Upper Willamette and Upper Siuslaw Agricultural Water Quality Management Area Plan

Developed by the Upper Willamette and Upper Siuslaw Local Advisory Committee

with assistance from

The Oregon Department of Agriculture
and
The Upper Willamette Soil and Water Conservation District

October 2009

Local Advisory Committee Members and Alternates:

Jerry Marguth, Chair
Robin Pfeiffer, Vice Chair
Rick Allison
Todd Anderson
Frank Cataldo
Cleve Dumdi
Mike Gibson
Scott Gibson
Tom Hunton
Barbara May
Jan Nelson
Brian Parker
Paul Reed
John Reerslev
Jeff Levy

Blank

Table of Contents

Blank

Acronyms and Terms Used in this Document

AF – Acre Foot

AgWQM - Agricultural Water Quality Management

Area Plan - Upper Willamette and Upper Siuslaw Agricultural Water Quality Management Area Plan

Area Rules - Upper Willamette and Upper Siuslaw Agricultural Water Quality Management Area Rules

Beneficial Use - Existing or desired use that requires a certain level of water quality. For example, water contact recreation, coldwater aquatic life, or drinking water supply.

CFS – Cubic Feet per Second

CWA - Clean Water Act

DEQ - Oregon Department of Environmental Quality

DO – Dissolved Oxygen

EPA - Environmental Protection Agency

FSA - Farm Services Agency.

GWMA - Ground Water Management Area

IPM - Integrated Pest Management

LAC - Local Advisory Committee

LASAR - Laboratory Analytical Storage and Retrieval

LMA - Local Management Agency

Management Area – Upper Willamette and Upper Siuslaw Agricultural Water Quality Management Area

NRCS - Natural Resources Conservation Service

OAR - Oregon Administrative Rule

ODA - Oregon Department of Agriculture

ORS - Oregon Revised Statute

OSU - Oregon State University

OSUES - Oregon State University Extension Service

OWEB - Oregon Watershed Enhancement Board

RUSLE - Revised Universal Soil Loss Equation

SWCD - Soil and Water Conservation District

TMDLs - Total Maximum Daily Loads

303(d) List - The Clean Water Act, in Section 303(d), requires states to list waters that are "water quality limited."

USDA - United States Department of Agriculture

WSC - Watershed Council

Foreword

This Agricultural Water Quality Management Area Plan provides guidance for addressing agricultural water quality issues in the Upper Willamette and Upper Siuslaw Management Area. The purpose of this Plan is to identify strategies to reduce water pollution from agricultural lands through a combination of outreach programs, suggested land treatments, management activities, and monitoring.

The provisions of this Plan do not establish legal requirements or prohibitions.

The Oregon Department of Agriculture (ODA) will exercise its enforcement authority for the prevention and control of water pollution from agricultural activities under Oregon Administrative Rules (OARs) for the Upper Willamette and Upper Siuslaw Agricultural Water Quality Management Area (OAR 603-095-2600 through 603-095-2660) and OAR 603-090-0060 through 603-090-0120.

Blank

1. Introduction

This Agricultural Water Quality Management Area Plan (Area Plan) was developed in response to the Agricultural Water Quality Act, passed in 1993 and now codified at ORS 568.900 – 568.933. The Act authorizes the Department to develop and carry out a plan to prevent and control water pollution from agriculture and soil erosion. The intent of the Act and of ODA's Water Quality Program are to:

- Satisfy multiple federal and state water quality mandates;
- Encourage voluntary conservation;
- Promote water quality improvement through outreach and education;
- Allow flexibility in meeting local water quality standards; and
- Involve local citizens and organizations in the development of agricultural water quality regulations.

Under the Act, ODA is authorized to develop and carry out a water quality management plan for agricultural or rural lands when required by state or federal law.

In 1995, the Oregon Legislature passed SB 502, now codified at ORS 561.191, authorizing ODA to develop and implement any program or rules that directly regulate agricultural activities for the purpose of protecting water quality and that are applicable to areas of the state designated as exclusive farm use zones or other agricultural lands. Under these statutes, ODA is the agency responsible for regulating agricultural activities in Oregon as they affect water quality.

In addition to the Area Plan, Agricultural Water Quality Management Area Rules (Area Rules) provide enforcement provisions for landowners who refuse to work towards meeting water quality standards.

This Area Plan applies specifically to agricultural activities on all agricultural, rural, and forest lands within the Upper Willamette and Upper Siuslaw Agricultural Water Quality Management Area (Management Area) that are not owned by the federal government, are not part of an Indian reservation, or are not tribal trust lands. It applies to all lands, regardless of size, in current agricultural use and those lying idle or on which management has been deferred. It also applies to agricultural operations within incorporated city boundaries. Activities subject to the Oregon Forest Practices Act are not included in this Plan.

Oregon Administrative Rule (OAR) 603-095-0010(4) defines agricultural use as "the use of land for the raising or production of livestock or 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."

This Area Plan provides background information on the Management Area, discusses local water quality concerns, and describes goals, objectives and strategies to improve water quality. The Plan also references Area Rules, which describe conditions land users must meet on all agricultural lands they own, occupy, or manage, and describes procedures for handling complaints and enforcement actions. Finally, the Plan describes a process for evaluating Plan effectiveness and updating the Plan on a regular basis.

This Area Plan does not hold agriculture responsible for cleaning up water quality problems from other sources; its focus is on encouraging landowners to keep water as clean when it leaves their property as when it enters. This Plan is also not intended to tell anyone how to farm, ranch, or otherwise manage his or her natural resources. However, the Upper Willamette Soil and Water Conservation District (SWCD), U.S. Department of Agriculture - Natural Resources Conservation Service (NRCS), the ODA, the Long Tom and Siuslaw Watershed Councils, and other partners are available to provide technical, financial, and educational assistance to landowners in the Management Area to meet their conservation goals and local water quality standards.

A Local Advisory Committee (LAC) developed this Area Plan with assistance from the Upper Willamette SWCD and the ODA, and with input from members of the community. LAC members and alternates are:

Member	**Area/Watershed**	**Operation**
Rick Allison	Noti/Long Tom	Pasture, livestock, timber
Todd Anderson	Monroe/Long Tom	Small acreage
Frank Cataldo	Lorane/Upper Siuslaw	Vegetable seed, hay
Cleve Dumdi	Junction City/Long Tom	Pasture, livestock
Mike Gibson	Junction City/Long Tom	Grass seed, vegetables, mint, livestock
Scott Gibson	Monroe/Long Tom	Grass seed, vegetables, mint, dairy
Tom Hunton	Junction City/Long Tom	Grass seed, mint
Jerry Marguth	Junction City/Long Tom	Grass seed, vegetables, mint
Barbara May	Eugene/Long Tom	Small acreage
Jan Nelson	Crow/Long Tom	Farm, forest
Brian Parker	Junction City/Long Tom	Grass seed, flower and vegetable seed
Robin Pfeiffer	Junction City/Long Tom	Wine grapes, timber
Paul Reed	Veneta/Long Tom	Small acreage
John Reerslev	Junction City/Long Tom	Grass seed, mint, sugar beet seed
Jeff Levy	Lorane/Upper Siuslaw	Native riparian plant nursery

2. Background

2.1. Geographical and Physical Setting

2.1.1. General Description

The Upper Willamette and Upper Siuslaw Agricultural Water Quality Management Area is located in the southernmost part of the Willamette Valley west of the Willamette River. The Management Area includes most of the Long Tom watershed and the Upper Siuslaw watershed, as well as several small streams that drain directly into the Willamette River, including Spring Creek and Flat Creek (Map 1). The area includes central Lane County and a small portion of Benton County; the cities of Eugene, Junction City, Monroe, and Veneta; and the rural communities of Crow, Elmira, Lorane, and Noti. The total size of the area is approximately 495,000 acres.

Long Tom River

The Long Tom River's headwaters are located on the east side of the Coast Range near Noti. The river flows southeast for several miles through forestlands, rural residential areas, and small acreage farms until it reaches the Willamette Valley floor near Veneta. The river then flows northward through rural residential areas and small farms and empties into Fern Ridge Reservoir. Below Fern Ridge Dam, the river meanders northeast, mostly through large-scale commercial farms. It empties into the Willamette River at Norwood Island and Sam Daws Bend.

Coyote Creek, a major tributary to the Long Tom River, begins near Lorane and flows northwest through forest and small acreage agricultural lands before emptying into Fern Ridge Reservoir near Highway 126. Amazon Creek also supplies some of the water to Fern Ridge Reservoir. Much of the upper Amazon Creek watershed is within the city of Eugene.

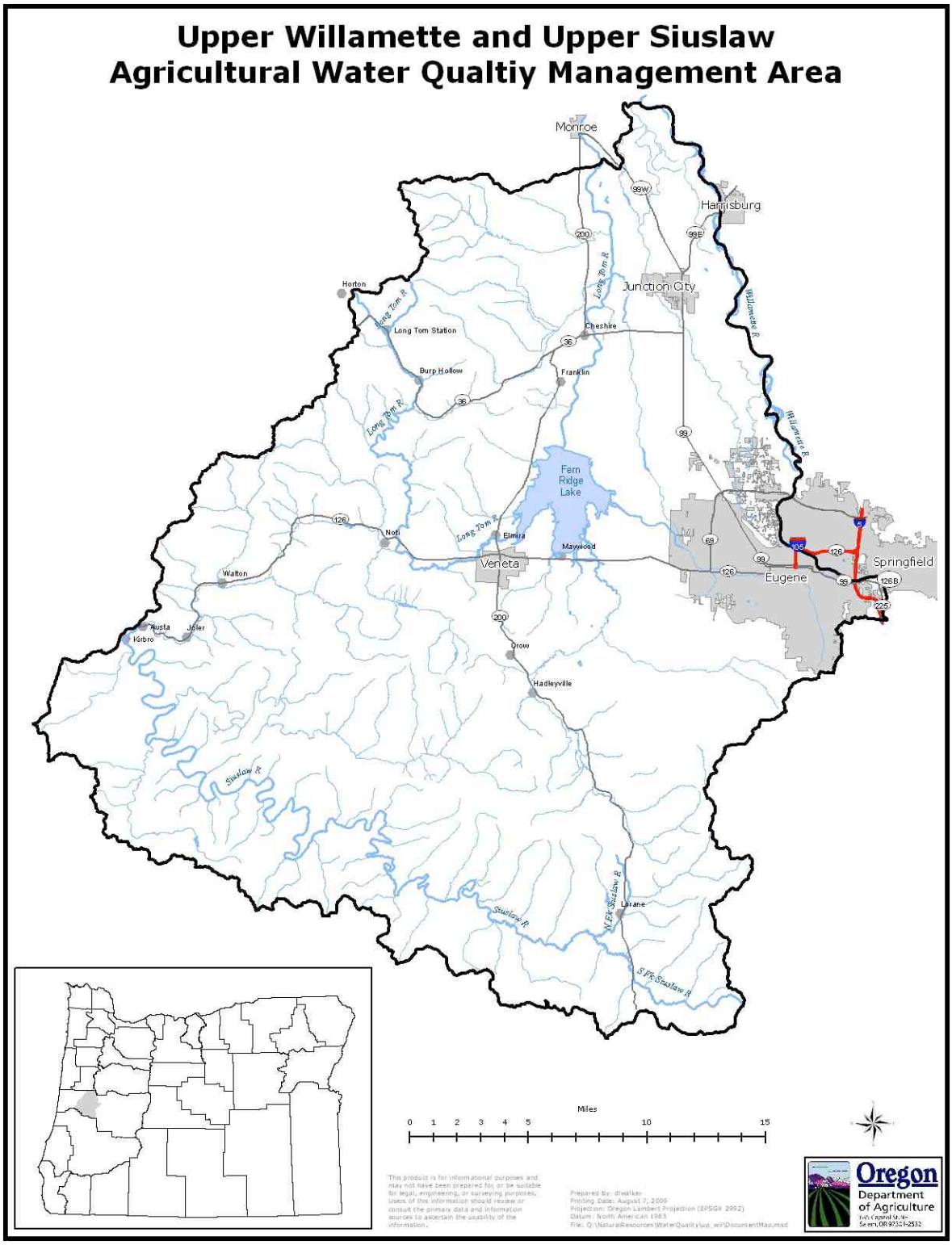
Above Fern Ridge Reservoir, other major tributaries include Noti Creek and Elk Creek. Both of these watersheds are mostly forested with a few rural residential properties and mid-sized family farms.

Below Fern Ridge Dam, Ferguson and Bear Creeks are major tributaries of the Long Tom. The headwaters for both streams are found in the Coast Range, and much of the land in these watersheds is forested. These creeks also flow through some agricultural and rural residential lands before emptying into the Long Tom River west of Junction City.

Spring Creek and Flat Creek

Spring and Flat Creeks both begin near Santa Clara and flow north through industrial and agricultural lands before their confluence with the Willamette River. Flat Creek flows parallel to Amazon Creek, and may mix with Amazon Creek and the Long Tom River during high-flow events (Thieman, 2000).

Map 1. Upper Willamette and Upper Siuslaw Agricultural Water Quality Management Area.



Upper Siuslaw River

The Siuslaw River also begins east of the Coast Range, but it flows west to the Pacific Ocean. The Upper Siuslaw is included as part of this Management Area, rather than the Mid Coast Management Area along with the Lower Siuslaw, because the agricultural land uses are more similar to those in the Upper Willamette.

From the confluence of the North and South Forks west of Lorane, the Siuslaw River flows northwest until about Walton, loops around Bailey Ridge and Bald Mountain, then flows southwest until it reaches the ocean.

Except for an agricultural area around Lorane, most of the Upper Siuslaw watershed is forested. Agricultural lands in the Lorane Valley include family livestock and hay operations, vineyards, nurseries, and rural residential properties.

Major tributaries of the Siuslaw River within the Management Area include Wolf, Wildcat and Chickahominy Creeks. There are also many small tributaries that flow directly into the Siuslaw from steep Coast Range slopes.

Southern Willamette Valley Groundwater Management Area (GWMA)

A small portion of the GWMA is within the Middle Willamette Agricultural Water Quality Management Area. Starting in the south, the GWMA includes land bounded on the west by Territorial Highway from Highway 36 north to Monroe, Highway 99W from Monroe to Corvallis, and Highway 20 from Corvallis to Albany. From the east, the GWMA is bounded by I-5 from just south of Coburg north to the intersection of I-5 with Muddy Creek, and then follows Muddy Creek until it's confluence with the Willamette River near Corvallis. From the north the eastern boundary is the Willamette River until its intersection with Highway 20. The southern boundary of the GWMA also includes several surface roads south of Junction City, but outside of the Middle Willamette Watershed. See Figure 2, Page 19 for a map of the GWMA.

