Oregon Department of Agriculture

Hood River Agricultural Water Quality Management Area Plan

December 2014

Developed by the

Hood River Local Advisory Committee

Oregon Department of Agriculture

With support from the

Hood River Soil and Water Conservation District

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Acronyms and Terms Used in this Document

Ag Water Quality Program – Agricultural Water Quality Management Program
Area Plan – Agricultural Water Quality Management Area Plan
Area Rules – Agricultural Water Quality Management Area Rules
CAFO – Confined Animal Feeding Operation
cfs – cubic feet per second
CGFG – Columbia Gorge Fruit Growers
CNPCP – Coastal Nonpoint Pollution Control Program
CTWS – Confederated Tribes of the Warm Springs Reservation
CWA – Clean Water Act
CZARA – Coastal Zone Act Reauthorization Amendments
DEQ – Oregon Department of Environmental Quality
DSL – Oregon Department of State Lands
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
ODF – Oregon Department of Forestry
ODFW – Oregon Department of Fish and Wildlife
ORS – Oregon Revised Statute
OSU – Oregon State University
OSU-MCAREC – OSU Mid-Columbia Agricultural Research and Extension Center
OWEB – Oregon Watershed Enhancement Board
PMP – Pesticides Management Plan
PSP – Pesticides Stewardship Partnership
Regulations – Agricultural Water Quality Management Area Regulations
RUSLE – Revised Universal Soil Loss Equation
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 603-095-1100). 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

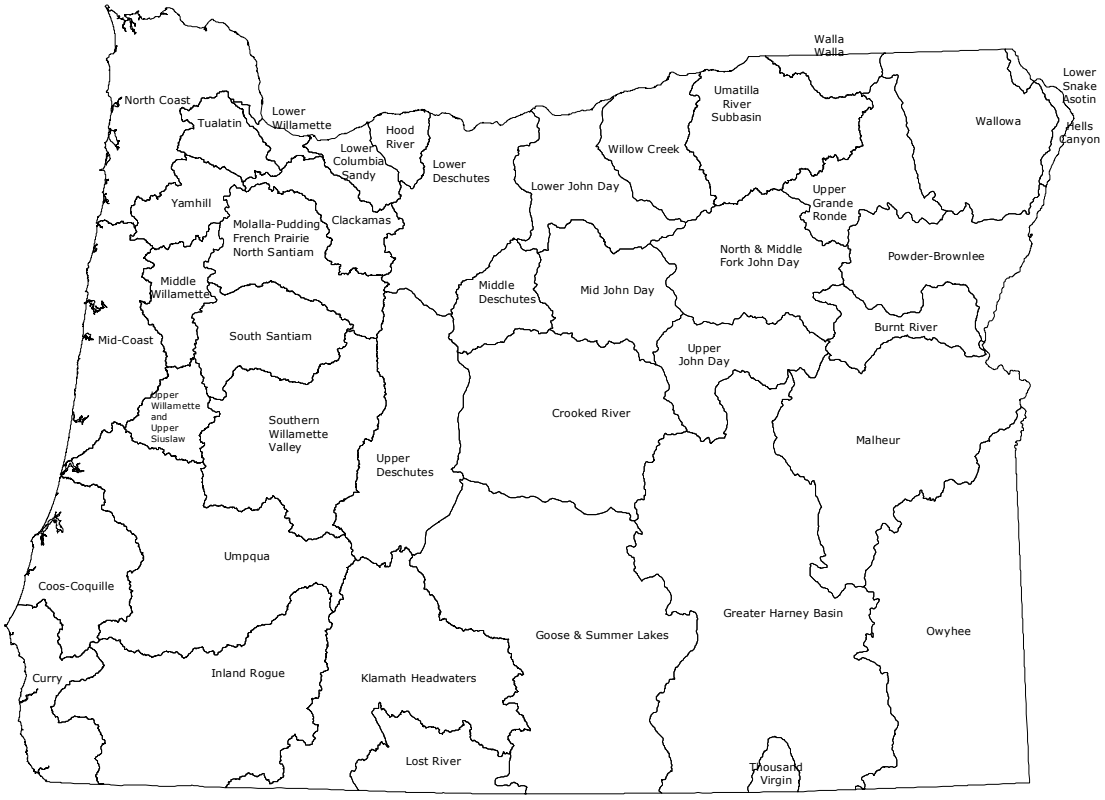
In 1993, the Oregon Legislature passed the Agricultural Water Quality Management Act, directing ODA to develop plans to prevent and control water pollution from agricultural activities and soil erosion, and to achieve water quality standards (ORS 568.900 through ORS 568.933). Senate Bill 502 was passed 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 and federal agencies, tribes, 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)

The Oregon Department of Agriculture 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).

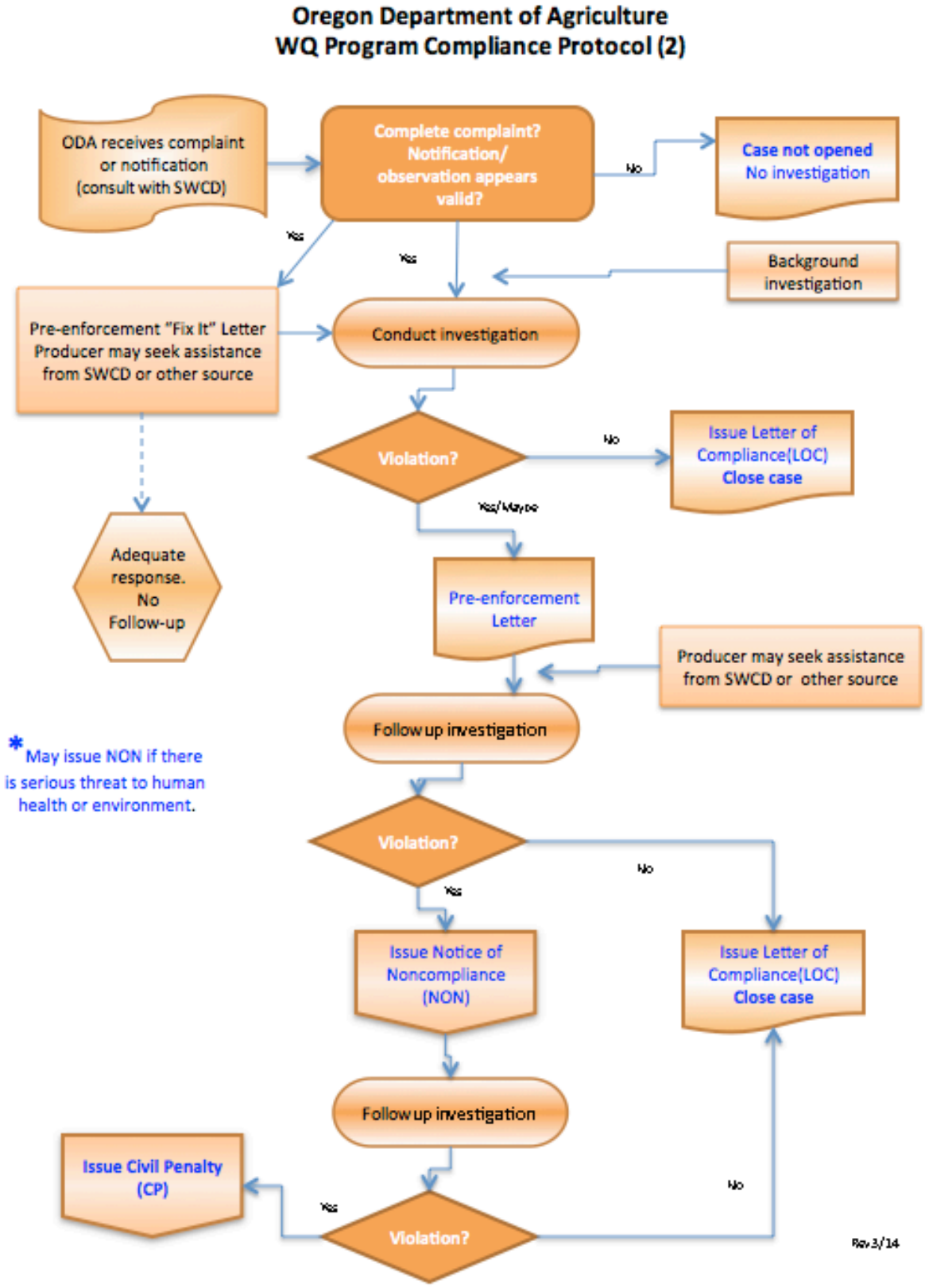
The Oregon Department of Agriculture has the legal authority to develop and implement Area Plans and associated regulations for the prevention and control of water pollution from agricultural activities and soil erosion, where such plans are required by state or federal law (ORS 568.909 and ORS 568.912). The

Oregon Department of Agriculture 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.

The Oregon Department of Agriculture, 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.

Total Maximum Daily Loads 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)

The Oregon Department of Agriculture 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 Oregon Department of Agriculture 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.

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

The Department of Environmental Quality 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

The Oregon Department of Agriculture and SWCDs work in close partnership with local, state, and federal agencies and organizations, including: DEQ (as indicated above), the United States Department of Agriculture (USDA) NRCS and Farm Service Agency, watershed councils, tribes, 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

The Oregon Department of Agriculture 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.

