Lower Deschutes Agricultural Water Quality Management Area Plan

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Developed by the

Lower Deschutes Local Advisory Committee

Oregon Department of Agriculture

With support from the

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Table of Contents

Acronyms and Terms Used in this Document **1**

Foreword **3**

Required Elements of Area Plans **3**

Plan Content **3**

Chapter 1: Agricultural Water Quality Management Program Purpose and Background **5**

1.1 Purpose of Agricultural Water Quality Management Program and Applicability of Area Plans **5**

1.2 History of the Ag Water Quality Program **5**

1.3 Roles and Responsibilities **6**

1.3.1 Oregon Department of Agriculture (ODA) 6

1.3.2 Local Management Agency 9

1.3.3 Local Advisory Committee (LAC) 9

1.3.4 Agriculture's Role 9

1.3.5 Public Participation 10

1.4 Agricultural Water Quality **10**

1.4.1 Point and Nonpoint Sources of Water Pollution 10

1.4.2 Beneficial Uses and Parameters of Concern 10

1.4.3 Impaired Water Bodies and Total Maximum Daily Loads (TMDLs) 11

1.4.4 Water Pollution Control Law – ORS 468B.025 and ORS 468B.050 11

1.4.5 Streamside Vegetation and Agricultural Water Quality 12

1.5 Other Water Quality Programs **13**

1.5.1 Confined Animal Feeding Operation (CAFO) 13

1.5.2 Drinking Water Source Protection 14

1.5.3 Groundwater Management Areas (GWMAs) 14

1.5.4 Pesticide Management and Stewardship 14

1.5.5 The Oregon Plan for Salmon and Watersheds 15

1.6 Partner Agencies and Organizations **15**

1.6.1 Oregon Department of Environmental Quality (DEQ) 15

1.6.2 Other Partners 16

1.7 Measuring Progress **16**

1.7.1 Measurable Objectives 16

1.7.2 Land Condition and Water Quality 16

1.7.3 Focused Implementation in Small Geographic Areas 17

1.8 Implementation, Monitoring, Evaluation, and Adaptive Management **18**

1.8.1 Statewide Aerial Photo Monitoring of Streamside Vegetation 18

1.8.2 Agricultural Ambient Water Quality Monitoring Assessment 18

1.8.3 Biennial Reviews and Adaptive Management 18

Chapter 2: Local Background **19**

2.1 Local Roles and Responsibilities **20**

2.1.1 Local Advisory Committee (LAC) 20

2.2 Geographical and Physical Setting **20**

2.3 Agricultural Water Quality in the Management Area **22**

2.3.1 Beneficial Uses 22

2.3.2 Water Quality Parameters of Concern 22

2.3.3 Drinking Water Protection in the Management Area 25
2.3.4 Middle Columbia-Hood (Miles Creek) Subbasin TMDL and Agricultural Load Allocations 26
2.4 Prevention and Control Measures 27
2.4.1 Management Objectives 27
2.4.2 Requirements (Prohibited Conditions) 27
2.4.2.1 Soil Erosion on Uplands Within Acceptable Rates 28
2.4.2.2 Streambank Erosion Within Acceptable Levels 29
2.4.2.3 Elimination of Placement, Delivery or Sloughing of Wastes 31
2.4.2.4 Adequate Riparian Vegetation 31
2.4.3 Recommended Management Practices 33

Chapter 3: Goals, Objectives, and Strategies 37
3.1 Area Plan Goal 37
3.2 Measurable Objectives 37
3.3 Focus Area 38
3.4 Strategic Implementation Area 38
3.5 Strategies for Area Plan Implementation 39
3.6 Costs and Funding 41

Chapter 4: Implementation, Monitoring, and Adaptive Management 43
4.1 Implementation and Accomplishments 43
4.2 Water Quality Monitoring—Status and Trends 45
4.3 Progress Toward Measurable Objectives 45
4.3.1 Riparian Buffers in the Fifteenmile Creek Priority Area 45
4.4 Aerial Photo Monitoring of Streamside Vegetation 46
4.5 Biennial Reviews and Adaptive Management 47

REFERENCES 48

Attachment 1: Fisheries 49

Attachment 2: TMDL Shade curves 50

Attachment 3: Field Office Technical Guide (FOTG) 52

Acronyms and Terms Used in this Document

Ag Water Quality Program – Agricultural Water Quality Management Program
Area Plan – Agricultural Water Quality Management Area Plan
Area Rules – Agricultural Water Quality Management Area Rules
CAFO – Confined Animal Feeding Operation
CREP – Conservation Reserve Enhancement Program
CRP – Conservation Reserve Program
CCRP – Continuous Conservation Reserve Program
CWA – Clean Water Act
DEQ – Oregon Department of Environmental Quality
DSL – Oregon Department of State Lands
FOTG – Field Office Technical Guide
FSA – Farm Service Agency
GWMA – Groundwater Management Area
HUC – Hydrologic Unit Code
IFP – Integrated Fruit Production
IPM – Integrated Pest Management
LAC – Local Advisory Committee
Management Area – Agricultural Water Quality Management Area
MOA – Memorandum of Agreement
NOAA – National Oceanic and Atmospheric Administration
NPDES – National Pollution Discharge Elimination System
NRCS – Natural Resources Conservation Service
OAR – Oregon Administrative Rules
ODA – Oregon Department of Agriculture
ODFW – Oregon Department of Fish and Wildlife
ORS – Oregon Revised Statute
OWEB – Oregon Watershed Enhancement Board
PMP – Pesticides Management Plan
PSP – Pesticides Stewardship Partnership
Regulations – Agricultural Water Quality Management Area Regulations
RMS – Resource Management System
RUSLE – Revised Universal Soil Loss Equation
SWCD – Soil and Water Conservation District
T – Soil Loss Tolerance Factor
TMDL – Total Maximum Daily Load
USDA – United States Department of Agriculture
USEPA – United States Environmental Protection Agency
USFS – United States Forest Service
WQPMT – Water Quality Pesticides Management Team

Foreword

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

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

Required Elements of Area Plans

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

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

Plan Content

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

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

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

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

Chapter 1: Agricultural Water Quality Management Program Purpose and Background

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

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

The provisions of this Area Plan do not establish legal requirements or prohibitions (ORS 568.912(1)). Each Area Plan is accompanied by OAR regulations that describe local agricultural water quality regulatory requirements. ODA will exercise its regulatory authority for the prevention and control of water pollution from agricultural activities under the Ag Water Quality Program's general regulations (OARs 603-090-0000 to 603-090-0120) and under the regulations for this Management Area (OARs 603-095-0600). The Ag Water Quality Program's general OARs guide the Ag Water Quality Program, and the OARs for the Management Area are the regulations that landowners must follow.

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

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

1.2 History of the Ag Water Quality Program

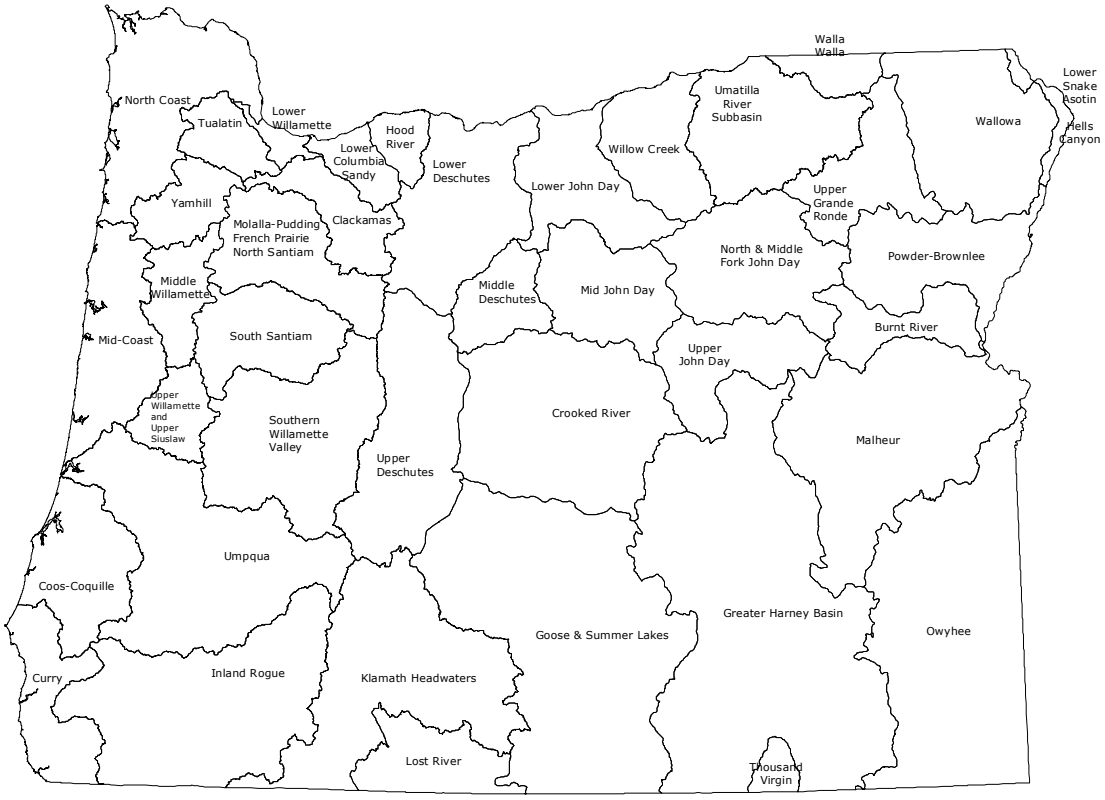
In 1993, the Oregon Legislature passed the Agricultural Water Quality Management Act, directing ODA to develop plans to prevent and control water pollution from agricultural activities and soil erosion, and to achieve water quality standards (ORS 568.900 through ORS 568.933). Senate Bill 502 was passed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

