Malheur River Basin Agricultural Water Quality Management Area Plan

January 17, 2019

Developed by the
Oregon Department of Agriculture
Malheur River Basin Local Advisory Committee

With support from the
Malheur County Soil and Water Conservation District

https://oda.direct/AgWQPlans
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Acronyms and Terms Used in this Document

Ag Water Quality Program – Agricultural Water Quality Management Program
Area Plan – Agricultural Water Quality Management Area Plan
Area Rules – Agricultural Water Quality Management Area Rules
CAFO – Confined Animal Feeding Operation
cfs – cubic feet per second
CWA – Clean Water Act
DEQ – Oregon Department of Environmental Quality
DMA – Designated Management Agency
ESA – Endangered Species Act
GWMA – Groundwater Management Area
HABs – Harmful Algal Blooms
LAC – Local Advisory Committee
LMA – Local Management Agency
Management Area – Agricultural Water Quality Management Area
MOA – Memorandum of Agreement
NPDES – National Pollution Discharge Elimination System
NRCS – Natural Resources Conservation Service
OAR – Oregon Administrative Rules
ODA – Oregon Department of Agriculture
ODF – Oregon Department of Forestry
OHA – Oregon Health Authority
ORS – Oregon Revised Statute
OSU – Oregon State University
OWEB – Oregon Watershed Enhancement Board
PMP – Pesticides Management Plan
PSP – Pesticides Stewardship Partnership
RCA – Required Corrective Action
SIA – Strategic Implementation Area
SWCD – Soil and Water Conservation District
TMDL – Total Maximum Daily Load
USDA – United States Department of Agriculture
US EPA – United States Environmental Protection Agency
WPCF – Water Pollution Control Facility
WQPMT – Water Quality Pesticides Management Team
Foreword

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

The Area Plan is neither regulatory nor enforceable (Oregon Revised Statute (ORS) 568.912(1)). It references associated Agricultural Water Quality Management Area Rules (Area Rules), which are Oregon Administrative Rules (OARs) enforced by the Oregon Department of Agriculture (ODA).

Required Elements of Area Plans

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

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

Plan Content

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

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

Chapter 3: Local Goals, Objectives, and Implementation Strategies. Presents goal(s), measurable objectives, and timelines, along with strategies to achieve these goal(s) and objectives.

Chapter 4: Local Implementation, Monitoring, and Adaptive Management. ODA and the Local Advisory Committee (LAC) will work with knowledgeable sources to summarize land condition and water quality status and trends to assess progress toward the goals and objectives in Chapter 3.
Chapter 1: Agricultural Water Quality Management Program

Purpose and Background

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

As part of Oregon’s Agricultural Water Quality Management Program (Ag Water Quality Program), the Area Plan guides landowners and partners such as Soil and Water Conservation Districts (SWCDs) in addressing water quality issues due to agricultural activities. The Area Plan identifies strategies to prevent and control water pollution from agricultural activities and soil erosion (ORS 568.909(2)) on agricultural and rural lands within the boundaries of this Management Area (OAR 603-090-0000(3)) and to achieve and maintain water quality standards (ORS 561.191(2)). The Area Plan has been developed and revised by ODA and the LAC, with support and input from the SWCD and the Oregon Department of Environmental Quality (DEQ). The public was invited to participate in the original development and approval of the Area Plans and is invited to participate in the biennial review process. The Area Plan is implemented using a combination of outreach, conservation and management activities, compliance with Area Rules developed to implement the Area Plan, monitoring, evaluation, and adaptive management.

The provisions of the Area Plan do not establish legal requirements or prohibitions (ORS 568.912(1)). Each Area Plan is accompanied by Area Rules that describe local agricultural water quality regulatory requirements. ODA will exercise its regulatory authority for the prevention and control of water pollution from agricultural activities under the Ag Water Quality Program’s general regulations (OAR 603-090-0000 to 603-090-0120) and under the Area Rules for this Management Area (OAR 603-095-0900). The Ag Water Quality Program’s general rules guide the Ag Water Quality Program, and the Area Rules for the Management Area are the regulations that landowners are required to follow. Landowners will be encouraged through outreach and education to implement conservation management activities.

The Area Plan and Area Rules apply to all agricultural activities on non-federal and non-Tribal Trust land within this Management Area including:

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

Water quality on federal lands in Oregon is regulated by DEQ and on Tribal Trust lands by the respective tribe, with oversight by the United States Environmental Protection Agency (US EPA).

1.2 History of the Ag Water Quality Program

In 1993, the Oregon Legislature passed the Agricultural Water Quality Management Act directing ODA to develop plans to prevent and control water pollution from agricultural activities and soil erosion; to achieve water quality standards; and to adopt rules as necessary (ORS 568.900 through ORS 568.933). Senate Bill 502 was passed in 1995 to clarify that ODA is the lead agency for regulating agriculture with respect to water quality (ORS 561.191). The Area Plan and Area Rules were developed and subsequently revised pursuant to these statutes.
Between 1997 and 2004, ODA worked with LACs and SWCDs to develop Area Plans and Area Rules in 38 watershed-based Management Areas across Oregon (Figure 1). Since 2004, ODA, LACs, SWCDs, and other partners have focused on implementation including:

- Providing education, outreach, and technical assistance to landowners.
- Implementing projects to improve agricultural water quality.
- Investigating complaints of potential violations of Area Rules.
- Conducting biennial reviews of Area Plans and Area Rules.
- Monitoring, evaluation, and adaptive management.
- Developing partnerships with state and federal agencies, tribes, watershed councils, and others.

Figure 1: Map of 38 Agricultural Water Quality Management Areas

1.3 Roles and Responsibilities

1.3.1 Oregon Department of Agriculture

The Oregon Department of Agriculture is the agency responsible for implementing the Ag Water Quality Program (ORS 568.900 to 568.933, ORS 561.191, OAR 603-090, and OAR 603-095). The Ag Water Quality Program was established to develop and carry out a water quality management plan for the
prevention and control of water pollution from agricultural activities and soil erosion. State and federal laws drive the establishment of an Ag Water Quality Management Plan, which include:

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

The Oregon Department of Agriculture has the legal authority to develop and implement Area Plans and Area Rules for the prevention and control of water pollution from agricultural activities and soil erosion, where such plans are required by state or federal law (ORS 568.909 and ORS 568.912). ODA bases Area Plans and Area Rules on scientific information (ORS 568.909). ODA works in partnership with SWCDs, LACs, DEQ, and other partners to implement, evaluate, and update the Area Plans and Area Rules. ODA is responsible for any actions related to enforcement or determination of noncompliance with Area Rules (OAR 603-090-0080 through OAR 603-090-0120). ORS 568.912(1) and ORS 568.912(2) give ODA the authority to adopt rules that require landowners to perform actions necessary to prevent and control pollution from agricultural activities and soil erosion.