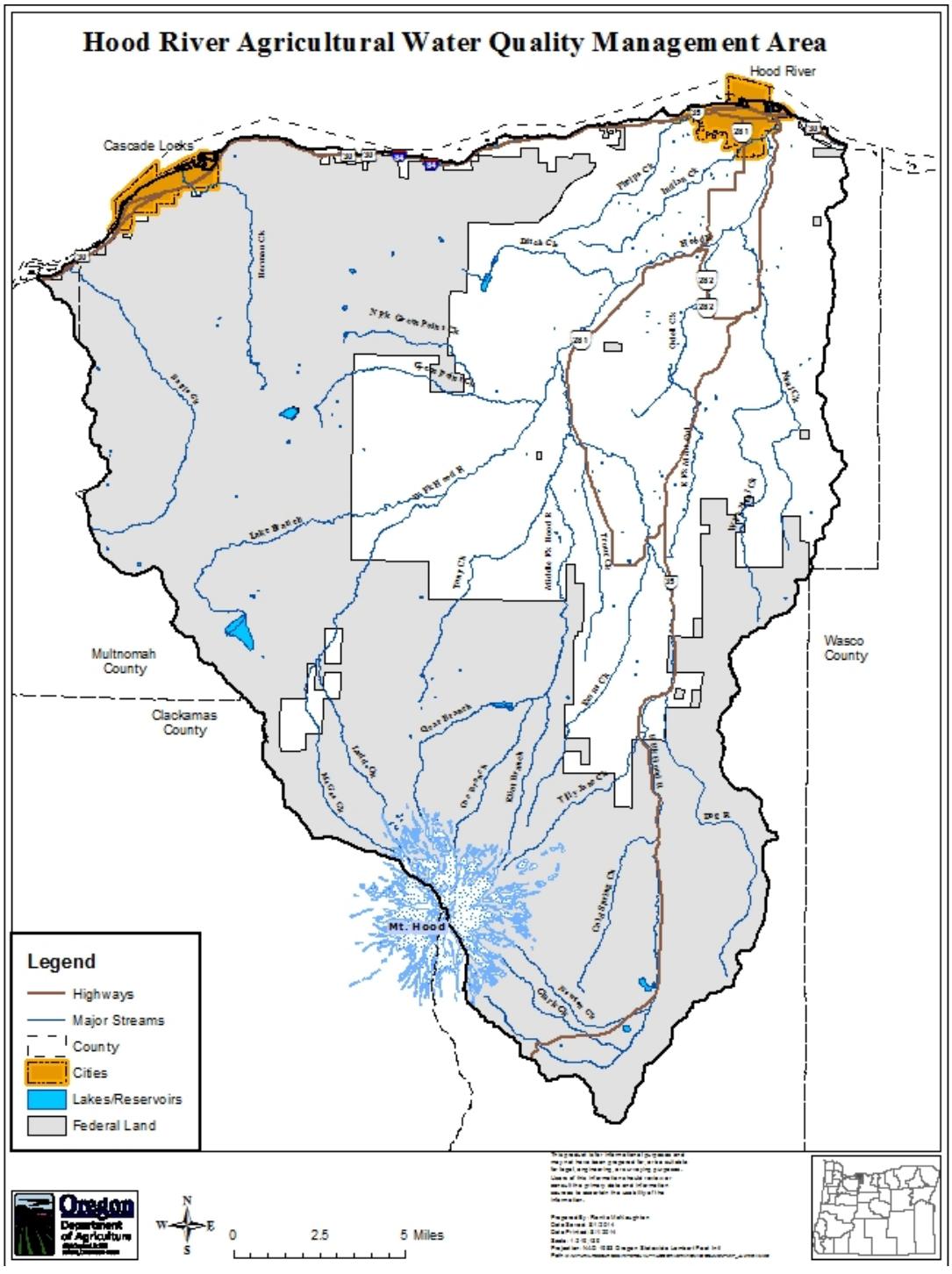
1.8.3 Biennial Reviews and Adaptive Management

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 Management Area includes most of Hood River County and is comprised of the Hood River drainage and all other tributaries to the Columbia River between and including Eagle Creek to the west and Fir Mountain to the east (Figure 3).

Figure 3. Map of Management Area



2.1 Local Roles and Responsibilities

As resources allow, Hood River SWCD, NRCS, ODA, licensed pesticide applicators, and OSU-MCMAREC staff can help landowners evaluate effective practices for water conservation, appropriate pesticide usage, and reducing runoff. Staff can also design and help implement practices, and help identify sources of cost-sharing funds for the construction and/or use of some of these practices. Implementation priorities are established on a periodic basis through annual work plans developed jointly by the Hood River SWCD and ODA with input from partner agencies.

The Oregon Department of Agriculture and the Hood River SWCD provide presentations to interested groups on an ongoing basis. They also meet individually with landowners to explain the Area Plan and Rules and to provide site-specific educational reviews of land conditions relative to water quality.

The LAC, Hood River SWCD, and ODA will:

- Develop and implement strategies to provide landowners with information and technical and financial assistance
- Work with others to:
  - Characterize baseline conditions
  - Track Area Plan implementation
  - Evaluate Area Plan effectiveness, including improvements in water quality and land conditions
  - Identify priority areas
  - Identify annual and long-range strategies for Area Plan implementation
- Continue to include the public in the development and implementation of the Area Plan and Rules process

2.1.1 Local Advisory Committee (LAC)

The LAC was formed in 1999 to assist with the development of the Area Plan and regulations and with subsequent biennial reviews.

The LAC members represent the interests of local landowners (orchardists, livestock owners, and small-acreage farmers), Columbia Gorge Fruit Growers (CGFG), fruit packing houses and agricultural businesses, irrigation districts, Hood River Watershed Group, fish biologists, Hood River County Board of Commissioners, Confederated Tribes of the Warm Springs Reservation (CTWS), and the Hood River SWCD (Table 1).

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

Mike Oates, **Chair**: Odell, orchard	Steve Hunt: Dee, orchard
Bruce Decker, **Vice Chair**: Wilbur-Ellis fieldman	Davinne McKeown-Ellis: Pine Grove, llamas
Tim Annala: Hood River, orchard	Brian Nakamura: Willow Flat, orchard
Chris Brun: Tribal fish program, coordinator	Roger Nelson: Parkdale, blueberries
John Buckley, East Fork Irrigation District	Jim Wells: Pine Grove, orchard
Steve Castagnoli: OSU Extension	
Jean Godfrey, CGFG	Alternate: Leonard Aubert, Parkdale, orchard & livestock

The LAC receives additional technical support from the USDA Natural Resources Conservation Service (NRCS); USDA Farm Service Agency; United States Forest Service (USFS); ODA, Oregon Department of Fish and Wildlife (ODFW), Oregon Department of Forestry (ODF), and DEQ; Oregon State University Mid-Columbia Agricultural Research and Extension Center (OSU-MCAREC), and others.

2.1.2 Local Management Agency

The Hood River SWCD is the Local Management Agency for implementing the Area Plan. They provide meeting administration, outreach, and technical assistance to landowners.

The day-to-day implementation of this Plan is accomplished through Memoranda of Agreement between the Hood River SWCD and ODA. The Hood River SWCD acts as the Local Management Agency under such agreements.

2.2 Geographical and Physical Setting

2.2.1 Location

The Management Area encompasses approximately 450 square miles in north-central Oregon and includes the communities of Cascade Locks, Hood River, Pine Grove, Odell, Dee, and Parkdale. Approximately one third of the land is county or privately owned. Almost all the remaining lands are federally owned and managed by the USFS. Elevations in the Management Area range from 74 feet to 11,245 feet above sea level.

The Management Area is located in the transition zone between weather dominated by wet marine airflow to the west and the dry continental climate of eastern Oregon[1]. About two-thirds of the Hood River drainage is within the Cascades ecoregion and has a moist temperate climate. The northeast portion is in the dry Eastern Cascades slopes and foothills ecoregion. Mean annual precipitation ranges from 130 inches on the upper west boundary in the Cascade Range to less than 30 inches in the lower east valley.

2.2.2 Hydrology[1]

One quarter of the Management Area consists of tributaries to the Columbia that flow almost exclusively through federal lands managed by the USFS.

The Hood River drains 339 square miles (217,340 acres) of the Management Area and consists of three main forks (West, Middle, and East) that converge into the mainstem Hood River near River Mile 12.0. The drainage contains approximately 400 miles of perennial stream channel of which an estimated 100 miles is accessible to anadromous fish.

Five tributaries of the three forks are fed by glacial sources that drain approximately one-third of the total glacial ice on Mt. Hood. During high flows, large amounts of bedload and sediment are transported in these tributaries and in the mainstem. Glacial melt increases water turbidity in the form of suspended silt and glacial flour during summer and early fall. Glacial sediment is more prevalent in the Middle and East Forks and Hood River mainstem, while glacial sediment in the West Fork is contributed by a single small tributary, Ladd Creek. Natural disturbances that contribute significant amounts of sediment to stream channels include landslides and debris torrents that originate on glacial moraines and steep slopes of Mt Hood.

The majority of stream channels in the Management Area are moderate to high gradient and confined by terraces or narrow v-shaped valleys with limited floodplain area. Notably, much of the mainstem Hood River, the East Fork and portions of the West Fork consist of low gradient reaches of 2.5 percent or less. Forty-one percent of the total stream length consists of habitat types classified as a sediment source, 36 percent as sediment transport, and 23 percent as sediment deposition zones.

Typical of many Cascade mountain streams, the hydrology of the Management Area is characterized by highly variable streamflow and rapid storm runoff. The mean annual flow in the Hood River is 1,079 cfs (cubic feet per second) at Tucker Bridge (River Mile 6.1). The record flood is reported as 33,000 cfs (December 1964), while the minimum seven-day average was 155 cfs (September 1994). Mean monthly flows range from 392 cfs in September to a high of 1,747 cfs in January. Snowmelt generally begins during April. Many tributaries have very low summer flows, while tributaries with glacial sources maintain higher flows.

Natural disturbances occurring in the Management Area include floods, fires, mudflows, landslides, and insect and botanical disease epidemics. Rain-on-snow floods are common disturbance events. Periodically, natural dams created by terminal moraines at receding glaciers on Mt. Hood break and cause floods and debris flows; many of these events are triggered by intense rainstorms. Landslides are common but not frequent events.