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

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

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

Figure 1: Map of 38 Agricultural Water Quality Management Areas



1.3 Roles and Responsibilities

1.3.1 Oregon Department of Agriculture (ODA)

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

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

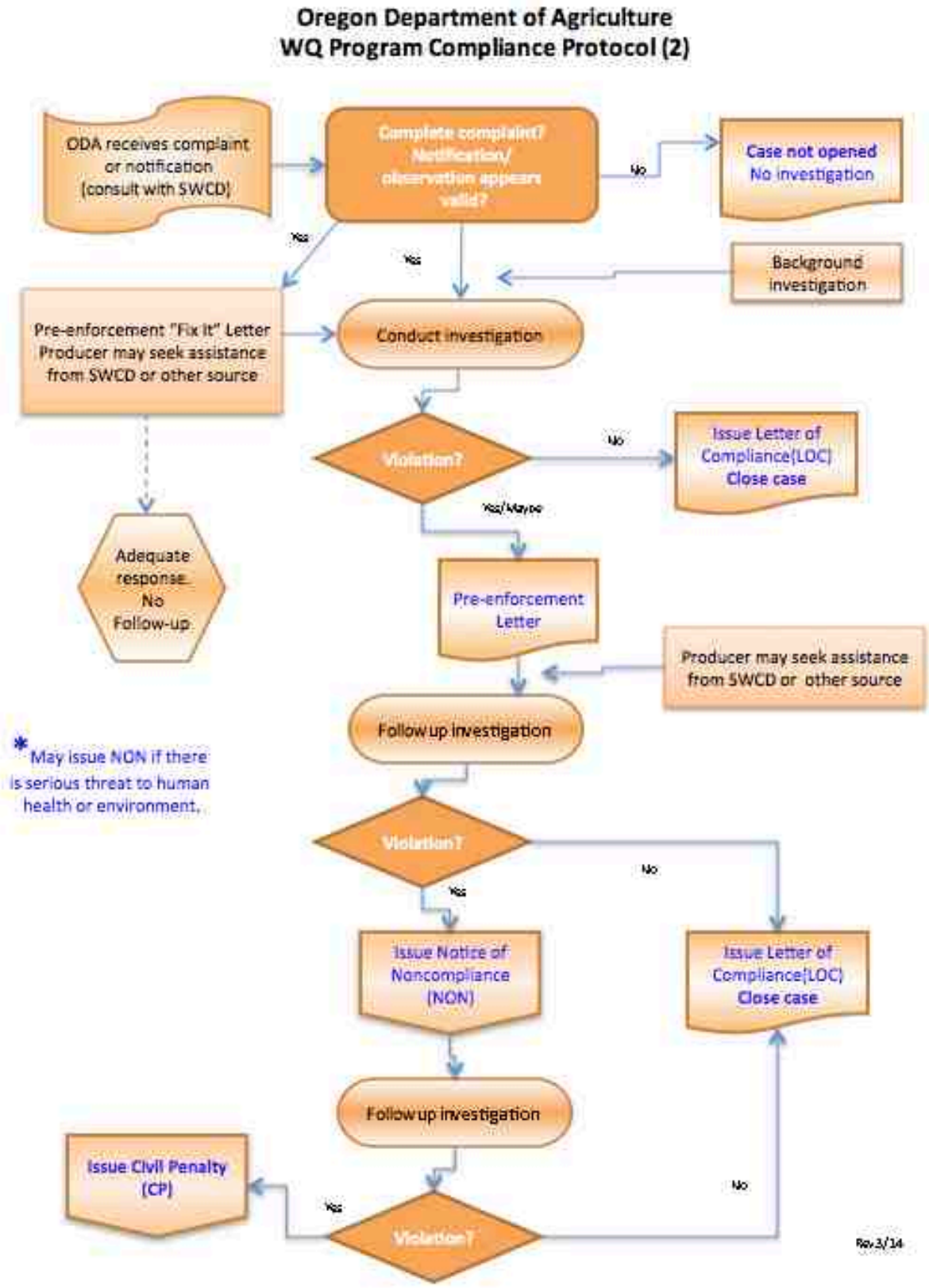
ODA has the legal authority to develop and implement Area Plans and associated regulations for the prevention and control of water pollution from agricultural activities and soil erosion, where such plans are required by state or federal law (ORS 568.909 and ORS 568.912). ODA will base Area Plans and regulations on scientific information (ORS 568.909). ODA works in partnership with SWCDs, LACs,

DEQ, and other partners to implement, evaluate, and update the Area Plans and associated regulations. ODA has responsibility for any actions related to enforcement or determination of noncompliance with regulations (OAR 603-090-0080 through OAR 603-090-0120). ORS 568.912(1) and ORS 568.912(2) give authority to ODA to adopt regulations that require landowners to perform actions necessary to prevent and control pollution from agricultural activities and soil erosion.

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

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

Figure 2: Compliance Flow Chart



1.3.2 Local Management Agency

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

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

1.3.3 Local Advisory Committee (LAC)

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

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

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

1.3.4 Agriculture's Role

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

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

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

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

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

1.3.5 Public Participation

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

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

1.4 Agricultural Water Quality

1.4.1 Point and Nonpoint Sources of Water Pollution

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

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

1.4.2 Beneficial Uses and Parameters of Concern

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

Many water bodies throughout Oregon do not meet state water quality standards. These water bodies may or may not have established water quality management plans documenting needed reductions. The most common water quality concerns related to agricultural activities are temperature, bacteria, biological criteria, sediment and turbidity, phosphorous, algae, pH, dissolved oxygen, harmful algal blooms, nitrates, pesticides, and mercury. These parameters vary by Management Area and are summarized in Chapter 2.

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

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

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

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

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

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

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

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

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

ORS 468B.025 states that:

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

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

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

Definitions (ORS 468B.005)

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

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

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

1.4.5 Streamside Vegetation and Agricultural Water Quality

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

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

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

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

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

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

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

1.5 Other Water Quality Programs

1.5.1 Confined Animal Feeding Operation (CAFO)

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

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

1.5.2 Drinking Water Source Protection

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

1.5.3 Groundwater Management Areas (GWMAs)

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

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

1.5.4 Pesticide Management and Stewardship

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

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

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

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

1.5.5 The Oregon Plan for Salmon and Watersheds

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

1.6 Partner Agencies and Organizations

1.6.1 Oregon Department of Environmental Quality (DEQ)

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

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

The MOA includes the following commitments:

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

- Whether the rate of progress is adequate to achieve the goals of the Area Plan.

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

1.6.2 Other Partners

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

1.7 Measuring Progress

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

1.7.1 Measurable Objectives

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

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

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

1.7.2 Land Condition and Water Quality

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

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

- Landowners can see land conditions and have direct control over them.
- It can be difficult to separate agriculture's influence on water quality from other land uses.

- It requires extensive monitoring of water quality at an intensive temporal scale to evaluate progress; it is expensive and may fail to demonstrate short-term improvements.
- Improved land conditions can be documented immediately, but there may be a significant lag time or a need for more extensive implementation before water quality improves.
- Agricultural improvements in water pollution are primarily through improvements in land and management conditions.

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

1.7.3 Focused Implementation in Small Geographic Areas

Focus Areas

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

Systematic implementation in Focus Areas can provide the following advantages:

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

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

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

Strategic Implementation Areas

Strategic Implementation Areas are small watersheds selected by ODA, in cooperation with partners, and after review of water quality and other available information. ODA leads the assessment of current conditions and the landowner outreach. Strategic Implementation Areas and Focus Areas are both tools to

concentrate efforts in small geographic areas to achieve water quality standards. As with Focus Areas, SWCDs and partners work with landowners to improve conditions that may impact water quality. However, Strategic Implementation Areas also have a compliance evaluation and assurance process that allows ODA to proactively gain compliance with Ag water quality regulations.

1.8 Implementation, Monitoring, Evaluation, and Adaptive Management

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

1.8.1 Statewide Aerial Photo Monitoring of Streamside Vegetation

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

1.8.2 Agricultural Ambient Water Quality Monitoring Assessment

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

1.8.3 Biennial Reviews and Adaptive Management

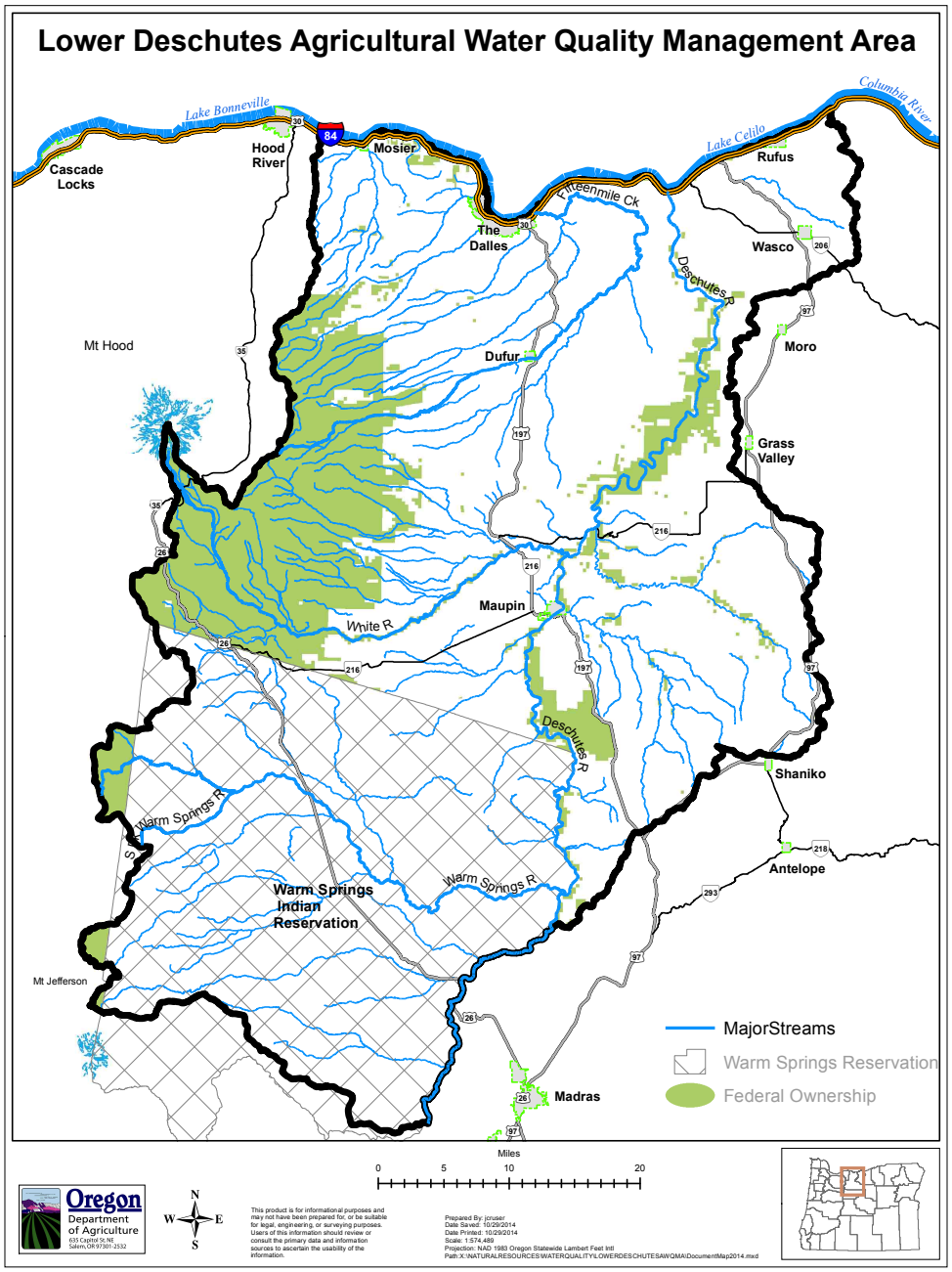
The Area Plan and associated regulations undergo biennial reviews by ODA and the LAC. As part of each biennial review, ODA, DEQ, SWCDs, and the LAC discuss and evaluate the progress on implementation of the Area Plan and associated regulations. This evaluation includes enforcement actions, landscape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

Chapter 2: Local Background

The Area Plan and Rules were first adopted by ODA in 2000. This is the 6th revision of the Area Plan. The Area Rules were last updated in 2002.

The Management Area includes the drainage area of the Deschutes River downstream from its confluence with Trout Creek to its confluence with the Columbia River near the city of The Dalles. It also includes all Oregon lands draining to the Columbia River between the Hood River drainage and the John Day Basin (Figure 3).

Figure 3. Map of Management Area



2.1 Local Roles and Responsibilities

Wasco County SWCD is designated as the Local Management Agency for revisions of the Area Plan and for implementation of the Area Plan and projects in Wasco County. Sherman County SWCD is responsible for implementing the Area Plan and related projects within Sherman County. Implementation priorities are established on a periodic basis through annual work plans developed jointly by the SWCDs and ODA with input from partner agencies.

As resources allow, Sherman and Wasco County SWCDs and NRCS staff are available to assist landowners in evaluating effective practices for reducing runoff and soil erosion on their farms, and incorporating these practices into Conservation Plans. Personnel in these offices can also design and assist with implementation of practices, and assist in identifying sources of cost-sharing funds for the construction and/or use of some of these practices.

Technical and cost-sharing assistance for installation of certain conservation practices may be available through current USDA conservation programs such as Environmental Quality Incentive Program (EQIP), Continuous Conservation Reserve Program (CCRP); EPA's nonpoint source implementation grants (319); or state programs such as Oregon Watershed Enhancement Board (OWEB) and the CREP. Other agencies, such as Oregon Department of Fish and Wildlife, may provide technical assistance or financial assistance to private landowners.

2.1.1 Local Advisory Committee (LAC)

This Area Plan was developed by volunteer members of the LAC with assistance from ODA and the Wasco County SWCD, in consultation with members of the community. The LAC was formed in 1998 to assist with the development of the Area Plan and regulations and with subsequent biennial reviews. Current members are:

Table 1. Current Local Advisory Committee (LAC) members.

