HOOD RIVER
AGRICULTURAL WATER QUALITY
MANAGEMENT AREA PLAN

4th Biennial Revision

December 2, 2008

Developed by the

HOOD RIVER LOCAL ADVISORY COMMITTEE

with assistance from

OREGON DEPARTMENT OF AGRICULTURE
and
HOOD RIVER SOIL AND WATER CONSERVATION DISTRICT

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ACRONYMS & ABBREVIATIONS

Area Plan - Hood River Agricultural Water Quality Management Area Plan

Area Rules - Oregon Administrative Rules 603-095-1100 through 603-095-1160

cfs - cubic feet per second

DEQ - Oregon Department of Environmental Quality

DSL - Department of State Lands

LAC - Hood River Local Advisory Committee

Management Area - Hood River Agricultural Water Quality Management Area

NOAA's Fisheries Service – National Oceanic and Atmospheric Administration National Marine Fisheries Service

NRCS - USDA Natural Resources Conservation Service

NTUs - Nephelometric Turbidity Units

OAR - Oregon Administrative Rules

ODA - Oregon Department of Agriculture

ODF - Oregon Department of Forestry

ORS - Oregon Revised Statutes

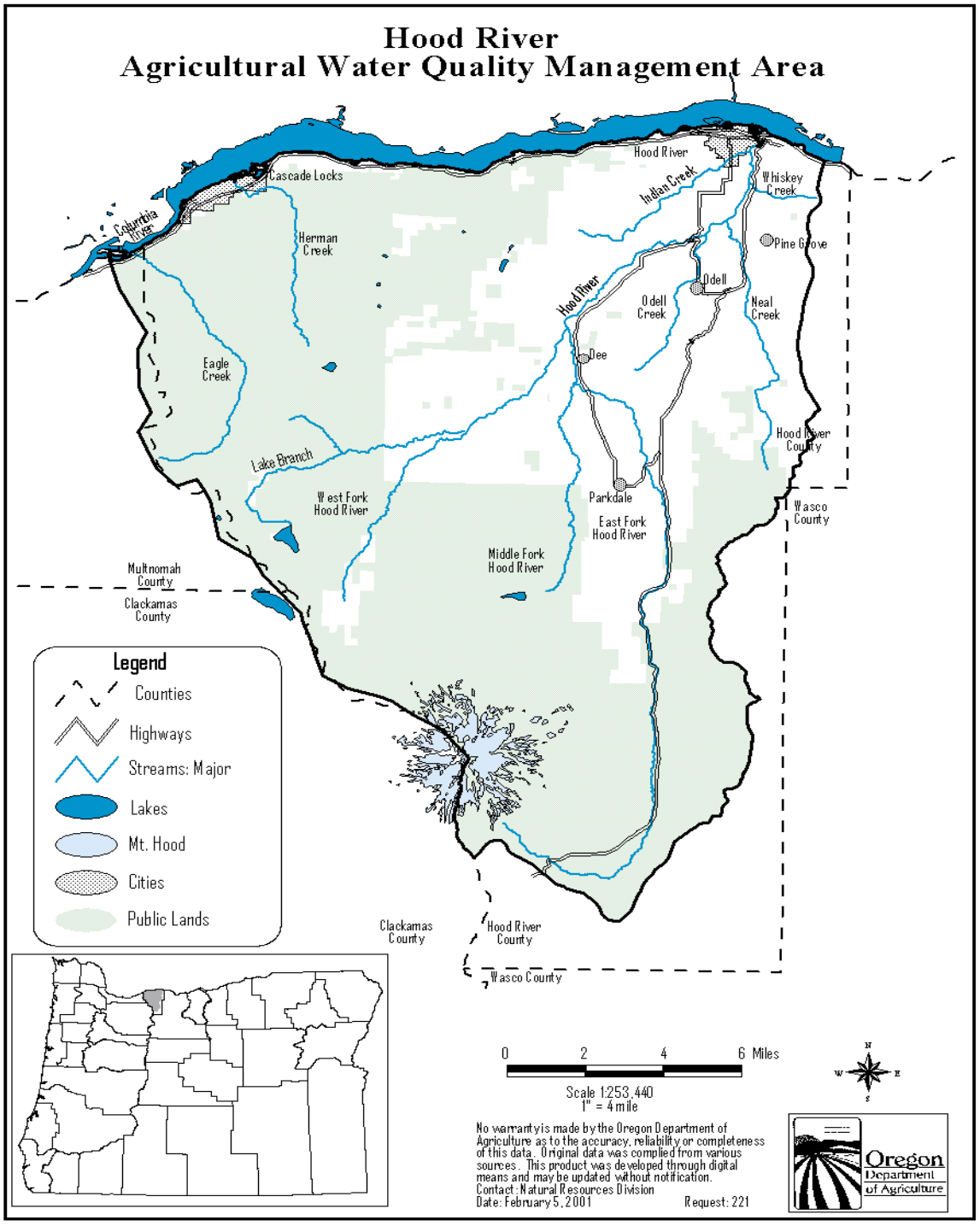
OSU - Oregon State University

SWCD - Soil and Water Conservation District

TMDL - Total Maximum Daily Load

USDA - United States Department of Agriculture

MAP - MANAGEMENT AREA



FOREWORD

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

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

The Oregon Department of Agriculture (ODA) exercises its enforcement authority for the prevention and control of water pollution from agricultural activities under Oregon Administrative Rules for the Hood River Management Area (603-095-1100 through 603-095-1160) and statewide enforcement procedures provided in Oregon Administrative Rules 603-090-0060 through 603-090-0120.

APPLICABILITY

This Area Plan applies specifically to agricultural activities on all agricultural, rural, and forest lands within the Hood River Agricultural Water Quality Management Area that are neither owned by the federal government nor are Tribal Trust lands. The Area Plan applies to agricultural lands in current use, those lying idle or on which management has been deferred, and lands (like private roads) not strictly in agricultural use but that support agricultural activities.