Table 1 lists major tributaries of the Long Tom and Siuslaw watersheds within the Management Area.

Table 1. Acreages and major tributaries of watersheds in the Management Area.
(Thieman, 2000; Oregon Geospatial Data Clearinghouse, 2002)

Watershed	**Area (acres)**	**Major tributaries**
Long Tom River	257,584	Amazon Creek, Bear Creek, Coyote Creek, Elk Creek, Ferguson Creek, Spencer Creek
Upper Siuslaw River	200,554	Camp Creek, Douglas Creek, Letz Creek, South Fork, Walker Creek, Wildcat Creek, Wolf Creek

2.1.2. Geology and Soils

Coast Range

The Coast Range was created by compression and uplift as the Juan de Fuca, Kula, and Farallon Plates subducted under the North American plate along the Pacific coast. The mountains are composed primarily of sedimentary rocks such as shale, sandstone, and siltstone, as well as some volcanic material (Patching et al, 1987).

Soils in the Coast Range mountains are formed primarily from sedimentary material as well as some volcanic material. They are relatively unstable and subject to puddling and active erosion. Soils in the Coast Range foothills formed from alluvial and colluvial deposits, which have been weathered extensively. They are less subject to slumping than soils in steeper areas.

Willamette Valley

Willamette Valley lowlands are composed of alluvial material deposited during the Missoula floods and by the rivers and their tributaries. The alluvial material is underlain by sedimentary and volcanic formations, deposited through erosion as uplift processes created the Coast Range. Depending on the composition of the deposited material, soils in bottomlands and terraces range from excessively drained loams and well-drained gravelly loams to poorly drained silty clay loams and silt loams (Patching et al, 1987).

2.1.3. Climate

Like most of Western Oregon, the climate of the Management Area is relatively mild throughout the year. Temperatures rarely fall below zero during the winter, and exceed 90° F for only a few days during the summer each year (Patching, 1987). Average summer temperatures range from the low 50s to low 80s, and average temperatures in the winter are generally between the low 30s to about 40° F. The mean growing season (the number of days between 32° F temperatures) is 150 to 180 days on the valley floor to 110 to 130 days in the foothills (Patching, 1987).

Precipitation in the Management Area ranges from approximately 40 to 45 inches on the valley floor to 60 to 120 inches in the foothills and Coast Range. Approximately 70 percent of the precipitation falls during November through March. Most of the precipitation is in the form of rain on the Willamette Valley floor. The amount of snowfall increases with elevation.

2.1.4. Biological Resources

A variety of species depend on the Management Area's aquatic and upland habitats. In foothill and Coast Range forests, vegetation includes Douglas-fir, western hemlock, grand fir, western red cedar, bigleaf maple, and Oregon white oak (Pojar and MacKinnon, 1994). Forest wildlife species include Roosevelt elk, blacktail deer, black bear, porcupine, voles, and a variety of resident and Neotropical migratory songbirds and raptors (Csuti et al, 1997). Much of the lowland areas were historically wet prairie or oak savannah, and remnants of these areas are

scattered throughout the lower Long Tom watershed and Lorane Valley. Vegetation in these habitats includes Oregon white oak, California black oak, red alder, Oregon ash, and a variety of grasses, rushes and sedges, and wildflowers. Wildlife species include the acorn woodpecker, western bluebird, sharptail and ringneck snakes, and several species of shrew. Lowland riparian and wetland vegetation in the Management Area includes Oregon ash, willow, red osier dogwood, black cottonwood, snowberry, serviceberry, Pacific ninebark, and wild rose (Guard, 1995). Aquatic and riparian-obligate species in the Management Area include beaver, western pond turtle, northern red-legged frog, pacific tree frog, Oregon chub (Long Tom watershed, historically present), steelhead (Siuslaw watershed), cutthroat trout, coho (Siuslaw watershed), Pacific and brook lamprey, and other resident fish species. Migratory waterfowl, shorebirds, raptors, and songbirds are seasonally abundant throughout the area as well.

2.1.5. Land Use/Land Ownership

Agriculture and Forestry

Forestry and agriculture are the predominant land uses in the area. There are approximately 324,310 acres of forestlands in the area (Oregon Geospatial Data Clearinghouse, 2002). Most of the forestlands are located in the Coast Range and foothills. Major forest landowners and managers include the Bureau of Land Management, U.S. Forest Service, and many large and small private landowners.

Forest management on both federal and private lands has changed significantly in the past few decades. In federal forests, management objectives have diversified in recent years, and fish and wildlife habitat is now a greater priority. While timber harvest still occurs, there is less emphasis on timber production. Private landowners, from industrial timber companies to small woodland owners, are not only regulated by the Oregon Forest Practices Act, but have also made voluntary efforts to manage forestlands for multiple objectives including water quality.

Agricultural lands account for approximately 121,000 acres, or 25 percent of the Management Area (Oregon Geospatial Data Clearinghouse, 2002). Agriculture in the area includes grass seed, row crops, sheep, cattle, horses, and other livestock, hay, Christmas trees, vineyards, orchards, and nurseries. Farm size in the area ranges from 5-acre farms with pasture and horses to diverse farms of several thousand acres.

Limited Use Areas

There are several large natural areas in the Management Area. In the Upper Siuslaw watershed, the Bureau of Land Management manages several large tracts of forestland. Between Eugene and Veneta, federal and local agencies, nonprofit organizations, and private landowners manage several thousand acres of natural and constructed wetlands, native prairie remnants, oak savannah, and other habitats. This area includes Fern Ridge Reservoir and associated wildlife areas, the West Eugene Wetlands, and the Willow Creek Preserve.

Urban

Eugene is the largest urban area in the Management Area. There are also several smaller cities and rural communities, including Crow, Elmira, Junction City, Lorane, Monroe, Noti, and Veneta. The total population of the incorporated communities in the Management Area in 2006 was estimated to exceed 219,000 (Population Research Center, 2007).

2.2. Water Resources

2.2.1. Water Availability

As with most streams with headwaters in the Coast Range, rainfall provides much of the surface water supply in Management Area watersheds. Seasonal fluctuations in streamflow are much more pronounced in the Long Tom and Siuslaw watersheds than in streams with headwaters in the Cascade Mountains because snowmelt supplies a relatively small portion of the streamflow. Flow in the Siuslaw River during its highest flow month is 35 times the flow during the lowest flow month, while the high flow month – low flow month ratio for the Long Tom River is 116, much "flashier" than the high-flow – low-flow difference of just five times in the McKenzie River (Bastasch, 1998). Table 3 lists minimum, maximum, and average flows for several waterbodies in the area.

Groundwater resources in much of the Coast Range and foothills are relatively meager because there are few porous, permeable geologic formations to absorb and transmit water. Alluvial materials along major streams and rivers are the most abundant source of groundwater.

2.2.2. Water Use

Consumptive uses of water in the Management Area include irrigation, municipal use, and commercial use. Non-consumptive uses include recreation, power generation, and fish and wildlife habitat. Sources of appropriated water are reservoirs, surface water, and groundwater. Table 4 summarizes water allocations in the area. Allocations in cubic feet per second represent the maximum amount of water that may be withdrawn at any given time; allocations in acre-feet represent the total amount of water that may be withdrawn during a water year. In this table, "agriculture" appropriations are for agricultural uses other than irrigation, such as livestock watering.

Table 3. Minimum, maximum, and average flow in several waterbodies in the Management Area.
Flow is in cubic feet per second (cfs). Figures are derived from either U.S. Geological Survey stream gage data, gathered from the year the gage was installed until the present, or from Oregon Water Resources Department projections of stream flow based on water availability (U.S. Geological Survey, 2001, Oregon Water Resources Department, 1990).

Waterbody	Average Summer Flow (cfs)	Average Winter Flow (cfs)	Minimum Flow (cfs)	Maximum Flow (cfs)	Average Annual Flow (cfs)
Long Tom @Noti	38	542	.04	6,990	233
Long Tom @ Alvadore (just below Fern Ridge reservoir)	63	1,211	2	11,500	520
Long Tom River @ Monroe	70	1,842	7	19,300	760
Coyote Creek @ Crow	7	468	Not available	Not available	177

Table 4. Water allocations in several waterbodies in the Management Area.
Allocations are in cubic feet per second (cfs) or acre-feet (af) (Oregon Water Resources Department, 2003).

Waterbody	Irrigation	Agriculture	Domestic	Industrial	Municipal	Fish and Wildlife/ Other
Flat Creek	52 cfs 230 af	.08 cfs 0 af	.05 cfs 0 af	2 cfs 0 af	8 cfs 0 af	0 cfs 2 af
Long Tom	355 cfs 8,000 af	.2 cfs 285 af	.6 cfs 3 af	34 cfs 370 af	4 cfs 0 af	6 cfs 644 af
Upper Siuslaw	14 cfs 17 af	1 cfs 34 af	.4 cfs 0 af	1 cfs 0 af	0 cfs 0 af	245 cfs 154 af

2.3. Water Quality

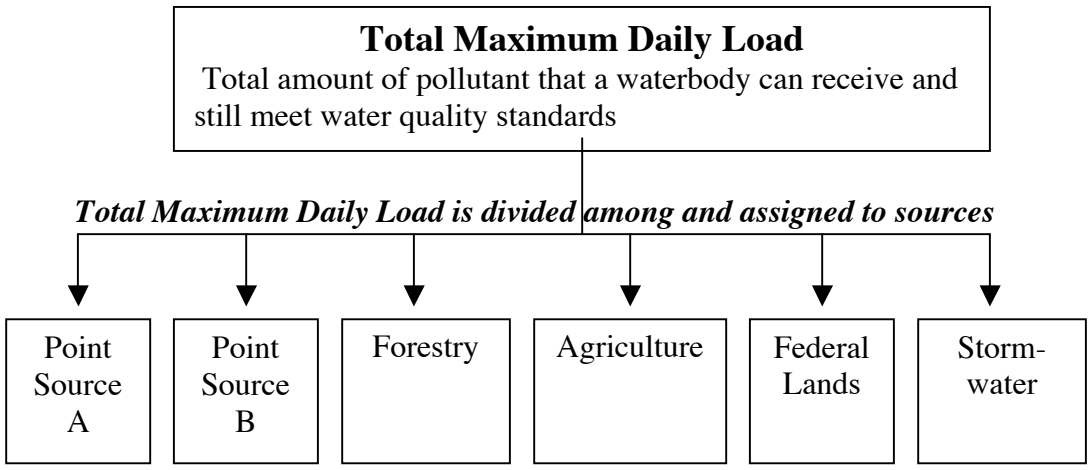
2.3.1. Clean Water Act

The Federal Clean Water Act (CWA) requires states to monitor water quality and identify waterbodies that do not meet water quality standards. In Oregon, these tasks are the responsibility of the Department of Environmental Quality (DEQ). Waterbodies that are identified as "water quality limited" are placed on the state "303(d)" list (named after the section of the CWA that requires the list be maintained).

DEQ has established state water quality standards for several water quality parameters, such as bacteria, temperature, and dissolved oxygen (Appendix B). The standards protect "beneficial uses" associated with waterbodies. Beneficial uses in Oregon include water contact recreation, drinking water, salmonid spawning and rearing, aesthetics, and livestock watering. A waterbody is placed on the 303(d) list for a particular parameter when water quality is no longer adequate to protect the most sensitive beneficial use.

DEQ is also responsible for developing Total Maximum Daily Loads (TMDLs), which specify the amount of a particular pollutant a waterbody can receive without exceeding water quality standards. Sources of pollution, such as wastewater treatment plants, industrial plants, city storm water runoff, agricultural lands, and forestlands, are identified and each assigned a maximum load in the TMDLs (Figure 1).

Figure 1. Each source of a pollutant in a waterbody is assigned a load in the TMDL for that waterbody.



2.3.2. Water Quality and Total Maximum Daily Loads in the Management Area

The DEQ evaluated data from its own monitoring program, the Lane Council of Governments, the U.S. Geological Survey, and data collected in other local studies to determine the listing status of stream segments in the Management Area. Several stream segments exceed state standards for temperature, bacteria, dissolved oxygen, and turbidity. Beneficial uses impaired by these water quality concerns include salmonid rearing and water contact recreation. Appendix A shows the 303(d) list and Decision Matrix for Management Area waterbodies.

Many water quality concerns occur seasonally throughout the Management Area. Temperature and dissolved oxygen violations occur during the summer months. Bacteria problems mainly occur during the fall, winter, and spring, when storm-related runoff and discharges are most likely to occur from a variety of sources.

Many factors may affect water quality in the Management Area. Water temperature may be increased by wastewater treatment plants, industrial operations, removal of riparian vegetation, seasonal reductions in stream flow, and stream channel and floodplain alteration. Contributors to bacteria and nutrient levels include wastewater treatment plants, applications of municipal wastewater, legal and illegal waste dumping sites, leaching septic systems, runoff from residential areas, runoff from agricultural lands, and background sources such as geese and elk.

Several researchers have studied agriculture and water quality issues within the Management Area. The Long Tom Watershed Council completed a two-year baseline water quality monitoring study in 2001. The resulting evaluation of water quality for several Long Tom sub-watersheds is in Table 5. The council also conducted an agricultural surface runoff pilot study during 2000-2001 to assess water quality of surface runoff from agricultural fields and the quality of recipient stream water. First year results indicated mostly low levels of total suspended solids in runoff from agricultural fields, and potentially problematic nitrate and phosphorus levels in runoff from some sites (Thieman, 2001). Researchers from Oregon State University (OSU) and other agencies conducted several research and education programs in the area related to groundwater and irrigation, nutrient and pesticides management on mint and other field crops. While pesticides in groundwater were detected at levels well below safe drinking water standards (Gatchell, 1996), nitrate levels were a concern in some areas (Petit, 1988; Penhallegon, 1994; Shelby, 1995). Researchers presented the results of their work through several educational forums, prompting many growers to alter their nutrient and irrigation application schedules (Smesrud and Selker, 1998).

In April 2007, the Long Tom Watershed Council updated its baseline water quality monitoring efforts with the publishing of its summary report for 1999-2006 (Thieman, 2007). A summary of the major issues and findings includes:

- High water temperature and low dissolved oxygen levels in most mid-elevation and lowland stream reaches pose threats to native fish populations
    - Stream vegetation, stream flow levels, and instream impoundments all are factors in high water temperatures
- There are high bacteria concentrations in parts of the watershed

- Nitrate and phosphorus levels appear to be highest in urban and agricultural areas

Table 6 summarizes the updated water quality status of Long Tom subwatershed.