2.2.3 Hydrologic Modifications[1]

The natural flow regime of the Hood River drainage has been modified by irrigation and domestic water withdrawals and hydropower diversions. Low summer stream flows due to irrigation withdrawals are identified in the Lower Columbia Recovery Plan as the primary factor inhibiting recovery of fish populations in the Management Area.

Consumptive water use between July and September is estimated at 40 percent (296 cfs) of natural flow at the Hood River mouth. Reservoir storage is limited to 4,600 acre-feet, or less than one percent of mean annual discharge. Laurance Lake at Clear Branch Dam is the largest reservoir with a volume of 3,550 acre-feet storage for irrigation. Water rights held by five irrigation districts total 588 cfs. The three major irrigation districts have invested significant funds to conserve water and decrease operation and management costs, by replacing open ditch, canal segments, and low-efficiency pipe with pressurized pipe.

Municipal diversions include the cities of The Dalles and Hood River. Four water districts serve rural areas or towns, and instream water rights are established at seven locations but are consistently met at only two of these due to senior water rights. The Management Area is closed to new surface water withdrawals from April 15 to September 30, although exceptions are made in the administrative rules for some projects such as off-stream watering facilities for livestock.

2.2.4 Land Use

Historical[1]

Native Americans maintained huckleberry fields and trails later used by non-Native settlers, and collected plants, hunted game, and fished in tributaries and forks of the Hood River. Native houses were located at the Hood River mouth and vicinity. The Management Area was included in the one million acres of land ceded to the U.S. in the 1855 Treaty with the Tribes of Middle Oregon by ancestors of the CTWS.

Sheep herding and cattle grazing were common on the upper slopes of the East Fork in meadow areas during early settlement prior to 1900. Around 1880, orchards and strawberry fields began to progress up the valley as the natural landscape pattern of coniferous forest and riparian habitat networks was transformed into pasture and fruit crops. Wet areas were drained for agriculture and other land uses throughout much of the valley. Many wetlands and stream channels were drained or diverted to reduce saturated soil conditions, and roads were constructed adjacent to and across streams. Possibly the biggest factor altering the vegetative pattern in the lower Hood River drainage was the growth of the fruit industry, where orchards have replaced coniferous forest and riparian habitat networks.

Water-powered sawmills, dams and mill ponds operated in Neal and Green Point creeks and the lower East Fork and mainstem Hood River as early as 1861. Logs were transported in rivers or by flumes, horse teams, and later railroads. Before 1900, streams were diverted into hand-dug canals and ditches for irrigation.

Historic timber practices have resulted in riparian corridors and stream channels lacking the large woody debris needed to build and maintain high quality fish habitat. Extensive use of splash dams occurred through the 1940s. During the 1960s and 1970s, stream cleanout was encouraged and believed to benefit fish passage. The present deficiency of instream large wood debris has reduced the amount and quality of pool habitat, side channels and slow water areas, hiding cover, and limits retention of spawning-size gravel within low water stream channels.

Current[1]

The economy is based on agriculture (primarily pear, cherry, and apple orchards), forestry, recreation and tourism, the latter having overtaken forest products as the second largest economic contributor. Approximately 15,000 acres of orchard and 2,000 acres of pasture are actively irrigated. An estimated 59 percent of agricultural land is irrigated with low-flow irrigation systems, which can achieve up to 70 percent water savings over the handline and impact sprinklers they replaced. An estimated 5-10 percent of Hood River valley orchardists use soil moisture sensors to improve orchard water efficiency. The Integrated Fruit Production (IFP) program promotes environmentally sustainable orchard practices including reduced pesticide, fertilizer, and water use.

The majority of livestock operations occur on small acreage farms of less than 20 acres. Forestry continues to be an important economic activity. Hood River County owns approximately 30,000 acres or 15 percent of the Hood River drainage, which is managed as industrial forest. Weyerhaeuser owns 22,000 acres in the Neal Creek drainage, the West Fork Hood River, and along Tony Creek. About two-thirds of the Management Area is within the Mt. Hood National Forest where timber harvest is guided by the 1994 Northwest Forest Plan.

The Hood River County population is growing approximately 0.6 percent per year. Land use is governed by the 1984 County Comprehensive Land Use Plan, which established urban growth boundaries for the cities of Hood River and Cascade Locks and the towns of Parkdale, Odell and Mt. Hood. Conversion of forest and pasture to single-family residential development is increasing in rural lands outside of the urban growth areas. Visitor use of the Management Area has multiplied due to regional population growth and the increasing popularity of outdoor recreation and tourism. These trends are expected to continue.

2.3 Agricultural Water Quality in the Management Area

2.3.1 Local Issues of Concern

This Area Plan addresses sediment, nutrient, bacteria, toxics, temperature, pH, and flow concerns related to agricultural activities.

This Area Plan addresses conditions affecting water quality that result from agricultural management of:

- Streamsides
- Livestock
- Cultivated lands
- Agricultural wastes

- Nutrients, farm chemicals, and pesticides
- Irrigation water and surface drainage

Salmonids and lamprey

Because aquatic species are so sensitive to a variety of pollutants, they are often viewed as indicators of water quality.

Table 2. Distribution and status of salmonids and lamprey in the Hood River drainage (Source: ODFW and CTWS.)

SPECIES	PRIMARY SPAWNING, HOLDING AND REARING AREAS	STATUS OF WILD POPULATION
Pacific Lamprey	Mainstem Hood River East Fork Hood River	State Sensitive species (ODFW). Formerly extirpated. Recolonizing Hood basin after removal of Powerdale
ANADROMOUS SALMONIDS		
Spring chinook salmon	Elk Creek McGee Creek Tony Creek East Fork Hood River Dog River West Fork Hood River Lake Branch Creek Middle Fork Hood River Mainstem Hood River	Threatened Species - listed by NOAA's Fisheries Service. Native stock extirpated. Hatchery reintroduction ongoing to re-establish spring chinook.
Summer steelhead	West Fork and tributaries Mainstem Hood River	Threatened Species - listed by National Oceanic and Atmospheric Administration (NOAA) Fisheries Service.
Winter steelhead	East Fork and tributaries Neal Creek Green Point Creek Middle Fork and tributaries Mainstem Hood River	Threatened Species - listed by NOAA's Fisheries Service. Hatchery supplementation ongoing to strengthen wild run and support fisheries.
Fall chinook salmon	Mainstem Hood River East Fork Hood River	Threatened Species - listed by NOAA's Fisheries Service.
Coho salmon	East Fork and tributaries Middle Fork and tributaries Mainstem Hood River Neal Creek and tributaries	Threatened Species - listed by NOAA's Fisheries Service.
Sea-run cutthroat trout	East Fork and tributaries Middle Fork and tributaries Mainstem Hood River Neal Creek and tributaries	State Sensitive species (ODFW). Severely depressed (less than 100 spawners).
RESIDENT SALMONIDS		
Rainbow trout	Entire Hood River drainage	
Cutthroat trout	Entire Hood River drainage	
Bull trout	Middle Fork Hood River Mainstem Hood River Clear Branch Coe Branch and tributaries Pinnacle Creek Compass Creek	Threatened Species – listed by USFWS

The abundance and range of anadromous fish in the Hood River Watershed has declined compared to historical conditions. Native spring Chinook are extirpated, and Coho and fall Chinook stocks are at low levels. Bull trout and steelhead were listed as Threatened in 1998 under the federal Endangered Species Act. Sea-run cutthroat trout are listed as a state-sensitive species. However with the removal of Powerdale Dam and ongoing habitat restoration and hatchery supplementation projects the downward trends appear to have stabilized and, in the case of spring Chinook salmon, are increasing.

State law, as provided by ORS 509.585, requires fish passage "in all waters of this state in which native migratory fish are currently or have historically been present." The elimination of fish passage barriers is one goal of the Hood River Watershed Action Plan, a guidance document for the Hood River SWCD.

2.3.2 Water Quality Parameters of Concern

Water quality data have been collected since 1998 in the Management Area. There are also streams and times of year where data have never been collected so their water quality status is unknown. Monitoring efforts since 1998 include: the Pesticide Stewardship Partnership, monitoring done by the CTWS, the Hood River Watershed Group, and Columbia Riverkeepers.

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

Table 3. Water-quality limited streams in the Hood River Management Area.

Stream Segment	Water Quality Parameters						
	Temperature*	pH	Dissolved Oxygen	*E. coli*	Biological Criteria	PESTICIDES: Chlorpyrifos (C), Guthion (G)	METALS: Arsenic (A), beryllium (B), copper (C), iron (I), manganese (M), thallium (T), zinc (Z)
Clear Creek Branch (River Mile 0-3.8)	X						
Cold Spring Creek (0-4.7)					X		
Dog River (0-10.7)							B, I
East Fork Hood River (Mile 0-27.4)	X				X		B, C, I, T
Evans Creek (0-8)					X		B, C, I
Harphan Creek (0-2.6)					X		
Hood River (0-14.6)	X						B, C, I, T
Indian Creek (0-7.8)	X			X		C	
Indian Creek: 2 tributaries (0-0)				X			
Lake Branch (0-11.1)	X						
Lenz Creek (0-1.5)		X			X	C, G	A, B, I, M
McGuire Creek (0-0.9)						G	
Middle Fork Hood River (0-9.5)	X				X		B, I
Middle Fork Hood River trib (0-1.4)					X		
Mitchell Creek (0-2.3)							Z
Neal Creek (0-5.6)	X		X		X	C, G	A, B, I, M
Polallie Creek trib (0-2.7)					X		
West Fork Hood River (0-14.4)	X	X					B, T
West Fork Neal Creek (0-9)			X				
Whiskey Creek (0-2.5)	X						

* TMDL established for this parameter.

1. **Water temperatures** are critical to salmonid growth and survival at all life stages. Warm stream temperatures increase stress and disease, raise metabolism and lower growth rates, and enhance conditions for introduced non-native predators. Temperature affects the dissolved oxygen potential in water; the warmer the water, the less dissolved oxygen it can hold. Temperature controls the rate of many chemical reactions including the equilibrium between ammonium (NH_4) and un-ionized ammonia NH_3 (toxic form). Lethal temperatures for adult salmonids vary according to a variety of factors, but are generally reported in the range of 70 to 77°F.