Activities governed by the Forest Practices Act are outside the jurisdiction of this Area Plan. Pesticide use is governed by the Pesticide Control Act (ORS 634); those laws are administered by ODA Pesticides Division. Activities of irrigation districts that affect water quality are regulated by the Oregon Department of Environmental Quality (DEQ).

IMPLEMENTATION PLAN FOR TEMPERATURE TMDL

The Oregon Department of Environmental Quality (DEQ), in accordance with the federal Clean Water Act, is required to establish "Total Maximum Daily Loads" (TMDLs) for pollutants on the 303(d) list. The 303(d) list consists of streams that violate state water quality standards. TMDLs set maximum limits on the amount of pollutants allowed to enter water bodies so that water quality standards can be met.

Each jurisdiction (such as agriculture, forest lands, federal lands, and urban areas) is allocated a portion of the TMDLs. This amount is the jurisdiction's Load Allocation. Each jurisdiction develops pollution control plans and programs designed to achieve the load allocations.

A TMDL for temperature (based on the 1998 303(d) list) was developed for the Management Area and was approved by EPA in January, 2002[1]. The TMDL includes solar radiation loads (in langleys per day). These loads have been translated into Effective Shade surrogate measures, which are more useful for guiding nonpoint source management practices. The Hood River Agricultural Water Quality Management Area Plan is the implementation plan for Agriculture's Load Allocation.

INTRODUCTION

This Hood River Agricultural Water Quality Management Area Plan (Area Plan) addresses sediment, nutrient, bacteria, toxics, temperature, pH, and flow concerns related to agricultural activities on non-federal and non-Tribal Trust lands in the Hood River Agricultural Water Quality Management Area (Management Area). Temperature and pH were on the Oregon Department of Environmental Quality's 1998 303(d) list of "water quality limited" streams in the Management Area; pesticides (chlorpyrifos and azinphos methyl), iron and zinc are on the 2002 list. Additional metals are on the 2004/06 list. Temperature concerns were addressed by the 2002 TMDL.