Table 5. Long Tom Subbasins Water Quality Evaluation 1999-2001.
From the Long Tom Water Quality Monitoring Final Report for 1999-2001 (Thieman, 2001).
"Impaired" means water quality met the state standard for less than 50 percent of samples.
"Moderate" means water quality met the state standard for 50-85 percent of the samples.
"OK" means water quality met the state standard for more than 85 percent of the samples.

Subbasin	Water Temp	Turbidity	Dissolved oxygen	E. coli	pH	Nitrate-nitrite
Bear Creek	Impaired	OK	OK	Impaired	OK	OK
Coyote Creek	Impaired	OK	Moderate	Moderate	OK	OK
Elk Creek	Impaired	OK	OK	Moderate	OK	OK
Ferguson Creek	Impaired	OK	OK	Impaired	OK	OK
Lower Amazon	Impaired	OK	Moderate	OK	OK	OK
Lower Long Tom	Impaired	OK	Moderate	OK	OK	OK
Spencer Creek	Impaired	OK	Moderate	Moderate	OK	OK
Upper Amazon	Impaired	OK	Moderate	Impaired	OK	OK
Upper Long Tom	Impaired	OK	OK	Moderate	OK	OK

Table 6. Long Tom Subbasins Water Quality Evaluation 1999-2006.
From the Long Tom Water Quality Monitoring Final Report for 1999-2006 (Temperature map on page 16, Appendix F using the most downstream monitoring site) (Thieman, 2007).
"Impaired" means water quality met the state standard for less than 50 percent of samples.
"Moderate" means water quality met the state standard for 50-85 percent of the samples.
"OK" means water quality met the state standard for more than 85 percent of the samples.

Subbasin	Water Temp	Turbidity	Dissolved oxygen	E. coli (ave)	pH	Nitrate-nitrite
Bear Creek	Impaired	OK	Moderate	Impaired	OK	OK
Coyote Creek	Impaired	OK	Moderate	Moderate	OK	OK
Elk Creek	Impaired	OK	Moderate	Moderate	OK	Moderate
Ferguson Creek	Impaired	OK	Moderate	Impaired	OK	Moderate
Lower Amazon	Impaired	OK	Moderate	Moderate[a]	OK	Impaired
Lower Long Tom	Impaired	Moderate	Moderate	OK	OK	Impaired
Spencer Creek	Impaired	OK	Moderate	Moderate	OK	OK
Upper Amazon	Impaired	OK	Impaired	Impaired	OK	Moderate
Upper Long Tom	Impaired	OK	Moderate	Moderate	OK	Moderate

Notes: a/ Based on the single sample standard of >406 cells/mL

A watershed assessment has been completed for the Siuslaw watershed (Siuslaw Basin Council and Ecotrust, 2002). In addition to summarizing existing data on the watershed, the assessment included some ground truthing of water quality and habitat conditions. One concern identified in the assessment was stream temperature. The authors listed several contributors to stream temperatures above state water quality criteria, including a relatively warm summer climate compared with more northern coastal watersheds, lack of riparian cover, and the amount of exposed bedrock, which heats much more rapidly than gravel or sand, in and adjacent to stream channels.

Management Area Total Maximum Daily Loads (TMDLs)

To address water quality issues and impacts on beneficial uses in the Management Area, DEQ expects to complete the Siuslaw Subbasin TMDLs sometime in the year 2010.

DEQ has completed the Willamette Basin TMDLs – for temperature, bacteria, and mercury - and the US Environmental Protection Agency (EPA) approved the TMDLs in September of 2006. These TMDLs include temperature, bacteria and mercury loads specific to the Upper Willamette Subbasin. In addition, DEQ defined two additional TMDLs: dissolved oxygen for Amazon Diversion Channel and Coyote Creek, and turbidity for Fern Ridge Reservoir.

Temperature
DEQ endeavored to set the TMDL for temperature to protect salmon spawning, rearing, and passage as the most sensitive beneficial uses in the Upper Willamette Subbasin. DEQ has identified the existing nonpoint source pollution sources as solar heating of the Area's waterways due to a lack of riparian vegetation from forestry, agriculture, rural-residential, and urban activities.

Bacteria
DEQ has set the bacteria TMDL to protect human water contact recreation, the most sensitive beneficial use. Urban stormwater discharge and agricultural run-off are two potential sources of bacteria.

Mercury
Human fish consumption is the most sensitive beneficial use for which DEQ has set the Mercury TMDL. Primary sources of mercury include air deposition from national and international sources, discharge from specific legacy mining sites, and erosion of soils containing mercury.

Dissolved Oxygen
Salmon and trout rearing, resident fish and aquatic life, and fishing are the most sensitive beneficial uses in the Amazon Diversion Channel and Coyote Creek that DEQ attempts to protect with this TMDL. An interaction of high water temperatures and nutrient levels interact to create low dissolved oxygen levels that threaten fish survival. DEQ has identified multiple sources of pollutants, including stormwater discharges, agricultural run-off, and insufficient riparian vegetation.

Turbidity
In setting the TMDL for turbidity in the Fern Ridge Reservoir, DEQ looked at trout rearing, resident fish and aquatic life, and fishing as the most sensitive beneficial uses to defend. For potential sources of turbidity, DEQ has identified urban stormwater discharge, urban and agricultural run-off, and bank erosion from areas where the riparian vegetation has been removed.

Oregon agriculture and ODA have developed and are implementing the Area Plan and Area Rules for the Upper Willamette and Upper Siuslaw Management Area to achieve the TMDLs.

Southern Willamette Valley Groundwater Management Area

In 2004, the DEQ declared a Groundwater Management Area (GWMA) for the Southern Willamette Valley because monitoring data showed elevated nitrate levels in groundwater (Figure 2). In December 2006, after significant debate and research, the GWMA stakeholder committee action plan for the GWMA was finalized and accepted. This action plan is not a regulatory document, but includes many recommendations and voluntary strategies to address the issue of excess nitrate in regional groundwater. Currently, 93 percent of the land area within the GWMA is in agricultural use. Although agricultural use makes up the vast portion of land area, there are also many non-agricultural potential sources of nitrate. To address this, the action plan provides recommendations and strategies to reduce nitrate inputs from four focus sectors: (1) agricultural, (2) residential, (3) commercial / industrial / municipal, and (4) public water supplies. Some of these recommendations and strategies are already accomplished by or included in this document, and some will likely be incorporated and developed over time.

DEQ is currently conducting quarterly sampling of 38 groundwater monitoring locations inside the GWMA for nitrate. This program includes monitoring 24 shallow monitoring wells and 14 domestic wells. The domestic wells are generally installed deeper than the monitoring wells. As of October 2009, there appears to be some downward contamination trends, although there are some areas where nitrate levels are still increasing. In the spring of 2009, DEQ completed a Synoptic Sampling Event, where approximately 100 domestic wells in the GWMA were tested at the same time as the long-term monitoring wells. The mean nitrate concentration for the event was 5.5 mg/L, while the highest level of nitrate was close to 35 mg/L.

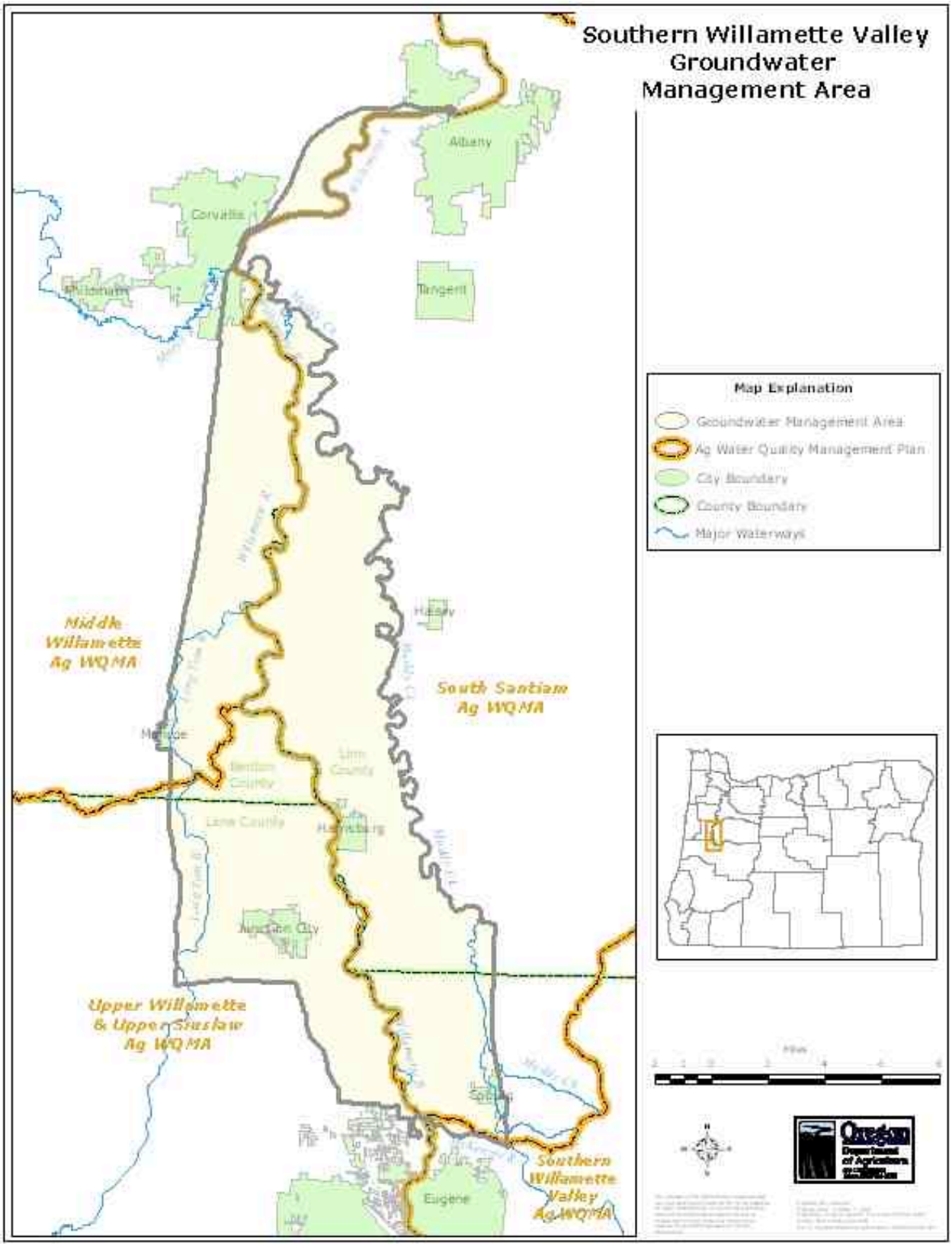


Figure 2: Southern Willamette Valley Groundwater Management Area

Blank

3. Mission, Goal, Objectives, and Strategies

3.1. Mission

The mission of the LAC is to advise ODA on development of methods to improve water quality directly related to agricultural practices in the Upper Willamette and Upper Siuslaw Agricultural Water Quality Management Area.

3.2. Goal

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

3.3. Objectives and Strategies

The LAC developed the following work plan with outreach and funding strategies for improving water quality. The objectives and strategies below are high priority and may be implemented by the Local Management Agency (Upper Willamette SWCD), with guidance and resources from ODA, and other partners as funding allows. The LAC recognizes that this list is not all-inclusive, that other strategies may also be effective in improving water quality, and that resources may not always permit these recommended strategies to be completed before the next biennial review.

Objective 1: Education

Create awareness among the agricultural community, rural landowners, and the public of conditions that cause water quality concerns or problems.

Strategy 1. Encourage education programs to promote public awareness of water quality issues.

- Co-sponsor workshops and tours between the SWCDs, OSU Extension (OSUE), other agencies, and agribusinesses (businesses directly related to the agriculture industry, such as fertilizer dealers or farm stores), or participate in events sponsored by agribusiness and other organizations to promote water quality issues.
  Target: Four workshops, tours, and/or agribusiness events, but at least two workshops (see Objective 2, Strategy 1).
- Develop demonstration projects showcasing successful management practices and systems.
  Target: Two demonstration projects (see Objective 2, Strategy 1).
- Organize demonstration project tours for agricultural managers and producers.
  Target: One tour of each demonstration project.

- Include updates on the status of the Area Plan and water quality data in SWCD newsletters.
  Target: Provide update in Annual Work Plan report and accompanying newsletter.
- Develop media articles, public service announcements, videos and other tools about the state's agricultural water quality program and successful resource management practices. Submit these information resources to local media for publication.
  Target: Eight articles and/or public service announcements delivered to local media. As other information resources are developed, share these with the media.
  Target: Distribute agricultural water quality technical and planning information to 2000 Upper Willamette SWCD residents through targeted mailings of Eugene Watershed Enhancement Board, Farm Services Agency, OSU/OSUE, and others as available.
- Sponsor or attend small acreage resource management workshops and give presentations on water quality issues to resource, recreation, and education groups.
  Target: Sponsor and/or attend 4 small acreage workshops or meetings.

Strategy 2. Build partnerships with agribusiness and agencies to promote water quality.

- Coordinate with ODA to update staff at local watershed councils, NRCS and OSUE offices to on the status and activities of this Area Plan.
  Target: Once per biennium to NRCS (Tangent office), Lane County OSUE, Long Tom Watershed Council, and two agribusinesses.
- *Coordinate with the Southern Willamette Valley Ground Water Management Area (GWMA) committee and staff to ensure that agricultural activities are being completed and the committee is updated regularly of the status of activities.*
- Develop educational materials in conjunction with agribusinesses and commodity and volunteer organizations.
  Target: Determine interest by at least three local agribusinesses to help sponsor agricultural water quality educational materials.
- Speak at industry and producer meetings or conferences.
  Target: Give presentations at two events.

Objective 2: Resource Management

Promote awareness of conditions that result in improvement of water quality.

The LAC recommends the following strategies be used to achieve this objective:

Strategy 1. Encourage agricultural producers to improve water quality.

- Promote the operational economic efficiency and water quality benefits of resource management practices by showcasing positive and effective practices through workshops and tours of demonstration projects.
  Target: Two workshops and two demonstrations projects (see also Objective 1, Strategy 1)

- Promote Integrated Pest Management (IPM).
  Target: Write one article (newsletter, newspaper, mass mailing, etc) discussing the management and economic considerations of IPM for a priority crop.
  Target: Integrate the article into one workshop or presentation.
- *Promote proper nutrient management and irrigation efficiencies to reduce nitrogen loss to groundwater.*
  Target: Work with eight producers to implement best management practices and one demonstration project.