The Area Rules are a set of standards that landowners must meet on all agricultural or rural lands. (“Landowner” includes any landowner, land occupier or operator per OAR 603-95-0010(24)). All landowners must comply with the Area Rules. The ODA will use enforcement where appropriate and necessary to gain compliance with Area Rules. Figure 2 outlines ODA’s compliance process. ODA will pursue enforcement action only when reasonable attempts at voluntary solutions have failed (OAR 603-090-0000(5)(e)). If a violation is documented, ODA may issue a pre-enforcement notification or an enforcement Order such as a Notice of Noncompliance. If a Notice of Noncompliance is issued, ODA will direct the landowner to remedy the condition through required corrective actions (RCAs) under the provisions of the enforcement procedures outlined in OAR 603-090-060 through OAR 603-090-120. If a landowner does not implement the RCAs, ODA may assess civil penalties for continued violation of the rules. If and when other governmental policies, programs, or rules conflict with the Area Plan or Area Rules, ODA will consult with the appropriate agencies to resolve the conflict in a reasonable manner.
Figure 2: Compliance Flow Chart

**Oregon Department of Agriculture**
**Water Quality Program Compliance Process**

- **ODA Receives Complaint or Notification**
  - **Complaint Complete?**
    - **Notification/Observation Appears Valid?**
      - **YES**
        - **Case Not Opened**
      - **NO**
        - **Pre-Enforcement “Fix-It” Letter**
          - **No Follow-Up If Adequate Response**
          - **YES**
            - **Conduct Investigation**
            - **Violation?**
              - **NO**
                - **Letter of Compliance Close Case**
              - **YES or LIKELY**
                - *** Pre-Enforcement Letter**
                  - **Is an Advisory or Warning Not an Enforcement Action**
                  - **Follow-Up Investigation**
                  - **Violation?**
                    - **NO**
                      - **Letter of Compliance Close Case**
                    - **YES**
                      - **Notice of Noncompliance**
                      - **Follow-Up Investigation**
                      - **Violation?**
                        - **NO**
                          - **Letter of Compliance Close Case**
                        - **YES**
                          - **Civil Penalty**

* May issue a Notice of Noncompliance if there is a serious threat to human health or environment

NOTE: Producer may seek assistance from SWCD or other sources as needed throughout the process. However, cost-share funds are no longer available once a Notice of Noncompliance has been issued.
1.3.2 Local Management Agency

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

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

1.3.3 Local Advisory Committee

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

The LAC may meet as frequently as necessary to carry out their responsibilities, which include but are not limited to:
- Participate in the development and ongoing revisions of the Area Plan.
- Participate in the development and revisions of the Area Rules.
- Recommend strategies necessary to achieve the goals and objectives in the Area Plan.
- Participate in biennial reviews of the progress of implementation of the Area Plan and Area Rules.
- Submit written biennial reports to the Board of Agriculture and the ODA director.

1.3.4 Agricultural Landowners

The emphasis of the Area Plan is on voluntary action by landowners to control the factors affecting water quality in the Management Area. Each landowner in the Management Area is required to comply with the Area Rules. In addition, landowners need to select and implement a suite of measures to protect water quality. The actions of each landowner will collectively contribute toward achievement of the water quality standards.

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

Under the Area Plan and Area Rules, agricultural landowners are not responsible for mitigating or addressing factors that do not result from agricultural activities, such as:
- Conditions resulting from unusual weather events,
- Hot springs, glacial melt water, extreme or unforeseen weather events, and climate change,
- Septic systems and other sources of human waste,
- Public roadways, culverts, roadside ditches and shoulders,
- Dams, dam removal, hydroelectric plants, and non-agricultural impoundments,
• Housing and other development in agricultural areas,
• Other circumstances not within the reasonable control of the landowner.

However, agricultural landowners may be responsible for some of these impacts under other legal authorities.

1.3.5 Public Participation

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

The Oregon Department of Agriculture, LACs, and SWCDs conduct biennial reviews of the Area Plans and Area Rules. Partners, stakeholders, and the general public are invited to participate in the process. Any future revisions to the Area Rules will include a formal public comment period and a formal public hearing.

1.4 Agricultural Water Quality

The CWA directs states to designate beneficial uses related to water quality for every waterbody, decide on parameters to measure to determine whether beneficial uses are being met, and set water quality standards based on the beneficial uses and parameters.

1.4.1 Point and Nonpoint Sources of Water Pollution

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

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

1.4.2 Beneficial Uses and Parameters of Concern

Beneficial uses related to water quality are defined by DEQ in OARs for each basin. They may include: public and private domestic water supply, industrial water supply, irrigation, livestock watering, fish and aquatic life, wildlife and hunting, fishing, boating, water contact recreation, aesthetic quality, hydropower, and commercial navigation and transportation. The most sensitive beneficial uses usually are fish and aquatic life, water contact recreation, and public and private domestic water supply. These uses generally are the first to be impaired because they are affected at lower levels of pollution. While there may not be severe impacts on water quality from a single source or sector, the combined effects from all sources can contribute to the impairment of beneficial uses in the Management Area. Beneficial uses that have the potential to be impaired in this Management Area are summarized in Chapter 2.
Many water bodies throughout Oregon do not meet state water quality standards. Many of these water bodies have established water quality management plans that document needed pollutant reductions. The most common water quality concerns related to agricultural activities are temperature, bacteria, biological criteria, sediment and turbidity, phosphorous, algae, pH, dissolved oxygen, harmful algal blooms (HABs), nitrates, pesticides, and mercury. These parameters vary by Management Area and are summarized in Chapter 2.

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

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

A TMDL includes an assessment of water quality data and current conditions and describes a plan to achieve conditions so that water bodies will meet water quality standards. TMDLs specify the daily amount of pollution a water body can receive and still meet water quality standards. In the TMDL, point sources are allocated pollution limits as “waste load allocations” that are then incorporated in National Pollutant Discharge Elimination System (NPDES) waste discharge permits, while a “load allocation” is attributed to nonpoint sources (agriculture, forestry, and urban). The agricultural sector is responsible for helping achieve the pollution limit by achieving the load allocation assigned to agriculture specifically, or to nonpoint sources in general, depending on how the TMDL was written.