Ken Bailey, **Co-Chair**: The Dalles, orchard	Dick Lindley: Bakeoven, cattle
Neal Harth, **Co-Chair**: Boyd, small grains	Norm Lyda: Dufur, SWCD, cattle and wheat
Gary Brown: Gordon Ridge, crops	Tom McCoy: Wasco, small grains
Rod French: ODFW District Fish Biologist	John McElheran: Juniper Flat, small grains
Bill Hammel: Fifteenmile, SWCD, cattle and wheat	Glenn Miller: Dufur, City Superintendent
Zachary Harvey: Fifteenmile ,small grains	

2.2 Geographical and Physical Setting

The Management Area is east of the Cascade Mountain Range in North Central Oregon. This area includes portions of the Mount Hood National Forest, Bureau of Land Management parcels, and State of Oregon Lands. Counties within this area include Hood River (eastern-most portion), Wasco, and Sherman (western portion). The Management Area contains 1,311,493 acres (2,049 square miles).

The Deschutes and Columbia rivers are the largest rivers within the area. Major tributaries of the Deschutes River in the Management Area include White River, Buck Hollow Creek, and Bakeoven Creek. The Trout Creek watershed is the southern boundary of, but is not included in, this Management Area. All waters of the Management Area flow into the Columbia River, which is the northern boundary of the area. Streams between Rufus and Mosier and their drainages are also part of the area. This includes Spanish Hollow, Fifteenmile Creek, Threemile Creek, Mill Creek, Chenoweth Creek, and Mosier Creek.

Average annual precipitation ranges from about 110 inches on Mount Hood to about 10 inches in the east. This results from the rain shadow effect produced by the Cascade Mountain Range. While most precipitation is in the form of rain, substantial snow falls almost every winter in the higher elevations. Elevations range from 98 feet at The Dalles, to 11,240 feet at the top of Mount Hood (headwaters of White River). The low annual rainfall on the majority of the landscape is characteristic of the Intermountain Region, which receives 70-80 percent of its precipitation between November and March. This reflects the strong influence of marine air masses moving in from the Pacific Ocean. Most of the area was once native grassland. The Dalles, located on the Columbia River on the northern end of the Management Area, is often the warmest location in the state. Two types of events that produce substantial and frequently damaging runoff events in this area are heavy precipitation or rapid snowmelt on frozen soils and violent cloudbursts in the summer.

The Management Area lies within the Columbia Plateau and the Eastern Cascade Mountain physiographic province. The Columbia Plateau is a lava-floored plain that has been uplifted since molten basalt flooded the area. The Eastern Cascade province is a high upland terrace of coarse loose soil and volcanic rock fragments. This terrace is eroded and is characterized by wide nearly level ridge tops and deep V-shaped canyons up to 1,000 feet deep. The Columbia River Basalt of the Miocene series is the most prominent formation. It is part of a widespread series of basalt flows that extend from Astoria, in the western part of Oregon, east into Idaho and north into Washington. The Columbia River Basalt has preserved major ridges in the basin and is between 1,000 to 2,000 feet thick.

Soils in the basin were formed in residuum from the weathering of bedrock and in loose bodies of sediment on sloping uplands and plateaus; material transported by water and deposited as unconsolidated deposits of clay, silt, and gravel; pumice and ash from volcanic activity (Newberry Crater and Mount Mazama); and deposits of silt that has been transported by wind from other areas.

Land Use

Agriculture is the predominant land use in the Management Area. The small portion of Hood River County in the Management Area is primarily national forest land.

Wasco County was established in 1854 and has a total area of 2,396 square miles, including the Warm Springs Indian Reservation. Farming became the principle industry in Wasco County in the 1860s.

Water Use

The largest watercourses in this Management Area are the Deschutes and Columbia rivers. The Deschutes River drains approximately 10,500 square miles, with an average discharge of 4,222,000 acre-feet/year (5,828 ft^3/second). The third largest water course in the area is the White River, which originates from Mount Hood. The White River drains approximately 417 square miles, with an average discharge of 308,600 acre-feet/year (426 ft^3/second).

Five reservoirs store water in the Lower Deschutes Basin and are used for irrigation and municipal water supply. Three of the five reservoirs reside in the Mount Hood National Forest. Badger Lake has a maximum volume of 660 acre feet available for irrigation and feeds Badger Creek. Clear Lake has a maximum volume of 13,060 acre-feet and feeds Clear Creek. Rock Creek Reservoir has a maximum volume of 1,280 acre-feet. It is fed by Rock, Gate, and Threemile creeks. Crow Creek Reservoir is surrounded by National forest land, but resides within land owned by the city of The Dalles. The maximum volume is 955 acre-feet and it is fed by the South Fork of Mill Creek and Dog River. Crow Creek Reservoir is the primary water source for the city of The Dalles. Pine Hollow Reservoir has a maximum volume of 4,750 acre-feet that allots 3,550 acre feet for irrigation use. Many orchards near The Dalles are irrigated with Columbia River water.

2.3 Agricultural Water Quality in the Management Area

Agricultural sources of pollution in the Management Area include runoff and erosion from fields, removal of streamside vegetation, leaching of pollutants to groundwater, eroding stream banks, and runoff from roads. Pollutants can be carried to the surface water or groundwater through the actions of rainfall, snowmelt, irrigation, and leaching. Heat input due to direct solar radiation, seasonal flow reduction, changes in channel shape, and floodplain alteration can contribute to water quality impairment. Channelization and bank instability may alter gradient, width/depth ratio, and sinuosity, thereby causing undesirable changes in sediment transport regime, erosional and depositional characteristics, and stream temperature.

In September 2011, DEQ published the Deschutes Basin Water Quality Status and Action Plan. It discussed water quality concerns and emphasized the following actions related to agriculture in the Management Area:

1. Surface Water Actions

- Reduce temperatures, improve flow volume and patterns, and improve habitat through:
    - Better land management and conservation
    - Increasing native, streamside vegetation
    - Improved water conservation
    - Increased instream flows
    - Channel restoration
    - Juniper reduction
    - Combating invasive weeds
- Reduce erosion and nutrient and pesticide levels in water through better land and crop management.

2. Groundwater Actions

- Minimize nitrate contamination from … agriculture.
- Assess effects of groundwater pumping and irrigation efficiency projects on stream flows.
- Assess cause, extent and magnitude of risks associated with bacteria … in groundwater.

2.3.1 Beneficial Uses

Beneficial uses in the Management Area include domestic water supply, irrigation, industrial, municipal, livestock watering, fish and aquatic life, boating, fishing, water contact recreation, and aesthetics. Uses related to aquatic life are the most sensitive. Attachment 1 discusses fisheries.

2.3.2 Water Quality Parameters of Concern

Table 3 consists of water quality limited streams from DEQ's 2010 303(d) list. DEQ has also documented concerns regarding stream flow and habitat modification.

Table 3. Water quality limited streams in the Management Area.						
STREAM SEGMENT	PARAMETER					
	Temperature	Sedimen-tation	pH	Dissolved oxygen	Biological Criteria	Pesticides: Chlorpyrifos (C), Malathion (M)
LOWER DESCHUTES SUBBASIN						
Bakeoven Creek (River Mile 0-20.5)	X					
Buck Hollow Creek (0-37.7)	X					
Clear Creek (0-15.1)	X					
Deschutes River (0-88)	X		X	X		
Gate Creek (0-14.3)	X	X				
Oak Canyon (0.6.3)	X					
Rock Creek (0-14.1)	X					
Sixteen Canyon (0-3.7)	X					
Tenmile Creek	X					
Threemile Creek (tributary to White River) (0-11.3)	X					
Unnamed Creek in Rock Creek watershed (0-3.1)					X	
Wapinitia Creek (0-14.4)	X					
White River (0-12)	X					
Willow Creek (0-33.2)	X					
MIDDLE COLUMBIA-HOOD SUBBASIN						
Chenowith Creek (0-7.9)	X*					
Dry Creek (0-16.6)	X*					
Eightmile Creek (0-34.6)	X*	X**				
Fifteenmile Creek (0-53.3)	X*	X**				
Fivemile Creek (0-18)	X*					
Mill Creek (0-7.7)	X*					C, M
Mosier Creek (0-16.2)	X*					
North Fork Mill Creek (0-3.8)	X*					
Ramsey Creek (0-13.2)	X*	X**				
Rock Creek (0-10.6)	X*					
South Fork Mill Creek (0-10.6)	X*					
Threemile Creek (0-14.7)	X*					
West Fork Mosier Creek (0-7.9)	X*					

*Miles Creek TMDL addresses these issues, but the streams are still considered water quality limited until data show otherwise. The TMDL applies to all perennial and/or fish bearing streams in the Middle Columbia-Hood Subbasin in the Management Area, including those listed in this table.
**According to the Wasco Co. SWCD, sedimentation issues on these streams have been largely addressed by the conversion of approximately 96% of Wasco County cereal grain cropland to no-till.

1. **Water temperatures** above 55°F inhibit salmonid spawning, egg incubation, and fry emergence from the egg and from stream gravels. Salmonid rearing is impaired by temperatures greater than 64°F. The water quality standard requires that waters supporting all life stages of bull trout must be

cooler than 50°F. This temperature is required for spawning, but other bull trout life stages exist at higher temperatures.

The temperature standard (OAR 340-041-0028) provides numeric and narrative temperature criteria. Maps and tables provided in OAR 340-041-151 specify where and when the criteria apply.

2. Fine **sediment** can harm fish communities by silting in redds (affecting egg incubation), damaging gills, reducing food availability, and causing other problems. Standards are found at OAR 340-041-0036 and 340-041-007(13).

3. High **pH** and low **dissolved oxygen** generally result from excessive plant growth, which is stimulated by the availability of nutrients, temperature, and light. Standards are found at OAR 340-041-0135 and OAR 340-041-0016. **Nutrients (primarily nitrogen and phosphorus)** occur naturally in streams and rivers, but human activities can elevate their concentrations. Excessive plant growth can increase water pH, which can harm fish. And, dead plants are broken down by bacteria, which use up oxygen in the process. The breakdown of aquatic plants can use up large amounts of the oxygen needed by aquatic animals for survival.

4. **Bacteria** are used to determine the safety for "water contact recreation." *Escherichia coli* is one bacterial contaminant that is monitored as an indicator of fecal contamination. The DEQ has established acute and chronic water quality standards for *E. coli* in recreational waters. Concentrations of *E. coli* in many water samples from various sites on Mill Creek from 2009 – 2014 exceeded the water quality standards. Potential sources of fecal contamination and *E. coli* include sewer or septic leaks, urban stormwater runoff, pet or wildlife waste, and livestock manure.

5. **"Biological Criteria"** listings indicate waters that don't adequately support aquatic insects and similar invertebrates (benthic macroinvertebrates). These organisms are important as the basis of the food chain and are very sensitive to changes in water quality. To assess a stream's biological health, the community of benthic macroinvertebrates is sampled and compared to the community expected if the stream were in good shape ("reference community"). If the difference is too great, the stream section is designated as 'water quality limited.' This designation does not identify the actually limiting factor (e.g. sediment, excessive nutrients, temperature).

6. **Pesticides** used on farms, forest lands, rights-of-way and urban areas can contaminate surface waters through runoff or aerial drift. Analysis of water samples from some Wasco County creeks indicates that pesticides potentially threaten water quality and aquatic life in the Management Area. Some broad-spectrum pesticides, such as organophosphate insecticides, are toxic to aquatic life even at low concentrations. Toxic pesticides are of particular concern in streams that support steelhead, which are listed as threatened under the Endangered Species Act.