Strategy 2. Provide information so producers can initiate improvements.

- Provide technical assistance from the SWCDs, NRCS, and partner organizations.
  Target: Provide technical assistance to 150 landowners, 50 of these within the Southern Willamette GWMA.
- Compile and make available ongoing research on effective practices, effective adaptive resource management, and practical knowledge from agricultural producers.
  Target: Obtain a research article (authored by OSU/OSUE, NRCS, etc.) or develop one that summarizes practical resource management for water quality.
  Target: Integrate the article into one workshop or presentation.

Resource Management Planning

Landowners and occupiers have flexibility in choosing management approaches and practices to address water quality issues on their lands. They may implement resource management systems on their own with or without an approved plan.

Alternative Management Practices

Alternative management practices are specific to individual farms and are selected by the landowner depending on the cropping system, livestock operation, topography, environmental, and economic conditions existing at a given site. As markets, technology, and cropping systems change, the alternative management practices which are most appropriate for a particular site may change as well. Producers should, therefore, view current practices as methods that are likely to change over time to reflect new technologies and management strategies.

The Upper Willamette SWCD offers technical assistance for resource management planning and will provide guidance to producers who wish to develop their own plans. In addition to the sound business practice of reviewing practices, resource management plans also qualify producers for a variety of funding programs. The United States Department of Agriculture (USDA) and other organizations offer financial assistance for implementing alternative management practices included in resource management plans (Appendix C). The Upper Willamette SWCD can also help connect the producer with the appropriate funding source that best meets their management goals.

Objective 3: Funding

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

The LAC recommends that Upper Willamette SWCD seek funding to implement the Upper Willamette & Upper Siuslaw Agricultural Water Quality Management Area Plan. Funding is necessary in three main areas:

1. Education – to fund education programs such as workshops, tours, and development of educational materials.

2. Technical assistance – maintain adequate staffing to provide technical assistance to producers to implement resource management for water quality improvement.

3. Financial assistance – to assist landowners in obtaining cost-share dollars to address water quality goals or needs.

The LAC recommends that the Upper Willamette SWCD, ODA, and other partners use the following strategies to achieve this objective:

Strategy 1. Obtain financial assistance for implementation of resource management practices, and funding for technical and/or resource management planning assistance, education, and water quality monitoring.

- Submit grants to the Oregon Watershed Enhancement Board (OWEB), the OWEB Small Grant Program, USDA, U.S. EPA, Oregon DEQ, and other agencies and private organizations.
  Target: Write and implement ten OWEB Small Grant Program awards to improve agricultural water quality.
- Form partnerships with the agribusiness sector for additional funding.
  Target: Join with an agribusiness to obtain one large grant to address a priority agricultural water quality issue.
- Promote USDA incentive based cost share programs to assist producers who are interested in conservation plan implementation.
  Target: Develop and implement two USDA NRCS conservation program plans that include federal cost-share (state and/or other costs-share may be integrated into these plans as well).
  Target: Write and implement ten agricultural water quality plans.
- Assist landowners in using the Pollution Abatement Tax Credit program.
  Target: Integrate this program into two conservation plans.
- Explore incentive programs designed to promote riparian enhancement on agricultural lands.

Target: Develop and implement four riparian enhancement project grants (can be large or small grants).

- Provide education to landowners on current incentive programs for riparian enhancement and other activities that enhance water quality.
  Target: Summarize this information in four presentations and four articles.

Strategy 2. Ensure adequate administration of the Upper Willamette & Upper Siuslaw Agricultural Water Quality Management Area Plan.

- Include implementation of the UW & US Willamette Agricultural Water Quality Management Area Plan in the Upper Willamette SWCD annual and long-range work plans.
  Target: Confirm this is accomplished.

Objective 4: Evaluation

Monitor and evaluate the effectiveness of the plan and rules.

The Local Advisory Committee recommends the following strategies be used by ODA, the Upper Willamette SWCD, and other partners to achieve this objective:

- Work with watershed councils, DEQ, Southern Willamette Valley GWMA, and other organizations conducting water quality monitoring to coordinate monitoring programs, evaluate completeness of existing programs, and identify additional monitoring that needs to be conducted.
  Target: The Upper Willamette SWCD and ODA will sponsor at least one meeting with primary water quality monitoring entities by January 15, 2010.

- Establish a plan for monitoring streams and surface water areas that will accurately reflect baseline water quality conditions and agricultural water quality trends. This could be augmentation or continuance of existing plans. For example, the Long Tom Watershed Council already has an extensive water quality-monitoring program.
  Target: This plan or augmentation will be a result of the above meeting.

- Document successful practices implemented in the Management Area.
  Target: Develop a research and documentation plan to evaluate best management practice implementation. Provide this review in the Biennial Report.

- Track increases in awareness of water quality issues.
  - Document participation in workshops, tours, demonstration projects, presentations, etc.
  - Document the number of agribusiness partnerships produced.

  Target: Provide this review in the Biennial Report.

- Monitor violations of prevention and control measures in the Upper Willamette & Upper Siuslaw Agricultural Water Quality Management Area.
    - Document the amount, subject, outcome and validity of complaints regarding potential violations of the prevention and control measures.
    - Review the ODA's compliance assessment, which will be done prior to the plan and rules review and update.

  Target: Provide this review in the Biennial Report and in the biennial review LAC meeting.

- Monitor the availability of cost-share funds to implement resource management practices.
  Target: Compare changes in cost-share available and obtained between biennial reviews; provide this information in the Biennial Report.

4. Prevention and Control Measures

The Agricultural Water Quality Management Act also provides for a regulatory backstop to ensure prevention and control of water pollution from agricultural sources in cases where landowners or operators refuse to correct problem conditions. Agricultural Water Quality Management Area Rules serve as this backstop while allowing landowners flexibility in how they protect water quality. Area Rules are goal-oriented and describe characteristics that should be achieved on agricultural lands, rather than practices that must be implemented.

This LAC developed Area Rules (Prevention and Control Measures) to protect water quality and prevent and control water pollution from agriculture. While developing the Area Rules that were adopted for the first time in 2003, the LAC also considered the time and expense that would be involved for area landowners to meet the rules. As a result, each Rule has an implementation date the LAC believed would be acceptable to area landowners. These implementation dates are now passed, and all landowners are expected to be in compliance with these prevention and control measures.

This Area Plan serves as a guidance document and, as stated in the Foreword, does not establish provisions for enforcement. The Area Rules developed with input from the LAC (OAR 603-095-2600 to 603-095-2660) are enforceable and are included in this document only as a reference for landowners.

Each Area Rule relates directly to water quality concerns identified on the 303(d) list in the Management Area, and addresses the Upper Willamette Total Maximum Daily Loads as required under the federal Clean Water Act. The concerns addressed in the Area Rules are described below.

Temperature

Oregon's temperature standard was set to protect coldwater aquatic life, the most sensitive beneficial use affected by stream temperature.

For many years, researchers have investigated factors that influence stream temperatures. Many studies highlight the significance of streamside shade in the maintenance of stream temperatures (Brown, 1969; Beschta, 1997). Several authors emphasize that the capture of precipitation in the soil profile and the eventual flow of groundwater into streams is key to maintaining stream temperatures (Krueger et al, 1999; Moore and Miner, 1997; Naiman and Decamps, 1997). Clark (1998) explains that both upland and riparian conditions strongly influence stream temperatures by affecting the infiltration of precipitation and the storage and release of water. Adequate ground cover in upland areas increases the likelihood of precipitation infiltrating into the soil profile and decreases the possibility of overland flow, soil loss and resulting sediment delivery to streams. Other influences on stream temperature include stream channel width, stream depth, channel substrate, air temperature, and elevation (Bilby, 1984; Chen et al, 1998; Ward, 1995).

Bacteria

The most commonly used indicator of fecal pollution in a waterbody is the organism *Escherichia coli* (*E. coli*). It is a type of fecal coliform bacteria. These bacteria reside in the intestines of warm-blooded animals, including humans, livestock, and wild birds and mammals. Not all *E. coli* are pathogenic; however, the presence of *E. coli* indicates contamination by sewage or animal manure and the potential for health risks.

Numerous factors influence the nature and amount of bacteria that reach waterways. Some of these factors are climate, topography, soil types, infiltration rates, animal species, and animal health. Typically, bacteria levels in streams are elevated after the first major storm event of the rainy season.

Bacteria also settle into sediments in a streambed and can live there for an extended period of time. If sediments are disturbed by increased stream turbulence following a runoff event, human or animal traffic, or other means, sediment-bound bacteria may be re-suspended into the water column (Sherer et al 1992). Sediment disturbance may account for erratic bacteria levels typically measured in water quality monitoring programs.

Oregon's water quality standard for bacteria was established to protect the most sensitive beneficial use affected by bacteria levels, water contact recreation.

Mercury

Mercury is a metal, liquid at room temperature, commonly used in the recent past for thermometers. It continues to have many dental, medical, and industrial uses. It is found naturally in the soils of the Willamette Valley. It is also found in fossil fuels and is released into the air upon combustion. In the air mercury can travel over continents and oceans to be deposited on land, added to naturally occurring mercury, and is carried by stormwater and erosion into Oregon's waterways. Fish consumption is the most common way humans are exposed to elevated levels of mercury (Oregon Department of Environmental Quality, 2007).

Mercury is also a severe poison. According to the DEQ (2007), small children and fetuses are most sensitive to mercury's toxic effects.

Mercury from point and non-point sources is bioaccumulating in fish tissue to levels that adversely affect public health. Mercury binds to particles; thus there are both higher levels of total suspended solids as well as higher mercury levels in the wet season. In setting the TMDL for mercury, DEQ has found that erosion of native soil makes up almost 48% of the mercury in the Willamette Basin. Some industrial facilities and domestic wastewater treatment facilities also discharge mercury, but at low levels.

The current DEQ mercury TMDL consists of interim targets and allocations. Sometime in 2011, DEQ plans to finalize these after additional data collection and public outreach (Oregon Department of Environmental Quality, 2007).

Dissolved Oxygen

Dissolved oxygen refers to the amount of oxygen that is dissolved in water. Oregon's dissolved oxygen standards protect cool and coldwater aquatic life, which require relatively high levels of dissolved oxygen to breathe.

Dissolved oxygen levels can vary over the course of the day based on algal growth and decay. An increase in available nutrients may result in elevated algal production, eventually depleting dissolved oxygen when algae decay. Temperature and dissolved oxygen exhibit an inverse relationship; as water temperature falls, dissolved oxygen levels rise; as water temperature rises, dissolved oxygen levels fall. Elevated stream temperatures, in addition to affecting the metabolic processes of aquatic animals, cause further physical stress by lowering the dissolved oxygen available for respiration.

Turbidity

Turbidity refers to the clarity of a waterbody. It includes the amount of suspended solids in the water column. Sediment, algae, and other particles contribute to turbidity.

Oregon's turbidity standard was established to protect fish and aquatic life. High turbidity levels can negatively affect aquatic life by consuming dissolved oxygen, clogging gills and other respiratory organs, reducing water infiltration through stream substrate (harming incubating fish eggs) and reducing animals' ability to see predators and prey.

Nitrate

Nitrate is a form of nitrogen that is dissolved in water (mainly an issue in groundwater). Oregon does not have a standard for nitrate, but public drinking water systems must adhere to the EPA standard for nitrate of 10 mg/L, which was established due to health concerns. Individuals with household wells are not required to adhere to drinking water standards.

Nitrate is highly soluble in water, easily mobile in the soil, and can potentially leach through the soil and into the groundwater. Potential sources of nitrate pollution include fertilizer, animal waste, septic systems, and wastewater.

Area Rules

Landowners in the Management Area are required to achieve the conditions outlined in the Area Rules below. Each Rule has a box around it and appears in italics. Relevant definitions are included after each Rule.

> ***OAR 603-095-2640***
>
> *(1) All landowners or operators conducting activities on lands in agricultural use shall comply with the following criteria. A landowner shall be responsible for only those conditions caused by activities conducted on land controlled by the landowner. A landowner is not responsible for violations of the Prevention and Control Measures resulting from actions by another landowner. Conditions resulting from unusual weather events (equaling or exceeding a 25-year, 24-hour storm event) or other exceptional circumstances are not the responsibility of the landowner. Limited duration activities may be exempted from these conditions subject to prior written approval by the department.*

Riparian Areas

> *(a) Effective upon rule adoption, agricultural activities shall allow the establishment and development of riparian vegetation along perennial and intermittent streams for streambank stability, shading, and proper riparian function, consistent with site capability.*
> *(A) Legally constructed drainage and irrigation ditches are exempt from OAR 603-095-2640(1)(a).*

Riparian vegetation means plant communities consisting of plants dependent upon or tolerant of the presence of water near the ground surface for at least part of the year (OAR 603-095-0010(36)).

Site capability means 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 site-specific. More information is included in Appendix E.

Waste, Nutrients, and Other Pollutants

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

(c) Corralled or enclosed livestock areas will be managed to control runoff of sediment and animal waste. Application and storage of manure will be done in a manner that minimizes the introduction of nutrients and bacteria to waterways.

Wastes has the meaning given in ORS 468B.005(7): 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.

Waters of the state has the meaning given in ORS 468B.005(8): 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.

Erosion and Sediment Control

(d) Effective January 1, 2004, agricultural activities will not cause the following visual indicators of erosion where erosion may cause sediment runoff into waters of the state:

(A) Sheet erosion; noted by scoured surfaces or pedestals of soil at the base of plants on sparsely vegetated or bare ground;

(B) Visible active gullies;

(C) Multiple rills, which have the form of gullies, but are smaller in cross-sectional area than one foot.

(D) This prevention and control measure applies to farm roads and staging areas, pastures, cropland, and other areas where agricultural activities occur.

Erosion, sheet means the removal of a fairly uniform layer of soil from the land surface by runoff water (OAR 603-095-0010(15)).

(e) Construction, maintenance, and use of surface drainage field ditches or surface irrigation field ditches shall cause no pollutant delivery to waters of the state from soil erosion induced by excessive channel slope, unstable channel cross section or placement of disposed spoils.

(f) Agricultural activities shall not cause pollution from active channel erosion or other means of sediment delivery from intermittent streams and drainage ways.

Active channel erosion means gullies or channels which at the largest dimension have a cross-sectional area of at least one square foot and which occur at the same location for two or more consecutive years (OAR 603-095-0010(1)).