Total Maximum Daily Loads generally apply to an entire basin or subbasin, not just to an individual water body on the 303(d) list. Water bodies will be listed as achieving water quality standards when data show the standards have been attained.

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

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

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

In 1995, the Oregon Legislature passed ORS 561.191. This statute states that any program or rules adopted by ODA “shall be designed to assure achievement and maintenance of water quality standards adopted by the Environmental Quality Commission.”

To implement the intent of ORS 561.191, ODA incorporated ORS 468B.025 and 468B.050 into all of the Area Rules.

ORS 468B.025 states that:

1. Except as provided in ORS 468B.050 or 468B.053, no person shall:
2. (a) Cause pollution of any waters of the state or place or cause to be placed any wastes in a location where such wastes are likely to escape or be carried into the waters of the state by any means.
(b) Discharge any wastes into the waters of the state if the discharge reduces the quality of such waters below the water quality standards established by rule for such waters by the Environmental Quality Commission.

(2) No person shall violate the conditions of any waste discharge permit issued under ORS 468B.050.”

ORS 468B.050 identifies the conditions when a permit is required. A permit is required for CAFOs that meet minimum criteria for confinement periods and have large animal numbers or have wastewater facilities. The portions of ORS 468B.050 that apply to the Ag Water Quality Program state that:

“(1) Except as provided in ORS 468B.053 or 468B.215, without holding a permit from the Director of the Department of Environmental Quality or the State Department of Agriculture, which permit shall specify applicable effluent limitations, a person may not:

(a) Discharge any wastes into the waters of the state from any industrial or commercial establishment or activity or any disposal system.”

Definitions used in ORS 468B.025 and 468B.050:

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

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

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

1.4.5 Streamside Vegetation and Agricultural Water Quality

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

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

- Streamside vegetation improves water quality related to multiple pollutants, including: temperature (heat), sediment, bacteria, nutrients, toxics, and pesticides.
- Streamside vegetation provides fish and wildlife habitat.
- Landowners can improve streamside vegetation in ways that are compatible with their operation. Streamside conditions may be improved without the removal of the agricultural activity, such as with managed grazing.
- Streamside vegetation condition is measurable and can be used to track progress in achieving desired site conditions.

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

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

Occasionally, mature site-capable vegetation such as tall trees may not be needed for narrow streams. For example, shrubs and grass may provide shade, protect streambanks, and filter pollutants. However, on larger streams, mature site-capable vegetation is needed to provide the water quality functions.

In many cases, invasive, non-native plants, such as introduced varieties of blackberry and reed canarygrass, grow in streamside areas. This type of vegetation has established throughout much of Oregon due to historic and human influences and may provide some of the water quality functions of site-capable vegetation. ODA’s statutory authority does not require the removal of invasive, non-native plants, however, ODA recognizes removal as a good conservation activity and encourages landowners to remove these plants. Voluntary programs through SWCDs and watershed councils provide technical assistance and financial incentives for weed control and restoration projects. In addition, the Oregon State Weed Board identifies invasive plants that can negatively impact watersheds. Public and private landowners are responsible for eliminating or intensively controlling noxious weeds as may be provided by state and local law enacted for that purpose. For further information, visit www.oregon.gov/ODA/programs/weeds.

1.5 Other Water Quality Programs

The following programs complement the Ag Water Quality Management Program and are described here to recognize their link to agricultural lands.

1.5.1 Confined Animal Feeding Operation Program

The Oregon Department of Agriculture is the lead state agency for the CAFO Program. The CAFO Program was developed to ensure that operators do not contaminate ground or surface water with animal manure or process wastewater. Since the early 1980s, CAFOs in Oregon have been registered to a general Water Pollution Control Facility (WPCF) permit designed to protect water quality. A properly maintained CAFO must implement a site-specific suite of structural and management practices to protect ground or surface water. To assure continued protection of ground and surface water, the 2001 Oregon State Legislature directed ODA to convert the CAFO Program from a WPCF permit program to a federal
NPDES program. Oregon Department of Agriculture and DEQ jointly issue the NPDES CAFO Permit, which complies with all CWA requirements for CAFOs. In 2015, ODA and DEQ jointly issued a WPCF general CAFO Permit as an alternative for CAFOs that are not subject to the federal NPDES CAFO permit requirements. Currently, ODA can register CAFOs to either the WPCF or NPDES CAFO permit.

Either of the Oregon CAFO permits require the registrant to operate according to a site-specific, ODA-approved, Animal Waste Management Plan that is incorporated into the CAFO permit by reference. You can view the CAFO program site at http://www.oregon.gov/ODA/programs/NaturalResources/Pages/CAFO.aspx

1.5.2 Groundwater Management Areas

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

Oregon has designated three GWMAs because of elevated nitrate concentrations in groundwater: Lower Umatilla Basin, Northern Malheur County, and Southern Willamette Valley. Each GWMA has a voluntary action plan to reduce nitrates in groundwater. After a scheduled evaluation period, if DEQ determines that voluntary efforts are not effective, mandatory requirements may become necessary.

1.5.3 The Oregon Plan for Salmon and Watersheds

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

1.5.4 Pesticide Management and Stewardship

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

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

Through the PSP, state agencies and local partners work together to monitor pesticides in streams and to improve water quality (https://www.oregon.gov/deq/wq/programs/Pages/Pesticide.aspx). ODA, DEQ, and Oregon State University Extension Service work with landowners, SWCDs, watershed
councils, and other local partners to voluntarily reduce pesticide levels while improving water quality and crop management. Since 2000, the PSPs have made noteworthy progress in reducing pesticide concentrations and detections.

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

1.5.5 Drinking Water Source Protection

Oregon implements its drinking water protection program through a partnership between DEQ and OHA. The program provides individuals and communities with information on how to protect the quality of Oregon’s drinking water. The DEQ and OHA encourage preventive management strategies to ensure that all public drinking water resources are kept safe from current and future contamination. For more information see: https://www.oregon.gov/deq/wq/programs/Pages/dwp.aspx.

1.6 Partner Agencies and Organizations

1.6.1 Oregon Department of Environmental Quality

The US EPA delegated authority to Oregon to implement the federal CWA in our state. DEQ is the lead state agency with overall authority to implement the CWA in Oregon. DEQ coordinates with other state agencies, including ODA and ODF, to meet the requirements of the CWA. The DEQ sets water quality standards and develops TMDLs for impaired waterbodies, which ultimately are approved or disapproved by the US EPA. In addition, DEQ develops and coordinates programs to address water quality including NPDES permits for point sources, the CWA Section 319 grant program, Source Water Protection, the CWA Section 401 Water Quality Certification, and GWMAs. DEQ also coordinates with ODA to help ensure successful implementation of Area Plans.