   Salmonid eggs and juveniles are much more sensitive to high temperatures. Generally, water temperatures above 55°F inhibit salmonid spawning, egg incubation and fry emergence from the gravel. However, salmonids have successfully survived in some areas where natural water temperatures are higher. Egg development and the subsequent timing of emergence are closely associated with stream temperatures. Juvenile rearing and growth may be impaired by temperatures

greater than 64˚F. Optimal water temperature for bull trout is less than 50˚F, but some life stages commonly are found in temperatures in the mid-50s.

The temperature standard was revised in 2004. It assigns a temperature criterion (50˚, 53.6˚, 55.4˚, 60.8˚or 64.4˚F) to each water body depending on its use by fish (species, life stage, and time of year). If the water temperature exceeds the criterion, human activities cannot further increase the temperature. The natural water temperature can be higher than the criterion.

The Department of Environmental Quality, in conjunction with fisheries agencies, has defined the salmonid spawning and rearing periods and locations in the Management Area. There are reaches throughout the Management Area where the core spawning (55.4˚F), cold-water habitat (60.8˚F), and/or rearing (64.4˚F) criteria are exceeded at certain times of the year.

The 53.6˚F bull trout temperature criterion is exceeded in the Middle Fork Hood River and Clear Branch below Laurance Lake.

Even though USEPA approved the temperature TMDL in 2002, elevated stream temperatures are still a concern. The approval recognized that plans, such as the Area Plan, would be implemented by the different jurisdictions to meet load allocations and improve stream temperatures. The Western Hood Subbasin TMDL includes shade targets that are to be met on Management Area streams[2]. These targets are discussed further in Section 4. The TMDL applies to all perennial and/or fish bearing streams in the Management Area, including those listed in Table 3.

2. Extremes in water **pH** and low levels of **dissolved oxygen** can harm fish and other aquatic life. Both conditions can be stimulated by the availability of **nutrients**, warm temperatures and light, all of which stimulate aquatic plant or algae growth. Aquatic plants can invade gravel bars creating conditions that are no longer suitable for salmonid spawning. Excessive aquatic plant growth can increase water pH, which may harm fish. The death and subsequent decomposition of aquatic plants can consume large quantities of dissolved oxygen, which can kill fish and other aquatic animals. These conditions are usually aggravated by low stream flow.

Elevated **nitrogen and phosphorous** (nutrient) concentrations exceeding recommended criteria were measured in 1998 in Odell, McGuire, Neal, Lenz, Trout, Wishart, Whiskey, Baldwin, and Indian creeks, and in 2001 and 2002 in Baldwin, Graham, Rhoades (tributary to Lenz Creek), Tieman, and Odell creeks. The Oregon Watershed Assessment Manual recommends using a value of 0.3 mg/L for nitrogen (as total nitrate) to evaluate water quality[3]; scientific literature reports that concentrations greater than 0.3 mg/L can trigger algal blooms[4]. The value of 0.3 mg/L does not have any regulatory standing, as Oregon currently does not have nitrogen standards for surface water in the Management Area. The maximum nitrate concentration measured in 1998 was 4.0 mg/L in McGuire Creek, and 4.84 in Rhoades Creek in 2001. Nitrogen concentrations generally increased in a downstream direction in response to adjacent land uses. See Section 2.3.4 for a discussion of nitrate levels.

Oregon currently does not have phosphorus standards for the Management Area. The expected natural concentration of total phosphorous in forested streams is less than 0.02 mg/L[5]. To prevent nuisance algal growth in cold water streams that do not discharge directly to a lake or reservoir, USEPA recommends a total phosphorous concentration of 0.10 mg/L or less[6]. The maximum concentration measured in the 1998 sampling was 1.2 mg/L in Odell Creek. Phosphorous concentrations tended to increase in a downstream direction; for example, samples taken in the upper Neal Creek system were close to expected natural levels.

Based on 1998 DEQ monitoring study results, **dissolved oxygen** concentrations in the Hood River drainage[1] ranged from 8.3 – 11.7 mg/L in June, 7.8 – 10.7 mg/L in August, and 8.0 – 11.8 mg/L in October. Dissolved oxygen standards are set to protect both salmonid spawning and rearing. See http://www.deq.state.or.us/wq/standards/guidance.htm for locations of criteria and designations of spawning seasons.

3. **Bacteria** are used to determine the safety for "water contact recreation." High levels of *E. coli* bacteria can cause severe gastric illness and even death in humans. In 1998, DEQ sampling showed exceedances of the state standard at sites on Wishart, Baldwin, Odell, McGuire, Whiskey, Spring, and Indian creeks. In 2008, sampling by Columbia Riverkeepers showed exceedances of the state standard at sites on Indian, Whiskey, and Phelps creeks. These data resulted in 303(d) listings for Indian Creek and two of its tributaries. A more comprehensive study would be needed to identify contamination sources and the degree of the contamination problem.

4. **"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).

5. **Pesticide** use on agricultural, forest, right-of-way and residential properties was identified as a potential concern by the Hood River Water Quality Technical Committee. A preliminary study conducted in cooperation with the CGFG and DEQ in spring and summer of 1999 found that concentrations of the organophosphate pesticides chlorpyrifos and/or azinphos methyl exceeded the state standard in Neal Creek, Indian Creek, and the mouth of Hood River[1]. Further stream monitoring studies by Oregon State University (OSU), DEQ, and United States Geological Survey (USGS) have continued since 2000.

   In 2000, orchardists, DEQ, and other stakeholders initiated the first PSP in Oregon, which is still ongoing. The CTWS funded a USGS–led study of the occurrence and distribution of pesticides in surface water of the Hood River Basin in 1999-2009 (Scientific Investigations Report 2011-5082) based on DEQ analysis of water samples. This study noted that the frequency of organophosphate detections decreased during the period of record although all five detected organophosphate insecticides and one detected organochlorine insecticide were present at concentrations exceeding water quality standards, sublethal effects thresholds or acute toxicity values in one or more samples. However, the concentrations of detected herbicides and fungicides were less than water quality standards, sublethal effects thresholds, or acute toxicity standards. The study also noted that many samples contained mixtures of pesticides, but the synergistic and cumulative effects to salmonids of these mixtures are unknown.

   The PSP continues to lead pesticide monitoring and reduction activities. In 2013, DEQ pesticide monitoring of area streams, samples were taken at four sites, with weekly water samples taken 11 times at four sites from March through June. From July to November, samples were collected every other week at two sites and monthly at two sites, for a total of 73 sampling events. DEQ analyzed the samples for over 100 pesticide analytes. Eighteen pesticides were detected for a total of 193 pesticide detections in 2013. Four commonly used herbicides were detected in more than 50 percent of the 73 sampling events, albeit at very low levels. There were four detections of organophosphate pesticides in 2013 with two of the detections above the water quality standards. The two detections above the standards were from the same site on Odell Creek. This compares to two detections of

organophosphate pesticides in 2012, with one of them above the state aquatic life criterion. The number of detections and exceedances exemplifies a need to continue pesticide education, outreach and monitoring efforts.

6. Some **metals** exceeded water quality standards when sampled by DEQ in 1998-2000. The source of these metals in the water is unknown and could be natural or due to human activities. According to Paul Measeles, ODA's Hydrologist, the metals identified in the Management Area probably are mostly natural in origin, and are likely to enter streams from erosion. Reducing sediment loads to the streams would reduce their concentrations. Source assessment will be part of future TMDL development.

7. **Sediments** carried in streams can adversely affect aquatic life by reducing light penetration and visibility, reducing water infiltration through stream substrate (harming incubating fish eggs), and irritating gill filaments. Sediment also decreases primary production and the abundance of macroinvertebrates, which are a primary food source for salmonids. Several Hood River tributaries are seasonal conduits for glacial silt and sediment, while other tributaries have no glacial influence.

   Oregon currently does not have numeric sediment standards. Only one of 34 sites (Wishart Creek) sampled during the 1998 DEQ intensive study exceeded[1] the turbidity guideline of 50 Nephelometric Turbidity Units (NTUs) recommended by the Oregon Watershed Enhancement Board[3] (OWEB). However, this study was conducted during the dry season when there were no rain events. It is unknown what proportion of suspended sediment in the Management Area occurs naturally as glacial silt, and how much has been introduced by human activity. Some glacial silt has been transferred to non-glacial streams by irrigation systems, but this source is being reduced as irrigation districts pipe their systems.

8. **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).

