.933 or any rules adopted thereunder may file a complaint with the department.

(4) The department will evaluate or investigate a complaint filed by a person under section OAR 603-095-3860 (3) if the complaint is in writing, signed and dated by the complainant and indicates the location and description of: (a) The waters of the state allegedly being damaged or impacted; and (b) The property allegedly being managed under conditions violating criteria described in ORS 568.900 to 568.933 or any rules adopted thereunder. (c) As used in section OAR 603-95-3860(4), “person” does not include any local, state, or federal agency.

(5) Notwithstanding OAR 603-095-3860(4), the department may investigate at any time any complaint if the department determines that the violation alleged in the complaint may present an immediate threat to the public health or safety.

(6) If the department determines that a violation of ORS 568.900 to 568.933 or any rules adopted thereunder has occurred, the landowner may be subject to the enforcement procedures of the department outlined in OARs 603-090-0060 through 603-090-0120.

Statutory Authority: ORS 561.190 - 561.191, and ORS 568.912 Statutes Implemented: ORS 568.900 - 568.933