A Memorandum of Agreement (MOA) between DEQ and ODA recognizes that ODA is the state agency responsible for implementing the Ag Water Quality Program. ODA and DEQ updated the MOA in 2012.

The MOA includes the following commitments:

- ODA will develop and implement a monitoring strategy, as resources allow, in consultation with DEQ.
- ODA will evaluate the effectiveness of Area Plans and Area Rules in collaboration with DEQ.
  - ODA will determine the percentage of lands achieving compliance with Area Rules.
  - ODA will determine whether the target percentages of lands meeting the desired land conditions, as outlined in the goals and objectives of the Area Plans, are being achieved.
- ODA and DEQ will review and evaluate existing information to determine:
  - Whether additional data are needed to conduct an adequate evaluation.
  - Whether existing strategies have been effective in achieving the goals and objectives of the Area Plans.
  - Whether the rate of progress is adequate to achieve the goals of the Area Plans.
The Environmental Quality Commission, which serves as DEQ’s policy and rulemaking board, may petition ODA for a review of part or all of any Area Plan or Area Rules. The petition must allege, with reasonable specificity, that the Area Plan or Area Rules are not adequate to achieve applicable state and federal water quality standards (ORS 568.930(3)(a)).

1.6.2 Other Partners

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

1.7 Measuring Progress

Agricultural landowners have been implementing effective conservation projects and management activities throughout Oregon to improve water quality for many years. However, it has been challenging for ODA, SWCDs, and LACs to measure progress towards improved water quality. ODA is working with SWCDs, LACs, and other partners to develop and implement strategies that will produce measurable outcomes. ODA also is working with partners to develop monitoring methods to document progress.

1.7.1 Measurable Objectives

Measurable objectives allow the Ag Water Quality Program to better evaluate progress towards improved water quality. A measurable objective is a numeric long-term desired outcome to achieve by a specified date. Milestones are the interim steps needed to make progress toward the measurable objective and consist of numeric short-term targets to reach by specific dates. Together, the milestones define the timeline needed to achieve the measurable objective.

The Oregon Department of Agriculture, LAC, and LMA will establish measurable objectives and associated milestones for each Area Plan. Many of these measurable objectives relate to land conditions and primarily are implemented through focused work in small geographic areas (section 1.7.3), with a long-term goal of developing measurable objectives and monitoring methods at the Management Area scale.

At each biennial review, ODA and its partners will evaluate progress toward the most recent milestone(s) and why they were or were not achieved. ODA, the LAC, and LMA will evaluate whether changes are needed to keep on track for achieving the measurable objective(s) and will revise strategies to address obstacles and challenges.

The measurable objectives and associated milestones for the Area Plan are in Chapter 3 and progress toward achieving the measurable objectives and milestones is summarized in Chapter 4.

1.7.2 Land Conditions and Water Quality

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

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

- Landowners can see land conditions and have direct control over them.
- It can be difficult to separate agriculture’s influence on water quality from other land uses.
- There is generally a lag time between changes on the landscape and the resultant improvements in the water. Extensive monitoring of water quality is needed to evaluate progress, which is expensive and may fail to demonstrate improvements in the short term.
- Improved land conditions can be documented immediately, but there may be significant lag time before water quality improves or water quality impacts due to other sources.
- Reductions in water quality from agricultural activities are primarily through changes in land conditions and management activities.

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

### 1.7.3 Focused Implementation in Small Geographic Areas

**Focus Areas**

A Focus Area is a small watershed with water quality concerns associated with agriculture. Through the Focus Area process, the SWCD delivers systematic, concentrated outreach and technical assistance in a small geographic area. A key component of this approach is measuring conditions before and after implementation to document the progress made with available resources. The Focus Area approach is consistent with other agencies’ and organizations’ efforts to work proactively in small geographic areas and is supported by a large body of scientific research (e.g. Council for Agricultural Science and Technology, 2012. Assessing the Health of Streams in Agricultural Landscapes: The Impacts of Land Management Change on Water Quality. Special Publication No. 31. Ames, Iowa).

Systematic implementation in Focus Areas provides the following advantages:

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

Soil and Water Conservation Districts select a Focus Area in cooperation with ODA and other partners. The scale of the Focus Area matches the SWCD’s capacity to deliver concentrated outreach and technical assistance, and to complete (or initiate) projects. The current Focus Area for this Management Area is described in Chapter 3. The SWCD will also continue to provide outreach and technical assistance to the entire Management Area.
Strategic Implementation Areas

Strategic Implementation Areas (SIAs) are small watersheds selected by ODA in cooperation with partners based on a statewide review of water quality data and other available information. ODA conducts an evaluation of likely compliance with Area Rules, and contacts landowners with the results and next steps. Landowners have the option of working with the SWCD or other partners to voluntarily address water quality concerns. ODA follows up, as needed, to enforce Area Rules. Finally, ODA completes a post-assessment to document progress made in the watershed. Chapter 3 describes any SIAs in this Management Area.

1.8 Monitoring, Evaluation, and Adaptive Management

The Oregon Department of Agriculture, LAC, and LMA will assess the effectiveness of the Area Plan and Area Rules by evaluating the status and trends in agricultural land conditions and water quality (Chapter 4). This assessment will include an evaluation of progress toward measurable objectives. ODA will utilize other agencies’ and organizations’ local monitoring data when available. ODA, DEQ, SWCDs, and LACs will examine these results during the biennial review and will revise the goal(s), measurable objectives, and strategies in Chapter 3 as needed.

1.8.1 Agricultural Water Quality Monitoring

As part of monitoring water quality status and trends, DEQ regularly collects water samples at over 130 sites on more than 50 rivers and streams across the state. Sites are present across the major land uses (forestry, agriculture, rural residential, and urban/suburban). Sites are visited every other month throughout the year and represent a snapshot of water quality conditions. Parameters consistently measured include alkalinity, biochemical oxygen demand (BOD), chlorophyll a, specific conductance, dissolved oxygen (DO), DO percent saturation, E. coli, ammonia, nitrate and nitrite, pH, total phosphorus, total solids, temperature, and turbidity.

Other partners may have water quality data that is described in Chapter 3 and presented in Chapter 4.