9. **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. Channelization also prevents river water from accessing its floodplain in high flows, resulting in increased bank erosion and reduced storage of water in the soil profile. 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 Basin TMDLs and Agricultural Load Allocations

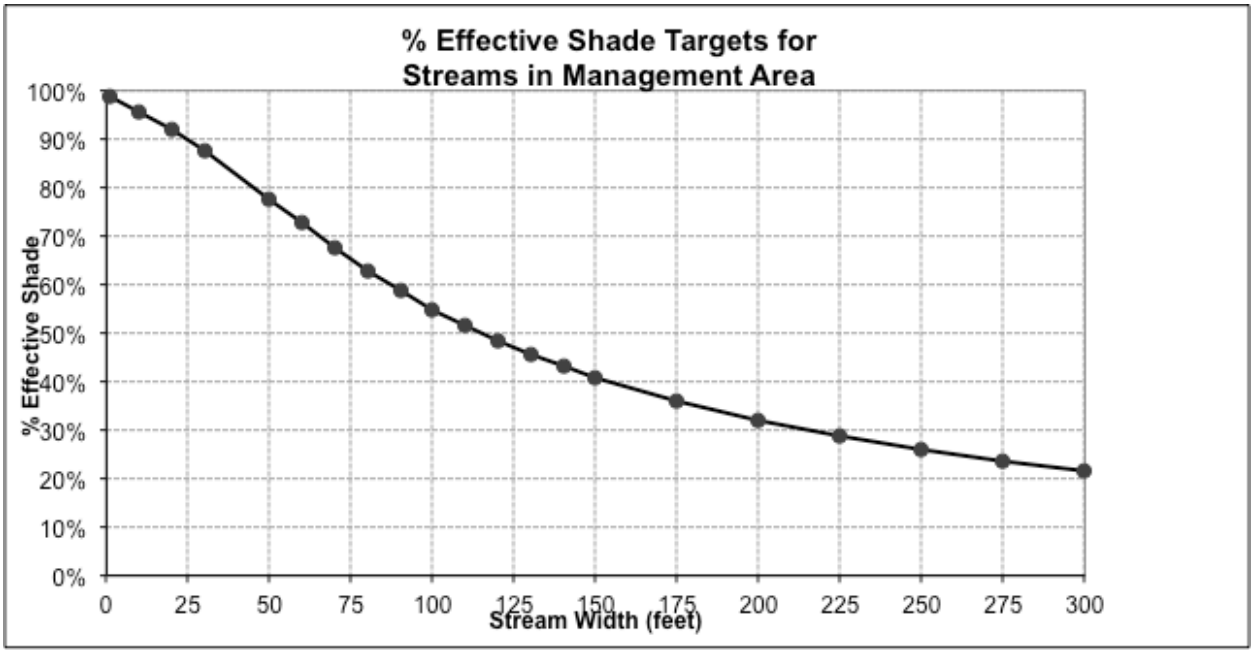
A TMDL for temperature was developed for the Management Area and was approved by the USEPA in January, 2002[1].

The TMDL developed by DEQ addresses high stream temperatures. 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 langleys per day. For the non-scientist, these loads have been translated

into ‘percent effective shade’ targets, while acknowledging that flow and channel modifications also affect stream temperatures.

The TMDL contains Percent Effective Shade Targets for 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.

The following graph approximates these shade targets. For example, shade should intercept approximately 99 percent of the sunlight reaching a five-foot wide stream on an August day, and 89 percent of the sunlight reaching a 30-foot wide stream on an August day. The graph is a composite of multiple graphs in DEQ’s TMDL.



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 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.

The Oregon Department of Agriculture provides reference sites and photographic examples for landowners who wish to visualize these targets.

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

2.3.4 Drinking Water Protection in the Management Area

Several communities obtain domestic drinking water from surface and groundwater sources in the Management Area. Drinking water is an important beneficial use under the 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 two public water systems in the Management Area supplied by surface water intakes (city of The Dalles and USFS Lost Lake Campground) have no agricultural lands in their source areas.

Nineteen public water systems use groundwater wells or springs. Two of the groundwater systems (Odell Water Company and Parkdale Water Company, Inc.) are served by springs and have agricultural land uses within their source area. Both are conducting assessment monitoring to evaluate potential contribution from surface water sources to the springs. The aquifers for both springs are considered highly sensitive. Odell Water Company has had nitrate detected in the past up to 10 mg/L (the EPA maximum contaminant level) but is showing a continuing downward trend in nitrate concentrations in recent years. From 2012 to 2014, nitrate samples for Odell have been under 6 mg/L. Parkdale Water Company has not had detections of nitrate above background levels.

The Department of Environmental Quality only addresses drinking water issues identified for *public* water systems. A query of WRD's 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 43 private domestic water rights. Most of these are along Hood River, East Fork Hood River and their tributaries. 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.

2.3.5 Sources of Impairment

Potential contributors to pollution in the Management Area include runoff and erosion from agricultural and forest lands, eroding streambanks, runoff from roads and urban areas, waste discharges from pipes, municipal and irrigation withdrawals, sewage treatment plants, urban stormwater, recreational use, and landslides. Rerouting of runoff via road building, construction, and land surfacing such as parking areas may lead to excessive erosion or pollutant transport. Pollutants may be carried to the surface water or groundwater through the actions of rainfall, snowmelt, irrigation, and leaching. Increased heat input due to vegetation removal, seasonal flow reduction, changes in channel shape, and floodplain alteration is a source of 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 temperature. Sediment input into streams due to human activity is primarily related to roads, undersized culverts at road crossings, and irrigation ditches[1].

Land conditions associated with the following agricultural activities were identified by the LAC as potential contributors to water quality concerns:

- Removal or reduction of vegetation along streams
- Livestock grazing and areas of concentrated livestock
- Irrigation water use and drainage
- Application and storage of crop nutrients and farm chemicals
- Agricultural roads
- Cultivation
- Channelization

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.

This section outlines the intent of those measures, lists some voluntary recommended management practices, and presents the regulations. These management measures address the objectives of the Area Plan.

2.4.1 Management Intent

To help achieve water quality standards in the Management Area, an effective strategy must:

1. Maintain adequate vegetation along streams
2. Minimize streambank erosion
3. Minimize potential pollutants in streams
4. Maximize irrigation efficiency

Voluntary efforts are the primary means to prevent and control agricultural sources of pollution. Local, state, and federal agencies and organizations provide information and technical and financial assistance. The Hood River SWCD, NRCS, and OSU Extension are the main support agencies at the local level.

Landowners have flexibility in choosing management approaches and practices to address water quality issues on their lands. Landowners may choose to develop management systems to address problems on their own, or they may choose to work with natural resource agencies to address applicable resource issues. Landowners may seek planning assistance from any agency or a consultant.

Regulations are included in addition to voluntary strategies. ODA pursues enforcement to gain compliance with the regulations only when reasonable attempts at a voluntary solution have failed.

2.4.2 Recommended Management Practices

Appropriate management practices for individual farms may vary with the specific cropping, topographical, environmental, and economic conditions that exist at a given site. Because of these variables, it is not possible to recommend uniform management practices for all farms or ranches in the Management Area. The NRCS Field Office Technical Guide contains extensive lists of management practices. The NRCS office is in Hood River. The Hood River SWCD, OSU-MCAREC staff, CTWS, and ODFW biologists can also recommend practices.

The following Recommended Management Practices (Table 4) generally are accepted as effective, economical and practical on a site-specific basis for the Management Area, and they address water quality issues. They are not required. Widespread adoption of these practices will address the water quality parameters of concern in the Management Area. These practices should also maintain the economic viability of agriculture in the area.

Table 4. Some recommended management practices for the Hood River Management Area.		
INTENT	**RECOMMENDED MANAGEMENT PRACTICES**	**OBJECTIVES**
Maintain Adequate Vegetation Along Streams *Adequate riparian vegetation:* *1. provides shade* *2. has diverse species & age structure* *3. is dense enough to filter out/trap excess nutrients, bacteria and sediment in overland or shallow subsurface flow* *4. has roots capable of withstanding high streamflows*	• Where manageable, preserve at least a 20-foot streamside buffer of native riparian vegetation as measured by slope distance from the high water mark • Plant native vegetation in riparian areas where lacking; desired species include conifer trees, willow, red osier dogwood (contact agencies or SWCD for other native species) • Control noxious weeds that compete with native vegetation. Noxious weeds include: Himalayan blackberries, Scotch broom, knapweed, purple loosestrife, Japanese knotweed, and others. Contact the County Weed and Pest Division for more information. • Plant or encourage low growing woody species for erosion control and shade where the need for cold air drainage conflicts with tall trees • Limit livestock access within riparian areas by fencing off streambanks and wetlands and use water gaps or off-channel watering methods (stock tank, nose pumps, etc.) • Maintain riparian fences and other structures over time. • Control the timing and intensity of livestock access to streams by using a grazing strategy that limits livestock distribution and the duration and season of riparian area use [note: this strategy requires large acreage] • Use buffers, dense ground cover and efficient irrigation management to increase water infiltration and to prevent soil runoff	Prevent or control increases in summer stream temperatures Improve late season streamflows by increasing the capacity of adjacent soils to store water during spring runoff Filter out excess nutrients, bacteria, pesticides and sediment that could pollute streams Maintain streambank stability and minimize erosion
Minimize Streambank Erosion	• Maintain adequate riparian vegetation (see above) • Avoid or minimize channelization and ditching of streams and wetlands • Properly place, design and maintain culverts, bridges, stream crossings (contact Oregon Department of State Lands (DSL), ODFW, or ODF) • Don't remove leaning trees, snags or woody debris from streams, as they provide important habitat for fish. Check with ODFW first if there is a flood damage concern. • Use vegetation to stabilize streambanks instead of using structural methods. If vegetation alone seems inadequate, contact ODFW, DSL, or ODF.	Increase stream bank stability Reduce sediment input to streams Reduce channel width and increase channel depth, which in turn reduces stream temperature Increase floodplain connectivity Reduce stormwater velocities
Minimize Runoff Containing Potential Pollutants	**Cultivated Lands** • Minimize time of soil exposure between cultivation and planting • Use contour cultivation where applicable • Maintain cover crops • Use sediment basins or barriers to reduce downslope erosion • Establish vegetative buffer strips to trap or filter sediment and/or contaminants • Eliminate long runs when applying gopher bait, especially on hill slopes • Reduce potential of diesel or petroleum spills from entering streams or water table by: 1) using automatic shutoff on pressurized systems, 2) maintaining equipment, or 3) installing alternative frost protection methods such as orchard fans • Keep machinery away from streams where oil or fluids can leak • Locate filling areas away from streams and off porous soils • Avoid over-applying fertilizer, manure or sludge by using soil/leaf analyses to determine appropriate rates • Do not apply fertilizer or herbicides inside the stream buffer • Do not apply fertilizer or herbicides when expecting heavy rain, ground is frozen or ground is too dry • To avoid soil compaction, minimize machinery operations on wet soils in the rainy season **Livestock Management** • Locate feedlots and corral areas on high ground where possible,	Reduce soil erosion Reduce and capture runoff Reduce potential pollutants in runoff