The Oregon Agricultural Water Quality Act, passed as Senate Bill 1010 in 1993 (ORS 568.900-568.933), and Oregon Administrative Rules (OAR 603-090) outline the process for the development and implementation of Agricultural Water Quality Management Area Plans to prevent and control water pollution resulting from agricultural activities and soil erosion. The process includes the formation of a Local Advisory Committee that consists primarily of landowners in the affected area to assist the Oregon Department of Agriculture (ODA) in the development of the Area Plan and Rules.

In November 1999, the Hood River Local Advisory Committee (LAC) was convened by ODA. It is assisted by the Hood River Soil and Water Conservation District (SWCD). LAC members represent the interests of local landowners (orchardists, livestock owners, and small-acreage farmers), Columbia Gorge Fruit Growers, 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, and the Hood River SWCD. Local Advisory Committee members are:

Mike Oates, **Chair**: Odell, orchard	Davinne McKeown-Ellis: Pine Grove, llamas
Bruce Decker, **Vice Chair**: Wilbur-Ellis fieldman	Brian Nakamura: Willow Flat, orchard
Tim Annala: Hood River, orchard	Roger Nelson: Parkdale, blueberries
Chris Brun: Tribal fish program, coordinator	Chuck Thomsen: County Commissioner & orchard
Steve Castagnoli: OSU Extension	Jim Wells: Pine Grove, orchard
Steve Hunt: Dee, orchard	Alternate: Jean Godfrey, Columbia Gorge Fruit Growers
Mike Kleinsmith: Farmers Irrigation District	

The LAC receives additional technical support from the USDA Natural Resources Conservation Service (NRCS); USDA Farm Service Agency; United States Forest Service; Oregon Departments of Agriculture, Fish and Wildlife, Forestry, and Environmental Quality; Mid-Columbia Agricultural Research and Extension Center; and others.

The goal of this Area Plan is to prevent and control water pollution and soil erosion through voluntary activities by agricultural landowners, aided by information and technical and financial assistance from local, state, and federal agencies, and other sources. ODA uses regulatory measures as a last resort when voluntary approaches do not adequately correct conditions causing water quality problems.

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

- Streamsides
- Livestock
- Cultivated lands
- Agricultural wastes
- Nutrients, farm chemicals, and pesticides
- Irrigation water and surface drainage

1: MANAGEMENT AREA

Geographic Area and Physical Setting

Location

The Hood River Agricultural Water Quality Management Area (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 (see map). 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. Approximately one third of the land is County or privately owned. Almost all the remaining lands are federally owned and managed by the US Forest Service. 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[2]. 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.

Hydrology[2]

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

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% or less. Forty-one percent of the total stream length consists of habitat types classified as a sediment source, 36% as sediment transport, and 23% 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 7-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.

Hydrologic Modifications[2]

The natural flow regime of the Hood River drainage has been modified by irrigation and domestic water withdrawals and hydropower diversions. Consumptive water use between July and September is estimated at 40% (296 cfs) of natural flow at the Hood River mouth. Reservoir storage is limited to 4,600 acre-feet, or less than 1% 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.

Land Use

Historical[2]

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 Confederated Tribes of the Warm Springs Reservation.

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 in 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[2]

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 10% of Hood River valley orchardists use soil moisture sensors to improve orchard water efficiency. The Integrated Fruit Production 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 dedicated as industrial forest or 15% of the Hood River drainage. Longview Timberland 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 2% 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: WATER QUALITY CONCERNS

The federal Clean Water Act requires that each state designate the beneficial uses of water, select water quality parameters most directly related to the beneficial uses, and set standards for those parameters. Streams that violate state water quality standards are placed on the 303(d) list by DEQ.