> *(g) Roadways, staging areas, and heavy-use areas shall be constructed and maintained to prevent sediment or runoff contaminants from adversely affecting waters of the state.*
>
> *(A) Exemptions: Public roads and roads subject to the Oregon Forest Practices Act.*

Pesticides

Although no new Area Rules have been developed for pesticides, landowners should be aware that Oregon has strict laws and regulations related to pesticide use, storage, and reporting, and that improper application and storage may lead to surface or groundwater quality problems. All pesticide users are required to apply and store pesticides according to the label (ORS 634.372). Users of restricted-use pesticides are required to obtain certification from ODA's Pesticides Division.

5. Preferred Management Practices

The following tables are intended as recommendations for landowners to meet Area Rules and generally maintain and enhance natural resources on their property. The practices below benefit a variety of water quality parameters, not just those parameters of concern within the Management Area. The tables provide some idea of the water quality benefits of each practice as well as potential costs and benefits to landowners. The tables are organized by resource, such as nutrients and manure.

Landowners who want more information on any of the following practices, or who are looking for other ideas for water quality improvement and conservation on their lands, may contact several agencies and organizations that provide technical assistance (Appendix D) or read some of the publications cited below. Also, please consult Appendix C for a list of cost-sharing programs that cover many of these practices.

5.1. Riparian Areas and Streams

Practice	Resource Concerns Addressed	Potential Benefits of Practice to Producer	Potential Costs of Practice to Producer
a. Light rotational grazing in riparian area; timed when growth is palatable to animals and when riparian areas are not saturated (Adams, 1994; Chaney, Elmore and Platts, 1003; Rogers and Stephenson, 1998).	Helps establish desirable riparian vegetation, promotes streambank integrity; helps filter nutrients and sediment from runoff; helps reduce stream temperatures by providing shade.	May lessen streambank erosion and loss of pastures; allows limited use of riparian area for grazing, improves wildlife habitat, and may control weeds. Practice may be eligible for cost-sharing programs.	May require time and financial investment for livestock control and off-stream watering facilities. Practice may be eligible for cost-sharing programs.
b. Livestock exclusion from riparian area; establish off-stream watering facilities (Natural Resources Conservation Service, 1997g and 1997h).	Helps promote desirable riparian vegetation; promotes streambank integrity; helps filter nutrients and sediment from runoff; may help narrow channel and reduce erosion in channel.	May lessen streambank erosion and loss of pastures; less time involved in managing livestock grazing in riparian area, improves wildlife habitat. Practice may be eligible for cost-sharing programs.	May require higher weed control costs than seasonal riparian grazing. May require financial investment for livestock control and off-stream watering facilities. Practice may be eligible for cost-sharing programs.

Practice	Resource Concerns Addressed	Potential Benefits of Practice to Producer	Potential Costs of Practice to Producer
c. Plant perennial vegetation in riparian area. Recommend using native vegetation, or if using non-native vegetation, avoid using invasives (Guard, 1995; Pojar and MacKinnon, 1994).	Helps establish perennial riparian vegetation rapidly; promotes streambank integrity; may help narrow channel and reduce erosion in channel.	May lessen streambank erosion and loss of pastures. If livestock are excluded from riparian area, area may be eligible for federal cost-share programs. Some alternative perennial agricultural products may be harvested from riparian areas.	Costs of vegetation and weed control. May require financial investment for riparian fencing and off-stream watering facilities while vegetation establishes. Practice may be eligible for cost-sharing programs.

5.2. Nutrient and Manure Management

Practice	Resource Concerns Addressed	Benefits to Producer	Costs to Producer
a. Apply nutrients according to soil test results (Hart, Pirelli, and Cannon, 1995; Marx, Hart, and Stevens, 1999; Natural Resources Conservation Service, 1997i; Sullivan, 1998; Waskom, 1994).	Helps prevent nutrient runoff into waters of the state and leaching into groundwater.	May help reduce fertilizer costs; ensures that plants receive needed nutrients for growth; makes plants more competitive against weeds. Practice may be eligible for cost-sharing programs.	Costs of soil testing; time associated with taking soil samples. Practice may be eligible for cost-sharing programs.
b. Store manure under a tarp or roof; preferably on an impervious surface such as concrete or plastic (Gamroth and Moore, 1996; Godwin and Moore, 1997; Moore and Wilrich, 1993).	Helps prevent nutrient and bacteria runoff into waters of the state and leaching into groundwater.	Prevents nutrient leaching so manure applied on crops or pasture has higher nutrient content; may save some fertilizer costs; producers may be eligible for cost-sharing programs.	Cost of constructing manure storage facilities. Practice may be eligible for cost-sharing programs.

Practice	Resource Concerns Addressed	Benefits to Producer	Costs to Producer
c. Establish animal heavy-use areas where animals are confined during the winter to protect other pastures from trampling and compaction. Limit livestock access to pastures when soils are saturated; cover heavy-use areas with rock, hogged fuel, and/or geotextile. Clean manure regularly from heavy-use area (Natural Resources Conservation Service, 1997d).	Helps prevent sediment, nutrient and bacteria runoff into waters of the state and leaching into groundwater. Helps protect streamside areas.	Protects pastures from compaction during the winter, improving growth. May improve animal health by covering heavy-use areas with material so animals are not wading in mud. Practice may be eligible for cost-sharing programs.	Cost of fencing heavy-use area; cost of feeding hay during the winter; cost of materials for protecting heavy-use area. Practice may be eligible for cost-sharing programs.
d. Site barns and heavy-use areas away from streams (Godwin and Moore, 1997).	Helps prevent sediment, nutrient, and bacteria runoff into waters of the state. Helps protect streamside areas.	Helps prevent flooding in barns and heavy-use areas. Practice may be eligible for cost-sharing programs.	Need either off-stream watering facility or other source of water for livestock. Practice may be eligible for cost-sharing programs.
e. Prevent silage leaching and/or store and manage leachate from silage and other vegetative materials (Bruneau, Hodges, and Lucas, 1995; Feise, Adams, and LaSpina, 1993).	Helps prevent nutrient runoff into waters of the state and leaching into groundwater.	Preventing leaching maintains higher nutrient content of ensiled feed material. Practice may be eligible for cost-sharing programs.	May require cost of facility development and purchase of moisture-absorbing materials. Practice may be eligible for cost-sharing programs.

Practice	Resource Concerns Addressed	Benefits to Producer	Costs to Producer
f. Installing gutters and downspouts in areas with high livestock use. Connect downspout water to drainage system or, if possible, route clean downspout to a location where it can soak into the ground (Natural Resources Conservation Service, 1997f).	Helps prevent sediment, nutrient and bacteria runoff into waters of the state. Helps protect streamside areas.	May improve animal health by lessening mud during the winter, so animals are not wading in mud. Practice may be eligible for cost-sharing programs.	Cost of installation and maintenance of gutters and downspouts. Practice may be eligible for cost-sharing programs.
g. Cover heavily used animal walkways with sand, rock, and/or geotextile (Natural Resources Conservation Service, 1997c).	Helps prevent sediment, nutrient and bacteria runoff into waters of the state. Helps protect streamside areas.	Can improve animal health because animals are not wading in mud. Can help prevent animal health problems such as scratches, hoof or foot rot, and worms. Practice may be eligible for cost-sharing programs.	Cost of sand, rock or other materials. Owners should be aware that feeding equine species on sand may result in sand colic. Practice may be eligible for cost-sharing programs.

5.3. Erosion and Sediment Control

Practice	Resource Concerns Addressed	Benefits to Producer	Costs to Producer
a. Grazing management: graze pasture plants to appropriate heights, rotate animals between several pastures; provide access to water in each pasture (Ko, 1999; Lundin, 1996; Hirschi, 1997).	Helps prevent sediment, nutrient, and bacteria runoff into waters of the state. Helps protect streamside areas.	May improve pasture production; easy access to water may increase livestock production as well. May improve composition of pasture plants and help prevent weed problems. Practice	Cost of installing fencing, watering facilities for rotational grazing system; time involved in moving animals through pastures. Practice may be eligible for cost-sharing programs.

Practice	Resource Concerns Addressed	Benefits to Producer	Costs to Producer
		may be eligible for cost-sharing programs.	
b. Farm road construction: construct fords appropriately, install water bars or rolling dips to divert runoff to roadside ditches (Binn, 1998; U.S. Forest Service, 1998).	Helps prevent sediment runoff to waters of the state.	May help prevent water damage on farm roads. Practice may be eligible for cost-sharing programs.	Cost of installation and maintenance. Practice may be eligible for cost-sharing programs.
c. Plant appropriate vegetation along drainage ditches; seed ditches following construction (Natural Resources Conservation Service, 1997a).	Helps prevent sediment runoff into waters of the state.	May help prevent ditch bank erosion and slumping. Practice may be eligible for cost-sharing programs.	Costs of establishing vegetation. Practice may be eligible for cost-sharing programs.
d. Plant cover crops on erosion-sensitive areas (Natural Resources Conservation Service, 1997b; Hirschi, 1997).	Helps prevent sediment runoff into waters of the state; filters nutrients and slows runoff.	May reduce weed problems; prevents loss of applied nutrients. Practice may be eligible for cost-sharing programs.	Costs of establishing cover crops; cover crops may compromise primary crop. Practice may be eligible for cost-sharing programs.
e. Irrigate pasture or crops according to soil moisture and plant water needs (Hansen and Trimmer, 1997; Trimmer and Hansen, 1994).	Helps prevent irrigation return flow and associated nutrients and sediment to waters of the state.	May reduce costs of irrigation; may help crop or pasture production. Practice may be eligible for cost-sharing programs.	Installation/ maintenance cost. Monitoring time. Practice may be eligible for cost-sharing programs.

Practice	Resource Concerns Addressed	Benefits to Producer	Costs to Producer
f. Install/maintain diversions or French drains to prevent unwanted drainage into barnyards and heavy-use areas (Natural Resources Conservation Service, 1997e).	Helps prevent nutrient runoff into waters of the state.	Decreases muddiness and shortens saturation period in protected areas. Practice may be eligible for cost-sharing programs.	Cost of installation. Practice may be eligible for cost-sharing programs.
g. In areas where gullies repeatedly appear, install underground outlet or grassed waterway to capture and convey water (Natural Resources Conservation Service, 1997j and 1997k; Hirschi, 1997).	Prevents gully erosion and sediment runoff to waters of the state.	Prevents loss of soil and fertilizers, lessens inconvenience of driving equipment over gullies. Practice may be eligible for cost-sharing programs.	For underground outlet, costs of installing inlets and plastic pipe; for grassed waterways, costs of installation, seeding, weed control, and any land put out of production. Practice may be eligible for cost-sharing programs.
f. Install and manage field borders/filter strips along field boundaries (Natural Resources Conservation Service, 2001)	Controls sediment and nutrient movement to waters of the state. Erosion control during high water events.	Prevents loss of soil and fertilizers, lessens inconvenience of driving equipment in wet areas. Practice may be eligible for cost-sharing programs.	Cost of installation. Cost of management. Practice may be eligible for cost-sharing programs.

5.4. Pest Management

Practice	Resource Concerns Addressed	Benefits to Producer	Costs to Producer
a. Apply pesticides and herbicides according to the label. Use the correct rate and timing. Comply	Reduces risk of pesticide runoff to streams or other water resources.	Compliance with federal and Oregon law; reduces health risks to applicator, may decrease costs.	N/A

Practice	Resource Concerns Addressed	Benefits to Producer	Costs to Producer
with label restrictions and precautions.			
b. Triple rinse pesticide application equipment; apply rinsates to sites; dispose of or recycle clean containers according to Oregon law	Reduces risk of pesticide runoff to streams.	Dilutes pesticide residues; correct disposal or rinsate ensures compliance with federal and Oregon law; eliminates disposal costs of collected rinsates identified as hazardous waste.	Triple rinsing creates more volume that must be disposed of.
c. Calibrate, maintain, and correctly operate application equipment.	Reduces risk of pesticide runoff to streams.	May reduce use and therefore cost of pesticides; reduces health risks to applicator.	
d. Integrated pest management practices such as pheromone traps, beneficial insect release, and field monitoring. (either in combination with pesticide use or as a replacement to pesticide use)	Reduces risk of pesticide runoff to streams, may reduce loss of non-target species.	May improve effectiveness of pest control system. Practice may be eligible for cost-sharing programs.	Time involved to scout fields is usually offset by reduced or more effective pesticide use.
e. Store and mix pesticides on leak-proof facilities.	Reduces risk of pesticide runoff to streams.	Helps protect drinking water; reduces health risks to applicator.	Cost of installation and maintenance.
Store petroleum products such as fuel and oil in leak proof containers and facilities; clean up spills of petroleum products properly.	Reduces risk of runoff of petroleum products to streams or soil contamination.	Helps protect drinking water, reduces health risks to landowner or operator.	

Hirschi, 1994 and 1997

5.5. Nutrient and Irrigation Efficiencies

Practice	Resource Concerns Addressed	Benefits to Producer	Costs to Producer
Apply fertilizer at the correct rate and time applications for crop uptake.	Reduces the risk of excess nitrogen in the soil at the end of the growth season.	Precise application saves the producer money in fertilizer costs.	Time related to precision application.
Sample soil prior to fertilizer application to know existing nutrients.	Prevents the application of excess nutrients.	Precise application saves the producer money in fertilizer costs.	Cost of soil sampling and analysis.
Plant winter cover crops to take up excess nitrogen left over after crops are harvested.	Takes up extra nitrogen and limits potential for leaching into ground water.	Stores extra nitrogen in plant matter for later release when cover crop is incorporated into the soil.	Cost of seed and fuel to plant cover crop.
Properly maintain irrigation systems to prevent over-irrigation.	Prevents leaching of excess nitrogen past the root zone.	Uniform irrigation application and save producer money on nitrogen costs.	Replacement nozzles at least every four years is recommended.
Monitor soil water content and adjust irrigation schedules to maintain soil water content in an appropriate range in the root zone.	Prevents over-irrigation and leaching of excess nitrogen past the root zone.	Allows accurate irrigation application and keeps nutrients available to crops.	Soil monitoring equipment and time to evaluate soil water content.
Schedule irrigation applications based on expected evapotranspiration rates.	Prevents over-irrigation and leaching of excess nitrogen past the root zone.	Allows accurate irrigation application and keeps nutrients available to crops.	Time to evaluate expected evapotranspiration rates.

Selker et al, 2004

6. Administrative Roles and Responsibilities

6.1. Total Maximum Daily Loads

The Oregon DEQ, in accordance with the federal CWA, is required to list polluted streams (section 303(d) of the CWA) and establish TMDLs for waterbodies on the 303(d) list. The 303(d) list consists of streams that exceed state water quality standards. TMDLs identify the maximum amount (load) of each pollutant that a listed waterbody can receive and still meet state water quality standards. Once a TMDS is established for a particular pollutant, each source of pollution in the area will be assigned a portion of that load (see also Section 2.3.1), and each source must develop or modify pollution control plans and programs designed to achieve their load.

