MIDDLE DESCHUTES AGRICULTURAL WATER QUALITY MANAGEMENT AREA PLAN

3rd Biennial Revision

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Developed by the

MIDDLE DESCHUTES LOCAL ADVISORY COMMITTEE

with assistance from

OREGON DEPARTMENT OF AGRICULTURE
and
JEFFERSON COUNTY SOIL AND WATER CONSERVATION DISTRICT

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Table of Contents

ACRONYMS and ABBREVIATIONS

Area Plan - Middle Deschutes Agricultural Water Quality Management Area Plan

Area Rules - Oregon Administrative Rules 603-095-1600 through 603-095-1660

BLM - Bureau of Land Management

CREP - Conservation Reserve Enhancement Program

CRP - Conservation Reserve Program

DEQ - Oregon Department of Environmental Quality

LAC - Middle Deschutes Local Advisory Committee

Management Area - Middle Deschutes Agricultural Water Quality Management Area

NRCS - USDA Natural Resources Conservation Service

NUID - North Unit Irrigation District

OAR - Oregon Administrative Rules

ODA - Oregon Department of Agriculture

ORS - Oregon Revised Statutes

SWCD - Soil and Water Conservation District

TMDL - Total Maximum Daily Load

USDA - United States Department of Agriculture

FOREWORD

This Middle Deschutes Agricultural Water Quality Management Area Plan (Area Plan) provides guidance for addressing agricultural water quality issues in the Middle Deschutes 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 exercises its enforcement authority for the prevention and control of water pollution from agricultural activities under Oregon Administrative Rules (OAR) for the Middle Deschutes Management Area (603-095-1600 through 603-095-1660) and state-wide enforcement procedures provided in Oregon Administrative Rules 603-090-0060 through 603-090-0120.

APPLICABILITY

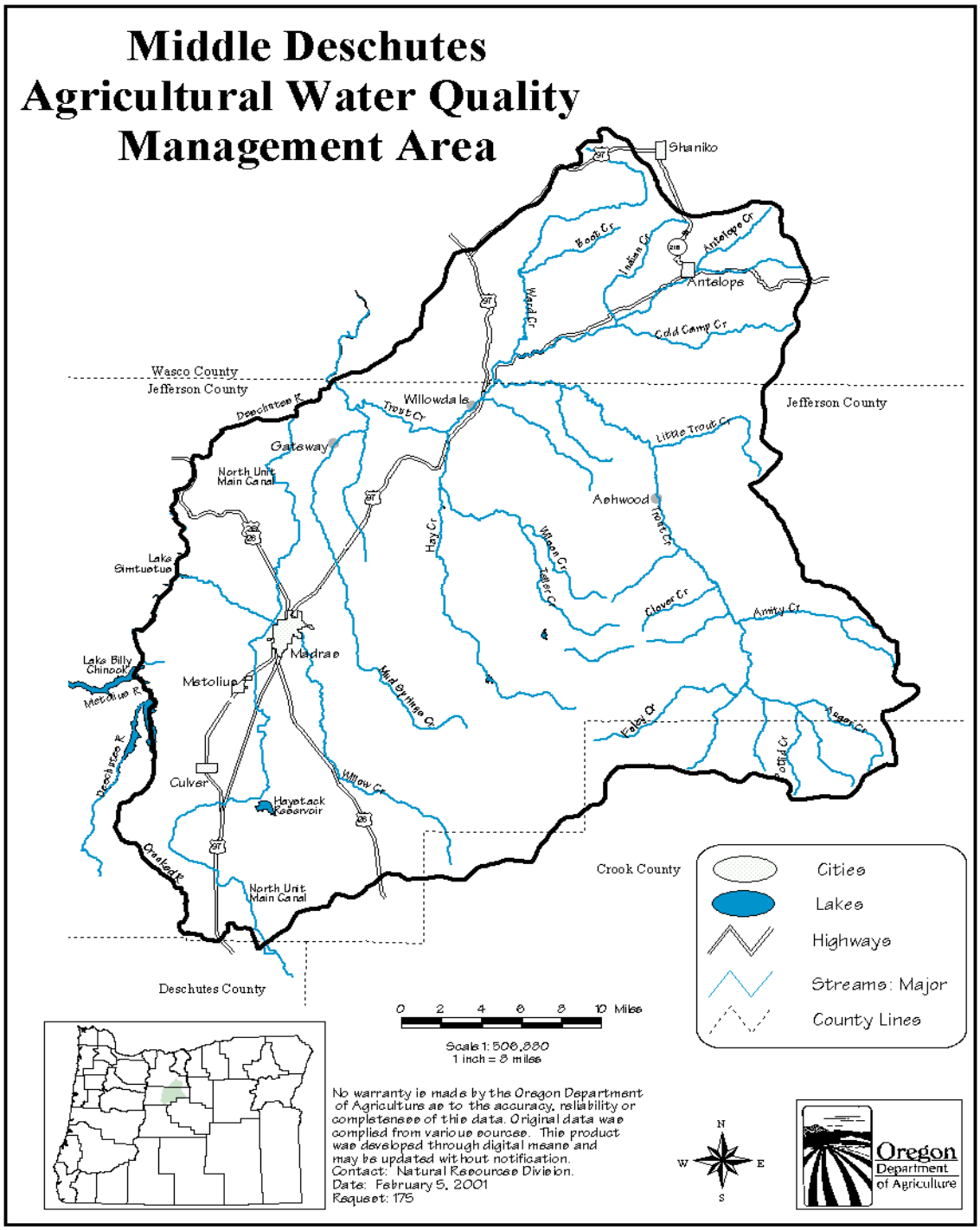
This Area Plan applies to agricultural activities on all non-Federal and non-Tribal Trust agricultural, rural, and forestry lands within the Middle Deschutes Agricultural Water Quality Management Area. The Area Plan also applies to agricultural lands in current use, those lying idle or on which management 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 the ODA Pesticides Division.

ENDANGERED SPECIES ACT LIABILITY

Compliance with the water pollution abatement measures contained in the Area Plan and Rules may not be adequate to protect a landowner from "take" under the Federal Endangered Species Act.

MAP - MANAGEMENT AREA



INTRODUCTION

This *Middle Deschutes Agricultural Water Quality Management Area Plan* addresses water quality concerns (sediment, nutrient, bacteria, toxics, temperature, dissolved oxygen, habitat, and flow) related to agricultural activities on non-Federal and non-Tribal Trust lands in the Middle Deschutes Agricultural Water Quality Management Area. Most of these issues were included by Oregon's Department of Environmental Quality (DEQ) on its DRAFT 2004 303(d) list, which identifies 'water-quality limited' streams as required by the Federal Clean Water Act.