Beneficial Uses

Beneficial uses for the Management Area include domestic and industrial water supplies, irrigation, livestock watering, aquatic life, recreation, aesthetics, and hydropower. Of these, 'salmonid fish rearing and spawning', 'drinking water', and 'human contact recreation' are the most sensitive uses. Bacterial contamination is the greatest concern for swimming and other types of human water contact; drinking water is affected primarily by toxics and nitrates. However, aquatic life is affected by temperature, sedimentation, turbidity, toxics, nutrients, pH, and dissolved oxygen.

Because aquatic species are so sensitive to a variety of pollutants, they are often viewed as an indicator species of water quality. Therefore, in this section, the Area Plan focuses on salmonid numbers and habitat requirements.

Salmonids

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.

Table 1. Distribution and status of salmonids in the Hood River drainage.

SPECIES	PRIMARY SPAWNING, HOLDING AND REARING AREAS	STATUS OF WILD POPULATION
ANADROMOUS SALMONIDS		
Spring chinook salmon	Elk Creek McGee Creek East Fork Hood RIver West Fork Hood River Middle Fork Hood River Mainstem Hood River	Native stock extinct. Hatchery supplementation ongoing to reintroduce spring chinook using Deschutes stock.
Summer steelhead	West Fork and tributaries Mainstem Hood River	Threatened Species - listed by NOAA's 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

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 TMDL adopted by EPA in 2002 identified shade targets that are to be met on Management Area streams[1]. These targets are addressed in Section 4.

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.

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.

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.

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

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 Watershed Action Plan, a project of the Hood River SWCD.

Water Quality Parameters of Concern

303(d) Listed Parameters

Table 2. Violations of Oregon's Water Quality Criteria in the Hood River Management Area (Source: 2004/06 303(d) list[3]).

Stream Segment	Water Quality Parameters			
	Chlorpyrifos	Azinphos methyl	pH	Arsenic (A), beryllium (B), copper (C), iron (I), manganese (M), and/or zinc (Z)
East Fork Hood River (Mile 0-27.4)				B, C, I
Evans Creek (0-8)				B, C, I
Hood River (0-14.6)				B, C, I
Indian Creek (Mile 0-7.8)	X			
Lenz Creek (0-1.5)	X		X	A, B, I, M
Middle Fork Hood River (0-9.5)				B, I
Mitchell Creek (0-2.3)				Z
Neal Creek (0-5.6)	X	X		A, B, I, M
West Fork Hood River (0-14.4)				B

1. **Pesticide and herbicide** use on orchard, 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 Columbia Gorge Fruit Growers 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[2]. Further stream monitoring studies by OSU and/or DEQ have continued since 2000. Results of these studies have shown a general decline in the number of pesticide detections.

   Results from 2007 included one detection of chlorpyrifos (below the state water quality criterion) two detections of azinphos methyl (both over the state water quality criterion), one detection of imidan, another organophosphate, and multiple detections of simazine, an herbicide. There are no state or federal water quality standards for imidan or simazine. Water quality sampling by DEQ at the packing house discharge sites has shown exceedances for guthion.

2. Elevated levels of some **metals** were measured in 1998-2000 by DEQ. The source of these metals in the water is unknown and could be natural.

Other parameters of concern

1. **Elevated stream temperatures** are still a concern. There are no listings on the current 303(d) list because a temperature TMDL was developed and was approved by EPA in 2002[1]. This approval recognizes that the Water Quality Management Plan (WQMP) associated with the TMDL will be implemented. The WQMP includes plans, such as the Area Plan, describing how each of the different jurisdictions will address the load allocations in the TMDL. Subject to available resources, DEQ intends to review the progress of the TMDL and WQMP on a five-year basis.

   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.

   DEQ, 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[3] in the Middle Fork Hood River and Clear Branch below Laurance Lake.