DEQ approved the TMDLs for the Willamette in 2006, and expects to complete those for the Siuslaw River Subbasin in 2010. The Area Plan and Rules seek to satisfy agriculture's load in the TMDLs for these waterbodies. Once TMDLs are completed for the Management Area, ODA and DEQ will compare the TMDLs and Area Plan and Rules to determine if any adjustments need to be made to the Area Plan and Rules to achieve agriculture's load allocations.

6.2. Designated Management Agency/Local Management Agency

The ODA is the "Designated Management Agency" for addressing agricultural water quality issues in the Management Area. In turn, through Memoranda of Agreement, ODA designated the Upper Willamette SWCD as the Local Management Agency to assist with the development and implementation of the Upper Willamette and Upper Siuslaw Agricultural Water Quality Management Area Plan.

SWCDs are legal, independent subdivisions of state government, and are led locally by an elected board of directors who serve four-year terms without pay. For several decades, SWCDs in Oregon have worked with landowners to promote the good stewardship of natural resources. Many SWCDs in Oregon choose to serve as Local Management Agencies for Area Plan development and implementation.

During the Area Plan and Rules development process, the Upper Willamette SWCD provided support to the LAC, conducted outreach and education about the Area Plan and Rules development process, and provided technical assistance to landowners in the Management Area who requested assistance with addressing water quality and other natural resource issues on their property. The LAC also received a great deal of assistance from the Long Tom Watershed Council.

During implementation of the Area Plan and Rules, the Upper Willamette SWCD, the NRCS, and other partners will continue conducting education and outreach programs, providing technical assistance to producers in evaluating and implementing resource management practices, and securing additional funds for plan implementation as resources allow.

Implementation priorities will be established and reviewed regularly through annual work plans developed by the SWCD and Memoranda of Agreement with ODA, with input from partner agencies.

ODA and the SWCD will provide information to individual landowners and interested groups on an ongoing basis.

6.3. Resolution of Complaints and Enforcement Action

ODA investigates complaints against landowners or occupiers who are reported to be out of compliance with OAR 603-095-2600 through 603-095-2660, the Area Rules. The complaint must relate to a specific site and contain a thorough description of the problem. ODA staff may also initiate an inspection if they directly observe violations of conditions or measures outlined in the Area Rules adopted to implement an Area Plan or if they are alerted to a violation by another agency.

Before conducting a complaint investigation, ODA makes every reasonable attempt to establish contact with the operator to schedule a site visit.

ODA uses professional judgment to determine if a violation of a condition exists. Based on this determination, ODA takes appropriate action to assure that the condition is remedied.

If a violation is found, ODA will use enforcement mechanisms where appropriate and necessary to gain compliance with the conditions. Any enforcement action is pursued only when reasonable attempts at voluntary solutions have failed.

A landowner or operator is responsible for only those conditions caused by activities conducted on land managed by the landowner or operator. Criteria do not apply to conditions resulting from unusual weather events or other exceptional circumstances that could not have been reasonably anticipated, such as fire or natural disaster. ODA recognizes that every farm and situation is different and will take into account each individual situation when applying the rules.

6.4. Monitoring and Evaluation of the Area Plan

Evaluation of the Area Plan's success involves several types of monitoring. These are:

- Baseline condition monitoring
- Trend monitoring
- Effectiveness monitoring
- Implementation monitoring

This section describes each type of monitoring and the activities associated with each type of monitoring.

Baseline Condition and Trend Monitoring – What are current conditions and how are they changing?

Baseline condition monitoring provides a starting point for assessing water quality trends and land conditions. To evaluate the effects of the Area Plan and Rules, implementation partners must establish a picture of conditions prior to implementation.

Trend monitoring evaluates long-term changes in landscape conditions and water quality. In general, trend monitoring activities are a continuation of baseline monitoring activities. Ideally, areas selected for baseline monitoring will also be used for trend monitoring.

To assess existing water quality conditions, the ODA water quality staff review water quality data from the Oregon DEQ's Laboratory Analytical Storage and Retrieval (LASAR) database. In many cases, monitoring sites included in this database are adequate to track water quality in agriculturally influenced watersheds. In other cases, ODA staff may recommend additional monitoring sites that would be useful for tracking agriculture's effects on water quality.

ODA looks at all data for trends, but focuses on the parameters of concern for the specific subbasin.

ODA applies the following criteria to water quality data used for trend monitoring:

1) Monitoring stations must have at least partial influence from agricultural lands.
2) Data must not be older than 1985.
3) Data must be a continuous record of at least two years (the frequency of monitoring was not considered).
4) Data set ideally should include at least the following constituents:
    a) Total Suspended Solids
    b) Nitrate
    c) Ammonia
    d) E. coli or fecal coliform
    e) Total Phosphorus or orthophosphate
    f) Dissolved Oxygen, or Chemical Oxygen Demand/Biochemical Oxygen Demand
    g) pH

The above constituents are considered needed for tracking changes in water quality related to agricultural activities. Temperature is not included on this list because it is continuously monitored, rather than periodically like the parameters above, and because ODA expects changes in temperature to take place more slowly with changes in land conditions.

An ODA review of monitoring stations in the Management Area concluded the existing sites do not provide enough data to characterize water quality trends as part of ODA's larger statewide effectiveness monitoring efforts. However, the LAC identified several additional sites that would be useful for tracking water quality trends locally in agriculturally influenced watersheds. Below is a summary of water quality trends from the existing stations in the LASAR database reviewed by ODA, followed by summaries of watershed council monitoring data and the LAC's recommendations for additional monitoring sites.

LASAR Data Summary

Only two monitoring stations on the LASAR database are suitable for monitoring trends in agricultural lands in this basin. These are the Long Tom River at Stow Pit Road (near Monroe) and the Willamette at Hwy 126. However, this latter site also has a strong urban influence. The Long Tom site has a much stronger agricultural influence. Water quality at the Long Tom site is adversely affected by elevated concentrations of E. coli, and some occurrences of elevated pH and turbidity.

Review of the data current as of 2007 shows that there is a declining trend in *E. coli* at the Long Tom monitoring site. This site does show frequent problems with elevated turbidity, but there is no apparent trend in turbidity concentrations. As of September 2009, there were no appreciable changes in water quality at the Long Tom monitoring location.

In addition to the LASAR data summary prepared by ODA, the Long Tom Watershed Council provided information on their monitoring efforts for this report, including water temperature monitoring efforts.

In April 2007, the Long Tom Watershed Council updated its baseline water quality monitoring efforts with the publishing of its summary report for 1999-2006. A summary of the major issues and findings includes:

- High water temperature and low dissolved oxygen levels in most mid-elevation and lowland stream reaches pose threats to native fish populations
    - Stream vegetation, stream flow levels, and instream impoundments all are factors in high water temperatures
- There are high bacteria concentrations in parts of the watershed
- Nitrate and phosphorus levels appear to be highest in urban and agricultural areas
- Bear Creek, Elk Creek, Ferguson Creek, Upper Amazon Creek, and Upper Long Tom River Dissolved Oxygen (DO) levels show a downward trend
- Worsening bacteria levels are evident in the Lower Amazon, while the Bear Creek, Ferguson Creek, and Upper Amazon Creek remain impaired and have shown no improvement
- The following waterways show increasing levels of nitrate-nitrogen: Elk, Ferguson, Lower Amazon, Lower Long Tom, Upper Amazon, and Upper Long Tom.

- No waterways showed an overall improvement in water quality.

Additional Recommendations for Monitoring Sites

The LAC identified additional sites that would help characterize trends in agriculturally-influenced watersheds in the Management Area. The LAC recommends adding long-term monitoring station a site between Eugene and Monroe, possibly Amazon Creek at High Pass Road.

Effectiveness monitoring – Are efforts protecting and improving water quality?

Effectiveness monitoring occurs at two scales. At a Management Area scale, land management, land condition, and water quality data are compared to determine if changes in land conditions are improving water quality in relation to beneficial uses. At a farm scale, ODA and local partners have initiated several projects to evaluate the effects of several management practices on water quality.

ODA is focusing land condition monitoring efforts on riparian areas because these areas have such an influence over water quality. Riparian land conditions are evaluated every five years by analyzing aerial photographs of about 5 percent of the riparian agricultural land. ODA staff examine riparian ground cover at specific points in 90-foot bands along the stream from the aerial photos and assign each sample stream reach a score based on ground cover. The score can theoretically range from 70 (all trees) to 0 (all bare ground). Staff will then compare that score with the score when photos are taken again in five years, tracking changes in riparian conditions over time. Because site conditions vary across the state, there is no one correct riparian index score. As of October 2009, this project is on hold because of budget constraints.

Implementation monitoring – What is being accomplished?

Implementation monitoring tracks the outreach and conservation practices that have been implemented to benefit water quality. The Upper Willamette SWCD and NRCS track practices that have been implemented through quarterly reports to the ODA and through an NRCS database. In addition, projects that have received funding from the OWEB are tracked in OWEB's restoration database.

For a report of accomplishments see attachment A to the biennial report.

7. Public Participation

ODA, the Upper Willamette SWCD, and other partners solicited community participation for development of the first Upper Willamette and Upper Siuslaw Agricultural Water Quality Management Area Plan and Rules in 2000. The SWCD prepared press releases to encourage participation on the LAC, and also spoke about the Area Plan and Rules development process at meetings of local organizations such as watershed councils and agricultural groups.

During the Area Plan and Rules development process, interested members of the public received announcements of all committee meetings. Meetings were publicized in local newspapers and publications, and ODA and SWCD staff provided updates on the process to local watershed councils and other organizations.

When the draft for the initial Area Plan and Rules were complete, the Area Plan and Rules were presented to the public at two information sessions in December 2002, at a Long Tom Watershed Council meeting in January 2003, and in several local newspaper articles. ODA conducted a formal public comment period in January and February 2003, including two public hearings where members of the public could comment on the drafts. After the comment period, the LAC and ODA reviewed the comments and as appropriate, made changes to the final plan and rules.

For the draft of the 2007 version of the Area Plan and Rules, notices of the review were provided to those on the Interested Parties List and to the Lane County Commissioners.

ODA, the Upper Willamette SWCD, and other partners will continue to conduct outreach and education to the public and especially to agricultural producers. For more information on outreach and education efforts to take place after Area Plan and Rules completion, please consult Section 3 of the Area Plan.

References

Adams, E.B. 1992. Farming practices for groundwater protection. Washington State University, Spokane, Washington.

Adams, E.B. 1994. Riparian grazing. Washington State University, Spokane, Washington.

Bastasch, R. 1998. Waters of Oregon. Oregon State University Press, Corvallis, Oregon.

Beschta, R.L. 1997. Riparian shade and stream temperature: an alternate perspective. Rangelands 19:25-28.

Bilby, R.E. 1984. Characteristics and frequency of cool-water areas in a western Washington stream. Journal of Freshwater Ecology 2:593-602.

Brown, G.W. 1969. Predicting stream temperatures of small streams. Water Resources Research 5:68-75.

Blinn, C. 1998. Managing water on roads, skid trails, and landings. Minnesota Department of Natural Resources, St. Paul, Minnesota.

Bruneau, A., S. Hodges, and L. Lucas. 1995. Water quality and home lawn care. North Carolina Cooperative Extension Service, Raleigh, North Carolina.

Chaney, E., W. Elmore, and W.S. Platts. 1993. Livestock grazing on western riparian areas. U.S. Environmental Protection Agency, Seattle, Washington.

Chen, D.Y., R.F. Carsel, S.C. McCutcheon, and W.L. Nutter. 1998. Stream temperature simulation of forested riparian areas. Journal of Environmental Engineering 124:316-328.

Clark, A. 1998. Landscape variables affecting livestock impacts on water quality in the humid temperate zone. Canadian Journal of Plant Science 78:181-190.

Csuti, B. et al. 1997. Atlas of Oregon Wildlife. Oregon State University Press, Corvallis, Oregon.

Darris, D. and S.M. Lambert. 1993. Native willow varieties for the Pacific Northwest. U.S. Department of Agriculture Soil Conservation Service, Corvallis Plant Materials Center, Corvallis, Oregon.

Feise, C., E. Adams, and J. LaSpina. 1993. Silage storage. Washington State University Cooperative Extension Service, Pullman, Washington.

Gamroth, M. and J.A. Moore. 1996. Assessing your manure management for water quality risk. Oregon State University Extension Service, Corvallis, Oregon.

Gatchell, L. 1996. Master's Thesis. Oregon State University, Corvallis, Oregon.

Godwin, D. and J.A. Moore. 1997. Manure management on small farm livestock operations. Oregon State University Extension Service, Corvallis, Oregon.

Godwin, D. and B. Rogers. 1998. Riparian area evaluation and management. Section II, Chapter 6 in Watershed Stewardship: A Learning Guide. Oregon State University Extension Service, Corvallis, Oregon.

Guard, J. 1995. Wetland plants of Oregon and Washington. Lone Pine Publications, Redmond, Washington.

Hansen, H. and W. Trimmer. 1997. Irrigation runoff control strategies. Pacific Northwest Extension, Corvallis, Oregon.

Hart, J., G. Pirelli, and L. Cannon. 1995. Fertilizer guide for pastures in western Oregon and western Washington. Oregon State University Extension Service, Corvallis, Oregon.

Hart, J. 1995. How to take a soil sample...and why. Oregon State University, Corvallis, Oregon.

Hart, J. 1999. Analytical laboratories serving Oregon. Oregon State University, Corvallis, Oregon.

Hermanson, R.E. 1994. Care and feeding of septic tanks. Washington State University, Spokane, Washington.

Hirschi, M. 1994. 50 ways farmers can protect their groundwater. North Central Regional Extension, Urbana, Illinois.

Hirschi, M. 1997. 60 ways farmers can protect surface water. North Central Regional Extension, Urbana, Illinois.

Ko, L. 1999. Tips on land and water management for small acreages in Oregon. Oregon Association of Conservation Districts, Portland, Oregon.

Krueger, W.C., T.K. Stringham, and C.E. Kelley. 1999. Environmental and management impacts on stream temperature. Final report. Department of Rangeland Resources, Oregon State University, Corvallis, Oregon.

Lundin, F. 1996. Pasture management guide for coastal pastures in Oregon and Washington. Oregon State University Extension Service, Corvallis, Oregon.

Marx, E.S., J. Hart, and R.G. Stevens. 1999. Soil test interpretation guide. Oregon State University Extension Service, Corvallis, Oregon.