The Oregon Agricultural Water Quality Act, passed as Senate Bill 1010 in 1993 and codified at ORS 568.900-568.933, together with Oregon Administrative Rules (OAR) Chapter 603 Division 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 included the formation of a Local Advisory Committee (LAC) 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 October 1998, the Middle Deschutes Local Advisory committee was convened by ODA. It has been assisted by the Jefferson County Soil and Water Conservation District (SWCD). LAC members represent the interests of local landowners, producer groups, irrigation districts, private timberlands, watershed councils, biologists, and the Jefferson County SWCD. Members are:

Roy Hyder, **Chair**: Madras, landowner Lowell Forman, **Vice Chair**: Antelope, ranching Lori Campbell: Portland General Electric, fish biologist Gary Dinkel: Culver, row crops Lloyd Forman: Antelope, livestock and hay Mickey Killingsworth: Madras, sheep	Brad Klann: Madras, row crops John Morgan: headwaters, Ochoco Lumber Terry Rohde: Gateway, livestock and hay Chuck Schonneker: North Unit Irrigation District Evan Thomas: Culver, row crops Bryce Vibbert: Gateway, row crops

The LAC receives additional technical support from the US Department of Agriculture (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; Oregon State University Cooperative Extension Service; Central Oregon Agricultural Research Center; and others.

The goal of this Area Plan is to prevent and control water pollution from agricultural activities through voluntary activities by 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 protect water quality.

1: MISSION, GOALS, AND OBJECTIVES

LAC MISSION

Refine an Agricultural Water Quality Management Area Plan for the Middle Deschutes that prevents and controls water pollution from agricultural activities to help achieve water quality standards that protect beneficial uses.

GOAL

Promote cost-effective agricultural activities that improve and protect water quality.

The LAC recognizes that certain water quality improvement projects may be prohibitively expensive for many landowners. In some cases, it is reasonable to expect that the expense may be disproportionate towards the overall benefits to water quality. In either case, the LAC recognizes that the landowner would be accountable for the improvement of water quality within the constraints of economic feasibility. The LAC expects that funding will be available from private and public sources to assist landowners with implementing projects.

OBJECTIVES

Educational outreach is a key strategy for achieving Area Plan objectives.

1. Minimize agriculture's contribution to the following water quality concerns, while acknowledging that these parameters are present at some natural level:
    - Sediment: keep soil on the land and out of streams (minimize soil erosion and amount of soil-laden runoff; maintain adequate riparian and upland vegetation)
    - Nutrients: keep nutrients on site and out of streams (apply at appropriate rates; minimize amount of nutrient-laden runoff and percolation to groundwater)
    - Toxics: keep pesticides and municipal sludge on site and out of streams (apply pesticides and municipal sludge at appropriate rates; prevent runoff)
    - Temperature: maintain adequate riparian vegetation based on site capability, and enhance channel morphology
    - Bacteria: keep livestock waste and municipal sludge on the land and out of streams
    - Dissolved oxygen: reduce agriculture's contribution to high temperatures, low flows, high nutrients, organic carbon and sediment
    - Habitat modification: maintain adequate riparian and upland vegetation; enhance channel morphology; minimize impacts of irrigation diversions
    - Flow modification: encourage efficient irrigation; improve the ability of uplands to capture, store, and beneficially release water

2. The LAC, Jefferson County SWCD, and ODA:
    - Develop strategies to provide landowners with information and technical and financial assistance
    - Work with others to develop and participate in a long-term monitoring plan that:
        - characterizes baseline conditions
        - tracks Area Plan implementation
        - evaluates Area Plan effectiveness (improvements in water quality and land conditions)
        - identifies priority areas
        - identifies 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

2: MANAGEMENT AREA

GEOGRAPHIC AREA and PHYSICAL SETTING

Location

The Middle Deschutes Agricultural Water Quality Management Area encompasses just over 1000 square miles in central Oregon and includes the towns of Madras, Culver, Metolius, Antelope, and Ashwood (see map). The Management Area includes most of the eastern half of Jefferson County and portions of Wasco and Crook Counties. Elevation above sea level ranges from 1250 to 5940 feet and averages 2400 feet around Madras. Typical summers are dry and hot (temperatures up to 100°F), and winters tend to be wet and cold (temperatures down to -10°F)[1]. Summer maximum temperatures average 87°F (July and August); winter minimum temperatures average 33°F (December-January) [2]. Extreme temperatures in the last 40 years are 106°F and -31°F. Average annual precipitation ranges from 9 to 25 inches[1]. Almost all the precipitation falls between November and April, and in the highest elevations more than half of it falls as snow.

The Management Area includes the Trout Creek and Willow Creek drainages, the area along the eastern side of the Deschutes River between Trout Creek and Crooked River, and the area east of Crooked River between its confluence with the Deschutes River to the north and Sherwood Canyon to the south. This includes the entire North Unit Irrigation District (NUID), which provides water to 58,860 acres from Gateway (mouth of Trout Creek) to Trail Crossing (Smith Rock). These NUID irrigated lands drain primarily into the Crooked River, Deschutes River, Mud Springs Creek, and Willow Creek.

Principal water bodies include:

- Trout Creek
- Willow Creek
- Deschutes River from confluence with Trout Creek upstream to confluence with the Crooked River (approx. 25 miles)
- Crooked River from mouth to just north of Smith Rock (approx. 21 1/2 miles)

Soils and Geology

The Management Area constitutes the far western corner of the John Day Ecological Province[1]. This rugged province is characterized by extensive, geologically eroded, steeply dissected hills of thick, ancient sedimentary materials interspersed with buttes and plateaus capped with basalt or tuffaceous rock. The area around Madras also includes flat to slightly rolling farmlands.

During the last 60 million years, Central Oregon has experienced major episodes of volcanic activity interspersed by periods of sedimentation[1]. In the Trout Creek watershed, soils on the north and east facing slopes consist mostly of volcanic ash and loess over or mixed with colluvium of fine to medium textured volcanic ash. The rock content in the soil profile is high. Productivity varies greatly between shallow and deep soils. Plateau tops, upper south-facing slopes, and ridgetops have very shallow soils and have lower productivity. Lower slopes and drainages, sideslopes and swales offer better vegetative growth and regeneration potential. The ash soils in this area potentially can produce large amounts of sediment from accelerated runoff when exposed, compacted, or channeled.

Most soils used for irrigated crops, hay, and pasture are in the *Madras-Agency-Cullius Association.* This consists of moderately deep, well-drained soils on upland terraces and plateaus[3]. Slopes range from 0 to 15%. These soils formed in medium-textured windblown deposits, and are underlain by gravels and basalt of the Deschutes Formation. The soils are fine-loamy, and depth to basalt or tuff bedrock is 10 to 40 inches. Wind erosion is a concern if the

soils are left unprotected. Sediment from runoff due to over-irrigation or storm events may be moderate to high on slopes greater than 10 percent. *Era* soils are sandy loam with a cobbly substratum, 0-3% slopes, and with a depth of over 60 inches to bedrock. They are well-drained and occur on mountains. Water erosion is a potential hazard.

The *Caphealy-Reute*r complex occurs in rolling hills and supports rangeland, dryland grain, and pasture[3]. *Caphealy* consists of loamy well-drained soils and has a depth of 20-40 inches to bedrock. *Reuter* soil is 10-20 inches to bedrock and is loamy and well-drained. This association is limited by slope, wind erosion, and low available water capacity. Wind erosion is a concern if the soils are left unprotected. The soils are very sensitive to overgrazing and recovery rates can be slow. The very low available water capacity and the shallow depth of the Reuter soil limit the choice of species for range seeding to those that are drought-tolerant. The very low available water capacity and moderately rapid permeability should be considered in irrigation water management. Sediment from runoff due to over irrigation or storm events may be moderate to high on slopes greater than 10 percent.