   Chlorpyrifos and malathion were detected in water samples collected from Mill Creek in 2002 – 2005 as part of the Pesticides Stewardship Partnership program. Each year of that study, pesticide concentrations in some samples exceeded water quality standards. Pesticide sampling on Mill Creek, Threemile Creek, and Fifteenmile Creek in 2010 – 2011 also led to some detections of chlorpyrifos and malathion in excess of state water quality standards. Several other pesticides were also detected in those samples, though not at levels in excess of "benchmarks," levels to which pesticide results are compared when water quality standards have not been established. Although organophosphate insecticides come from orchard use, the other pesticides detected in Wasco County streams may come from agricultural lands, forest lands, rights-of-way, or residential/urban lands. The pesticide sampling program continued in 2012 and 2013. Diuron dropped significantly between 2011 and 2012. In 2012, there was an 82 percent reduction in median Malathion. This trend continued in 2013. Between 2011

and 2103, the median concentration of malathion in sampled streams dropped by 94 percent and fell below the state standard of 0.1 ug/L in 2013. Chlorpyrifos was detected only in Threemile Creek in both 2012 and 2013; however, only one sample was above the Chronic standard. The aquatic life ratio for all pesticides sampled in Wasco's streams was exceeded only by malathion and chlorpyrifos. Average concentrations of all other pesticide detections were well under the aquatic life benchmarks set by EPA in both 2012 and 2013.

Stream flow modifications in the form of reduced flow can contribute to warmer water, increased pH, reduced dissolved oxygen, a general reduction in available habitat, and, in extreme cases, interfere with fish migration. Slow-moving streams are more susceptible to warming and they are less turbulent, all of which can contribute to reduced oxygen levels. A number of streams in the basin have flow modifications as irrigation districts divert water for irrigation and/or power generation. In some reaches in late summer-early fall, diversions reduce instream flows to an estimated 25 percent of normal (US Forest Service Hood River Basin Aquatic Habitat Restoration Strategy, 2006).

Modification of physical habitat can have direct adverse effects on all aquatic life. Channelization reduces the amount of habitat (stream length is usually reduced as meanders are eliminated), as well as the instream habitat complexity such as the normal mixture of pools, riffles, and runs. Loss of riparian vegetation often destabilizes streambanks, which results in increased erosion, increased stream sedimentation, loss of instream habitat complexity and cover, and the loss of future large woody debris that naturally falls into streams. Loss of riparian vegetation may also cause increased stream temperatures.

2.3.3 Drinking Water Protection in the Management Area

Several communities obtain domestic drinking water from surface and groundwater sources in the Lower Deschutes WQMP area. Drinking water is an important beneficial use under the federal CWA. When CWA standards are met in source waters, a drinking water treatment plant using standard technology can generate water meeting the Safe Drinking Water Act standards. The city of The Dalles is the only public water system in the Lower Deschutes WQMP area supplied by a surface water intake; pasture lands were identified in the source area for the intake.

There are 51 public water systems in the plan area using groundwater wells or springs. These groundwater systems serve more than 13,000 people. Ten of the groundwater systems have agricultural land uses (irrigated crops, pasture and livestock) within their source area and the following systems are considered to have a high to moderate susceptibility to land uses based on the Source Water Assessments: city of The Dalles (Jordan well), city of Maupin, Rufus Public Works, Barlow Water District, city of Wasco and Chenowith PUD-Columbia Crest. The city of Maupin is served by spring-fed sources and is conducting assessment monitoring to evaluate potential contribution from surface water sources to the springs so its aquifer is considered particularly sensitive until the assessment monitoring is complete. The drinking water standard for nitrates is 10 mg/L. Several of the systems with high susceptibility have also had detections of nitrate, including Rufus Public Works (nitrate was 6-8 mg/l in Rufus's Well #1 which is no longer used; Rufus drilled new well #3 which is deeper and has no detection for nitrate), Pinewood Mobile Manor (nitrate 3.7 to 7 mg/l - appears to be decreasing over time), and the city of Wasco (nitrate of 8 mg/l in March 2014).

DEQ only addresses drinking water issues identified for *public* water systems. A query of Oregon Water Resources' water rights database for private domestic points of diversion (using a threshold of 0.005 cfs for domestic water rights that are household use only, not irrigation) identified 45 private domestic water rights in the Lower Deschutes WQMP area. Most of these are in the Pine Hollow Creek, Mill Creek, and Spring Creek areas. There are also numerous private groundwater wells for domestic use. Real Estate

Testing data for 1989-2008 does not indicate significant detections of nitrate in groundwater where data are available.

According to DEQ's Watershed Approach Plan, the OSU Extension Service in Sherman County tested wells in Sherman County in 1993 (46 wells) and 1999 (41 wells). In both years, concentrations above the drinking water standard of 10 mg/L were observed: sixteen wells (35%) exceeded 10 mg/L in 1993 and 18 wells (44%) exceeded this limit in 1999. In both years, the maximum concentration observed was greater than 40 mg/L. The Extension Service has been interested in repeating this study again, but has been unable to secure funding.

DEQ recommended that ODA and the SWCDs further evaluate agricultural land uses in the following drinking water source areas for high susceptibility drinking water source areas and prioritize implementation of best management practices to reduce the potential for agricultural sources to impact source water: The Dalles (South Fork Mill Creek and wells), Maupin, Rufus, Pinewood Mobile Manor, and Chenowith PUD-Columbia Crest, Pine Hollow Creek, Spring Creek, and northern Sherman County.

The LAC supported more evaluation of the areas identified by DEQ. The Sherman County SWCD plans to repeat the 1990s well sampling in partnership with OSU Extension. ODA has requested water quality data and maps from DEQ for the Wasco SWCD.

2.3.4 Middle Columbia-Hood (Miles Creek) Subbasin TMDL and Agricultural Load Allocations

The goal of the TMDL is to reduce the amount of solar radiation that reaches the waterway to natural levels. The amount of "load" of solar radiation is measured by DEQ in watts per square meter. These loads have been translated into 'percent effective shade' targets.

The TMDL contains Percent Effective Shade Targets for the Middle-Columbia Hood portion of the Management Area. These targets were developed by evaluating the solar radiation load associated with native riparian communities that have not been impacted by human activities. **Landowners may use these targets as a guide to determine if they have sufficient riparian vegetation.** Percent effective shade is the amount of shade that reaches the stream. For example, 70 percent effective shade means that canopy cover has kept 70 percent of the sunshine on an August day from reaching the stream.

Attachment 2 shows the shade target graphs for the three ecoregions that include agricultural lands.

Historic vegetation is not required along streams, although the shade and function provided by historic vegetation should be targeted. Native trees such as fir and pine, which historically lined many Management Area streams, may not be desirable in some areas. Smaller native trees and shrubs, such as willow and dogwood, may provide sufficient shade along smaller streams to attain the shade targets. As a general guideline, landowners are encouraged to maintain the widest possible band or buffer of native vegetation along the stream. Streamside vegetation buffers also absorb fertilizer and manure runoff, reduce flood erosion, filter sediment, provide habitat for birds and other wildlife, and may help protect streams from pesticide drift.

All interested parties must understand that these targets may not be appropriate for all areas. For instance, streams at road crossings and road right-of-ways may not be shaded for visibility/safety reasons.

2.4 Prevention and Control Measures

Water pollution will be minimized through a combination of landowner education and implementation of appropriate management measures. Management measures include both recommended management practices and the regulations.

The intent of this Area Plan is not to tell anyone how to farm, ranch, or otherwise utilize his or her natural resources. However, the NRCS along with SWCD personnel in local offices can provide technical assistance to help farmers, ranchers, and other agricultural land users implement recommendations in this Area Plan (see Prohibited Conditions section). Each farmer, rancher, or other agricultural land user is expected to observe their property to ensure that either prohibited conditions do not exist or that they are beginning to improve. If problems are encountered in meeting the goals of this Area Plan, land managers are encouraged to seek assistance, as they must bring the land they own or operate into compliance with Area Rules.

This Area Plan recognizes that planning for water quality is only part of a successful plan for overall management of agricultural and rural land and that other, broader objectives must also be considered in total farm or resource management planning. Sustaining agricultural production capacity for future generations is one of those broader objectives. Conserving water and soil resources helps achieve that.

The Wasco and Sherman County SWCDs maintain a list of resource concerns, which are prioritized in their long-range planning documents. In addition, baseline assessments described in Chapter 3 will help identify specific priority areas for education, technical, and financial assistance.

Current top priorities for Wasco SWCD include: continuing to implement riparian buffers, making direct seed/no-till sustainable, conserving water, and working with small acreage landowners that have horses on streams. Sherman SWCD is focusing on reaching all residents of the county and their absentee landlord with conservation-related information, promoting CREP and CCRP to meet goals for improved water temperature, increasing the amount of "hands on" agriculture-related learning experiences available to youth, and providing quality assistance to NRCS and FSA in order to get more landowners involved in USDA programs.

2.4.1 Management Objectives

Farmers, ranchers, and other agricultural land users in the Management Area are expected to achieve the following conditions on the land they manage:

1. Soil erosion on uplands within acceptable rates.
2. Streambank erosion within acceptable levels.
3. Elimination of placement, delivery, or sloughing of wastes into streams.
4. Adequate riparian vegetation for bank stability and stream shading consistent with vegetative site capability.

2.4.2 Requirements (Prohibited Conditions)

To prevent and control pollution from agricultural land in the Management Area, the conditions identified below must be met. These conditions relate directly to the management objectives of this Area Plan.

A landowner's responsibility is to implement measures that prevent or end the occurrence of Prohibited Conditions. Prohibited Conditions are least likely to occur where an effective program for their identification and control is in place. Implementation of a voluntary, individual conservation plan that

addresses the conditions offers a way of meeting this responsibility. Individual conservation plans can be modified to meet changing conditions.

Structural conservation practices generally are designed to withstand different levels of storm events. For instance, terraces and waterways typically should handle a 10-year, 24-hour event, while drop structures, streambank protection, and larger dams should handle at least a 25-year, 24-hour event. Most agronomic practices can handle a 2-5 year event. Riparian systems in healthy condition are expected to withstand a 25-year event with minimal damage.

A landowner is responsible for only those conditions caused by agricultural activities conducted on land controlled by the landowner. A landowner is not responsible for prohibited conditions resulting from actions by another landowner. Conditions resulting from unusual weather events or other exceptional circumstances are not the responsibility of the landowner.

2.4.2.1 Soil Erosion on Uplands Within Acceptable Rates

Erosion is a natural process. Some parts of the crop production process increase vulnerability to erosion. In conservation planning an effort is made to design the plan so that erosion is at or below T, the theoretical erosion rate that equals the rate at which soil is formed. T varies by soil type and is also known as the tolerable loss rate in tons per acres that the soil can sustain without loss of productive capacity.

Characteristic to Achieve

Soil erosion must be minimized through appropriate vegetation management or structural practices to protect soils and increase water infiltration rates. While all soils lost through erosion may not necessarily enter waters of the state, due to distance from the stream or to practices such as sediment basins, the reduction in such erosion reduces the likelihood that soils will enter Management Area streams.

In addition to complying with this requirement, landowners should be aware that the waste rule requires them to prevent pollution from sediment delivery to streams. While an NRCS-approved farm plan may show compliance with the erosion rule, farming in accordance with the plan may still result in pollution in violation of rule #3 (OAR 603-095-0640(4)). If ODA determines during a compliance investigation that a landowner's farm plan is not adequate to comply with the waste rule, ODA works with NRCS and the landowner to modify the plan to comply with the waste rule.

Prohibited Condition (OAR 603-095-0640(2))

Effective on rule adoption, landowners must control soil erosion on uplands using practical and available methods.
(a) On croplands, a landowner may demonstrate compliance with 603-095-0640(2) by:
(A) operating consistent with a Soil and Water Conservation District (SWCD)-approved conservation plan that meets Resource Management System (RMS) quality criteria for soil and water resources; or
(B) operating in accordance with an SWCD-approved plan for Highly Erodible Lands (HEL) developed for the purpose of complying with the current US Department of Agriculture (USDA) farm program legislation; and farming non-HEL cropland in a manner that meets the requirements of an approved USDA HEL compliance plan for similar cropland soils in the county; or
(C) farming such that the predicted sheet and rill erosion rate does not exceed 5 tons/acre/year, as estimated by the Revised Universal Soil Loss Equation (RUSLE); or
(D) constructing and maintaining terraces, sediment basins, or other structures sufficient to keep eroding soil out of streams.
(b) On rangelands, a landowner may demonstrate compliance with 603-095-0640(2) by:
(A) operating consistent with a Soil and Water Conservation District (SWCD)-approved conservation plan that meets Resource Management System (RMS) quality criteria for soil and water resources; or
(B) maintaining sufficient live vegetation cover and plant litter to capture precipitation, slow the movement of water, increase infiltration, and reduce excessive movement of soil off the site; or
(C) minimizing visible signs of erosion, such as pedestal or rill formation and areas of sediment accumulation.
(c) Landowners must control active gully erosion to protect against sediment delivery to streams. 'Active Gully Erosion' means gullies or channels that at the largest dimension have a cross-sectional area of at least one square foot and that occur at the same location for two or more consecutive years of cropping or grazing.