Moore, J. and T. Willrich. 1993. Manure management practices to reduce water pollution. Oregon State University Extension Service, Corvallis, Oregon.

Naiman, R.J. and H. Decamps. 1997. The ecology of interfaces: riparian zones. Annual Review of Ecology and Systematics 28:621-658.

Nash, E. and T. Mikalsen, eds. 1994. Guidelines for streambank restoration. Georgia Soil and Water Commission, Atlanta, Georgia.

Natural Resources Conservation Service. 1997a. Conservation practice standard for critical area planting. Natural Resources Conservation Service, Portland, Oregon.

Natural Resources Conservation Service. 1997b. Conservation practice standard for cover and green manure crop. Natural Resources Conservation Service, Portland, Oregon.

Natural Resources Conservation Service. 1997c. Conservation practice standard for animal trails and walkways. Natural Resources Conservation Service, Portland, Oregon.

Natural Resources Conservation Service. 1997d. Conservation practice standard for heavy-use area protection. Natural Resources Conservation Service, Portland, Oregon.

Natural Resources Conservation Service. 1997e. Conservation practice standard for diversion. Natural Resources Conservation Service, Portland, Oregon.

Natural Resources Conservation Service. 1997f. Conservation practice standard for roof runoff management. Natural Resources Conservation Service, Portland, Oregon.

Natural Resources Conservation Service. 1997g. Conservation practice standard for use exclusion. Natural Resources Conservation Service, Portland, Oregon.

Natural Resources Conservation Service. 1997h. Conservation practice standard for livestock watering facility. Natural Resources Conservation Service, Portland, Oregon.

Natural Resources Conservation Service. 1997i. Conservation practice standard for nutrient management. Natural Resources Conservation Service, Portland, Oregon.

Natural Resources Conservation Service. 1997j. Conservation practice standard for underground outlet. Natural Resources Conservation Service, Portland, Oregon.

Natural Resources Conservation Service. 1997k. Conservation practice standard for grassed waterway. Natural Resources Conservation Service, Portland, Oregon.

Natural Resources Conservation Service. 2001. Conservation practice standard for filter strip. Natural Resources Conservation Service, Portland Oregon.

Oregon Department of Environmental Quality. 2007. Reducing Mercury Pollution in the Willamette River. Oregon Department of Environmental Quality, Portland Oregon.

Oregon Geospatial Data Clearinghouse. 2002. Watershed information for Oregon. Oregon Geospatial Data Clearinghouse, Portland, Oregon.

Oregon Water Resources Department. 2003. Water Rights Information System. Oregon Water Resources Department, Salem, Oregon.

Patching, W.R. et al. 1987. Soil survey of Lane County Area, Oregon. United States Department of Agriculture – Natural Resources Conservation Service, Portland, Oregon.

Penhallegon, R. 1994. Private well testing results for Lane County, Oregon. Oregon State University March 1994 Lane County Extension Report.

Petit, G. 1988. Assessment of Oregon's groundwater for agricultural chemicals. Report to the state of Oregon, Department of Environmental Quality, Portland, Oregon.

Pojar, J. and A. MacKinnon. 1994. Plants of the Pacific Northwest Coast. Lone Pine Publishing, Redmond, Washington.

Population Research Center. 2000. April 1, 2000 census and revised estimates for July 1, 2000 for Oregon, its counties, and cities. Portland State University, Portland, Oregon.

Rogers, B. and G. Stephenson. 1998. Livestock and forage management in western Oregon riparian areas. Section III, Chapter 3 in Watershed Stewardship: A Learning Guide. Oregon State University Extension Service, Corvallis, Oregon.

Sattell, R. et al. 1999. Nitrogen scavenging: using cover crops to reduce nitrate leaching in western Oregon. Oregon State University, Corvallis, Oregon.

Selker, J. et al. 2004. Nitrates and Groundwater: Why Should We Be Concerned with Our Current Fertilizer Practices? Special Report 1050. Oregon State University, Corvallis, Oregon.

Shelby, R. 1995. Assessment of groundwater recharge and quality under agricultural production in Lane County, Oregon. Master's Thesis. Oregon State University, Corvallis, Oregon.

Sherer, B.M. et al. 1992. Indicator bacterial survival in streams and sediments. Journal of Environmental Quality 21:591-595.

Siuslaw Basin Council and Ecotrust. 2002. A watershed assessment for the Siuslaw Basin. Siuslaw Basin Council, Mapleton, Oregon.

Smesrud, J.K. and J.S. Selker. 1998. On-farm testing of BMPs' reduction of nitrate loading to groundwater. Final report to Oregon Department of Agriculture. Oregon State University, Corvallis, Oregon.

South Santiam Watershed Council. 1998. Guide for using Willamette Valley native plants along your stream. Linn SWCD, Tangent, Oregon.

Thieman, C. 2000. Long Tom Watershed Assessment. Long Tom Watershed Council, Eugene, Oregon.

Thieman, C. 2001. Long Tom Water Quality Monitoring Program Final Report for 1999-2001. Long Tom Watershed Council, Eugene, Oregon.

Thieman, C. 2007. Stream Health and Water Quality in the Long Tom Watershed, 1999-2006. Eugene (OR): Long Tom Watershed Council Technical Report No. 2007-M-01. 2007. 36 p.

Trimmer, W. and H. Hansen. 1994. Irrigation scheduling. Pacific Northwest Extension, Corvallis, Oregon.

United States Geological Survey. 1995. 1995 water resources data for Oregon. United States Geological Survey, Portland, Oregon.

United States Geological Survey. 2001. Calendar year streamflow statistics for the nation. United States Geological Survey, Portland, Oregon.

United States Geological Survey. 2001. Monthly streamflow statistics for the nation. United States Geological Survey, Portland, Oregon.

Ursander, D. et al. 1997. Pastures for Profit: a guide to rotational grazing. University of Wisconsin, Madison, Wisconsin.

Ward, J.V. 1985. Thermal characteristics of running waters. Hydrobiologia 125:31-46.

Waskom, R. 1994. Best management practices for phosphorus fertilization. Colorado State University Cooperative Extension, Fort Collins, Colorado.

Blank

Appendices

A. 2006—303(d) List and Decision Matrix for the Upper Willamette and Upper Siuslaw
B. 303(d) List Parameters and Affected Beneficial Uses
C. Conservation Funding Programs
D. Sources of Information and Technical Assistance
E. Site Capability

Blank

Appendix A: 2006 303(d) List & Decision Matrix for the Upper Willamette and Upper Siuslaw

ALKALINITY/pH

Potential Concern	Season
Ferguson Creek, Mouth to Headwaters	
Long Tom River, Mouth to Headwaters	

303(d) List	Season
Amazon Creek Diversion Channel, River Mile (RM) 0 – 3	Summer
Cedar Creek, Mouth to Headwaters	Fall-Winter-Spring
Long Tom River, RM 26.8 – 52	Fall-Winter-Spring

DISSOLVED OXYGEN

Potential Concern	Season
Siuslaw River, Mouth to Headwaters	May 1 – September 30

303(d) List	Season
Amazon Creek Diversion Channel, RM 0 – 1.8	June 1 – September 30
Coyote Creek, Mouth to Headwaters	May 1 – October 31

TEMPERATURE

303(d) List	Season
Siuslaw River, Mouth to Headwaters	Summer
Long Tom River, Mouth to Fern Ridge Reservoir	Summer
Coyote Creek, Mouth to Headwaters	
Ferguson Creek, Mouth to Headwaters	

MERCURY

303(d) List	Season
Amazon Creek Diversion Channel, RM 0 – 3.5	

NUTRIENTS

Potential Concern	**Season**
Long Tom River (Phosphorus), Mouth to Headwaters	Summer

BIOLOGICAL CRITERIA

Potential Concern

Long Tom River, Fern Ridge Reservoir to Headwaters
Fox Hollow Creek (Coyote Creek watershed), RM 0 – 7.1

303(d) List

Siuslaw River, South Fork

BACTERIA

303(d) List	**Season**
Long Tom River, Mouth to Fern Ridge Reservoir	Fall-Winter-Spring
Amazon Creek Diversion Channel, RM 0 - 3	Year Round
Coyote Creek, Mouth to Headwaters	Year Round
Fern Ridge Reservoir	Fall-Winter-Spring
Bear Creek, Mouth to Headwaters	
Ferguson Creek, RM 0 – 8	
Spencer Creek, Mouth to Headwaters	Fall-Winter-Spring

TOXICS (may include: *Antimony*, *Arsenic*, *Cadmium*, *Chromium*, *Chlordane*, *Chlorophenozy Herbicides (2,4-d), Copper*, *DDT*, *Dichloroethylenes*, *Dioxin (2,3,7,8-TCDD*, *Dioxins/Furans, Iron,* Lead, *Manganese*, *Nickel*, *Pentachlorophenol*, *Phthalate Esters, Polynuclear Aromatic Hydrocarbons, Silver, Tetrachloroethylene* and *Zinc*)

Potential Concern	**Season**
A-3 Channel, Mouth to Headwaters	
Amazon Creek, Mouth to Headwaters	
Fox Hollow Creek. RM 0 to 7.1	

303(d) List	**Season**
A-3 Channel, Mouth to Headwaters	
Amazon Creek, Mouth to Headwaters	

Long Tom River, Mouth to Headwaters

TURBIDITY

303(d) List

Fern Ridge Reservoir

Blank

Appendix B: 303(d) List Parameters and Affected Beneficial Uses

The following is a list of parameters used by the DEQ in establishing the 303(d) List and the beneficial uses of water impacted by these parameters. This is an abbreviated summary and does not contain detailed descriptions of the standards. Specific information about these standards can be found in the Oregon 303(d) List or in OAR 340-041-0445. Listed parameters in the Management Area are indicated in boxes.

Parameters

Aquatic Weeds or Algae

Standard – The development of fungi or other growths having a deleterious effect on stream bottoms, fish, or other aquatic life, or which are injurious to health, recreation, or industry may not be allowed.

Beneficial Uses Affected - Public and private domestic water supply, irrigation, industrial water supply, livestock watering, fishing, water contact recreation, aesthetic quality.

Bacteria

Standard – *E. coli* levels shall not exceed a 30-day log mean of 126 *E. coli* organisms per 100 ml, based on a minimum of 5 samples and no single sample shall exceed 406 *E. coli* organisms per 100 ml. Bacterial pollution or other conditions deleterious to waters used for domestic purposes, livestock watering, irrigation, bathing, or shellfish propagation, or otherwise injurious to public health, may not be allowed.

Beneficial Uses Affected - Public and private domestic water supply, livestock watering, water contact recreation.

Biological Criteria

Standard – Waters of the State shall be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.

Beneficial Uses Affected - Salmonid spawning and rearing, resident fish and aquatic life.

Chlorophyll a

Standard – The following average Chlorophyll a values shall be used to identify waterbodies where phytoplankton may impair the recognized beneficial uses:

1.Natural lakes, which thermally stratify: 0.01 mg/l

2.Natural lakes, which do not thermally stratify, reservoirs, rivers, and estuaries: 0.015 mg/l

Beneficial Uses Affected - Water supply, fishing, water contact recreation, aesthetic quality.

Dissolved Oxygen
Standard - For waterbodies identified as salmonid spawning, dissolved oxygen must not be less than 11.0 mg/l and intergravel levels must not fall below 6mg/l. For waterbodies supporting cold water aquatic life, dissolved oxygen must not fall below 8 mg/l. For waterbodies supporting cool water aquatic life, dissolved oxygen must not fall below 6.5 mg/l. For waterbodies supporting warm water aquatic life, dissolved oxygen must not be less than 5.5 mg/l.
Beneficial Uses Affected - Salmonid spawning & rearing, resident fish and aquatic life.

Mercury
Standard – The methylmercury criterion for fish consumption is 300 micrograms/kilogram (ug/kg) of fish tissue. In addition, the current freshwater 'acute' criterion for mercury is 2.4 micrograms/liter (ug/l) and the freshwater 'chronic' criterion is 0.012 ug/l. See Table 33A Water Quality Criteria Summary; OAR 340-041-0033.
Beneficial uses affected – Human health (fish consumption)

Note: DEQ listed mercury on the 303(d) list and developed a mercury TMDL due to fish consumption advisories issued in the Willamette Basin. Therefore, the 300 ug/mg for methylmercury is the most applicable criterion.

Nutrients
Standard - see standards for aesthetics, pH, dissolved oxygen, chlorophyll a, and aquatic weeds or algae.
Beneficial Uses Affected - Aesthetics or use identified under related parameters.

pH
Standard - pH shall not fall outside 6.5 to 8.5. The following exception applies: waters impounded by dams existing on January 1, 1996, which have pHs that exceed the criteria shall not be considered in violation of the standard if the DEQ determines that the exceedance would not occur without the impoundment and that all practicable measures have been taken to bring the pH in the impounded waters into compliance with the criteria.
Beneficial Uses Affected - Salmonid spawning & rearing, resident fish and aquatic life, water

Sedimentation
Standard – The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry shall not be allowed.
Beneficial Uses Affected - Salmonid spawning & rearing, resident fish and aquatic life.

Temperature
Standard –Biologically Based Numeric Criteria. Unless superseded by natural conditions, the temperature criteria for State waters supporting salmonid fishes are as follows:

a. The seven-day-average maximum temperature of a stream identified as having salmon and steelhead spawning use may not exceed 13.0 degrees Celsius (55.4 degrees Fahrenheit) at the times of spawning use.

b. The seven-day-average maximum temperature of a stream identified as having core cold water habitat use may not exceed 16.0 degrees Celsius (60.8 degrees Fahrenheit).

c. The seven-day-average of a stream identified as having salmon and trout rearing and migration use may not exceed 18.0 degrees Celsius (64.4 degrees Fahrenheit).

d. The seven-day-average maximum temperature of a stream identified as having a migration corridor use may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit).

e. The seven-day-average maximum temperature of a stream identified as having Lahontan cutthroat trout or redband trout use may not exceed 20.0 degrees Celsius (68.0 degrees Fahrenheit).

f. The seven-day-average maximum temperature of a stream identified as having bull trout spawning and juvenile rearing use may not exceed 12.0 degrees Celsius (53.6 degrees Fahrenheit).

Beneficial Uses Affected - Resident Fish & Aquatic Life, Salmonid Spawning, Rearing, and Migration

Total Dissolved Gas
Standard – The concentration of total dissolved gas relative to atmospheric pressure at the point of sample collection shall not exceed 110 percent of saturation, and the liberation of dissolved gases, such as carbon dioxide, hydrogen sulfide, or other gases, in sufficient quantities to cause objectionable odors or to be deleterious to fish or other aquatic life, navigation, recreation or other reasonable uses made of such waters shall not be allowed.
Beneficial Uses Affected - Salmonid spawning & rearing, resident fish and aquatic life.