	away from streams and wetlands • Limit livestock access within riparian areas by fencing off streambanks and wetlands and use water gaps or off-channel watering methods (stock tank, nose pumps, etc.) • Know the livestock carrying capacity of your farm and stay within it • Plant dense vegetation buffer, or site pasture downslope from and adjacent to animal containment areas to filter runoff and nutrients from wastes • Build a covered manure storage compost system • Cover manure pile or storage area to keep rain off • Divert clean water away from manure storage or manure-contaminated areas • Install gutters and downspouts on livestock shelters, barns, and stables to channel stormwater away from manure and exposed soils • Drag pastures prior to the rest period to break up manure and increase absorption of nutrients • Use pasture rotation and good grazing management to produce more feed, fewer weeds and a minimum of bare ground • Allow irrigated soils to dry before grazing • Place salt licks and supplemental feeding stations away from water supplies to encourage even grazing • Install hardened paddock footings in heavy use areas to reduce concentrations of mud and manure. • During winter, corral animals and feed hay to avoid compacting saturated soils unless well drained and pasture is actively growing • Subdivide large pastures into smaller ones and implement rotational grazing. Ideally, begin grazing when pasture is six inches tall, move when grass is three inches tall. Thirty days are needed for irrigated pasture regrowth, and up to three months for non-irrigated pasture. • Allow long rest periods or use a high intensity, short-duration grazing to rejuvenate a pasture in poor condition	
Minimize Pesticides in Streams	• Always follow the container label, apply properly and avoid over-application • Rinse and dispose of pesticide containers properly • Use Integrated Fruit Production (IFP) orchard management or Integrated Pest Management (IPM) practices, e.g., insect pheromone disrupters to reduce the need for pesticides, beneficial insect populations, alternative “softer” pesticides (contact OSU Extension Agent or Experiment Station) • Monitor pest populations to document need, location and timing of sprays • Voluntarily reduce application amounts or number of sprays • Maintain/service spray equipment to avoid leaks and improper calibration • Build and maintain proper mixing facilities on less permeable soils away from wells and waterways • Provide training for field employees in proper pesticide use and handling • Build and maintain safe chemical storage that is: away from creeks and ditches, covered, elevated, contained, and secured • Establish and maintain vegetative buffers to reduce runoff and protect streams from accidental drift and direct application • Where small, non-fish bearing creeks cross through orchard, pipe creek only if buffer strip or other alternative is not feasible. On-site consultation with Oregon’s DSL is recommended to avoid noncompliance with state and federal wetland conservation rules. • Do not fill tanks directly from creeks or waterways if possible – use back flow devices if you do • Apply spray tank rinse water back onto orchard – do not drain out onto ground in one spot • Apply aquatic herbicides correctly and sparingly, in strict accordance with label • Minimize air drift in ground and aerial application: 1) avoid spraying in wind, 2) use tower sprayer or other directed applicator, 3) use spray additives to reduce drift, 4) practice one-direction spraying: spray only the outside of the outer two rows, spray inward at a lower speed for good coverage, and 5) turn nozzles off at end of each row • Spills: prepare a spill response plan; mix and load sprayers in areas where runoff to streams and ditches cannot occur; and use anti-foaming additives	Minimize air drift of pesticides Reduce runoff and pesticides in runoff Minimize leaching to groundwater Minimize chances for spills to enter streams

	• Use pesticides less prone to leaching; select and use pesticides based on your soil type. Contact OSU Extension for red-flag list of high leach soils and pesticides	
Maximize Irrigation Efficiency	• Line or pipe irrigation ditches to reduce leakage • Adhere to your existing water rights in terms of timing and amount • Schedule irrigation based on crop needs, soil type, climate, topography, and infiltration rates • Monitor irrigation applications to avoid overwatering and subsequent leaching of pollutants • Improve irrigation efficiency by replacing worn nozzles and using more precise systems • For private diversions: locate, maintain and screen properly and provide fish passage • Minimize return flows and impacts to streams • Replace "big gun" pasture sprinklers with lower volume sprinklers to reduce runoff • Irrigate pastures immediately after grazing to get plants growing again • Reduce irrigation endloss	Increase instream flows to reduce water temperatures Minimize potential pollutants Reduce soil erosion Protect natural resources

2.4.3 Requirements

All landowners conducting agricultural activities on non-federal and non-Tribal Trust lands (including timber lands) must comply with OAR 603-095-1100 through 603-095-1160.

In addition to meeting requirements of existing state laws, landowners are required to manage:

- Vegetation along streams
- Soil-disturbing activities
- Manure and other wastes

Stream systems in healthy condition are expected to withstand a 25-year flood with minimal damage. Structural conservation practices generally are designed to withstand different levels of storms or floods. For instance, underground outlets and grassed waterways typically are designed for a 10-year, 24-hour storm, while drop structures, streambank protection, and larger dams are designed for at least a 25-year flood.

Requirements may become more specific over time, as information becomes available on land conditions and water quality.

Oregon Administrative Rules 603-095-1140
Requirements

(1) Landowners must comply with OAR 603-95-1140(2) through (3) within the following limitations:

(a) A landowner is responsible for only those conditions resulting from activities controlled by the landowner. A landowner is not responsible for conditions resulting from activities by landowners on other lands. A landowner is not responsible for conditions that: are natural, could not have been reasonably anticipated, or that result from unusual weather events or other exceptional circumstances.

(2) Streamside Vegetation

(a) Effective upon adoption of these rules, agricultural activities must allow the establishment, growth, and maintenance of vegetation along streams. Vegetation must be sufficient to control water pollution by moderating solar heating, minimizing streambank erosion, filtering sediments and nutrients from overland flows, and improving the infiltration of water into the soil profile. The streambank should have sufficient vegetation to resist erosion during high streamflows, such as those reasonably expected to occur once every 25 years.

(3) Waste Management

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

"Streams" in Rule (2) refers to natural waterways such as streams, creeks, and rivers that were created through natural processes. They may have been altered by human activities, such as channelized creeks, but not created by human activities, such as irrigation ditches.

The TMDL developed by DEQ helps determine when streambank vegetation is sufficient to control water pollution.

The following regulations provide for resolution of complaints.

Complaints and Investigations (OAR 603-095-1160)

(1) When the department (ODA) receives notice of an apparent 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 603-095-1160(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 603-095-1160(4), "person" does not include any local, state or federal agency.

(6) Notwithstanding OAR 603-095-1160, 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.

Chapter 3: Goals, Objectives, and Strategies

3.1 Area Plan Goal

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

Minimize agriculture's contribution to the following water quality concerns:

- Temperature: maintain adequate vegetation along streams and sufficient instream flows; enhance natural channel morphology
- Nutrients: keep nutrients on site and out of streams by applying nutrients at appropriate rates and times; minimize amount of nutrient-laden runoff; maintain adequate streamside vegetation
- Pesticides: keep pesticides on site and out of streams by applying, handling, and storing pesticides appropriately; minimize runoff and aerial drift; maintain adequate streamside vegetation
- Bacteria: keep livestock waste on the land and out of streams by managing pastures, watering sites, and holding facilities to control runoff; maintain adequate streamside vegetation
- Sediment: keep soil on the land and out of streams by minimizing soil erosion and amount of soil-laden runoff; maintain adequate vegetation along streams; eliminate inter-basin water transfers
- Petroleum products: avoid spills and clean up spills appropriately; store properly

Achieve the following land conditions on agricultural lands throughout the management area:

- Sufficient streamside vegetation to stabilize streambanks, filter overland flow, moderate solar heating, and intercept pesticide drift.
- No visible sediment loss from cropland through precipitation or irrigation-induced erosion.
- No significant bare areas within 50 feet of streams on agricultural lands.
- Active gullies have healed or do not exist on agricultural lands.
- Stored livestock manure is under cover during the winter and in a location that minimizes risk to surface and groundwater.

The LAC expects that recommended and required actions are cost-effective and that funding is available from private and public sources to assist landowners with implementing projects.

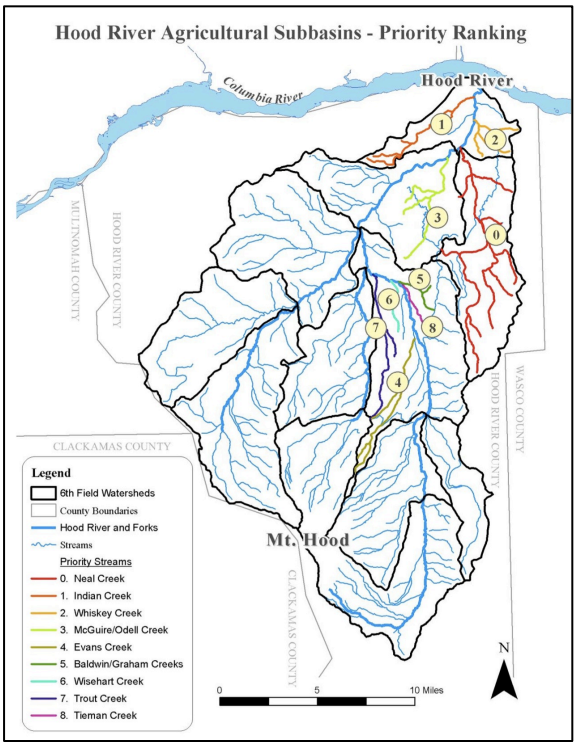
3.2 Measuring Progress

The primary water quality issue in the Management Area is elevated stream temperature due to low flows because of irrigation withdrawals. For almost all landowners, irrigation water is provided by irrigation districts, so individual landowners cannot control how much water is withdrawn. While improving on-farm irrigation efficiency is an important activity to reduce overall irrigation water needs, maintaining sufficient vegetation to reduce additional heating of water is an activity that landowners can do to directly improve water quality. This vegetation will also help improve water quality by filtering out bacteria and pesticides from overland flows and intercepting pesticide drift. Therefore, the SWCD and LAC agreed that riparian vegetation conditions would be the focus on any measurable objectives developed for the Management Area.