Compliance can be documented through a variety of methods. Landowners may choose to follow a voluntary conservation plan. The Revised Universal Soil Loss Equation (RUSLE) provides a standard method of calculating predicted sheet and rill erosion rates. Photo points may be used to show compliance with active channel erosion requirements or upland vegetation requirements. The Prohibited Conditions describe several ways in which adequate erosion control can be demonstrated.

2.4.2.2 Streambank Erosion Within Acceptable Levels

Streams naturally experience some bank erosion. The Wasco County SWCD estimates, based on field observations, that banks of perennial and intermittent streams currently are approximately 80 percent stable. Stable stream banks reduce sediment in the stream caused by mass wasting and bank erosion and help narrow channels, thereby reducing the amount of surface water exposed to solar radiation.

Ephemeral streams (dry draws) rarely have defined banks and are primarily influenced by upland management practices. Appropriate cropping and rangeland practices minimize the sediment contributed by such streams.

Characteristic to Achieve

Active stream bank erosion must be within acceptable levels. Stream channel modification caused by short-term erosion is minimal. Stabilization of stream banks reduces stream sediment loads. Vegetation used to stabilize banks helps reduce the rate of heating of water.

Prohibited Condition (OAR 603-95-0640(3))

By January 1, 2005, active stream bank erosion is not allowed beyond that expected for stream flow regimes and channel types. Stream channel modification that extends well beyond the level anticipated from natural disturbance given system characteristics is not allowed.

Methods for evaluating stream bank stability include, but are not limited to: Environmental Protection Agency's (EPA) monitoring protocol for bank stability (1993), protocols described in Platts (1987) and Rosgen (1996), and NRCS-developed protocols (Oregon Tech Note No. 12 "Procedures for using Oregon Stream Habitat Data Sheet" and National Water and Climate Center Tech Note 99-1 "Stream Visual Assessment Protocol"). Selection of the appropriate protocol is site-specific.

2.4.2.3 Elimination of Placement, Delivery or Sloughing of Wastes

High nutrient concentrations, pathogens associated with livestock manure, high sediment concentrations in run-off, pesticides, and other potential pollutants should not be transported to streams and groundwater.

Wastes include livestock manure from situations like seasonal feeding and birthing areas, gathering pastures and corrals, rangelands and pasture, and any other situations not already covered by Oregon's Confined Animal Feeding Operation laws. Indicators of water quality issues include 1) runoff flowing through areas of high livestock usage and entering waters of the state, 2) livestock waste accumulated in drainage ditches or areas of flooding, and 3) fecal coliform counts that exceed State water quality standards. Livestock grazing is allowed to the extent it does not cause conditions that violate State water quality standards and complies with the Prohibited Conditions in the Area Rules. Livestock facilities located near streams should use an adequate runoff control system. Compliance with the riparian objectives below helps keep wastes from running into waters of the state.

Characteristic to Achieve

Wastes are placed so they are not likely to pollute waters of the state. This is already State law under ORS 468b; the following Prohibited Condition is consistent with the current law.

Prohibited Condition (OAR 603-095-0640(4))
Effective on rule adoption, no person subject to these rules shall violate any provision of ORS 468B.025 or ORS 468B.050.

If visual inspection discloses a potential problem, then an appropriate monitoring protocol may be selected to determine if there is an adverse effect on water quality. The nature of the waste involved determines which monitoring protocol is appropriate.

2.4.2.4 Adequate Riparian Vegetation

Landowners must eliminate activities restricting the growth of streamside riparian vegetation.

The purpose of this objective is to provide for stream bank stability and stream shading, as allowed by site capability. Adequate vegetation for stream bank stability and stream shading also results in: interception and immobilization of nutrients and sediment, more complex stream structure, and, where applicable, presence of large woody debris. The potential width of the vegetated riparian area varies depending on site capability.

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.

Site capability refers to the types and amount of vegetation that could be expected to occur in a particular area based on existing ecological conditions and human infrastructure. Site capability is influenced by physical and biological factors such as elevation, aspect, geology, climate, and the current plant community. It is also influenced by disturbances such as flooding. 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) and resident wildlife use.

The purpose is not to restore riparian areas to their pre-settlement conditions or to address wetland areas away from streams.

Adequate riparian vegetation should:

- Include a variety of plant species and ages;
- Include plants that have root masses capable of withstanding high stream flows; and
- Provide adequate cover to protect the stream bank and dissipate energy during high flows;
- Include sufficient ground cover to filter out excess sediment or nutrients in overland flows;
- Provide shade.

Adequate vegetation includes:

- Visible ongoing renewal of riparian vegetation through natural processes;
- Vigorous growth; presence of native species; and
- The maintenance of a majority of each year's new growth of woody vegetation (trees and shrubs).

Noxious weeds are undesirable as they generally provide less shade, filtering capacity, and stabilizing root mass than the plants they replace.

As riparian vegetation matures, stream channels are expected to narrow and deepen. These stream channels will have less water surface area exposed to solar radiation (thereby reducing heating rates during summer) and will be more connected to their floodplain. Better floodplain connectivity has the added benefit of increasing storm water storage and reducing storm water velocities. These streams will also meander more, which will reduce flow velocities and reduce the damage from flooding. Additionally, as late season stream levels drop, groundwater stored in the flood plain will add some cooler water to the stream.

Characteristic to Achieve

Riparian vegetation provides sufficient: 1) root mass for stream bank stability and 2) above-ground herbaceous material for stream shading to reduce the solar heating rate of surface water.

Prohibited Condition (OAR 603-095-0640(5))

By January 1, 2005, agricultural management or soil-disturbing activities that preclude establishment and development of adequate riparian vegetation for stream bank stability and shading, consistent with site capability, are not allowed.

Monitoring for Condition

ODA uses a modification of the Greenline method (Bureau of Land Management, 1993) to determine compliance with this condition. The method evaluates ground cover, canopy cover, and plant diversity in relation to stream shading and stabilizing streambanks.

Site capability is determined on a site-specific basis, generally by comparison with nearby sites in good condition with similar characteristics and by reviewing scientific information.

Photographic records with a time sequence of photographs taken from the same point are the simplest method for qualitative assessments and for monitoring of trends.

The following regulations apply to investigations of agricultural water quality concerns.

Complaints and Investigations (OAR 603-095-0660)

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

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

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

(4) The department will evaluate or investigate a complaint filed by a person under section OAR 603-095-0660(3) if the complaint is in writing, signed and dated by the complainant and indicates the location and description of:

(a) The waters of the state allegedly being damaged or impacted; and

(b) The property allegedly being managed under conditions violating criteria described in ORS 568.900 to 568.933 or any rules adopted thereunder.

(5) As used in section OAR 603-095-0660(4), "person" does not include any local, state or federal agency.

(6) Notwithstanding OAR 603-095-0660, the department may investigate at any time any complaint if the department determines that the violation alleged in the complaint may present an immediate threat to the public health or safety.

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

2.4.3 Recommended Management Practices

Soil Erosion and Sediment Control

- Conservation tillage (crop residue management): reduced tillage, minimum tillage, no-till, direct seeding, modified conventional tillage, reservoir tillage, sub-soiling or deep chiseling
- Enrollment in Conservation Reserve Program (CRP) and CCRP
- Cover crops (perennial, annual)
- Contour farming practices: strip cropping, divided slopes, terraces (level and gradient), contour tillage
- Water and sediment control basins
- Crop rotations
- Early or double seeding
- Vegetative buffer strip (filter strips, grassed waterways, field borders, contour buffer strips)
- Irrigation scheduling
- Prescribed burning
- Weed control
- Grazing management plans
- Range plantings
- Livestock distribution

Streamside Areas

- Critical area planting

- Enrollment in CREP and CCRP
- Vegetative buffer strips (filter strips, riparian buffers, riparian forest buffers)
- Livestock management (see below)
- Conservation tillage practices
- Weed control
- Nutrient and chemical application scheduling
- Road, culvert, bridge, and crossings maintenance
- Wildlife management

Livestock

- Grazing management or scheduling: intensity, duration, frequency, season pasture rotations, rest/deferral
- Vegetation management (grazing management, grass seeding, weed control, controlled burning)
- Fencing (temporary, cross, exclusion)
- Watering facilities (spring development, off-stream water, water gaps)
- Salt and mineral distribution
- Waste management systems: clean water diversions; waste collection, storage, and utilization; facilities operation and maintenance

Irrigation

- Irrigation scheduling: crop needs, soil type, climate, topography, and infiltration rates
- Irrigation system efficiency (flood, sprinkler, drip)
- Diversion maintenance (push-up dam management, fish screens)
- Return flow management
- Back-flow prevention devices
- Reservoir tillage
- Cover crops

Nutrient and Farm Chemical Application

- Nutrient budgeting (soil testing, tissue testing, plant needs, water testing)
- Application methods
- Application timing
- Tail water management
- Hydraulic connectivity
- Label requirements
- Irrigation scheduling

Integrated Pest Management

- Pest and disease modeling
- Weather monitoring
- Selection of low toxicity pesticides
- Mating disruption
- Ground cover management
- Spray drift barriers
- Low volume sprayers

Channel and Drain Management

- Vegetation management (burning, chemical, clipping)

- Stream bank stabilization (structural, bio-engineered)
- Critical area planting
- Channel management
- Obstruction removal
- Wetland development
- Out-fall protection

Chapter 3: Goals, Objectives, and Strategies

3.1 Area Plan Goal

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

3.2 Measurable Objectives

To achieve the Area Plan purpose and goal, the following water quality related objectives are established:

1. **Control soil erosion on uplands to acceptable rates.**

   By 2016, uplands will be evaluated for erosion potential. The method consists of RUSLE2 evaluations based on average slopes for conventional and direct seed management practices. Soil loss will be estimated for 2016 and previous years.

   These results will help the LAC develop long-term targets at the 2016 Biennial Review. Likely targets include:
   - By June 30, 2026, estimated soil erosion rates on cropland will be reduced by __% from 2014 levels.
   - By June 30, 20___, estimated soil erosion rates on cropland will be less than __ tons/acre.

2. **Provide adequate riparian vegetation for stream bank stability and stream shading consistent with site capability; streambank erosion is within acceptable levels.**

   By 2016, perennial stream reaches will be evaluated for vegetative water quality function (shading, bank stability, and filtration of potential pollutants in overland flows). The method consists of a combination of aerial photo evaluation and local knowledge to determine how similar the ground cover and canopy cover/shade are to what could be provided by site capable vegetation.

   These results will help the LAC develop long-term targets at the 2016 Biennial Review. Likely targets include:
   - By June 30, 2026, __% of perennial streams in agricultural areas will have streamside vegetation that likely provides the full suite of water quality functions the site is capable of (i.e., shade, bank stability, filtration of overland flow).
   - By June 30, 20__, 90% of perennial streams in agricultural areas will have streamside vegetation that likely provides the full suite of water quality functions the site is capable of (i.e., shade, bank stability, filtration of overland flow).

3. **Prevent water pollution from wastes**

   The following targets address bacteria from livestock manure. Sediment from erosion is already addressed in Objectives 1 and 2. Pesticides will be addressed in the next revision of this Area Plan. No other significant "wastes" have been identified in the Management Area.