2. 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[4]; scientific literature reports that concentrations greater than 0.3 mg/L can trigger algal blooms[5]. 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. High nitrate levels have also been found in domestic water provided by the Odell Water Company, which is sourced from a spring near Odell. There have been two spikes (in 1996 and 2006) that exceeded the 10 mg/L water quality criterion, and the nitrate level has generally run above 6 mg/L since 1995.

   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[6]. To prevent nuisance algal growth in coldwater streams that do not discharge directly to a lake or reservoir, EPA recommends a total phosphorous concentration of 0.10 mg/L or less[7]. 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.

3. Based on 1998 DEQ monitoring study results, **dissolved oxygen** (DO) concentrations in the Hood River drainage[2] 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. Because the state DO standard relies on a determination of salmonid spawning vs. rearing periods for each stream reach, further analysis and input from fisheries agencies is needed to assess where and when state DO standards apply.

4. **Bacteria** are used to determine the safety for "human contact recreation." High levels of E. coli bacteria can cause severe gastric illness and even death. 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. A more comprehensive study would be needed to identify contamination sources and the degree of the contamination problem.

5. **Sediment**: Oregon currently does not have numeric sediment standards. Only one of 34 sites (Wishart Creek) sampled during the 1998 DEQ intensive study exceeded[2] the turbidity guideline of 50 Nephelometric Turbidity Units (NTUs) recommended by the Oregon Watershed Enhancement Board[4]. 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.

Potential Contributors To Water Pollution

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 domestic withdrawals, sewage treatment plants, urban stormwater, hydroelectric diversions on the Hood River, failing septic systems, 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[2].

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

3: MISSION, GOALS, AND OBJECTIVES

Mission

Implement a Hood River Agricultural Water Quality Management Area Plan that guides the prevention and control of water pollution and soil erosion to help achieve water quality standards that protect beneficial uses (OAR 603-090)

Goal

Promote agricultural management that improves and protects water quality while sustaining a healthy agricultural economy

Objectives

1. 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
   - petroleum products: avoid spills and clean up spills appropriately; store properly

2. 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

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.

4: MANAGEMENT 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 Area Rules.

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

A. 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 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 develop a voluntary conservation plan to address applicable resource issues. Landowners may seek planning assistance from any agency or a consultant.

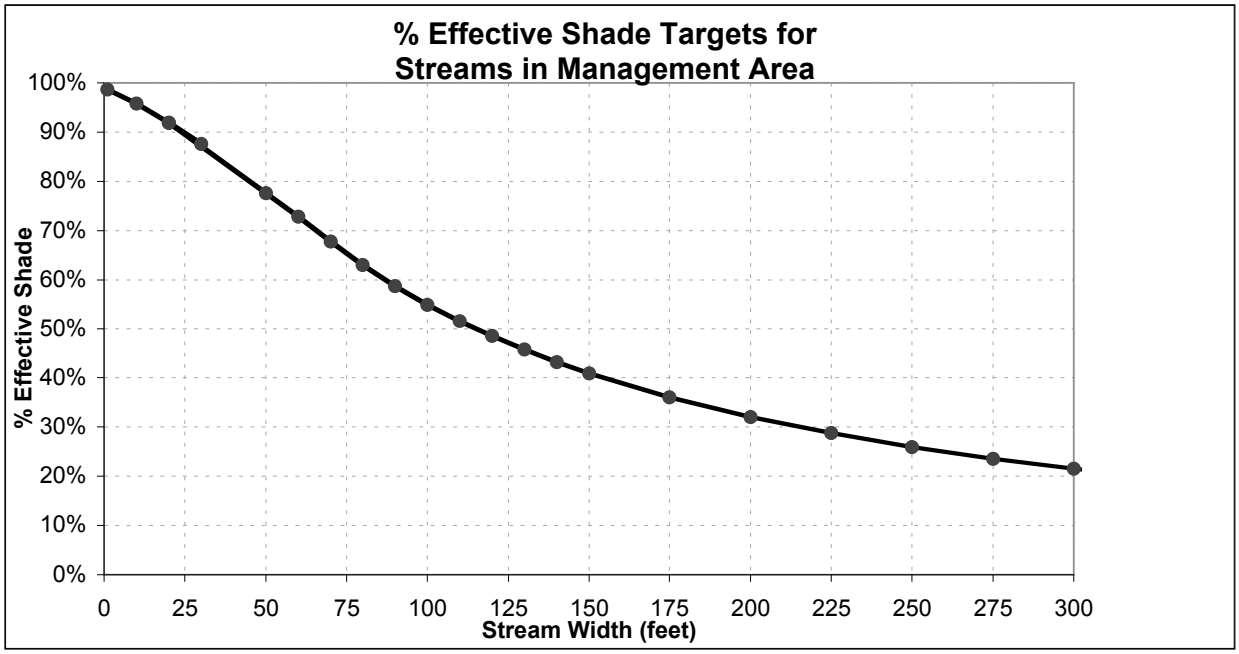
Regulatory measures (Area Rules) are included in addition to voluntary strategies. ODA pursues enforcement to gain compliance with the Area Rules only when reasonable attempts at a voluntary solution have failed. (See Area Rules in Section C.)