3.2.1 Focus Areas

To be strategic, the SWCD prioritized watersheds in the Management Area (map) using the following criteria:

- Documented water quality concerns
- High percentage of agricultural land base in subbasin
- Suspected water quality concerns
- Anadromous waterways
- Size of stream matches capacity of SWCD to address resource issues in a reasonable time frame.



Watersheds were ranked from 0-8, with #1 (Indian Creek) being the highest priority for the SWCD. Neal Creek (#0) is already being addressed by a partnership between CGFG and the CTWS, however the SWCD is assessing riparian vegetation in that watershed to complement those efforts.

The current Focus Areas for this Management Area are Indian Creek and Neal Creek. Two Action Plans for the current biennium have been developed and approved by ODA outlining the key components of the process.

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

The SWCD has already assessed riparian vegetation in the Indian Creek watershed and has begun assessment in Neal Creek. The SWCD will continue throughout the Management Area as resources allow. Results are presented in Section 4.3

3.2.2 Assessment Method

Riparian conditions are classified based on functionality. Is the vegetation sufficient to moderate solar heating, stabilize the streambank, prevent spray drift and filter out pollutants, consistent with site capability?

To determine riparian conditions, the Hood River SWCD uses a three-step process. First aerial photos are used to map the waterways and do a broad classification from I-IV, as defined in Table 5, below. Second, the mapped classifications are ground-truthed by stopping at all roads and public access points along mapped waterways to visually assess the ground and canopy cover along the waterway. Many of the minor tributaries in our area have been channelized, captured by irrigation ditches or piped. Piped drainages are included in class I as subcategory 1a, since the water is protected from solar heating,

streambank erosion and other pollutants. After ground-truthing, maps are adjusted to accurately depict piped, channelized or captured waterways. The third step happens after contacting landowners who have riparian buffers classified as II or III. If the landowner agrees, a site visit is made to walk the length of the waterway and visually assess the riparian vegetation conditions. In all cases, a buffer of 35 feet on either side of the waterway is assessed.

To be categorized as class I, the buffer of riparian vegetation has at least 75 percent ground cover and the stream has at least 75 percent canopy cover. To be categorized as class II, the vegetated buffer will have at least 50 percent ground or canopy cover. Those riparian buffers categorized as class III have either ground or canopy cover of less than 50 percent due to agricultural activities. While there are some spots where the site is not capable of growing ground or canopy cover, most lands in Hood River County are capable of growing vegetation that can function to protect water quality from agricultural pollution.

Table 5. Streamside condition classifications in the Hood River Management Area.

Class I	Class II	Class III	Class IV (non-ag)
Vegetation on agricultural lands likely sufficient to moderate solar heating, stabilize streambanks, and filter out pollutants consistent with site capability.	Agricultural activities allowing plant growth, but vegetation likely insufficient to moderate solar heating, stabilize streambanks, or filter out pollutants consistent with site capability.	Agricultural activities likely not allowing vegetation to moderate solar heating, stabilize streambanks, or filter out pollutants consistent with site capability.	Non-agricultural land, e.g. roads, rural residential, forest land.

3.2.3 Measurable Objectives

The LAC would like 100% of streambanks on agricultural lands to be in Class I throughout the Management Area. However, they believe it will take more than voluntary measures to achieve that due to the large number of small parcels, scattered rural residential properties, landowner turnover, and the small but persistent number of landowners who need the threat of regulation to make changes.

Due to limited staff, the SWCD will evaluate the Management Area one watershed at a time, beginning with Indian Creek and proceeding to Neal Creek. With more information, they will begin developing Management Area-wide Measurable Objectives.

At this biennial review, they developed the following Measurable Objective for Indian Creek:

- get the percentage of streammiles in Class III to <5% by June 30, 2015 and keep it there.

This objective may be challenging due to the characteristics noted above.

Measurable objectives for Neal Creek will be developed by the LAC at the 2016 biennial review.

3.3 Strategies for Area Plan Implementation

Education is the key to the success of this Area Plan. The Hood River SWCD, NRCS, ODA, OSU-MCAREC, CTWS, and CGFG work together to provide agricultural landowners in the Management Area with information about water quality goals and requirements.

The Hood River SWCD and ODA are responsible for determining progress towards Area Plan goals. The Hood River SWCD, as the Local Management Agency, maintains a Memorandum of Agreement with

The Oregon Department of Agriculture that outlines its responsibilities for providing and tracking educational outreach, technical, and financial assistance.

The following strategies are used at the local level by the Hood River SWCD in cooperation with landowners, other agencies and organizations:

1. Work to improve the quality of water in the Management Area through planning and implementation of technically sound and economically feasible conservation practices that contribute to meeting Area Plan objectives.
    a. Limit pollution caused by agricultural activities by implementing successful practices for streambank stabilization, reduction of extreme water temperatures, and restoration and enhancement of wetlands and riparian areas, while avoiding adverse fish habitat modification.
    b. 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.
    c. Participate in cooperative on-the-ground projects with partner organizations to solve critical problems identified by landowners and land managers.

2. Increase 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.
    a. Incorporate Area Plan implementation as a priority element in the Hood River SWCD's Annual Work Plan and Long-Range Plan, with support from partner organizations.
    b. Showcase successful practices and systems through tours and workshops.
    c. Recognize successful projects and practices through appropriate media and newsletters.
    d. Conduct educational programs to promote public awareness of water quality issues and their solutions.
    e. Proactively offer and provide site evaluations on any lands within the Management Area to assess conditions that may affect water quality.
    f. Prioritize subwatersheds within the Management Area for targeting implementation strategies.

3.4 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.

To implement this Area Plan, the Hood River SWCD needs support and resources for staff to:

- Provide educational programs (production and presentation)
- Identify high priority areas for implementation
- Evaluate Area Plan progress toward achieving water quality goals
- Coordinate planning and implementation activities with other agencies, organizations, and individuals working on similar goals
- Assess watershed conditions
- Monitor water quality
- Manage and facilitate meetings
- Help landowners find funding to implement recommended management practices

Technical and cost-sharing assistance for installation of certain management practices may be available through current USDA conservation programs such as Environmental Quality Incentive Program and Conservation Stewardship Program, USEPA's nonpoint source implementation grants, CTWS, or state programs such as OWEB and Conservation Reserve Enhancement Program. Other agencies may also be available to provide technical assistance or financial assistance to private landowners.

Chapter 4: Implementation, Monitoring, and Adaptive Management

4.1 Implementation and Accomplishments

The Hood River SWCD works with a variety of conservation partners to prevent and control water pollution from agricultural activities.

The following tables outline accomplishments in the last two years and expected activities in the upcoming two years.

Table 6. Accomplishments by conservation partners to implement the Area Plan: 2013-2014.

Resource Addressed	Projects	Outreach/Education	Monitoring	Demonstrating Progress
Streamside vegetation and morphology	Indian Creek Focus Area: ✓ Mapped existing riparian conditions using aerial photos and ground-truthing to document baseline conditions in priority area ✓ Developed database of all landowners along creek ✓ Contacted six landowners needing better buffers ✓ Planted 370 ft. spring 2014 with CGFG Neal Creek Focus Area: ✓ Mapped existing riparian conditions using aerial photos to document baseline conditions in priority area Aspen Creek: 190 ft. of roadside channel rerouted away from road, planted 120 live stakes, both sides of creek. Provided native plants to Portland Drive stable owner to create vegetated buffer along waterway that drains to FID ditch and then mainstem Hood River. Orchard waterways: CGFG/CTWS planted 5,190 ft. of riparian buffer in 2013 Annual plant sale: sold or donated ≈10,500 plants for enhancement projects West Fork Hood River: installed DID pipeline East Fork Hood River: Installed new EFID main canal diversion Whiskey Creek – wetland enhancement on 0.4 ac., 1,100 native trees and shrubs	**Presentations:** Board of Commissioners - 2, Indian Creek Stewards - 1 **Site visits:** Site visits to assess/consult on riparian enhancements – 4 **Notable articles:** Focus areas **Other:** ✓ Annual reports with updates on Ag WQ program - 2 ✓ eNewsletter (quarterly) ✓ Radio presentation - 1 ✓ Annual Hood River County Fair display - 2 ✓ County permit reviews ✓ Contacted ODA and HRC Planning about cottonwood logging on Indian Creek; ODA disclaimed responsibility, HRC sent landowner letter about stream protection overlay zone requirements	Indian Creek: riparian clearing complaint, one follow-up visit Unnamed tributary to mainstem Hood River: Monitor fencing and revegetation efforts at stable operation (subject of ag WQ complaint) March 2013	Indian Creek: 2,000 feet previously cleared has been partially planted and is being monitored to insure compliance with ag rules CGFG/CTWS riparian buffer project: with addition of 5,560 ft. planted in 2012-2014, 14,060 ft. of channelized waterways in orchards now buffered with willow and red osier dogwood West Fork Hood River: 3 cfs left instream as a result of DID pipeline. Also, Deer and Alder Creek diversions eliminated, returning those creeks to natural conditions. Camp Creek diversion fish screen installed and No Name Creek diversion upgraded, protecting aquatic resources. East Fork Hood River: access to 30 miles of upstream habitat improved by elimination of summertime push-up dam, 15 cfs minimum flow (initial 5 year guarantee) in bypass reach Unnamed tributary to mainstem Hood River is fenced and planted on both sides through a 325 ft. section of stable/ horsekeeping operation Neal Creek Small Scale Restoration Initiative: livestock fenced out of 1,400 feet of stream and over an acre of riparian habitat has been improved or protected.