   By 2016, livestock operations along streams will be evaluated for likelihood of pollution from bacteria. The method consists of: looking for likely sources (manure piles and heavy use areas) during

riparian vegetation survey and follow up with landowner to do site visit follow up by technical assistance if needed.

These results will help the LAC develop long-term targets at the 2016 Biennial Review. Likely targets include:

- By June 30, 2026, ????
- By June 30, 20__, fewer than 5% of livestock operations are likely to pollute surface water

3.3 Focus Area

The Wasco County SWCD has selected the Fifteenmile Creek watershed to track the presence of riparian buffers. Riparian buffers are lands along streams or waterways that have been set aside by the landowners to protect water quality and habitat. Riparian buffers as defined in this project area are at least 35 feet wide and meet NRCS standards. Buffer plans typically include planting prescriptions to fit the site with trees, shrubs, and ground cover; fencing to keep livestock off stream banks; and off-stream water development.

The Fifteenmile drainage has 465 stream miles. The SWCD is targeting the 160 miles of Fivemile, Eightmile, Fifteenmile creeks and principal tributaries of Ramsey Creek and Dry Creek. The SWCD has been tracking riparian buffers through landowner participation in CREP.

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

Additional focus areas will be identified based on the results of the 2015/2016 assessments described in Section 3.2.

3.4 Strategic Implementation Area

Mill Creek, near The Dalles, was one of the two pilot locations for the Strategic Implementation approach (see Section 1.7.3).

ODA completed a compliance evaluation in 2013 related to agricultural activities and potential concerns related to surface and ground water. The evaluation considered the condition of streamside vegetation, bare ground, and potential livestock impacts (including manure piles). The process involved both a remote evaluation and field verification from publicly accessible areas. Concern levels for each property were identified:

- None = No water quality concerns related to agricultural activities were observed.
- Low = Minimal potential for agricultural activities to impact surface or groundwater OR vegetation along streams is inadequate, but unable to determine if agricultural activities are limiting vegetation.
- Moderate = Likely potential for agricultural activities to impair surface or ground water OR agricultural activities may be preventing adequate vegetation along streams.
- Significant = Field-verified likely potential for agricultural activities to impair surface or ground water OR agricultural activities may be preventing adequate vegetation along streams.
- Serious = Field-verified pollution of surface or ground water or removal of vegetation along streams.

Out of 315 properties, ODA designated 291 as 'no concern,' 14 'low concern,' 6 'moderate concern,' three 'significant concern,' and one 'serious concern.'

All affected landowners were sent letters explaining the process and inviting them to an open house on May 9, 2014. Landowners with the serious and two of the significant concerns attended the open house and have proactively worked with the Wasco County SWCD to address concerns. In addition, landowners in the moderate and significant categories were sent letters in June explaining the process and any problems identified; they were also directed to the Wasco County SWCD for assistance.

In September, ODA completed a site visit on the 'significant' property that was not working with the SWCD. No concerns were observed.

In December, ODA sent out a second round of letters to the 'moderate' properties to set up compliance site visits.

3.5 Strategies for Area Plan Implementation

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

1. Work to improve water quality in the Management Area through planning and implementation of technically sound and economically feasible conservation practices that contribute to meeting Area Plan objectives.

    A. Limit soil erosion and pollution caused by agricultural activities, as close to the source as possible, by achieving soil erosion targets and sediment control.

    B. Show progress in reduction of pollution from agricultural and rural lands through periodic surveys of stream reaches and associated lands.

    C. Implement successful practices for stream bank stabilization, reduction in high summer water temperatures, restoration and enhancement of wetlands and riparian areas, and Integrated Pest Management, while avoiding adverse fish habitat modification.

    D. Implement conservation practices to improve irrigation water use and conveyance efficiency to reduce the impact of seasonal flow modifications on streams resulting from water withdrawals.

2. Create a high level of awareness and an understanding of water quality issues among the agricultural community and rural public in a manner that minimizes conflict and encourages cooperative efforts through education and technical assistance activities.

    A. Incorporate implementation of the Area Plan as a priority element in the Wasco and Sherman County SWCDs' Annual Work Plan and Long Range Plan with support from partner organizations.

    B. Inform landowners of the Area Plan and Rules and encourage landowners to make such changes as may be needed.

C. Showcase successful practices and systems and conduct annual tours for landowners and media.

D. Recognize successful projects and practices through appropriate media and newsletters.

E. Promote cooperative on-the-ground projects to solve critical problems identified by landowners/operators and in cooperation with partner organizations.

F. Conduct educational programs to promote public awareness of water quality issues and their solutions.

G. Examine current research and monitoring results and conduct such monitoring as may be necessary to better quantify current conditions and objectives contained in this Area Plan in preparation for biennial Area Plan reviews.

3. Encourage active participation by the agricultural community and rural public in the process of solving our water quality problems.

A. Encourage development of individual conservation plans by assisting landowners with plans that address water quality and with the implementation of conservation practices adopted in those plans.

(1) Conservation Plans

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

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

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

Landowners have flexibility in choosing management approaches and practices to address water quality issues on their lands. They may develop management systems to address problems on their own, or they may choose to develop a Conservation Plan with assistance from their local SWCD or NRCS office. Conservation Plans developed by SWCD or NRCS personnel are approved by the appropriate SWCD.

(2) Conservation Practices

Agricultural conservation practices for pollution control are those management practices and structural measures that are the most effective, practical means of controlling and preventing pollution from agricultural activities. Conservation practices are actions taken by individual agricultural operations to achieve production and water quality goals.

Appropriate conservation practices for individual farms vary with the specific cropping, topographical, environmental, and economic conditions existing at a given site. No set of

conservation practices is universally applicable to all areas and all agricultural activities within the Management Area.

A detailed listing of specific practices that can be used to control or reduce the risk of agricultural pollution are contained in other documents such as the Field Office Technical Guide (FOTG) (overview in Attachment 3). This guide is available from NRCS at the local USDA Service Center. An electronic version ('efotg') is available at http://www.nrcs.usda.gov/technical/efotg/.

Conservation practices are most effective when implemented as integral parts of a comprehensive resource management plan and are based on natural resource inventories and an assessment of management practices. The conservation planning process used by NRCS and the SWCDs should produce an effective, systems approach to resource management tailored for a specific land area and type of operation.

B. Promote the continued development, evaluation, and adoption of practices and technologies that enhance water quality in an efficient, effective, economic manner, by reviewing research and development needs with agriculture assistance agencies and consultants.

C. Promote incentive and cost-share programs to assist with implementation of Area Plans and related practices, by annually identifying water quality funding needs with agencies providing cost-share and technical assistance to agricultural operations.

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

In addition to these voluntary strategies, required measures (Section 2.4.2) are included as an implementation strategy. ODA uses enforcement where appropriate and necessary to gain compliance with Prohibited Conditions in the Rules.

3.6 Costs and Funding

Costs of implementing this Area Plan are difficult to assess in the absence of detailed, site-specific inventories of resource problems and quantification of nutrient and sediment loadings and other water quality issues of concern.

Chapter 4: Implementation, Monitoring, and Adaptive Management

4.1 Implementation and Accomplishments

Wasco County SWCD: 2013 and 2014			
Topic	**Projects**	**Outreach**	**Monitoring**
1. Soil erosion on uplands	District Cost Share Program funded: conversion of 611 acres to no-till, a sediment dam/stock water pond, 2 conservation tree & shrub planting projects, 1 fire erosion control project, 2 juniper control projects to improve range vegetation and reduce erosion. 86 conservation plans, both new and revisions, were done this biennium. Over 200 conservation practices benefitting water quality were completed this biennium. OWEB Small Grant Program funded one Water & Sediment Control Basin and one upland forage and wildlife habitat project.	The District published the fact that 95% of the county's wheat cropland has been converted to no-till, virtually eliminating erosion from those lands.	
2. Stream bank erosion	District Cost Share Program funded a bank stabilization project on Fivemile Creek.		
3. Eliminate waste discharge and related pollution	District Cost Share Program funded: 2 precision ag projects including GPS, autosteer and auto boom control. OWEB Small Grant Program funded 3 Integrated Pest Management projects.		District & Councils worked with DEQ to monitor pesticide levels in Mill Creek and Fifteenmile Creek through the "Pesticide Stewardship Partnership."
4. Adequate streamside vegetation	District Cost Share Program funded livestock water developments consisting of: 1 spring, 2 well, 1 fence, pipeline, multiple troughs. OWEB Small Grant Program funded one off channel watering trough. 14 new CREP plans were completed on 512.3 acres. 3 CREP renewals were completed on 286.3 acres.	Over 1,400 landowner contacts were made this biennium	District Cost Share Program helped fund the acquisition of a flail mower for ongoing invasive species control at Riverfront Park.
5. Additional conservation activities that do not fit neatly into explicit categories above	District Cost Share Program funded: 5 irrigation system upgrades for water conservation, 1 variable frequency drive optimization project, 4 weed control projects, 1 *E. coli* sampling project on Mill Creek. OWEB Small Grant Program funded one irrigation system efficiency upgrade.	District Cost Share Program funded: 3 hands-on environment education projects, a greenhouse for Dufur school. 12 newsletters, 23 newspaper articles, and 24 radio talk shows were done this biennium, along with 57 other public information activities.	District Cost Share Program helped fund the acquisition of automated irrigation ditch flow loss monitoring devices for 1 Irrigation District. Approximately 200 water samples were taken for *E. coli* analysis this biennium. The "mystery pipe," a contributor of *E. coli* to Mill Creek, was solved and repaired. Continued work with city of The Dalles on Gov't Flats Fire rehab. Entered into agreement with city to split local costs of USGS Stream gage installed under joint funding agreement with city.

Sherman County SWCD: 2013 and 2014

Small Grants – 11 Total grants

- 4 Spring Developments
- 1 Wildlife Solar Development
- 1 Direct Seed – 293 Acres
- 32 WASCB's
- 651 Feet of Grassed Waterway
- 37,825 Feet of Terrace – mostly reshaping

Large Grants - Direct Seeding

- 2 Large Grants approved for Direct Seeding.
- 18 Landowners
- 9,216 Total Acres

Pending Large Grant

- 2,368 Feet of New Terrace
- 9,422 Reshaping Terrace
- 15 WASCB's

Odds and Ends

- 8 Quarterly Newsletters
- 1,500 landowner contacts
- 4 After-hours sessions

Education – CAP – Conservation Awareness Program

- K – 5th Grades Participating
- 120 Kids Total
- Monthly Presentations
- This Year - All about soil – End of the year trip to Cottonwood Canyon State Park

Lower Deschutes Weed Management Program

- Year 1 sprayed 7 Total acres
- Year 2 Sprayed 65 Total acres
- Established 8 Monitoring Sites
- Main focus is restoring Riparian Area first

4.2 Water Quality Monitoring—Status and Trends

Water quality currently is monitored on a limited basis by: DEQ, ODFW, and Oregon's Water Resources Department; Wasco County SWCD; US Forest Service; Bureau of Land Management; the city of Dufur; the city of The Dalles; and the Confederated Tribes of the Warm Springs Reservation. These groups primarily are measuring temperature, although some also monitor turbidity and physical fish habitat.

Wasco County SWCD and watershed councils have also worked with DEQ to monitor pesticide levels in Mill Creek and Fifteenmile Creek through the collaborative "Pesticide Stewardship Partnership" program. The SWCD collected water samples in spring and summer of 2010 – 2014 and sent the samples to DEQ for pesticide analysis. Mill Creek was also monitored for organophosphate pesticides during an earlier phase of the Pesticide Stewardship Program in 2002 – 2005. At that time, Wy'East Resource Conservation and Development Council was the lead partner with DEQ on the project. In recent years, DEQ has had some funding to continue this program and the SWCD and watershed councils have continued to do pesticide monitoring. During 2014, ODA included this work in the SWCD Work Plan.