Willowdale-Rail soils are used for irrigated hay and pastureland[3]. Slopes range from 0 to 2 percent. Soils are 40 to 60 inches deep. Willowdale soils are well-drained, Rail soils are not. This association is limited by high water table and prone to flooding. Shallow excavations are limited due to water table. Runoff is slow and hazard from erosion is slight. Streambank erosion is high when flooding events occur or when riparian or vegetation condition is poor.

Vegetation

Three general vegetation types occur in the Management Area[4]. The upper Trout and Willow Creek watersheds near the Jefferson/Crook County line consist of coniferous forest dominated by ponderosa pine, Douglas fir, or grand fir. Middle elevations consist primarily of juniper savanna interspersed with treeless grassland (now mostly converted to dryland cropping in the Wasco County portion of the Management Area). Irrigated croplands cover the lower elevation areas, known locally as Mud Springs, Gateway, Little Agency Plains, Agency Plains, Culver, Henderson Flat, and Trail Crossing. Irrigated crops include: grass seed, alfalfa, seed potatoes, carrot seed, grains, flower seed, hay, nursery crops, herbs, mint, sugarbeets, onion seed, and garlic. Non-irrigated crops include hay, small grains, pasture, and perennial vegetation planted under the Conservation Reserve Program (CRP).

Juniper density has increased dramatically over the past 90 years[4]. The increase in juniper has reduced the uplands' ability to collect and store precipitation[5,6]. The potential for recovering rangeland vegetative cover exists if practical ways can be found to control soil erosion and plants such as juniper[1].

Noxious weeds include yellow starthistle; Scotch and Canada thistle; Dalmatian toadflax; spotted, diffuse, and Russian knapweed; whitetop; kochia; and teasel[4]. Weeds can affect water quality by providing inadequate soil cover and root mass, which can induce upland and streambank erosion[7].

HYDROLOGY

The Management Area incorporates two distinct drainages (Trout and Willow Creeks) and the area irrigated by the NUID.

Trout Creek[4]
Trout Creek drains approximately 700 square miles. Its headwaters are in the Ochoco National Forest in the Ochoco Mountains. These headwaters are forested; however most of the watershed consists of juniper/sagebrush rolling hills. Mud Springs Creek drains irrigated croplands.

Seasonal precipitation patterns result in flows in Trout Creek that peak in winter and early spring and rapidly diminish to low flows in summer. The NRCS estimates that current peak flows in some stream segments are two to three times greater than under presettlement conditions (Trout Creek Assessment, pages 8 &12). Changes in vegetative cover appear to be most responsible for this increase in flow volume.

Annual flows of Trout Creek at Ashwood between 1966 and 1991 average 26.3 cfs. Annual means during this period range from 1.0 (1977) to 62.9 cfs(1982). The highest daily mean measures was 1,510 cfs (February 23, 1986).

Willow Creek[8]
Willow Creek drains approximately 180 square miles and flows from the Crook/Jefferson County line northwest through Madras to the Deschutes River. It drains the northwestern portion of the Ochoco Mountains and flows through several miles of the Crooked River National Grasslands.

Willow Creek is typical of the high desert region. High flows occur during winter in unusually wet periods or when rain falls on snow, which melts the existing snow and sends large quantities of water down the drainage. In the summer, the remaining small flows are typically diverted for irrigation of hay fields and pasture throughout the drainage. An unusual occurrence of groundwater springs discharge in the lower 1.5 miles of Willow Creek, which increases the flow substantially at the mouth above what flows through the town of Madras. Temperature measurements on these springs ranged from 54°F to 70°F, and a flow measurement on a collection of seven springs yielded 1.25 cfs.

Streamflow above the town of Grizzly between October 1967 and December 1978 averaged 1.51 cfs, with long periods of no flow. The flow peaked at 52 cfs on April 26, 1978. Most of the flow occurred during the months of February, March, April, and May.

1964 Flood[4]
A large accumulation of snow, over frozen ground in some areas, followed by rapid warming and heavy rains caused widespread flooding through eastern Oregon in December 1964. Trout Creek completely inundated the Willowdale valley and dropped the streambed over 10 feet in places due to headcutting and channel widening. Many of these cut banks are still visible today. Major channelization by the Army Corps of Engineers followed the 1964 flood and the resultant berms have interfered with stream function by disconnecting streams from their floodplain. A project spearheaded by the Jefferson SWCD is underway to modify the berms on a site-specific basis within the next few years to improve stream channel morphology. This project has received positive attention throughout the Northwest.

North Unit Irrigation District (NUID)[9,10]
The NUID supplies water to 92 square miles (58,860 acres) of irrigable farmland that stretch from Gateway (mouth of Trout Creek) throughout the Agency Plains, Madras, and Culver areas, around Juniper Butte, and to Trail Crossing (just northwest of Smith Rock). Water is obtained from Wickiup Reservoir south of Bend, with supplemental water pumped from the Crooked River. Haystack Reservoir, east of Culver, provides off-stream storage and serves as a re-regulating reservoir; it was constructed to drastically reduce seasonal canal transmissions and spill losses. There was a 3-day lag time between "turnout" from Wickiup Reservoir and "on-farm delivery". Haystack Reservoir reduced this time lag considerably. Substantial seepage

losses occur between Bend and Crooked River crossing. As a result, NUID has adjusted their operation, management, and on-farm delivery over many years to match water availability. In 1997, NUID lined 11.5 miles of the Main Canal between Bend and Redmond, thereby reducing seepage losses and increasing on-farm deliveries. NUID is also quite active in piping laterals to improve operations and reduce seepage.

The NUID system consists of 65 miles of main canal and 235 miles of laterals. No on-farm tailwater is returned to the main canal or the laterals. The distribution system has an average conveyance efficiency of approximately 52%. Flow is intensively measured throughout the system. All water at the main diversion points from the Deschutes River and Crooked River, all laterals receiving water from main canals, and all points of delivery (on-farm) are accurately measured.

Average annual available deliveries usually do not exceed 2.25 acre-feet per acre. This delivery is inadequate to fully meet all crop water needs for all the irrigated farmland. Frequently, it is necessary for agricultural operators to direct water to high-value crops, sometimes leaving inadequate water for full growth of lower value crops.

Estimated on-farm irrigation efficiency is 60-65%, with a low of approximately 50% on flood irrigated land to a high of 80% on late-model center pivot systems. There is also a trend toward installation of micro or drip irrigation systems on high value crops.

Landowners are delivered water out of the canals, pump out of drain ditches, or combine water from both sources in a pond and then pump out of that; drainage water is reused up to 5-6 times on land that is flood irrigated. There is little to no runoff from sprinkler-irrigated lands. NUID has three emergency spills (at the Crooked River, Juniper Butte, and Willow Creek) that are rarely used and three regular drains (at Culver, Campbell Creek, and Mud Springs Creek). Most water in the Culver and Campbell Creek drains is used up by landowners at the "end of the line" before the water can exit the natural drainage ways into the Deschutes River.

Water Rights[4,8]

The earliest priority date for Antelope and Trout Creeks is 1870. Most of the water rights of Trout Creek and its tributaries are dated prior to 1909. The earliest groundwater right on Trout Creek has a priority date of 1953. Most of the groundwater rights were developed in the 1960s and 1970s.