B. TDML Shade Targets[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. 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.

The TMDL contains Percent Effective Shade Targets for the Management Area. Landowners may use these targets as a guide to determine if they have sufficient riparian vegetation. Percent effective shade is the amount of shade that reaches the stream. For example, 70% effective shade means that canopy cover has kept 70% 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% of the sunlight reaching a 5-foot wide stream on an August day, and 89% 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. 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 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.

ODA 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.

C. 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 Natural Resources Conservation Service (NRCS) Field Office Technical Guide contains extensive lists of management practices. The NRCS office is in Hood River. The Hood River SWCD, Mid-Columbia Agricultural Research and Extension Center staff, and Oregon Department of Fish and Wildlife biologists can also recommend practices.

The following Recommended Management Practices (Table 3) 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 3. Some Recommended Management Practices for the Hood River Agricultural Water Quality 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.) • 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 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 & 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 & 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, 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 soil erosion Reduce and capture runoff Reduce potential pollutants in runoff

	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 6 inches tall, move when grass is 3 inches tall. Thirty days are needed for irrigated pasture regrowth, and up to 3 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 Department of State Lands 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	Minimize air drift of pesticides Reduce runoff and pesticides in runoff Minimize leaching to groundwater Minimize chances for spills to enter streams

	in areas where runoff to streams and ditches cannot occur; and use anti-foaming additives • 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

D. Area Rules

The Area Rules are enforceable by ODA and are cited here for the reader's information. The Area Plan is not enforceable. The Area Plan and Rules complement each other. The Area Plan provides an overall proactive strategy for meeting the Area Plan's water quality objectives and for complying with the Area Rules.

All landowners conducting agricultural activities on non-federal and non-Tribal Trust lands (including timber lands) must comply with the Area Rules (OAR 603-095-1100 through 603-095-1160). "Landowner" includes any landowner, land occupier or operator (OAR 603-095-0010(24)). The landowner's responsibility is to implement measures that ensure compliance with the Area Rules. Sanctions can come into effect from ODA if a landowner is out of compliance with the Area Rules.

Activities governed by the Forest Practices Act are outside the jurisdiction of this Area Plan. Pesticide use is governed by the Pesticide Control Act (ORS 634); those laws are administered by the ODA Pesticides Division.

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.

Area Rules 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.

ODA determines when streambank vegetation is sufficient to control water pollution. The Total Maximum Daily Load (TMDL) developed by DEQ[1] helps guide this determination.

The Waste Management Rule is State Law (ORS 468B). ORS 468B.025 states that no person shall:

(1) (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) Violate the conditions of any waste discharge permit issued under ORS 468B or ORS 568.

ORS 468B.050 refers to situations when permits are required, such as for certain confined animal feeding operations.