1.8.2 Statewide Aerial Photo Monitoring of Streamside Vegetation

Starting in 2003, ODA began evaluating streamside vegetation conditions using aerial photos. Stream segments representing 10 to 15 percent of the agricultural lands in each Management Area were randomly selected for long-term aerial photo monitoring. Stream segments are generally 3-5 miles long. ODA evaluates streamside vegetation at specific points within 30-, 60-, and 90-foot bands along both sides of stream segments from the aerial photos and assigns each segment a score based on streamside vegetation. The score can range from 70 (all trees) to 0 (all bare ground). The same stream segments are re-photographed and re-scored every five years to evaluate changes in streamside vegetation conditions over time. Because site-capable vegetation varies across the state, there is no single “correct” streamside vegetation index score. The purpose of this monitoring is to measure positive or negative change for an individual reach.

1.8.3 Biennial Reviews and Adaptive Management

All Area Plans and Area Rules around the state undergo biennial reviews by ODA and the LAC. As part of each biennial review, ODA, DEQ, SWCDs, and the LAC discuss and evaluate the progress on implementation of the Area Plan and Area Rules. This evaluation includes discussion of enforcement actions, land condition and water quality monitoring, and outreach efforts over the past biennium. ODA and partners evaluate progress toward achieving measurable objectives, and revise implementation strategies as needed. The LAC submits a report to the Board of Agriculture and the director of ODA.
describing progress and impediments to implementation, and recommendations for modifications to the Area Plan or Area Plans necessary to achieve the goal of the Area Plan. ODA and partners will use the results of this evaluation to update the measurable objectives and implementation strategies in Chapter 3.
Chapter 2:  Local Background

The Management Area consists of the Malheur River Basin as defined by the United States Geologic Survey. The area includes the entire drainage of the Malheur River plus areas draining to the Snake River between the Burnt River and one mile south of Ontario, including Birch Creek, Moore’s Hollow, and Jacobsen Gulch (Figure 3).

Figure 3. Map of Management Area
2.1 Local Roles and Responsibilities

This Area Plan was developed by ODA with assistance from volunteer members of the LAC and the Malheur County SWCD, in consultation with members of the community. All entities involved in this Area Plan are committed to maintaining and improving the economic viability of agriculture in the Management Area. Productive and profitable agriculture is the cornerstone of the local economy. Social well-being is directly tied to this agricultural activity and the value-added processed goods provided. The income from these enterprises is indispensable.

The agricultural community of the Management Area has a sincere desire to protect the natural resources that everyone depends on. Most farmers and ranchers in the area have demonstrated that concern by applying environmentally friendly practices on their property. Many have implemented conservation projects to improve water quality and protect wildlife. Local growers and agencies have shown by implementing the Northern Malheur County Groundwater Protection Plan (Anon., 1991) that they can protect natural resources and maintain profitable agriculture.

2.1.1 Local Advisory Committee

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

Members of the LAC represent local agricultural producers, local landowners, local environmental interests, local recreation interests, Malheur County SWCD, and the Malheur Watershed Council.

<table>
<thead>
<tr>
<th>Table 1: Current LAC members.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Doug Maag, Chair:</strong> Jamieson, cattle &amp; row crops</td>
</tr>
<tr>
<td><strong>Jim Bentz:</strong> Drewsey, cattle</td>
</tr>
<tr>
<td><strong>Jerry Erstrom:</strong> Vale, seed producer</td>
</tr>
<tr>
<td><strong>Herb Futter:</strong> retired NRCS</td>
</tr>
<tr>
<td><strong>Les Ito:</strong> Ontario, row crops</td>
</tr>
<tr>
<td><strong>Bob Moore:</strong> Ontario, environmental community</td>
</tr>
<tr>
<td><strong>Marvin Rempel:</strong> Vale, dairy</td>
</tr>
<tr>
<td><strong>Bill Romans:</strong> Westfall, rancher</td>
</tr>
<tr>
<td><strong>Marc Suyematsu:</strong> Ontario, row crops</td>
</tr>
<tr>
<td><strong>Loren Weideman:</strong> hobby farm</td>
</tr>
</tbody>
</table>

2.1.2 Local Management Agency

The implementation of the Area Plan is accomplished through an Intergovernmental Grant Agreement between ODA, Malheur County SWCD, and Harney SWCD. This Intergovernmental Grant Agreement defines the SWCD as the LMA for implementation of the Area Plan. The SWCD was also involved in development of the Area Plan and Area Rules.

2.2 Area Plan and Rules: Development and History

The director of ODA approved the Area Plan and Area Rules in 2001.

Since approval, the LAC met regularly to review the Area Plan and Area Rules. The biennial review process includes an assessment of progress toward achieving the goals and objectives in the Area Plan.

2.3 Geographical and Physical Setting

The Malheur River Basin lies in east-central Oregon and covers 4,610 square miles. About 63 percent of the area is in Malheur County, 27 percent in Harney County, and small areas in Grant and Baker counties. The Malheur River is 190 miles long, and its headwaters are in the Strawberry Range at an elevation of
about 9,000 feet. Principal tributaries are the North Fork, the Middle Fork, and the South Fork. The Middle Fork originates in a federally designated wilderness area. High Lake is the only natural lake of significant size in the basin and is a popular recreation area. However, there are several reservoirs; the largest are Warm Springs, Beulah, Bully, and Malheur. The South Fork has only minor dams.

**Climate**

The climate is semi-arid with hot, dry summers and cold winters. Summer high temperatures average between 85-95°F and can be higher than 100°F. Winter high temperatures average in the 20s and can dip to -45°F. Precipitation averages 8 to 40-inches annually, depending on location and elevation. Most precipitation falls during the winter as snow; this mountain snowpack is an important source of water for irrigation, fish, wildlife, livestock, domestic water supply and other uses.

The area is prone to sudden, short but intense storms. These storms can cause erosion and high amounts of runoff. Despite the dams in the watershed, flooding occurs in the Vale and Ontario areas. Flooding also occurs higher up in the basin. For example, the town of Drewsey experiences floods as often as every 10 years. A primary cause of flooding is rain-on-snow events, when rain falls on snow, exceeds soil water infiltration rates, and water quickly reaches streams and rivers. Soil water infiltration rates are extremely low when the soil is wet and frozen. This occurred during the rain-on-snow event that caused the flood of 1993. Floodwaters can scour stream banks and damage riparian vegetation.

**Topography/Geology**

Most of the basin consists of gently sloping plateau uplands separated by river canyons or valleys. Elevations range from around 2,000 feet near the Malheur River's confluence with the Snake River to mountainous plateaus above 5,000 feet and isolated peaks above 9,000 feet. The Management Area is divided into three main geographic divisions: (1) low elevation terraces and floodplains in the irrigated eastern part, (2) grass-shrub uplands comprising the majority of the basin, and (3) forested uplands in the northwestern portion. These divisions generally correspond to the Snake River plain, Sagebrush steppe, and Blue Mountain provinces.