Water withdrawals are allowed year-round from Trout Creek. In 1980, the Oregon Water Resources Commission withdrew all unappropriated waters of Trout Creek and its tributaries, except for Mud Springs Creek, to protect fish spawning. This withdrawal still allows human and livestock consumption, and allows waters to be legally stored and released from storage.

The oldest water right on Willow Creek dates back to 1875 for the irrigation of 25 acres from the North Side Ditch. The primary use of water on Willow creek is for irrigation. There is an instream water right with a 1990 date for Willow Creek for the reach from Coon Creek to the mouth.

LAND USE

Historical[4]

Before the treaty of 1855 with the Tribes of Middle Oregon (now the Confederated Tribes of the Warm Springs Reservation), native peoples frequented the area for seasonal fishing, hunting, and subsistence food gathering.

Hay Creek saw the first permanent white settlement in Central Oregon. During the 1860s and early 1870s, stockmen settled the area, and water from Trout Creek was first used for cropping in 1877. Logging of the forested headwaters of Trout and Willow Creek began around this time.

Current

The Management Area is characterized by rural land ownership. Less than 20% percent of the lands are in Federal ownership, managed by the US Forest Service and the Bureau of Land Management (BLM). The Ochoco National Forest includes the headwaters of Trout Creek; the Crooked River National Grasslands (managed by the Forest Service) include juniper/sage lands around Madras. BLM lands primarily line the Deschutes River and include the ridge between Antelope and Ward Creeks. Forest Service and BLM lands have grazing leases.

Most of the range and forest lands are used for beef cattle production[4]. The beef industry is made up primarily of cow/calf operations with most calves being sold in late fall or early winter. A small number of yearlings are purchased from the outside area and grazed in the watershed.

Trout Creek has little cropping, consisting primarily of non-irrigated small-grain/fallow, with other dryland cropping systems including grass or grass/alfalfa in rotation with grains[4]. Some fields adjacent to streams are flood-irrigated from diversions; others have been enrolled in CRP, which keeps lands under perennial vegetation.

Gentle upland slopes in the north central Trout Creek watershed have been converted from native vegetation to dry farming[4]. Also, some larger bottoms or low terraces along major streams are now irrigated fields. Rangeland throughout the watershed is generally in fair condition. However, most highly accessible low-elevation range near water is in poor condition, while steeper rangeland or more remote areas are still in good condition. Riparian areas have been altered by grazing from livestock and big game animals, logging, and fire suppression. Increased runoff peaks have overloaded and exceeded the capacity of the natural flood plains in some places. Consequently many streambanks and most riparian areas are in low ecological condition.

The Willow Creek watershed is approximately 10% forested, 65% rangeland, and 25% cropped. Seventy percent of the cropland is irrigated[8]. Irrigated crops include: grass seed, alfalfa, seed potatoes, carrot seed, grains, flower seed, hay, nursery crops, herbs, mint, sugarbeets, onion seed, and garlic. Non-irrigated crops include hay, small grains, CRP, and pasture. Sixty five percent of the irrigated land is watered by sprinkler and 35% by flood. Sixty percent of the cropland (15,000 acres) is classified as Highly Erodible Land.

Most of Willow Creek's 85,000 acres of grazed forestland and rangeland have poor livestock distribution[8]. Approximately 10% of the rangeland is overstocked with juniper. Juniper numbers have increased dramatically on many areas of historically open juniper/ grassland savanna.

Landowners voluntarily have undertaken many projects to improve the watershed health of Trout and Willow Creeks. These include juniper cutting, spring improvements, riparian plantings, streambank stabilization, riparian fencing, conversion from flood to sprinkler irrigation; installation of instream structures for fish habitat, infiltration galleries, and sediment control basins; and changes in irrigation and livestock management. Two watershed councils (Trout Creek and Willow Creek), meet regularly to assess the condition of natural resources and to implement on-the-ground projects. They are assisted by the Jefferson County SWCD.

3: 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 for the Management Area designated by the State of Oregon include drinking water, irrigation, livestock watering, aquatic life, recreation, and aesthetics (OAR 340-41-0130). Of these, 'salmonid fish rearing and spawning' and 'human contact recreation' are the most sensitive uses.

MOST SENSITIVE BENEFICIAL USE: SALMONIDS[11]

Steelhead and bull trout in this area are listed as Threatened under the Federal Endangered Species Act.

Location

1. The Deschutes River from Trout Creek to the Reregulation Dam (River Mile 87 to 101) has several fish species, which are present year-round: fall chinook, summer steelhead, bull trout, and resident rainbow "redband" trout. All species with the exception of bull trout spawn and rear year-round in this section.

2. Trout Creek has summer steelhead and resident redband. These species are present in the system all year. Both steelhead and redband spawn and rear in Trout Creek.

3. Willow Creek has resident redband that are present all year. Redband spawn and rear in certain upper and lower reaches. There is seasonal use in areas around the City of Madras.

4. Lake Billy Chinook and Lake Simtustus have bull trout, redband trout, and kokanee. These three species all rear in the lake, and various age groups are present all year.

5. The Crooked River has resident redband, which spawn and rear and are present year round.

Habitat Requirements

Steelhead spawn during March to May in areas with good gravel, usually downstream of pools. From fertilization to when the fry swim up from the gravel takes about 60 days. The fry rear in the stream for one to three years and on average smolt in the second year. In the spring, fry begin to smolt and begin their migration to the ocean between March and June. After one to three years in salt water the adults begin their return to their natal stream to repeat the cycle.

Redband trout exhibit similar characteristics to steelhead except they don't migrate to saltwater. Adult redband in headwater reaches and in small tributaries can be as small as five inches.

Steelhead and redbands require cool water with varied habitat that includes diversity within pools and riffles aided by overhanging banks and vegetation, boulders, root wads, and large woody debris.

Kokanee salmon rear and mature in Lake Billy Chinook. These fish feed on zooplankton in deep areas of the lake. Most kokanee spawn in the Metolius River system, with a few spawners in the Deschutes River above Lake Billy Chinook.

Bull trout rear and mature in both the lakes and in the Deschutes River. They are fish-eaters and need cold water. Diverse habitat provides cover and ambush areas to feed from. The eggs for this species generally need water colder than 50°F.

WATER QUALITY PARAMETERS OF CONCERN

Table 1. Location and seasonality of exceedances of Oregon's Water Quality Criteria in the Middle Deschutes Area, from DEQ's 2004/2006 303(d) list[12]. Current information on the 303(d) list can be found at: *http://www.deq.state.or.us/wq/assessment/rpt0406/search.asp.*

Stream Segment	Water Quality Parameters				
	Sediment	Temperature	pH	Dissolved Oxygen	Chlorophyll *a*
Trout Creek	X	Year-Around (non-spawning)			
Trout Creek tributaries: Auger, Big Log, Bull, Cartwright, Dick, Dutchman, & Potlid	X	Summer (rearing) and Year-Around (non-spawning)			
Trout Creek tributary: Tenmile Creeks		Summer (rearing),; Oct. 1 – June 30 (spawning)			
Willow Creek		Year-Around (non-spawning)			
Deschutes River (Lake Simtustus and Lake Billy Chinook)			summer		summer
Deschutes River (below Reregulation Dam)		X		X	
Crooked River		Summer (rearing)	Year-round		

The 303(d)-listed parameters indicate problems for fish.