Definitions:

Wastes include manure, commercial fertilizers, soil amendments, composts, vegetative materials, or any other substances that will or may cause water pollution (OAR 603-095-0010(53)). Therefore, 'wastes' also include sediment.

Waste discharge means the discharge of waste, either directly or indirectly, into waters of the state (OAR 603-095-0010(54)).

Water pollution means such alteration of the physical, chemical or biological properties of any waters of the state, including change in temperature, taste, color, turbidity, silt or odor of the waters, or such discharge of any liquid, gaseous, solid, radioactive or other substance into any waters of the state, which will or tends to, either by itself or in connection with any other substance, create a public nuisance or which will or tends to render such waters harmful, detrimental or injurious to public health, safety or welfare, or to domestic, commercial, industrial, agricultural, recreational or other legitimate beneficial uses or to livestock, wildlife, fish or other aquatic life or the habitat thereof (ORS 468B.005(7)).

Waters of the State include lakes, bays, ponds, impounding reservoirs, springs, wells, rivers, streams, creeks, marshes, inlets, canals, and all other bodies of surface or underground waters, natural or artificial, public or private (except those private waters which do not connect to natural surface or underground waters) within Oregon (from ORS 468B.005(8)).

5: STRATEGIES TO ACHIEVE GOALS & OBJECTIVES

Voluntary Approach

To the greatest degree possible, prevention and control of agricultural pollution is encouraged in a cooperative spirit through the voluntary efforts of landowners, aided by information and technical and financial assistance from local, state, and federal agencies, and others.

Education is the key to the success of this Area Plan. The Hood River SWCD, NRCS, ODA, Mid-Columbia Agricultural Research and Extension Center, and Columbia Gorge Fruit Growers work together to provide agricultural landowners in the Management Area with information about the goals, objectives, and requirements of the Area Rules.

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.

2. Create a high level of awareness and an understanding of water quality issues among the agricultural community and rural public, in a manner that minimizes conflict and encourages cooperative efforts, through education and technical assistance.
    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. Promote cooperative on-the-ground projects in cooperation with partner organizations to solve critical problems identified by landowners and land managers.

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

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

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

    f. Proactively offer and provide site evaluations on any lands within the Management Area to assess conditions that may affect water quality.

g. Prioritize subwatersheds within the Management Area for targeting implementation strategies.

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

   For example, the 2002 Hood River Watershed Action Plan was updated in 2008 through a cooperative process with a wide variety of stakeholders. It incorporated subwatershed priorities developed in the 2006 Hood River Basin Aquatic Habitat Restoration Strategy. One major emphasis is conserving water and improving water quality through piping of irrigation district delivery systems and improvements to on-farm irrigation systems. Funding for projects ranging from $5,000 to $10,000,000 has been received from Bonneville Power Administration, Bureau of Reclamation, Environmental Protection Agency, Oregon Watershed Enhancement Board, Confederated Tribes of the Warm Springs Reservation, and others.

Regulatory Measures

In addition to the voluntary strategies, Area Rules (OAR 603-095-1100 through 603-095-1160) are included as an implementation strategy. ODA uses enforcement where appropriate and necessary to gain compliance with the Area Rules. Any enforcement action is pursued only when reasonable attempts at a voluntary solution have failed. The following Area Rules 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.

6: MONITORING AND EVALUATION

Every two years, ODA and the Hood River SWCD, in conjunction with the LAC:

1. Characterize existing water quality and land conditions
2. Track Area Plan implementation and compliance with the Area Rules
3. Evaluate Area Plan progress in improving water quality and land conditions

Representatives of the Confederated Tribes of the Warm Springs Reservation, Columbia Gorge Fruit Growers, Hood River Watershed Group, PacifiCorp, irrigation districts, DEQ, and other state and federal agencies currently monitor various water quality parameters in the Management Area. ODA is responsible for monitoring land conditions that influence water quality in agricultural areas. The LAC, ODA, and the Hood River SWCD will evaluate the effectiveness of the Area Plan in improving water quality and land conditions.