Wasco County SWCD and The Dalles Watershed Council have also monitored Mill Creek for bacteria, particularly *E. coli*, since 2009. High concentrations of *E. coli* have spurred the SWCD to increase monitoring efforts as time and funding allow. The city of The Dalles found and repaired two broken sewer mains through this monitoring. In 2014, the SWCD began to focus more on potential agricultural sources and has gotten landowner support to find and help fix problems.

Most soil erosion and sediment transport to waterways occurs during rain or snowmelt on frozen ground in the winter, although sediment from cropland also may enter waterways during and after severe thunderstorms in the summer. These events are often separated by periods of several years or more when little sediment enters streams. The lack of data and the sporadic and unpredictable timing of erosion events make it difficult to determine water quality conditions and trends relating to sediment in the Management Area. The LAC would like to see enough sediment monitoring stations established in the Management Area so that the amount and timing of sediment delivery to the waterways can be estimated each year. A record of yearly sediment delivery will be useful in determining trends in the condition of the Management Area.

In 2006 and 2007, staff from ODA, Wasco Co. SWCD, and DEQ collected data at 23 sites in the Fifteenmile drainage to characterize sediment transport in the streams. The data have been analyzed using the Relative Bed Stability method, which assesses the size of sediment compared to what would be expected under natural conditions. Data suggest that the major sediment issues are in the Eightmile drainage below Endersby but don't identify the reason.

4.3 Progress Toward Measurable Objectives

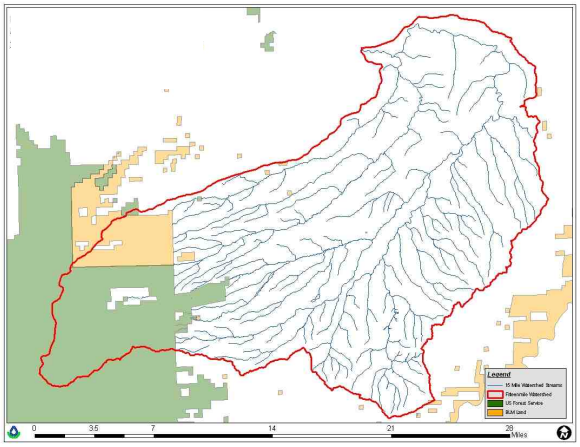
The Wasco and Sherman County SWCDs will use the methods described in Section 3.2 to track progress over time at 5 or 10 year intervals. They will also use the baseline information collected in the next two years to identify additional focus areas.

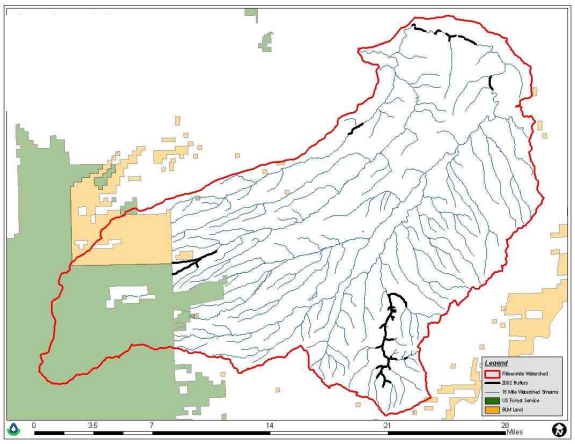
4.3.1 Riparian Buffers in the Fifteenmile Creek Priority Area

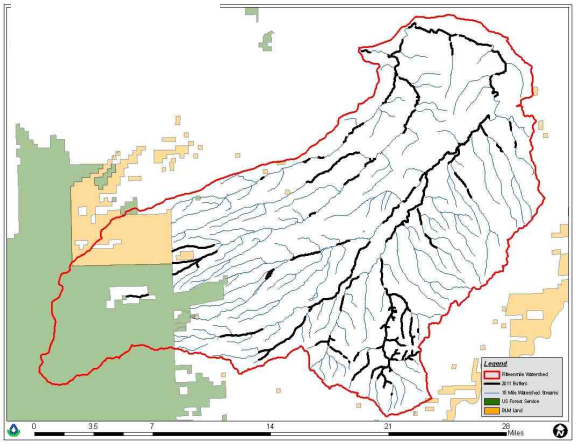
The following maps show buffer establishment with black lines. Grey lines in the last map show 38.8 miles of areas without buffers as defined above.

1998: prior to CREP

2002: 24 buffered miles







Wasco Co. SWCD goals and timelines:
2012 December: Identify and contact 100% of the landowners in the yellow, buffer gap areas; obtain signups for buffers in 50% of the gap areas and determine eligibility for CREP.
2013 May: Develop goals for 2013-2015
2013 June: Develop buffer plans to cover 2 miles of gap areas.
2014 November: Report progress to the LAC

This project was set back considerably due to lack of funding authority for Farm Bill programs such as CREP. Ability to take new sign ups resumed in 2014.

4.4 Aerial Photo Monitoring of Streamside Vegetation

ODA analyzed aerial photographs from 2004 for seven stream reaches per the methodology presented in Section 1.8.1. The higher the score, the more trees and shrubs compared to grass and bare ground. The length of each reach varied from about three to four miles.

TABLE 7. Riparian index scores from analysis of aerial photographs.

Stream	Scores		Comments About Analyzed Reach
	2004	2014	
Bakeoven Ck	49.6	Not yet analyzed	Large amounts of bare ground due to rock outcrops and/or thin soils. Unstable channel with many bare point bars.
Booten Ck	49.2		Large amounts of bare ground due to rock outcrops and/or thin soils. Narrow valley with little room for lateral stream migration.
Finnegan Ck	42.3		Large amounts of bare ground due to rock outcrops and/or thin soils. Narrow valley with little room for lateral stream migration.
Larch Ck	42.2		
Spanish Hollow	45.1		
Threemile Ck (near The Dalles)	54.2		
Trail Hollow	52.3		Narrow valley with little room for lateral stream migration.

In 2004, the seven streams showed a wide variety of land cover types. Bakeoven and Booten creeks had very mixed land cover, with no single type dominant. Trail Hollow and Threemile creeks were dominated by tree cover. Spanish Hollow and Finnegan creeks were dominated by shrubs. Larch Creek was dominantly grass. Nearly 30 percent of the 90-foot bank on the right side of Bakeoven Creek was bare ground, but only 4 percent of that was in agricultural use. With the exception of Threemile Creek, all streams did have significant amounts of bare agricultural land. Threemile Creek had the highest riparian index score (54.2) while Larch Creek had the lowest (42.2).

In terms of qualitative aspects, Bakeoven Creek appeared to have an unstable channel with many bare point bars. The reach examined showed evidence of an aggrading channel, though there was no indication of any factors that might have led to this instability.

Some areas of Booten Creek showed signs of heavy grazing pressure, with many animal trails. The stream channel itself appeared mostly stable. Trail Hollow and Finnegan creeks were much like Booten in these aspects, though Finnegan Creek was not confined by valley width as much as the other two streams.

About 30 percent of Threemile Creek appeared to be overgrazed with unstable or eroding streambanks. A channelized reach is evident through a short reach of rural residential development. Larch Creek also had some areas of heavy agricultural use with channel incision and some areas denuded by overgrazing. The lower 20 percent of the reach examined appeared to be impaired by agricultural activities, and the upper 5 percent showed strong evidence of overgrazing.

4.5 Biennial Reviews and Adaptive Management

The December 3, 2014, biennial review consisted mostly of a discussion of the proposed Management Area-wide assessments and an update on the Mill Creek Strategic Implementation Area.

The only enforcement actions in the Management Area were related to the Strategic Implementation Area.

Recommendations from the LAC:

- ODA should continue to publicize the good things the agricultural community is doing for water quality.
- ODA should initiate more Strategic Implementation Areas in the Lower Deschutes.
- Lower John Day LAC should adopt the same Management Area-wide assessments being used in the Lower Deschutes, and
- ODA should increase communication with their field staff and local SWCD regarding activities related to the local Strategic Implementation Area.

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EPA. Monitoring Protocols to Evaluate Water Quality Effects of Grazing Management on Western Rangeland Streams. EPA 910/R-93-017. 1993.

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Attachment 1: Fisheries

Sensitive Fish Species

The Management Area is located within the climatic transition zone between Eastern and Western Oregon. A wide variety of fish species have evolved in the diverse stream habitats of this area.

The small Columbia River tributary streams, including Rock, Mosier, Chenoweth, Mill, Threemile, and Fifteenmile creeks, support coastal cutthroat trout, rainbow trout, winter steelhead, coho salmon, Pacific lamprey, and a variety of non-game fish. In addition, Mill Creek periodically provides spawning and rearing habitat for fall Chinook salmon, and the Fifteenmile Creek system provides spawning and rearing habitat for spring Chinook salmon.

The lower Deschutes River supports summer steelhead, summer/fall Chinook, resident redband trout, bull trout, mountain white fish, and a variety of non-game fish. The river also serves as a migration corridor, as well as rearing habitat, for spring Chinook salmon. The river and tributaries, including White River, Macks, Jones, Ferry, Oak, and Stag Canyons, and Wapinitia, Nena, Bakeoven, Buck Hollow, and Eagle creeks, provide spawning and rearing habitat for summer steelhead, redband trout, and a variety of non-game fish.

White River and tributaries upstream from White River Falls support resident redband and brook trout, mountain whitefish, and several non-game fish species.