- Sediment fills in the gravels needed for salmonid spawning and clouds up water, thereby reducing aquatic productivity.
- Lethal temperatures for adult salmonids vary according to a variety of factors, but generally are 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 is closely associated with stream temperatures. Juvenile rearing and growth may be impaired by temperatures greater than 64°F. Optimal water temperature for juvenile bull trout is less than 50°F. Figures 130A and B referred to in OAR 340-041-0028(4) indicate which temperature criteria are applied to streams in the Management Area and can be accessed at *http://www.deq.state.or.us/WQ/rules/div041tblsfigs.htm#f1*

  Regardless, Oregon's temperature standard states that "for farming and ranching operations on State or private lands, water quality standards are intended to be attained and are implemented through the Agricultural Water Quality Management Act (ORS 568.900 to 568.933) and rules thereunder, administered by the Oregon Department of Agriculture. Therefore, farming and ranching operations that are in compliance with the Agricultural Water Quality Management Act requirements will not be subject to DEQ enforcement under this rule."

- High pH and low dissolved oxygen generally result from excessive plant growth (chlorophyll *a*), which is stimulated by high nutrient concentrations in the water and warm water temperatures. When plants die, they drop to the stream bottom and are broken down by bacteria, which use up oxygen in the process. The breakdown of aquatic plants can use up large amounts of the oxygen needed by other aquatic life for survival.

Three additional water quality concerns are not on the 2004/2006 303(d) list:

- 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. *E. coli* are also indicators of other pathogens.
- Habitat modification refers primarily to riparian areas that have been so modified that they no longer provide sufficient habitat to sustain aquatic life. Examples include: denuded streambanks, lack of large woody debris, and insufficient pools and riffles.
- Flow modification refers to reduced streamflows. Reduced streamflows can result in warmer water temperatures. Slower flows can also lead to lower concentrations of dissolved oxygen because the slow-moving water does not pick up oxygen as readily from the air.

POTENTIAL CONTRIBUTORS TO WATER POLLUTION

Potential contributors to pollution in the Management Area include runoff and erosion from agricultural and forest lands, leaching of pollutants to groundwater, eroding streambanks, runoff from roads and urban areas, and waste discharges from pipes. Rerouting of runoff via road building, construction, and land surfacing such as parking areas can lead to excessive erosion or pollutant transport. Pollutants can 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 major 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 stream temperature.

Land conditions associated with the following agricultural activities were identified by the LAC as potential contributors to water quality concerns through their effects on streambank stability, soil erosion, vegetation on uplands and along streams, and the amount and content of runoff:

1. Use of streambanks and uplands
2. Livestock grazing and areas of concentrated livestock
3. Irrigation water use and drainage
4. Application and storage of crop nutrients and farm chemicals

The following non-agricultural sources likely contribute to water quality issues in the Management Area: City of Madras, urban and suburban developments, sewage treatment plants, municipal sludge spread on fields, off-road vehicles, railroad beds, hydroelectric dams on the Crooked and Deschutes Rivers, activities on federal lands, and high concentrations of deer, elk, antelope, and feral swine. In addition, the Deschutes and Crooked Rivers drain huge areas upstream of the Management Area, so the Deschutes and Crooked Rivers will show cumulative effects from upstream sources.

4: MANAGEMENT MEASURES and their INTENT

INTRODUCTION

Water quality is maintained or enhanced through a combination of landowner education and implementation of appropriate Management Measures. Management Measures include both Voluntary Management Practices (Section 5) and the Mandatory Area Rules (cited in Section 6).

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 Jefferson and Wasco County SWCDs 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 and financial assistance from any agency or a consultant.

Area Rules complement the voluntary strategies. ODA pursues enforcement to gain compliance with the Area Rules only when reasonable attempts at a voluntary solution have failed.

To help achieve water quality standards in the Management Area, an effective strategy:
- Maintains adequate riparian vegetation
- Minimizes streambank erosion
- Minimizes runoff that contains potential pollutants

MANAGEMENT INTENT

1. Maintain Adequate Riparian Vegetation along Surface Waters

   Riparian vegetation consists of plants that depend on or tolerate the presence of water near the ground surface for at least part of the year.

   Adequate riparian vegetation helps:
   - Minimize streambank erosion by increasing the cohesiveness and structural strength of streambanks and by reducing flow velocities[13,14,15]
   - Reduce increases in summer water temperature[16,17]
   - Maintain late season flows by increasing the ability of the adjacent soils to store water during runoff seasons[18,19,20]
   - Moderate winter stream temperatures through the inflows of relatively warmer groundwater from adjacent soils[21]
   - Filter out and process excess nutrients, bacteria, and sediment in runoff that could pollute adjacent streams[22,23,24,25]

   Adequate riparian vegetation should:
   - Include a variety of plant species and ages
   - Include plants that have root masses capable of withstanding high streamflows
   - Provide adequate cover to protect the streambank and dissipate energy during high flows
   - Include sufficient ground cover to filter out excess sediment or nutrients in overland flows
   - Provide shade, where allowed by site capability

Adequate vegetation includes: visible ongoing renewal of riparian vegetation, vigorous growth, and the maintenance of a majority of each year's new growth of woody vegetation (trees and shrubs). Noxious weeds are undesirable as they generally provide less shade, filtering capacity, and stabilizing root mass than the plants they replace. Native vegetation is preferred where practical due to its integral role within the ecosystem.

As riparian vegetation matures, stream channels are expected to narrow and deepen. These stream channels will have less water surface area exposed to solar radiation (thereby reducing heating rates during summer) and will be more connected to their floodplain. Better floodplain connectivity has the added benefit of increasing stormwater storage and reducing stormwater velocities. These streams will also meander more, which will reduce flow velocities and reduce the damage from flooding.

2. Minimize Streambank Erosion[26]

Streambanks naturally change in form or location over time. Some bank instability usually occurs in undisturbed streams, and human activities can increase the speed and amount of streambank erosion. Adequate vegetation can significantly increase streambank stability.

Bank stability can be an important indicator of watershed condition and can directly affect several beneficial uses. Unstable banks contribute to:

- Sediment in the stream channel caused by slumps and surface erosion
- Fine sediment in the water
- Wider channels, which increases exposure of water to solar radiation
- Decreasing stream depth and alteration of fish habitat

3. Minimize Runoff that Contains Potential Pollutants

Potential pollution is reduced by having less runoff and fewer possible pollutants (sediment, nutrients, bacteria, toxics) in the runoff.

Sediments can enter from overland flow or gullies on croplands, rangelands, farmsteads, and roads. Reduction in sediment 1) reduces nutrient concentrations in streams, since many nutrients, especially phosphorus, attach to soil particles, and 2) increases dissolved oxygen due to a reduction in sediment oxygen demand[27,28].

5: VOLUNTARY MANAGEMENT PRACTICES

The following Recommended Management Practices address the objectives of the Area Plan and generally are accepted as effective, economical and practical, and they protect water quality. They are not required. Widespread adoption of these practices addresses the water quality parameters of concern in the Management Area. These practices should also maintain the economic viability of agriculture in the area.