The low-elevation terraces and flood plains that parallel the Snake River and extend up the valleys of the Malheur River and Willow Creek are important agricultural areas. These irrigated areas are intensively managed for wheat, sugar beets, onions, potatoes, corn, mint, grain, alfalfa seed, vegetable seed, irrigated pasture, and hay.

The grass-shrub uplands consist mainly of rolling, hilly terrain underlain by old sediments, volcanic basalt, and ash deposits. Sagebrush and native bunchgrass communities at higher elevations dominate the Malheur River Basin. Sagebrush/bunchgrass communities are the most widespread types in southeastern Oregon. Sagebrush/annual grass communities are common at lower elevations. Perennial grasslands dominate for long periods following fire due to the reduction of overstory canopy and subsequent release of the grasses. Many of the upper sagebrush steep areas are being invaded by western juniper.

The forested uplands are located in the northwest corner of the basin. Prior to fire suppression, open ponderosa pine stands dominated. Presently, understory conifers and shrubs crowd the forests. More frequent, low intensity fires could reduce this crowding. Forested areas are used for livestock summer range, and are important for deer and elk habitat. Some native hay is produced by flooding the meadow basins at intermediate elevations.

The build-up of fuels in both forests and rangelands is of great concern to watershed health and water quality. This build-up encourages hot destructive fires that burn down to mineral soil and make thousands of acres of land susceptible to erosion to local rivers.
Water Resources

The Malheur River system can be categorized into three separate zones: (1) the upper zone, above all major reservoirs, (2) a middle zone, below the reservoirs to the irrigation diversion dam at Namorf, and (3) a lower zone, from Namorf to the mouth.

Flow in the upper zone is controlled by precipitation and snowmelt patterns that result in natural cycles of high spring flows and low summer flows. Flows on the Middle Fork at Drewsey ranged from 12,000 cubic feet per second (cfs) at peak flood stage to zero during dry years between 1921 and 2012. On the North Fork above Beulah Reservoir, flows ranged from 4,000 cfs to 8.5 cfs between 1914 and 2012. Flow in the middle zone is managed according to irrigation water demand in the lower agricultural valley during the irrigation season (April to mid-October). During the winter months, however, flows are greatly reduced to store water in reservoirs for the following irrigation season. Winter flows are limited to leakage from the reservoirs, natural springs and flows from the undammed South Fork. During the spring, water may be released from the reservoirs in accordance with the rate of snowmelt and inflow into the reservoir. Normally during the irrigation season, water released from Beulah Dam averages between 75 and 300 cfs.

Occasionally, the area experiences winter or spring floods despite the control provided by the reservoirs. This happens after heavy rains or fast snowmelt. These floods can erode streambanks and damage riparian vegetation.

Building a new dam in the Vines Hill area is one way to improve the efficiency of this system. Currently, irrigators must request water from Warm Springs Reservoir four days in advance. This causes several water quality problems. One example is if in that four-day period a storm occurs, it could cause flows beyond what the channel can safely handle. A dam at Vines Hill would reduce the travel time of irrigation water to 12 hours. This greater control would reduce the chances of unexpected high flows and match water deliveries to crop needs. This dam would also capture and store more water for later in the season and keep sediment from continuing down the Malheur River.

Another advantage of this proposed dam is to provide irrigation water if minimal pool levels are maintained in Beulah Reservoir to support bull trout.

The lower zone is characterized by several irrigation diversion dams and is a mixing zone for irrigation return flows from several drain canals and from Bully Creek and Willow Creek. The summer flows vary according to irrigation water demand, amount of water diverted into the various canals, and amount of return flow.

John Fremont described Willow Creek as the “dry fork of the Malheur” in 1843, a wash that his group followed until they cut over the hills toward Farewell Bend (Fremont, 1843). During the summer months, Willow Creek was ordinarily a dry wash from Brogan to the Malheur River until irrigation projects were developed. The natural channel has been modified to facilitate farming, and the creek serves as an important drainage and irrigation canal for farmland in the area. Willow Creek, between Brogan and Malheur Reservoir, was placer-mined and dredged for gold and silver in the past. The flow in this reach of Willow Creek is controlled by water released from Malheur Reservoir. Above the reservoir, water flow is determined by natural cycles and irrigation demand.

Bully Creek is another tributary to the Malheur River. Above the reservoir, water flow is determined by natural cycles and irrigation demand. Much like Willow Creek, the lower reaches of Bully Creek have been straightened to facilitate farming and serves as an important drainage and irrigation canal for farmland in the area.
On October 14, 2016, the Oregon Water Resources Commission approved a request by ODA to extend the term of the Malheur Reservations of Unappropriated Water (OAR 690-510-0110) an additional 20 years so that they expire on January 7, 2037. The total reservation, which has a priority date of November 6, 1992 is comprised of: (a) 35,000 ac-ft of the Malheur River and tributaries, excluding the North Fork and South Fork Malheur rivers; and (b) 13,200 acre-feet of the South Fork Malheur River. Water from the reservations is to be stored in a surface or subsurface multipurpose reservoir; used for future economic development in agriculture, including irrigation and stockwater; agricultural, municipal or commercial use; recreation and hydropower generation.

**Agriculture's Economic Importance to the Management Area**

Agriculture and its related industries are the largest sector of the Malheur County economy. When measured by the percentage of total sales, food crop procurement, and processing, it was the largest industry, followed by crop production; livestock production, procurement and feeding; wholesale and retail trade. Oregon State University (OSU) estimated Malheur County’s gross agricultural income in 2012 at $373,397,000. Cattle and onions were the top agricultural commodities, bringing in about $233,000,000. Part of the income is generated in the Owyhee Watershed.

The 2012 Census of Agriculture estimated that Malheur County had 1,113 farms on 1,076,768 acres.

**Irrigation**

Irrigation practices in the Management Area, particularly in the row crop areas, differ from those in most areas in Oregon.

Furrow irrigation is the primary technique and is a desirable and viable method of irrigation when managed properly. It consists of placing water in furrows and allowing the water to flow downhill by gravity. When the water reaches the end of the field, it is collected in a small ditch, which could direct it to a variety of places. Usually the water is returned to an irrigation ditch and reused by another farmer down the line. By the time the water is returned to the Malheur or the Snake River, it has been used up to seven times. As a consequence of water reuse, the cumulative efficiency of the cooperative system of furrow irrigation is vastly more efficient than calculations of furrow irrigation based on isolated fields.