Toxics
Standard - Toxic substances shall not be introduced above natural background levels in the waters of the state in amounts, concentrations, or combinations which may be harmful, may chemically change to harmful forms in the environment, or may accumulate in sediments or bioaccumulate in aquatic life or wildlife to levels that adversely impact public health, safety, or welfare; aquatic life; wildlife; or other designated beneficial uses. Standards for specific toxic substances may be viewed on the Oregon DEQ website at http://www.deq.state.or.us/regulations/rules.htm, Division 41, Table 20.

Beneficial Uses Affected - Public, private and industrial water supply; irrigation, livestock watering, resident fish and aquatic life, fishing, water contact recreation.

Turbidity
Standard – No more than 10 percent cumulative increase in natural stream turbidities shall be allowed, as measured relative to a control point immediately upstream of the turbidity causing activities.
Beneficial Uses Affected - Resident fish and aquatic life, aesthetics.

Appendix C: Conservation Funding Programs

The following is a list of some conservation funding programs available to landowners and organizations in Oregon. For more information, please refer to the contact agencies for each program. Additional programs may become available after the publication of this document. For more current information, please contact one of the organizations listed below (see Appendix D for contact information).

Program	General Description	Contact
Conservation Reserve Enhancement Program (CREP)	Provides annual rent to landowners who enroll agricultural lands along fish-bearing streams. Also cost-shares conservation practices such as riparian tree planting, livestock watering facilities, and riparian fencing. May provide several bonuses to landowners who enroll.	Natural Resources Conservation Service, Soil and Water Conservation Districts, Oregon Department of Forestry
Conservation Reserve Program (CRP)	Competitive CRP provides annual rent to landowners who enroll highly erodible lands. Continuous CRP provides annual rent to landowners who enroll agricultural lands along seasonal or perennial streams. Also cost-shares conservation practices such as riparian plantings.	Natural Resources Conservation Service, Soil and Water Conservation Districts
Conservation Stewardship Program	Provides cost-sharing to landowners who adopt or maintain a wide range of management, vegetative, and land-based structural practices that address resource concerns such as water quality and wildlife habitat.	Natural Resources Conservation Service, Soil and Water Conservation Districts
Emergency Watershed Protection Program (EWP)	Available through the USDA-Natural Resources Conservation Service. Provides federal funds for emergency protection	Natural Resources Conservation Service, Soil and Water Conservation Districts

Program	General Description	Contact
	measures to safeguard lives and property from floods and the products of erosion created by natural disasters that cause a sudden impairment to a watershed.	
Environmental Protection Agency Section 319 Grants	Fund projects that improve watershed functions and protect the quality of surface and groundwater, including restoration and education projects.	Oregon Department of Environmental Quality, Soil and Water Conservation Districts, Watershed Councils
Environmental Quality Incentives Program (EQIP).	Cost-shares water quality and wildlife habitat improvement activities, including conservation tillage, nutrient and manure management, fish habitat improvements, and riparian plantings.	Natural Resources Conservation Service, Soil and Water Conservation Districts
Federal Reforestation Tax Credit	Provides federal tax credit as incentive to plant trees.	Internal Revenue Service
Forestry Incentives Program (FIP)	Provides cost-sharing for several forest stand improvement practices.	Natural Resources Conservation Service, Soil and Water Conservation Districts, Oregon Department of Forestry
Forest Resource Trust	State assistance up to 100 percent of the costs to convert non-stocked forest land to timber stands. Available to non-industrial private landowners.	Oregon Department of Forestry
Grassland Reserve Program	Provides long-term contracts and easements to landowners who maintain or enhance high-priority grassland resources including pasture and rangeland.	Natural Resources Conservation Service, Soil and Water Conservation Districts
Oregon Watershed Enhancement Board (OWEB).	Provides grants for a variety of restoration, assessment, monitoring, and education projects, as well as	Soil and Water Conservation Districts, Watershed Councils, Oregon Watershed

Program	General Description	Contact
	watershed council staff support. Also has small grant program that provides up to $10,000 for restoration projects. 25% match requirement on all grants.	Enhancement Board
Partners for Wildlife Program.	Provides financial and technical assistance to private and non-federal landowners to restore and improve wetlands, riparian areas, and upland habitats in partnership with the U.S. Fish and Wildlife Service and other cooperating groups.	U.S. Fish and Wildlife Service (503) 231-6179, Natural Resources Conservation Service, Soil and Water Conservation Districts
Public Law 566 Watershed Program	Program available to state agencies and other eligible organizations for planning and implementing watershed improvement and management projects. Projects should reduce erosion, siltation, and flooding; provide for agricultural water management; or improve fish and wildlife resources.	Natural Resources Conservation Service, Soil and Water Conservation Districts
Resource Conservation & Development (RC & D) Grants	Provides assistance to organizations within RC & D areas in accessing and managing grants.	Cascade-Pacific Resource Conservation and Development, (541) 757-4807
State Forestation Tax Credit	Provides for reforestation of under-productive forest land not covered under the Oregon Forest Practices Act. Situations include brush and pasture conversions, fire damage areas, and insect and disease areas.	Oregon Department of Forestry
State Tax Credit for Fish Habitat Improvements	Provides tax credit for part of the costs of voluntary	Oregon Department of Fish and Wildlife

Program	General Description	Contact
	fish habitat improvements and required fish screening devices.	
Stewardship Incentive Program (SIP).	Cost-sharing program for landowners to protect and enhance forest resources. Eligible practices include tree planting, site preparation, pre-commercial thinning, and wildlife habitat improvements.	Natural Resources Conservation Service, Soil and Water Conservation Districts, Oregon Department of Forestry
Wetlands Reserve Program (WRP)	Provides cost-sharing to landowners who restore wetlands on agricultural lands.	Natural Resources Conservation Service, Soil and Water Conservation Districts
Wildlife Habitat Tax Deferral Program	Maintains farm or forestry deferral for landowners who develop a wildlife management plan with the approval of the Oregon Department of Fish and Wildlife.	Oregon Department of Fish and Wildlife, Soil and Water Conservation Districts, Natural Resources Conservation Service

Appendix D: Sources of Information and Technical Assistance

Soil and Water Conservation Districts (SWCDs)
Provide technical assistance in a wide variety of agricultural and natural resource disciplines and help landowners in access federal and local funding programs.

Benton Soil and Water Conservation District
400 SW 4th Street, Suite A
Corvallis, OR 97333
(541) 753-7208
office@bentonswcd.org

Upper Willamette Soil and Water Conservation District
780 Bailey Hill Rd., Suite 5
Eugene, OR 97402
(541) 465-6436 ext. 3
upperwillamette.swcd@oacd.org

Linn Soil and Water Conservation District
33935 Hwy. 99E, Suite C
Tangent, OR 97389
(541) 926-2483
linn.swcd@oacd.org

Siuslaw Soil and Water Conservation District
1525 12th St., Suite 10A
Florence, OR 97439
(541) 997-1272
siuswcd@qwestoffice.net

Natural Resources Conservation Service (NRCS)
Provides information on soil types, soils mapping, and interpretation. Administers and provides assistance in developing conservation plans for federal programs such as the Conservation Reserve Program, Conservation Reserve Enhancement Program, the Environmental Quality Incentives Program, and the Wetlands Reserve Program. Makes technical determinations on wetlands and highly erodible lands.

Benton County
33630 McFarland Rd.
Tangent, OR 97389
(541)-967-5927

Lane County
780 Bailey Hill Rd., Suite 5
Eugene, OR 97402
(541) 465-6443 ext. 3

Linn County
33630 McFarland Rd.
Tangent, OR 97389
(541) 967-5927

Cascade-Pacific Resource Conservation and Development
305 SW C Ave., Suite 5
Corvallis, OR 97333-4400
(541) 757-4807

Farm Services Agency (FSA)
Maintains agricultural program records and administers federal cost-share programs. Maintains up-to-date aerial photographs and slides of agricultural and forest lands.

Lane County
780 Bailey Hill Rd., Suite 5
Eugene, OR 97402
(541) 465-6443 ext. 2

Benton County
33630 McFarland Rd.
Tangent, OR 97389
(541)-967-5927

Linn County
33630 McFarland Rd.
Tangent, OR 97389
(541) 967-5927

Oregon Department of Agriculture (ODA)
635 Capitol St NE
Salem, OR 97301
Natural Resources Division: (503) 986-4700
Pesticides Division: (503) 986-4635

The Natural Resources Division includes the Agricultural Water Quality Program, the Confined Animal Feeding Operation Program, the Smoke Management Program, and the Soil and Water Conservation District Program.

The Pesticides Division regulates the sale and use of pesticides; tests and licenses all users of restricted-use pesticides, is responsible for fertilizer registration, and investigates incidents of alleged pesticide misuse.

Oregon Department of Environmental Quality (DEQ)
1102 Lincoln St., Suite 210
Eugene, OR 97401
(541) 646-7838
http://www.deq.state.or.us

Responsible to protect Oregon's water and air quality, clean up spills and releases of hazardous materials, and manage the proper disposal of solid and hazardous wastes. Maintains a list of water quality limited streams and establishes Total Maximum Daily Loads for water quality limited waterbodies.

Oregon Department of Fish and Wildlife (ODFW)

3150 E Main St.
Springfield, OR 97478
(541) 726-3515
http://www.dfw.state.or.us

Works with landowners to protect and enhance habitat for a variety of fish and wildlife species, manages recreational fishing and hunting programs, monitors fish and wildlife populations, conducts education and information programs, and administers wildlife habitat tax deferral program.

Oregon Department of Forestry (ODF)

PO Box 157
Veneta, OR 97487
(541) 935-2283

Implements Oregon forest practices laws, administers Oregon forestry property tax programs, provides forest management technical assistance to landowners, and administers or assists with several federal and local cost-sharing programs.

Oregon Department of State Lands (DSL)

775 Summer Street NE Suite 100
Salem, OR 97301-1279
(503) 986-5200
http://statelands.dsl.state.or.us

Administers Oregon fill and removal law and provides technical assistance to landowners.

Oregon State University Extension Service (OSUES)

Offers educational programs, seminars, classes, tours, publications, and individual assistance to help landowners meet natural resource management goals.

Benton County

1849 NW 9th St.
Corvallis, OR 97330
(541) 766-6750

Lane County

950 W 13th Ave
Eugene, OR 97402
(541) 682-4243

Linn County

4th and Lyons
PO Box 756
Albany, OR 97321
(541) 967-3871

Oregon Water Resources Department (WRD)

220 N 5th
Springfield, OR 97477
(541) 682-3620
http://www.wrd.state.or.us

Provides information on streamflows and water rights, issues water rights, and monitors water use. Administers in-stream leasing and temporary water rights transfer programs.

Oregon Watershed Enhancement Board (OWEB)

775 Summer St. NE, Suite 360
Salem, OR 97301-1290
(503) 986-0178
http://www.oweb.state.or.us

Provides funding for a variety of watershed enhancement, assessment, monitoring and educational activities. Provides support to watershed councils throughout Oregon.

Watershed Councils

Bring diverse interests together to cooperatively monitor and address local watershed conditions. Collect watershed condition data, conduct education programs, and train and involve volunteers.

Long Tom Watershed Council

751 S. Danebo Ave.
Eugene, OR 97402
(541) 683-6578
longtom@efn.org
http://www.longtom.org

Siuslaw Watershed Council

P.O. Box 422
Mapleton, OR 97453
(541) 268-3044
watershed@siuslaw.org
http://www.siuslaw.org

Appendix E: Site Capability

Streamside vegetation generally affects water quality. The primary water quality-related functions provided by streamside vegetation are shade, bank stability, filtration of sediment and nutrients, and infiltration of runoff water. Absent of human influence, different riparian sites have varying abilities to support these functions. This ability is referred to as **site potential**, or the highest ecological status an area can attain. Site potential is influenced by physical and biological factors such as elevation, aspect, geology, climate, and the current plant community. It is also influenced by disturbances found in riparian systems, such as flooding, and the complex variation of these disturbances.

Site conditions that affect the establishment and development of streamside vegetation are further modified by human infrastructure, such as roads, power and telephone lines, and irrigation and drainage systems. When infrastructure limits a site's ability to achieve or maintain its vegetative potential, the resulting condition is called the **site capability**. This capability determines what can be expected in terms of vegetation, such as the types of bank-stabilizing shrub species, and the functions the site can provide.

Example

Historically, Llama Creek meandered through a narrow coastal valley until it reached the Pacific Ocean. Historical vegetation along Llama Creek included a canopy of Douglas-fir, western redcedar, bigleaf maple and alder in the headwaters, and a combination of alder, willow, red osier dogwood, grasses, and sedges in the lower reaches (site potential). The vegetation provided many functions, including shade, bank stability, infiltration of runoff water, and filtration of sediment and nutrients.

In the upper reaches of Llama Creek, there are generally more younger age classes and less older age classes of vegetation than there were historically, but vegetation is still composed mostly of Douglas fir, western redcedar, bigleaf maple and alder. Streamside sites in upper Llama Creek are still able to produce plant communities that were historically present, and those plant communities provide the water quality-related functions listed above.

Over the past few decades, the lower reaches of Llama Creek were channelized and straightened. As a result, streambanks eroded, lower Llama Creek became much wider and shallower, and the water table dropped. Presently, lower Llama Creek is capable of supporting those plant species that can establish and grow under the constraints of a lower water table and competitive pressure from invasive plant species. Depending on the site, the plant community will likely include blackberry, native shrubs, herbaceous species, and tree species capable of establishing and growing in these modified conditions. Some sites dominated by blackberry and other invasive vegetation do not provide riparian functions at the same level as the historic plant community, but at other sites the vegetation still promotes infiltration of runoff water, filters sediment and nutrients from runoff, provides shade, and provides for some bank stability.

How site capability applies in an Agricultural Water Quality Management Area

Site capability can be applied in several ways in an Agricultural Water Quality Management Area. It can help provide a clearer picture of the vegetation and riparian functions a site could be anticipated to provide in a compliance situation. It can be used in voluntary conservation and outreach projects to illustrate the vegetation landowners might expect given a management regime and the capability of a site. For example, it could predict the likelihood of success of "passive restoration, " which involves reducing management pressure on the existing plant community, versus more "active restoration," which involves reducing management pressure, planting desirable vegetation, and/or controlling undesirable vegetation. Site capability can also predict the benefits of planting species in specific locations in a riparian area.