Appropriate management practices for individual farms and ranches 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's *Field Office Technical Guide* contains extensive lists of management practices as well. NRCS offices are in The Dalles and Redmond. The Jefferson and Wasco County SWCDs, Cooperative Extension Agents, and Oregon Department of Fish and Wildlife biologists can also recommend practices.

Streamside Management
Objectives: achieve adequate riparian vegetation, increase streambank stability, filter out pollutants

- Minimize channelization
- Stabilize streambanks without confining the channel over any significant length
- Maintain vegetative buffer: continuous Conservation Reserve Program (CRP), Conservation Reserve Enhancement Program (CREP), riparian buffers, control weeds
- Manage livestock (see below)
- Properly place, design, and maintain roads, culverts, bridges, and crossings

Cropland Management
Objectives: reduce soil erosion, reduce and capture runoff, reduce potential pollutants in runoff

- Use conservation tillage: reduced tillage, direct seeding, subsoiling, chemical fallow
- Plant annual and perennial cover crops
- Farm on the contour: strip cropping, divided slopes, terraces, contour tillage
- Select crops that hold soil in place and enhance a crop rotation
- Seed early or double in critical areas
- Create and maintain sediment basins and vegetative buffer strips: riparian buffers, filter strips, grassed waterways, field borders, contour buffer strips, interception ditches
- Control weeds

Upland Management:
Objectives: reduce soil erosion, improve infiltration of water into soil, capture runoff

- Manage livestock (see below)
- Encourage vegetation that provides good ground cover and enhances water capture. Practices include: prescribed burning, range plantings, juniper control, weed control
- Use sediment retention basins
- Roads: close seasonally; properly maintain, design, and place

Livestock Management:
Objectives: reduce soil erosion, manage manure, achieve adequate riparian vegetation

- Manage grazing: livestock distribution; grazing intensity, duration, frequency, and season
- Improve riparian buffers
- Install fencing: temporary, cross, exclosure
- Control livestock watering through spring developments and off-stream water

- Provide salt, minerals, and shade away from streams
- Install adequate waste management systems: clean water diversions; waste collection, storage, and utilization; properly operate and maintain facilities
- Control runoff from concentrated feeding areas and irrigated pastures

Irrigation Management

Objectives: reduce runoff, minimize potential pollutants, reduce soil erosion, improve fish habitat

- Schedule irrigation based on crop needs, soil type, climate, topography, infiltration rates
- Improve irrigation efficiency
- Pipe or line mainline and delivery systems
- Select, locate, maintain, and operate diversions to minimize effects on water quality; install fish screens. [Infiltration galleries have the potential to take more water out of streams during low flows than is taken via conventional methods. The LAC recommends that infiltration galleries be designed following the guidelines in the NRCS' *Infiltration Galleries of the Deschutes Basin*; June 1999.]
- Minimize return flows through the use of cover crops, straw mulch, grass filter strips
- Install backflow devices
- Grade and slope property to retain runoff whenever possible

Crop Nutrient and Farm Chemical Management

Objectives: reduce potential for pollution, reduce runoff

- Develop nutrient budgets based on water and soil testing, tissue testing, plant needs.
- Apply appropriate amounts at proper times; dispose of containers properly
- Potential spills: have clean-up plan, store tanks away from streams, check the valves on delivery trucks
- Manage tailwater
- Use Integrated Pest Management
- Municipal sludge: keep on site and out of waters of the state. Preferably don't apply on agricultural lands at all

Ditch Management:

Objectives: reduce erosion, filter out potential pollutants

- Manage vegetation: burning, chemical, clipping, critical area planting
- Stabilize banks (structural and bioengineering)
- Install outfall protection to reduce erosion at culverts
- Pipe or line ditches
- Construct offstream or headwater storage
- Develop wetlands at end of line to filter and process drain water
- Size ditches appropriately to handle maximum flows

6: AREA RULES

INTRODUCTION

The *Area Rules* are enforceable by ODA and are cited here for information purposes. The *Area Plan* is not enforceable. The Area Plan and Rules complement each other. The Plan provides an overall proactive strategy for meeting the 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 603-095-1600 through 603-095-1660). '*Landowner'* includes any landowner, land occupier or operator (ORS 568.903). The landowner's responsibility is to implement measures that ensure compliance with these Area Rules. Sanctions can come into effect from ODA if a landowner is out of compliance with the Area Rules.

Healthy riparian systems 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, terraces and 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. Most agronomic practices can withstand a two to five year storm.

DEFINITIONS

Streambanks are the usual boundaries of a stream channel and do not extend to the flood boundaries. Banks of *perennial* streams (streams that flow continuously and are named on a US Geological Survey quadrangle map) include the area up to the ordinary high-water mark (OAR 603-095-0010(32) and (46)).

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

Site capability is the highest ecological status (vegetation) an area can attain given political, social, or economic constraints. Common constraints include the presence of a bridge, water gap, building, or highway. Natural factors determining site capability include: channel morphology, climate, elevation, and soil parent material (Process for Assessing Proper Functioning Condition. Bureau of Land Management. TR 1737-9. 1995).

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 and dredge spoils.

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)).

AREA RULES

Landowners in the Middle Deschutes Management Area are required to manage (details below):

- Riparian vegetation
- Irrigation water diversions
- Manure and other wastes
- Sediment in irrigation tailwater
- Application of crop nutrients

Limitations

OAR 603-095-1640

(1) Landowners must comply with OAR 603-095-1640(2) through (6) 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.

Effective dates of the Area Rules vary, depending on current state law and on the ease with which compliance with these Area Rules can be attained. Some Area Rules may become more specific over time, as additional information becomes available on land conditions and water quality.

Streamside Area

OAR 603-095-1640(2)

(a) By January 1, 2005, activities must allow the establishment and development of riparian vegetation, consistent with site capability, for streambank stability and stream shading.

(b) By January 1, 2005, activities must allow the establishment and development of vegetation or the presence of an equally effective erosion control device or practice for filtering out sediments before they enter perennial streams.

The Streamside Area Rules address stream temperature, sediment, nutrients, bacteria, and habitat modification. The LAC encourages ODA to 1) develop a map that reflects general vegetative site capability, and 2) determine targets for adequate vegetation to provide root mass for bank stability and herbaceous vegetation to reduce heat inputs to surface water.

Rule (a) requires activities that prevent vegetation from developing to cease by 2005; it does not require that adequate riparian vegetation be present by 2005. Reasonable rates of recovery include a 50% retention in annual vegetative growth within 15 to 25 feet of the stream. The rule does not specify any activities that must cease and does not require any

particular activity to take place. Landowners are not responsible for wildlife browsing and grazing use.

Rule (b) requires activities that keep vegetation from developing or that inhibit the presence of an equally effective erosion control device to cease by 2005; it does not require that all sediment be kept out of riparian streams by that date. This rule refers to the filtration of sediment caused by human activities, not sediment resulting from natural processes. This rule does not require that the vegetation be riparian; any type of vegetation other than noxious weeds, such as a grassed filter strip, may be used to filter out sediment. Different types of vegetated buffers (riparian, forest, grass, etc.) have different NRCS standards. Sufficient vegetation to filter out sediment also helps reduce the amount of bacteria and nutrients entering streams; nutrients can bind to sediments and can be carried into waterways in greater proportions than by water flow without sediments.