The Bureau of Reclamation and private companies developed the irrigation system with this reuse of return flow in mind. The system consists of diverting water from a reservoir or from the river to a main canal then to smaller canals and laterals and finally to individual farms. The main canals are arranged one below the next to catch the return flow. During the latter part of the irrigation season, the water in many of these ditches can be largely return flow. For example, by the middle of June in most years, all the water in the Nevada Ditch has been used for irrigation at least once if not many times.

In many ways, this reuse of water is efficient. It helps increase the length of the irrigation season. This system would be difficult to change because of the complexity of its design and the need for groundwater recharge and incidental wetlands.

However, landowners are converting their furrow irrigation systems into more efficient systems where possible. Sprinklers and drip technology apply water more efficiently to crops and result in less soil, fertilizer, and manure runoff to ground and surface water.

**2.4 Agricultural Water Quality**

This Area Plan addresses sediment, nutrients, bacteria, toxics, and temperature concerns related to agricultural activities.
Producers and agencies in the Malheur Watershed have a history of very high voluntary cooperative action to improve water quality. Substantial voluntary cooperative progress has resulted in steep declines in groundwater contamination by the residues of Dacthal and steady declines in groundwater nitrate (Richerson, P.M., 2014; Shock et al., 2001; Shock and Shock, 2012). Voluntarily adopting practices that protect surface and groundwater quality are widespread (Foley, 2013).

The LAC is committed to the rational use of natural resources for income and social welfare of the residents of Malheur County. The LAC is committed to conducting production practices consistent with the preservation of the natural resources of the county including water quality. In keeping with these principles, it is essential that all rules and regulations be based on sound science. Malheur County has low per capita income and high unemployment in comparison with the remainder of Oregon. As a matter of fairness, all aspects of this Plan must be sound and contribute to income and employment.

2.4.1 Water Quality Issues

Fish and aquatic life are considered some of the most sensitive beneficial uses in the basin. The fish-use designation for the lower 65 miles of the Malheur River, along with the lower portions of Willow and Bully creeks, is Cool Water Species (no salmonid use). The headwaters of the mainstem Malheur River, North Fork Malheur River, and Little Malheur River are designated either Bull Trout Spawning and Rearing or Core Cold-Water habitat. The remaining streams in the basin are designated Redband or Lahontan Cutthroat Trout habitat, however, Lahontan Cutthroat are not known to exist in the basin.

The native fish that use the Snake River include bull trout and redband trout, northern pike minnow, large-scale and bridgelip suckers, mountain whitefish, and white sturgeon. Adult bull trout use the river and reservoirs in and below Hells Canyon Reservoir. Bull trout are listed as threatened under the Endangered Species Act (ESA). The river and its tributaries below Hells Canyon Dam also provide habitat for the Snake River fall and spring/summer Chinook as well as steelhead, all of which are listed as threatened under the ESA.

In addition, many people receive their drinking water from wells. Well monitoring studies detected nitrate and Dacthal di-acid contamination in the shallow aquifer within the Lower Willow Creek and irrigated portion of the main Malheur River Basin. This area of the Malheur River Basin was designated a Groundwater Management Area in 1989 by Oregon DEQ for nitrate residue levels.

2.4.1.1 WQ Parameters and 303(d) list

Data indicate that moderate-to-high nutrient and bacteria loading starts in the upper Malheur River above Warm Springs and Beulah reservoirs. Significant increases in bacteria, phosphorus, nitrate, and chlorophyll occur in the lower river below Bully and Willow creeks. Similar dramatically increasing patterns of bacteria and nutrient loading occur in Bully Creek below Bully Reservoir and Willow Creek below Malheur Reservoir.

Table 2 consists of Category 4 and 5 water quality limited streams from DEQ’s 2012 303(d) list. The LAC has serious doubts about whether the contents of Table 2 are all based on sound science.
Table 2: Water-quality limited streams (Category 4 and 5) in the Malheur River Basin Management Area. Values given are river miles.

<table>
<thead>
<tr>
<th>Stream Segment</th>
<th>Temperature</th>
<th>E. coli</th>
<th>Dissolved Oxygen</th>
<th>Biological Criteria</th>
<th>DDT, Dieldrin</th>
<th>Chlorophyll a*</th>
<th>METALS: Arsenic (A), Iron (I), Mercury (M)</th>
</tr>
</thead>
<tbody>
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<td>Alder Creek</td>
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<td>Unnamed tributary (Upper Malheur)</td>
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<td>Unnamed trib (Willow)</td>
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<td>Warm Springs Creek</td>
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*TMDLs established for these parameters

Most non-compliance with water quality standards, e.g. temperature and chlorophyll \( a \), relate to the beneficial use of resident fish and aquatic life. In addition, excessive levels of bacteria (\( E. \ coli \)), nitrates, and toxics can cause problems for people (human contact recreation and drinking water).

Elevated stream temperatures can stress aquatic organisms and deplete oxygen from water. Low dissolved oxygen creates problems for fish and other aquatic life. The LAC believes that much of the elevated temperatures in the watershed are naturally occurring.

Excessive nutrients, such as nitrogen and phosphorus, can increase plant growth, which in turn can increase pH and reduce dissolved oxygen through daily respiration and photosynthesis processes. The nitrate drinking water standard is 10 mg/L.

Nitrate are primarily carried into surface and ground water dissolved in water. Phosphorus can be either dissolved or attached to soil particles. Sediment carried in streams can also impair aquatic life by reducing light penetration and visibility, reducing water infiltration through stream substrate (harming incubating fish eggs), and irritating gill filaments.
Toxics such as arsenic have been found in drinking water wells. The source is likely naturally occurring arsenic within the volcanic rocks of the region (Phil Richerson (DEQ), personal communication, 2014). Of 42 locations (40 wells and two surface drains) sampled by DEQ, 93 percent have average arsenic concentrations exceeding the 10 mg/L drinking water standard.

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

### 2.4.1.2 Groundwater

DEQ developed the Northen Malheur County Groundwater Mangement Area Action Plan to reduce nitrate concentrations to 7 mg/L ([https://www.oregon.gov/deq/FilterDocs/gw-nmccgwma-bmpimplrpt.pdf](https://www.oregon.gov/deq/FilterDocs/gw-nmccgwma-bmpimplrpt.pdf)).

Nitrate concentrations found in the groundwater are strongly influenced by agricultural fertilization, shallow depth to water table, large amounts of irrigation water applied, permeable soil types, and direction of ground water flow. Nitrates were detected in the majority of 25 wells in the Management Area that have been sampled regularly since 1991. Results through December 2012 show that 80 percent exceeded the 10 mg/L standard at least once, 64 percent had an average nitrate concentration above the 7 mg/L target, and 44 percent had an average that exceeded the 10 mg/L standard. The highest nitrate levels were around Vale and Annex.