Parameters likely to be monitored by local partners include stream temperature, bacteria, turbidity, pesticides and nutrients. ODA is monitoring riparian conditions by assessing streamside vegetation from aerial photographs every 5 years. The first flight was in 2004. ODA compiles the data and provides it to the LAC for review.

The Oregon Plan for Salmon and Watersheds' Water Quality Monitoring Technical Guide Book (July 1999) is the preferred reference manual for monitoring; however, other water quality monitoring protocols also are available.

Area Plan Implementation

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 ODA that outlines its responsibilities for providing and tracking educational outreach, technical, and financial assistance.

The Hood River SWCD:

- identifies potential sources of nutrients, pesticides, temperature increases, and other potential threats to all applicable water quality standards by consulting with local, state, and federal natural resource agencies.
- participates in developing and evaluating outreach and education programs designed to increase public awareness and understanding of water quality issues.
- conducts projects, demonstrations, and tours to promote successful management practices and systems.
- compiles water quality and land condition data and incorporates it into the revised Area Plan.
- evaluates the adequacy of technical and financial assistance sources available to the agricultural community to implement recommended management practices, monitoring and education.

Area Plan Progress

The Hood River SWCD and ODA are responsible for determining whether Area Plan goal and objectives are being met. Progress and success of implementation efforts will be assessed through compliance with the Area Rules and State standards and the measurement of water quality improvement over time.

7: ROLES AND RESPONSIBILITIES

Area Plan Development

ODA is the Designated Management Agency for controlling pollution from agricultural activities on agricultural, rural, and forestry lands in the Management Area. ODA is authorized to develop and carry out a water quality management plan for any agricultural or rural lands, where a water quality management plan is required by state or federal law.

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 Director of ODA appointed the Hood River Local Advisory Committee (LAC) representing local agricultural producers, local landowners, the Indian tribes, local agencies, and the Hood River SWCD to help develop and implement this Area Plan and Rules. The LAC reconvenes biennially to review the Area Plan and Rules and amend them as necessary.

The public is encouraged to participate in the Area Plan development process. All LAC meetings are open to the public, announced in the Hood River News, and follow Oregon's Public Meeting Laws. Future amendments to the Rules will have public comment periods.

Area Plan Implementation

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

As resources allow, Hood River SWCD, Natural Resources Conservation Service, ODA, licensed pesticide applicators, and Mid-Columbia Agricultural Research and Extension Center staff are available to assist landowners in evaluating effective practices for water conservation, appropriate pesticide usage, and reducing runoff. Personnel in these offices can also design and assist with implementation of practices, and assist in identifying any 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.

ODA 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.

Any actions related to determination of noncompliance with the Area Rules or enforcement are taken up directly by ODA, as outlined in OAR 603-090.

Water quality monitoring is coordinated by representatives of the LAC, ODA, Hood River SWCD, Columbia Gorge Fruit Growers, Hood River Watershed Group, Mid-Columbia Agricultural Research and Extension Center, DEQ, and other state and federal agencies. Monitoring of land conditions is the responsibility of ODA. Area Plan success is evaluated by the LAC, ODA, and the Hood River SWCD.

8: DISCUSSION OF 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 conduct the following:

- Educational programs (production and presentation)
- Identification of high priority areas for implementation
- Ongoing evaluation of Area Plan progress toward achieving water quality goals
- Coordinated planning and implementation activities with other agencies, organizations, and individuals working on similar goals
- Watershed assessments
- Water quality monitoring
- Meeting management and facilitation
- 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 (EQIP) and Conservation Stewardship Program (CSP), the Environmental Protection Agency's nonpoint source implementation grants, or state programs such as Oregon Watershed Enhancement Board (OWEB) and Conservation Reserve Enhancement Program (CREP). Other agencies may also be available to provide technical assistance or financial assistance to private landowners.

CITED SOURCES

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