Instream Structures

OAR 603-095-1640(3)

(a) Effective on rule adoption, temporary irrigation diversions must:
  (A) Be constructed and operated only during periods of irrigation.
  (B) Not hinder channel carrying capacity between November 1 and March 1 to accommodate anticipated or expected seasonal streamflow.
  (C) Not increase instream turbidity during operation by more than 10%, compared to a point just upstream of the diversion.

(b) By January 1, 2007, temporary irrigation diversions must not contribute to channel instability.

This rule addresses stream temperature, sediment, and habitat modification.

Temporary irrigation diversions can reduce water quality and impede fish passage. This rule addresses water quality concerns related to temporary irrigation diversions of less than 50 cubic yards of fill. Larger diversions require Oregon Fill and Removal Permits and must be managed to minimize water quality impairments as provided by ORS 196.800 through 196.990. State law, as provided by ORS 498.351, requires that all artificial stream structures allow fish passa ge. The intention on Trout Creek, which has a year-round irrigation season, is that landowners breach their temporary diversions when no longer in use (and remove the fill or spread it so it isn't likely to erode), instead of allowing winter and spring floodwaters to blow through the dams. This reduces the possible damage from flooding. Additionally, instream structures in use during a winter irrigation season should allow sufficient carrying capacity to withstand expected, seasonal high flows. The '10% increase' is based on the current state water quality standard for turbidity,.

The later date for channel instability will give landowners time to develop appropriate structural or agronomic alternatives. Also, instream work is only feasible during certain times of the year.

Waste Management

OAR 603-095-1640(4)

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

This rule is already state law (ORS 468B). ORS 468B.025 states that no person shall:

(a)

(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.

(c) 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.

This rule ensures that concentrated nutrient concentrations, pathogens associated with high animal density areas, high sediment concentrations in run-off, toxics, or other potential pollutants are not readily transported to waters of the state.

Wastes associated with livestock operations can include manure from seasonal feeding and birthing areas, gathering pastures and corrals, rangelands and pasture, and any other situations not already covered by Oregon's Confined Animal Feeding Operation laws. Potential indicators of noncompliance include 1) runoff flowing through areas of high livestock usage and entering waters of the state, 2) livestock waste located in drainage ditches or areas of flooding, and 3) fecal coliform counts that exceed state water quality standards. Livestock grazing is allowed to the extent it does not violate state water quality standards and complies with the Area Rules. Livestock facilities located near streams should employ an adequate runoff control and waste management system. Compliance with the Streamside Area Rule will help keep wastes from being carried into waters of the state. Landowners can contact the NRCS and SWCD for assistance with complying with this rule.

Wastes also include excess sediment discharges. Landowners who, based on visible erosion scars and/or sediment-laden runoff, are discharging significant quantities of sediment, may be in violation of this rule.

Irrigation Tailwater

OAR 603-095-1640(5)

(a) Effective on rule adoption, irrigation tailwater must not increase the turbidity of the perennial stream into which it drains by more than 10%, compared to a point just upstream of the tailwater discharge.

This rule helps reduce sediment and nutrients entering perennial streams.

The rule reflects current state water quality standards and applies both to irrigated lands watered directly from perennial streams and to lands served by the NUID. The NUID system is fairly complex (see NUID in Section 1). On lands served by the NUID, individual landowners are responsible for the water quality of return flows from their lands to both NUID and private drains. If a shared drain violates the above rule, each landowner contributing to that drain water is expected to take appropriate action to reduce turbidity. ODA will consider each individual's proportional contribution to the problem when deciding on actions to take. The Jefferson County SWCD assists landowners with plans for improved sediment control where necessary.

Nutrients

OAR 603-095-1640(6)
(a) Effective on rule adoption, nutrient application rates and timing must not exceed specific crop requirements. Crop nutrients will be based on recommendations from the best available data applicable to a specific site.

Fertilizers (both chemical and manure) can contribute nutrients to streams. By requiring that nutrients be applied at appropriate rates, the amounts of nitrates and phosphates that can enter streams will be reduced. Careful application of manure also reduces the amount of bacteria that could enter streams. Nutrients already present in the soil and irrigation water should be accounted for when calculating application rates.

7: STRATEGIES TO ACHIEVE GOALS AND OBJECTIVES

VOLUNTARY APPROACH

To the greatest degree possible, prevention and control of agricultural pollution are 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 NRCS and Jefferson and Wasco County SWCDs work together to provide farmers and ranchers in the Management Area with information about the goals, objectives, and requirements of the Area Plan and Rules.

The following strategies are used at the local level by the appropriate SWCD through workplans and Memoranda of Agreement with ODA, 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. Prevent and control pollution caused by agricultural activities by achieving riparian targets and sediment control.

    b. Implement successful practices for streambank stabilization, reduction in high summer water temperatures, and restoration and enhancement of wetlands and riparian areas, while avoiding adverse fish habitat modification.

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

    d. Show progress in reduction of pollution from agricultural and rural lands through periodic surveys of stream reaches and associated lands. Methods will be selected as targets become better understood and quantified.

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 SWCDs' Annual Work Plans and Long Range Plans, with support from partner organizations.

    b. Inform landowners of the Area Plan and Rules and encourage landowners to make needed changes.

    c. Showcase successful practices and systems; 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. Landowners can request a Compliance Review from ODA to ensure compliance with all Area Rules. ODA staff can also provide technical advice on management activities.

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.

AREA RULE ENFORCEMENT

In addition to the voluntary strategies, Area Rules (OAR 603-095-1600 through 603-095-1660) 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. ODA seeks input from the local SWCD prior to evaluating conditions for compliance or requiring a schedule of corrective practices. ODA consults with the local SWCD regarding appeals and requests for alternate measures provided by ORS 568.912 and OAR 603-090-0040 and 0050. The following Area Rules provide for resolution of complaints.

OAR 603-095-1660

(1) When the department 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 603-095-1660(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 603-095-1660(4), "person" does not include any local, state or federal agency.

(6) Notwithstanding OAR 603-095-1660, 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.

8: MONITORING AND EVALUATION

A monitoring program is being developed to:

- characterize baseline conditions
- track Area Plan implementation and compliance with the Area Rules
- evaluate Area Plan effectiveness (improvements in water quality and land conditions)
- identify priority areas and annual and long-range strategies for Area Plan implementation

Water quality in the Management Area currently is monitored on a limited basis by: Madras High School Forestry class, Willow Creek Watershed Council, Portland General Electric, Confederated Tribes of the Warm Springs Reservation, Oregon Department of Fish and Wildlife, Oregon Water Resources Department, US Forest Service, and Bureau of Land Management. These groups are measuring water temperature, water chemistry, flow, turbidity, physical fish habitat, riparian vegetation, and air temperature.

A recent study by Portland General Electric showed elevated levels of nitrates in springs flowing into Willow Creek, Campbell Creek, and Mud Springs Creek[29]. A diverse group of stakeholders ("Middle Deschutes Water Quality Group") formed to attempt to determine the source of the nitrates. Data collected by the Group suggest that the water in the springs is 10-40 years old; the younger water shows lower nitrate levels[30]. The most likely sources of the nitrates are: fertilizer from irrigated fields, leachate from wastewater ponds, dry wells, and/or septic systems.