	planted March 2013 Neal Creek Small Scale Restoration Initiative: four projects implemented since 2012 including riparian fencing, riparian planting, hardened stream crossing and beaver pond enhancement.			
Potential pollutants	Arranged for ODFW to donate fence posts to Portland Drive stable owner to enhance riparian fencing along waterway that drains to FID ditch. Developed three (3) project proposals for manure storage facilities and/or paddock footings; none funded Mainstem Hood River: FID installed pipeline to replace all or part of Lowline and Farmers canals	**Workshops:** Horsekeeping - 1 **Notable articles:** 1 – mud management **Other:** ✓ Yearly PSP review meetings ✓ Assist ODA on complaint investigations	PSP: seasonal WQ sampling/analysis of 100+ analytes Neal Creek turbidity monitoring Year Two monitoring report on 1 manure storage facility project Temperature monitoring on Lower Hood River for FID study Temperature monitoring on upper Middle Fork tributaries	PSP documented progress: Two OP pesticide exceedences in 2013 (one in 2012), slight upward trending in organophosphate detections for 2013 after years of downward trend, continuation of detected herbicide and fungicide concentrations at less than water quality standards, sub-lethal effects thresholds, or acute toxicity standards. Neal Creek: final monitoring report showed 3 year average turbidity level dropped from 72.4 NTU to 11.1 NTU before and after installation of the EFID Central Canal Pipeline and due to Mount Hood Forest Products settling ponds. FID converted 14,350 ft. of Lowline Canal to pipeline in fall 2012, eliminating an estimated 2,300 tons of sediment per year into area rivers. MFID installed 11,000 ft. of pipeline to replace Glacier Ditch, preventing an estimated 500 tons per year of sediment from entering Evans Creek.
Irrigation efficiency	Irrigation upgrades: 134.6 acres Commitment to irrigation water management on additional 32.3 ac. Developed 12 irrigation upgrade project proposals; 11 funded and implemented	**Workshops:** Irrigation Water Mgmt. - 1 **Site visits:** 12 orchards with irrigation upgrade proposals	Year Two monitoring reports on 10 irrigation improvement projects	Over 0.5 cfs left instream as a result of on-farm irrigation upgrades in past two years Flow meter monitoring project – issued final report on data from 36 growers showing upgraded irrigation systems use less water with greatest water savings seen when land managers were actively involved in IWM

Table 7. Expected activities by conservation partners: 2015-2016.				
Resource addressed	**Projects**	**Outreach/Education**	**Monitoring**	**Demonstrating Progress**
Streamside vegetation and morphology	Indian Creek Focus Area: ✓ Assess riparian conditions in 2015 to document improvements in priority area ✓ Contact any landowners needing better buffers Neal Creek Focus Area: ✓ Ground-truth existing riparian conditions to document baseline conditions in priority area ✓ Develop database of all landowners with poor or improving riparian buffers ✓ Contact landowners needing better buffers ✓ Assist with riparian planting, if needed Waterways adjacent to orchards: CGFG/CTWS spray buffer riparian planting project CTWS Small Scale Restoration Initiative: one project such as riparian fencing, riparian planting, and streambank stabilization. Whiskey Creek – wetland enhancement on 0.4 ac.: Plant additional native trees and shrubs in 2015 to replace those that didn't survive from 2014 planting Annual plant sale: sell or donate ≈10,000 plants for enhancement projects	**Presentations:** Board of Commissioners - 2, plus two others **Site visits:** Site visits to assess/consult on riparian enhancements – 4 **Other:** ✓ Annual reports with updates on Ag WQ program - 2 ✓ eNewsletter (quarterly) - 8 ✓ Radio presentation - 1 ✓ Annual Hood River County Fair display – 2 ✓ Article(s) on focus areas, buffer requirements ✓ County permit reviews	Unnamed tributary to mainstem Hood River: Monitor fencing and revegetation efforts at stable operation (subject of ag WQ complaint) CGFG/CTWS: monitor riparian buffer plantings Whiskey Creek: monitor plant survival on 0.4 ac. wetland enhancement project	Indian Creek: 2,000 feet previously cleared has been partially planted and is being monitored to insure compliance with ag rules Indian Creek: Percentage of land in poor condition decreased from 11% to 5%, in improving condition increased from 2% to 7% and in good condition increased from 53% to 54%. CGFG/CTWS riparian buffer project: with additional buffers planted in 2014-2016, 16,000 ft. of channelized waterways in orchards now buffered with willow and red osier dogwood Neal Creek Small Scale Restoration Initiative: livestock fenced out of 2,000 feet of stream and over two aces of riparian habitat has been improved or protected. Whiskey Creek: 90% survival of native plants and corresponding reduction of blackberry/reed canary grass
Potential pollutants	Developed project proposals for manure storage facilities and/or paddock footings, per interest EFID Christopher Pipeline project – phase 1 – begin design and piping of open ditch to stop contribution of glacial silt into Neal Creek. Mainstem Hood River: Completion of FID Farmers Pipeline project Evans Creek-Hutson Drive culvert replacement project Odell Creek Hydroelectric Project Decommissioning	**Workshops:** Horsekeeping - 1 **Other:** ✓ Yearly PSP review meetings ✓ Assist ODA on complaint investigations ✓ Articles on PSP for annual report ✓ Outreach on PSP results to ag community ✓ OSU sprayer optimization outreach	PSP: seasonal WQ sampling/analysis of 100+ analytes Neal Creek turbidity monitoring Temperature monitoring on Lower Hood River for FID study Temperature monitoring on upper Middle Fork tributaries	PSP documented progress: No exceedances of pesticide standards, continuation of detected pesticide concentrations below water quality standards, sub-lethal effects thresholds, or acute toxicity standards. Neal Creek: turbidity monitoring shows average turbidity levels below state standards. Odell Creek Hydroelectric Project Decommissioning results in normal sediment transport (no more pulses)

	OSU Sprayer optimization project			
Irrigation efficiency	Irrigation system upgrades: 100 acres Commitment to irrigation water management on additional 25 ac. Develop, fund and implement 10 irrigation upgrade projects Install EFID telemetry system	**Workshops:** Irrigation Water Mgmt. - 1 **Site visits:** 10 orchards with irrigation upgrade proposals	Year Two monitoring reports on 11 irrigation improvement projects	Over 0.5 cfs left instream as a result of on-farm irrigation upgrades in past two years EFID telemetry system will match water diversion with demand, increase summer stream flows and reduce "end spills"

4.2 Water Quality Monitoring—Status and Trends

Representatives of the CTWS, Hood River Watershed Group, irrigation districts, DEQ, and other state and federal agencies currently monitor various water quality parameters in the Management Area including stream temperature, bacteria, turbidity, pesticides, nutrients, and riparian vegetation.

4.3 Progress Toward Measurable Objectives

The SWCD worked in Indian Creek for two years. Table 8 shows the results pre-assessment. The 2015 results will be in the next update of the Area Plan. Neal Creek will be started in 2015.

Table 8. Results of riparian vegetation pre-assessment along 14.8 miles of Indian Creek and tributaries. Agricultural land made up 66% of the streambanks (9.8 miles).

Class	Description	Percent of streambank in each class on agricultural land	
		2013	2015
I	Vegetation likely sufficient to moderate solar heating, stabilize streambanks, and filter out pollutants consistent with site capability.	81%	To be determined
II	Agricultural activities not impairing riparian growth, but vegetation likely insufficient to moderate solar heating, stabilize streambanks, or filter out pollutants consistent with site capability.	3%	To be determined
III	Agricultural activities likely not allowing vegetation to moderate solar heating, stabilize streambanks, or filter out pollutants consistent with site capability.	16%	To be determined

After the assessment, six landowners with Class II and III properties were contacted. Two agreed to participate (one class II will maintain vegetation, one class III was planted spring 2014); four declined.

The SWCD will continue to work with landowners in the Focus Area to reduce the amount of Class III below 5 percent by June 30, 2015.

4.4 Aerial Photo Monitoring of Streamside Vegetation

Aerial photographs from 2004 were analyzed by ODA for five 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 9. Riparian index scores from analysis of aerial photographs.			
Stream	Scores		Comments About Analyzed Reach
	2004	2014	
East Fork Hood River	63.7	Not yet analyzed	No active agriculture within 90 feet of river
Griswell Ck	63.1		5-10% of reach is channelized.
Indian Ck	61.7		5-10% of reach is channelized
Neal Ck	61.0		
Odell Ck	57.8		Some channelized sections.

In 2004, four of the five streams analyzed had at least 50 percent tree coverage in each band, and the fifth (Odell Creek) had 50 percent or more in five of the bands. The East Fork Hood River had the greatest amount of bare land cover, with almost no active agriculture within the six bands. Odell Creek had significant amounts of bare agricultural land in both the 60 and 90 foot bands. Most of this bare ground was within orchards. The East Fork Hood River had the highest riparian index score (63.7) and Odell Creek had the lowest (57.8). The East Fork Hood River has what appears to be an anastomosing channel in the upper half of the reach examined. The channel is very dynamic with many bare point bars, and at least two active channels. There is almost no active agriculture within 90 feet of the banks. Odell Creek also had some channelized sections, and about 5 percent of the banks are visibly eroding.

4.5 Biennial Reviews and Adaptive Management

Ten members of the LAC met on December 11, 2014, for the biennial review. They discussed measurable objectives at length and felt that it would not be possible to achieve 90 percent streambanks in Class I using only voluntary means.

It was noted that there has been a general reduction in pesticides in the water column.
Major changes to the Area Plan consisted of adding drinking water information from DEQ and developing measureable objectives.

The LAC also felt that the following were needed to achieve good quality streamside vegetation:

- Enforcement where needed, in addition to voluntary landowner activities and
- Commitment by the county and the railroad to spray weeds and do maintenance work in a way that produces desirable vegetation instead of bare ground

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[5] MacDonald, L.H., A.W. Smart, and R.C. Wissmar. Monitoring Guidelines to Evaluate Effects of Forestry Activities on Streams in the Pacific Northwest and Alaska. EPA 910/9-91-001. 1991.

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