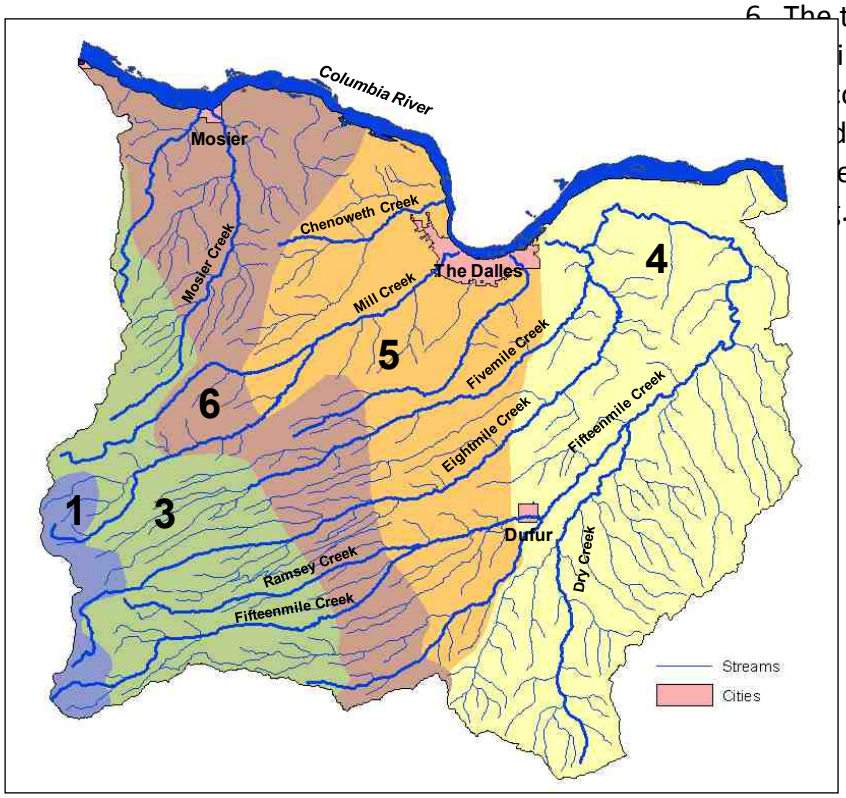
Status of Fish Populations

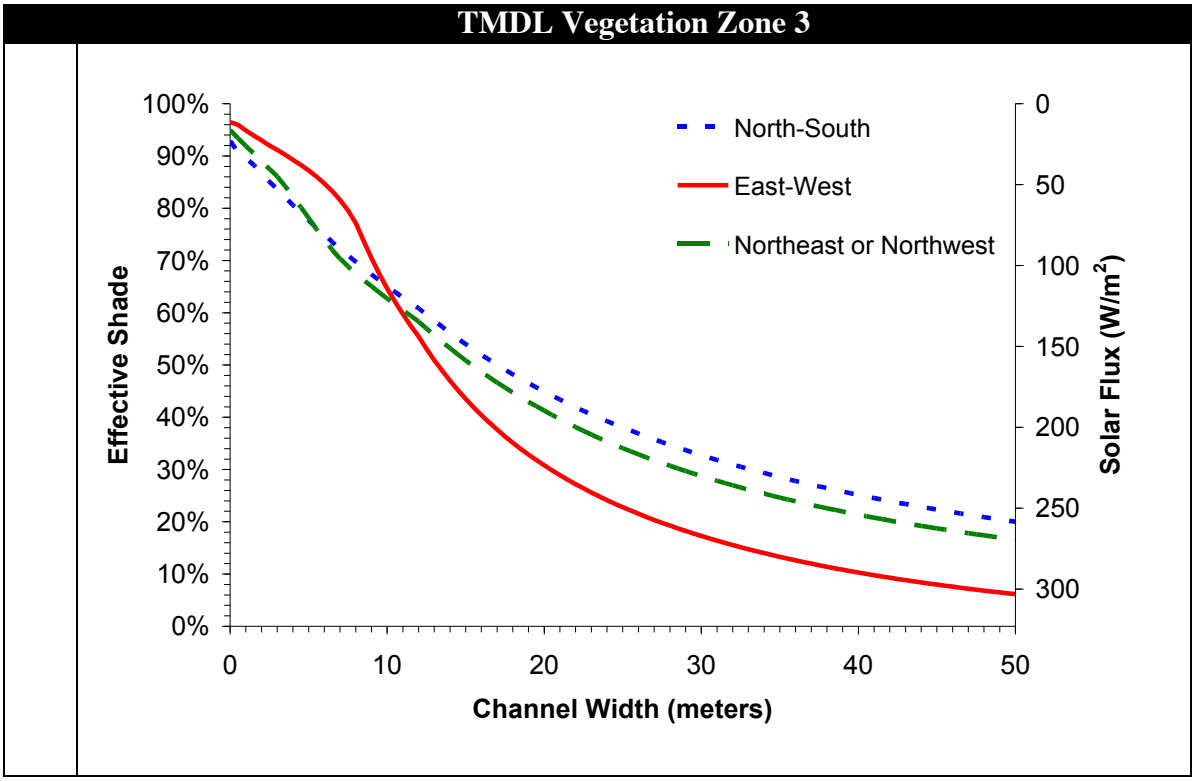
Steelhead throughout the Management Area are listed as "Threatened Species" under the Endangered Species Act (ESA). Bull trout also are currently listed as "Threatened." Fall Chinook salmon in the Deschutes River have been proposed for listing as “Threatened,” however, the listing was deemed unwarranted. In recent years, fall Chinook populations in the Deschutes River have rebounded to near historic highs. Cutthroat trout throughout the Management Area also have been considered for listing as "Threatened," however, this listing was also considered unwarranted.

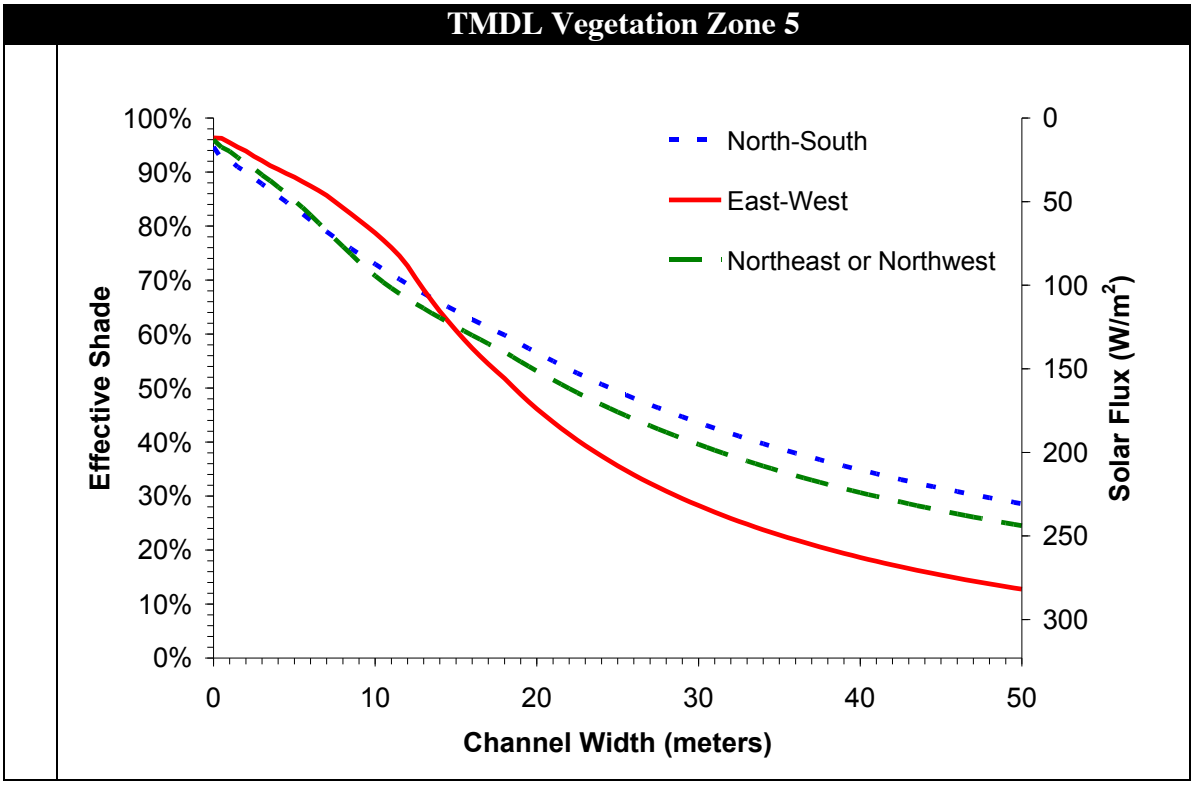
Redband trout and mountain white fish populations throughout the Management Area are considered to be healthy. The redband trout upstream from White River Falls are genetically unique and are most closely related to redband populations found in the desert streams in Southeast Oregon. Brook trout, found in upper White River tributaries (Clear, Frog, and Badger creeks), are an introduced species with limited distribution.

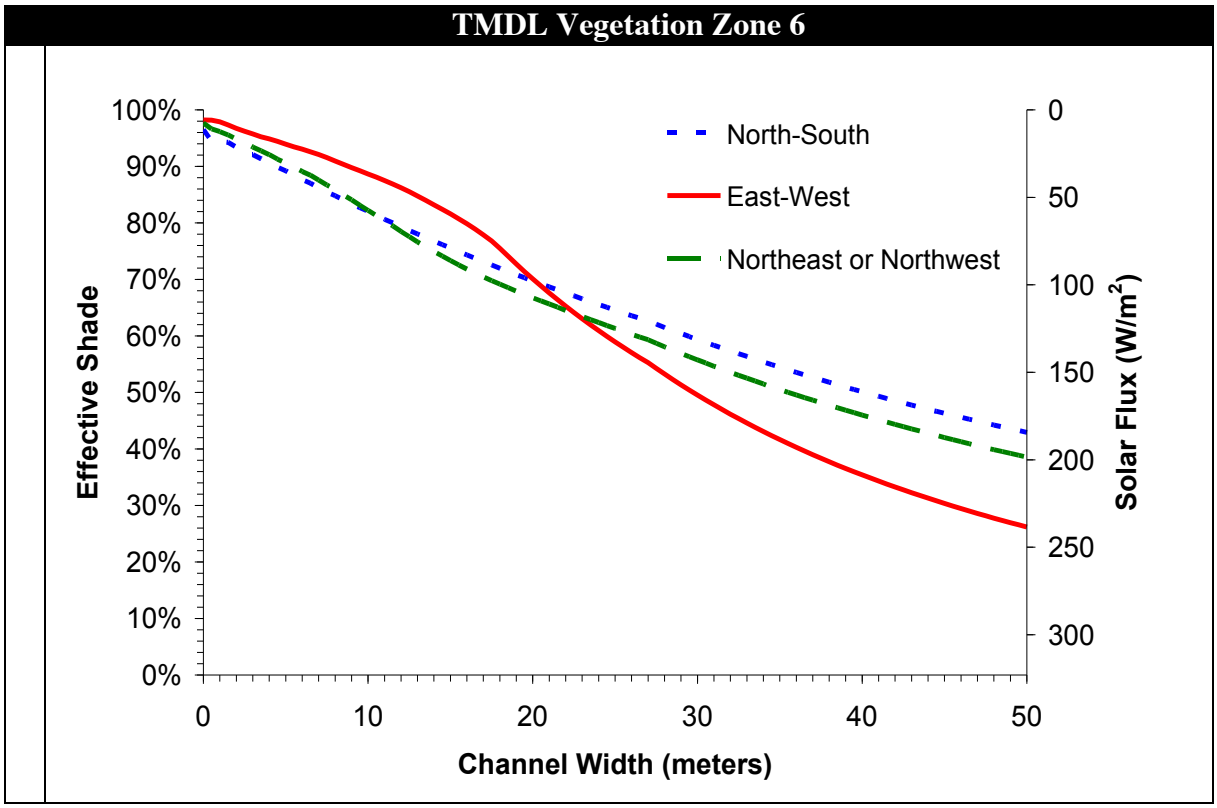
Attachment 2: TMDL Shade curves

Map of ecoregions and the shade curves that correspond to zones 4, 5, and 6. The three in each correspond direction ek is . mouth






TMDL Vegetation Zone 5
North-South
East-West
Northeast or Northwest
Effective Shade
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Solar Flux (W/m2)
0
50
100
150
200
250
300
0
10
20
30
40
50
Channel Width (meters)


TMDL Vegetation Zone 6
North-South
East-West
Northeast or Northwest
Effective Shade
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Solar Flux (W/m2)
0
50
100
150
200
250
300
0
10
20
30
40
50
Channel Width (meters)

Attachment 3: Field Office Technical Guide (FOTG)

The NRCS provides national leadership and administration of programs to conserve soil, water, and related resources on the private lands of the Nation. SWCDs provide local leadership for those programs. A primary goal is to provide technical assistance to decision-makers for the planning and implementation of a system of conservation practices and management that achieves a level of natural resource protection that prevents degradation and permits sustainable use. Where degradation has already occurred, the goal is to restore the resource to the degree practical to permit sustainable use. The FOTG provides procedures and criteria to develop and evaluate resource management systems that achieve these goals and, when needed, to develop and evaluate acceptable management systems that achieve these goals to the extent feasible.

The FOTG is a primary technical reference for NRCS and SWCDs. It contains technical information about conservation of soil, water, air, and related plant and animal resources. Technical guides are localized so that they apply specifically to the geographic area for which they are prepared.

Technical Guides provide:

1. Soil interpretations and potential productivity within alternative levels of management intensity and conservation treatment;
2. Technical information for achieving NRCS, SWCD, and decision-maker's objectives;
3. Information for interdisciplinary planning for conservation;
4. A basis for identifying resource management system (RMS) options and, when needed, acceptable management system (AMS) options and related components;
5. Information on effects of RMS, AMS, and component practices;
6. Criteria to evaluate the quality of RMS and AMS options and their components;
7. Standards and Specifications for conservation practices;
8. Information for evaluating economic feasibility and effects of RMS options and practices;
9. Information for locating and identifying cultural resources, and methods to account for their significance; and
10. Technical material for training employees.

The FOTG contains the following sections:

1. General Resource References
2. Soil and Site Information
3. Conservation Management Systems
4. Practice Standards and Specifications
5. Conservation Effects

Additional, descriptive information on the FOTG may be found in the USDA NRCS General Manual, Section 401 and is available at any USDA Service Center. An electronic version ('efotg') is available on the internet at http://www.nrcs.usda.gov/technical/efotg/.