For the last two years, the Jefferson SWCD, ODA, and CTWS have been intensively monitoring the quality of irrigation water draining into Trout Creek and the Deschutes River to identify water quality issues and prioritize conservation projects. Results suggest that nitrates are not a concern in irrigation surface runoff, but that there are some issues related to sediment, phosphorus, and E. coli in the Campbell Creek and Mud Springs drainages. The monitoring furthermore supports PGE's data showing higher nitrates in groundwater. Additional study will better identify water quality trends in surface and groundwater and document the water quality history of waters in the Management Area.

Monitoring of land conditions is the responsibility of ODA. Area Plan success is evaluated by the LAC, ODA, and the Jefferson County SWCD.

The LAC encourages ODA to develop a map that reflects general vegetative site capability.

The Oregon Plan for Salmon and Watersheds' *Water Quality Monitoring Technical Guide Book* (July 1999) is the preferred reference manual; however, other water quality monitoring protocols also can be obtained from the local SWCDs or watershed councils. Specific monitoring protocols depend on the condition being assessed.

BASELINE CONDITIONS

The LAC reviewed data for the Management Area and reviewed the Trout Creek and Draft Willow Creek Watershed Assessments. A comprehensive analysis of existing water quality data was beyond the scope of the LAC.

The LAC believes that the following steps are necessary to fully characterize baseline conditions and track water quality:

1. Gather all existing data sets, analyses, and monitoring reports.
   This consists of gathering water quality data sets from all groups (e.g. ODFW, DEQ,

and US Forest Service) to determine what data have been collected and to review conclusions drawn from those data.

2. Determine what data are being currently collected.
   This is necessary to determine the appropriateness and duration of existing data collection efforts to eliminate unnecessary duplication.

3. Analyze all available data to determine existing watershed condition.
   An in-depth analysis of data gathered from numbers 1 and 2 is necessary to determine the current watershed condition by identifying existing problems and their locations. Also, to the fullest possible extent, an estimate of the historic conditions needs to be determined. Both the historic and current conditions are what any future conditions need to be compared to for assessment of future success.

4. Determine where data gaps exist in present data collection efforts.
   The results of analyses conducted in number 3 will help determine what and where additional data need to be collected. For example, this could consist of more temperature locations or deciding what other water quality parameters need to be collected.

5. Develop and implement a water quality monitoring program.
   A water quality monitoring program would have to be designed to collect data on all necessary parameters that apply. The intensity of sampling for each parameter would be proportional to its probable importance (e.g. temperature would probably be sampled more intensively than toxics). The results from numbers 1-4 will help determine a plan that minimizes the cost of implementation, yet still allows for adequate assessment of watershed conditions through time.

AREA PLAN IMPLEMENTATION

The Jefferson County SWCD and ODA are responsible for implementing the Area Plan. The Jefferson County SWCD, as the Local Management Agency, maintains a formal agreement with ODA that outlines its responsibilities for providing educational outreach and technical assistance.

The Jefferson County SWCD:

- Evaluates available current water quality monitoring data
- Participates in developing and evaluating outreach and education programs designed to provide public awareness and understanding of water quality issues
- Reviews reports, projects, demonstrations, and tours used to showcase successful management practices and systems
- Evaluates the adequacy of technical and financial assistance sources available to the agricultural community to implement recommended best management practices, monitoring, and education.

AREA PLAN PROGRESS AND SUCCESS

The Jefferson County SWCD, ODA, and the LAC are responsible for determining whether the goals are being met within the timeframes identified in the Area Plan. Progress and success of implementation efforts are assessed through compliance with Area Rules and state standards and the measurement of water quality improvement over time.

The LAC considers baseline and trend monitoring to be critical. Trend monitoring is used to determine long-term changes in land conditions and water quality. It requires identification and establishment of "stable" sites and collection of data over time for comparison to baseline or initial information. Land conditions will be monitored over time using both photographic and quantitative techniques. ODA is using aerial photographs to classify riparian condition along 5% of randomly selected stream reaches in the Management Area, and will track those conditions over time. ODA has not been able to create riparian site capability maps due to technological constraints. However, ODA understands that this is of great interest to the LAC and an important tool for tracking riparian improvement.

The Monitoring Technical Guide book provides detailed information on how to set up and perform water quality monitoring, including considerations for site selection, quality assurance, quality control, and data storage.

DEQ conducts monitoring to determine compliance with state water quality standards and improvements in water quality over time.

9: ROLES AND RESPONSIBILITIES

TOTAL MAXIMUM DAILY LOADS

The Department of Environmental Quality, 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 Management Area waters. This loading capacity is calculated to achieve water quality standards.

Total Maximum Daily Loads for the Middle Deschutes Management Area are expected from DEQ in the Year 2010 at the earliest. Each jurisdiction (such as agriculture, forest lands, Federal lands, and urban areas) in the Management Area will be allocated a portion of the TMDLs. This amount is the jurisdiction's Load Allocation. Each jurisdiction will develop pollution control plans and programs designed to achieve the load allocations. The Middle Deschutes Agricultural Water Quality Management Area Plan will be the implementation plan for agriculture's Load Allocations in the Management Area and may be revised to address the Load Allocations as they are developed.

AREA PLAN IMPLEMENTATION

The Oregon Department of Agriculture 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.

Plan revisions will address Load Allocations assigned to agriculture in future TMDLs for this area.

The Jefferson County SWCD is the Local Management Agency for implementation of the Area Plan. It assists with administration, outreach, and providing technical assistance to landowners. The Jefferson County SWCD coordinates with the Wasco County SWCD to provide assistance to landowners in Wasco County.

The LAC was originally convened by ODA in 1998, and the original Area Plan and Rules were adopted in September 2001. The LAC reconvenes biennially to review the Area Plan and Rules and amend them as necessary. The first biennial review took place in October 2003. Any Area Rule amendments will include the public participation process outlined in Oregon Law.

The public is encouraged to participate in the Area Plan review process. All LAC meetings are open to the public, announced in the *Madras Pioneer*, and generally follow Oregon's Public Meeting Laws. Future amendments to the Area Rules will have public comment periods.

The day-to-day implementation of this plan is accomplished through Intergovernmental Agreements between the Jefferson and Wasco County SWCDs and ODA. Under such agreements, the Jefferson County SWCD acts as the Local Management Agency.

As resources allow, Jefferson and Wasco County SWCDs, Natural Resources Conservation Service, Cooperative Extension, and Central Oregon Agricultural Research Center staff assist landowners in evaluating effective practices. 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 SWCDs and ODA with input from partner agencies.

The Oregon Department of Agriculture and the SWCDs 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 Area Rules or enforcement are taken up directly by ODA, as outlined in OARs 603-090-0000 through 603-090-0120.

10: 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 SWCDs need 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

Landowners may need financial and technical assistance to meet Area Plan objectives and Area Rule requirements. 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 Continuous Conservation Reserve Program (CRP) and other programs such as the Environmental Protection Agency's nonpoint source implementation grants, 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.

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