In 2014, DEQ concluded in their DRAFT Fourth Northern Malheur County Groundwater Management Area Nitrate Trend Analysis Report that:
- The decrease in nitrate concentrations from 1991 through 2012 is statistically significant, even though some wells show increasing trends.
- The Action Plan goal of an area-wide nitrate concentration of 7 mg/L has not yet been met. Area-wide mean and median concentrations are 12.5 and 9.9, respectively.
- Continued and perhaps expanded best management practices implementation is needed.

Dacthal was a commonly used herbicide in onions for decades. It is no longer an issue because growers stopped using it in 1995-1998.

The contamination of nitrates and Dacthal di-acid is believed to have occurred over decades of irrigation. Best management practices to reduce groundwater contamination include (Action Plan; Appendix D):
- Soil, plant tissue, and water testing for precise nutrient management,
- Applying nutrients at agronomic rates specific to each crop,
- Pest management with products with short half-lives,
- Conservation cropping sequence,
- Continuing sound crop rotation,
- Mulching and polyacrylamide (PAM),
- Irrigation water management, including irrigation scheduling,
- Piping or lining irrigation delivery systems,
- Conversion to more efficient systems of irrigation,
• Capturing and reusing field runoff for irrigation.
Additional information is available on the Malheur Experiment Station website (http://www.cropinfo.net/BestPractices/)

Groundwater moves an estimated 0.4 miles per year in the Cairo Junction area, and it may take over 11 years for water in the Cairo Junction area to discharge to surface water. Other estimates have indicated it will take 20 years for the groundwater to move from the upper reaches of the aquifer to the lower discharge areas.

Due to this slow movement of groundwater, it will take decades to realize the full benefit of improved agronomic practices.

2.4.1.3 Surface Water

Cropland drainage systems in the Vale/Ontario area route irrigation discharge waters back to the Malheur River and Snake River. These return flows are usually high in nutrients and sediment. Pastures and cropland runoff can contribute nutrients and bacteria into drainage systems and eventually rivers and streams. Local storm events and spring runoff from snowmelt accelerate this process. Recent efforts incorporating Effective Management Practices has improved surface water quality in some areas.

In 1978, the county appointed a Citizen’s Water Resources Committee to develop a nonpoint source water quality management program. As part of this plan, the county conducted two years of intensive water sampling. The final report documented sediment loss, fecal coliform concentrations above acceptable levels and elevated levels of nitrogen and phosphorus in some areas (Anon., 1981). Malheur County and the Citizen’s Water Resources Committee failed to receive any state agency support to start implementing the county plan at that time.

Upland watershed management is a priority. Desirable upland native vegetation functions as a water trap and filter where rain and snowmelt are captured and incorporated into the sub-surface soil layers. Any reduction of native vegetation or replacement by undesirable species affects water infiltration rates into the sub-soil where surface runoff may supersede infiltration.

Many riparian waterways in the basin have experienced a loss of streambank vegetation due to natural scouring, excessive use by wild and domestic herbivores, road building, and many other causes. Many riparian waterways in the basin have experienced gain in riparian vegetation due to the lowering of grade and the lowering of maximum water flows due to reservoir construction and operation. Vegetation loss results in accelerated bank erosion, lowered water tables, higher stream temperatures, and invasion by more drought tolerant vegetation. Damaged riparian sites constitute a significant loss of an essential component of the watershed’s ecosystem. The original character and functioning ability of streams are changed through the simple mechanics of hydrology because the stream’s ability to store and filter runoff has been changed.

Recharging the sub-surface aquifer with surface water has, in the past, been one of the major contributors to stream flows. With the advent of irrigation and development of reservoirs, water capture and use has greatly changed seasonal stream flow patterns over much of the Management Area. One consequence is that irrigated lands has created and developed shallow aquifers and provide perennial surface flows in streams that used to run dry late in the season. Flood irrigation in the mountain meadow areas also contributes to ground water recharge. For example, the system of dikes and levees maintained by ranchers mimic one aspect of what beavers did historically by storing and dispersing spring floodwaters. In the future, additional groundwater recharge projects may be needed.
Storms contribute large flows into Ontario’s storm drain system. At times, runoff from agricultural areas can flow into drains that run under the city. At one time, these drains were strictly agricultural drains. The city grew over them and they were covered. All flows that enter these storm drains reach the Snake River untreated.

2.4.2 Basin TMDLs and Agricultural Load Allocations

The TMDL was finalized by DEQ in September 2010 and submitted to the US EPA for approval. The TMDL focuses primarily on phosphorus, bacteria, and temperature and contains load allocations for these pollutants. The goal is to meet these load allocations, however, the LAC questions whether the 1) phosphorus target is achievable due to naturally occurring phosphorus in local volcanic-based soils, and 2) shade targets are based on sound science.

Agricultural Load Allocations

Total phosphorus in the Malheur River at Ontario needs to be reduced by 81-87 percent to meet standards in the Snake River, primarily through reduction in sediment in irrigation return flows. Cleaner return flows will also reduce bacteria levels.

The TMDL sets a goal of reducing bacteria in the Malheur River at Ontario by 83% during low flows and 34% during high flows. Bacteria at the mouths of Jacobson and Shepherd Gulch must be reduced by 89-99%. The load allocations are assigned to nonpoint sources of bacteria collectively including agriculture, wildlife, urban and residential land uses. Large bacteria contributions to the Lower Malheur River occur in Vale where Bully Creek and Willow Creek discharge to the Malheur River, along with significant contributions from irrigation return drains in the area. The bacteria load from Willow Creek actually exceeds the load capacity for the Malheur River in Ontario, and Bully Creek had a bacteria load approximately half the load capacity of the Malheur River.

The TMDL states that high water temperatures are to be moderated primarily through improvements in riparian vegetation. The goal of the TMDL is to reduce the amount of solar radiation that reaches the waterway to natural levels. The amount of “load” of solar radiation is measured by DEQ in langleys per day. For the non-scientist, these loads have been translated into ‘percent effective shade’ targets. The LAC questions whether the temperature and shade targets are achievable due to naturally occurring heat load and historic scarcity of tall riparian vegetation capable of shading streams (Clark and Keller, 1966).

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. DEQ does not expect the potential target to be met at all locations due to natural vegetation disturbance.

DEQ modeled current and potential percent effective shade along 100 miles of the upper portions of the Malheur River and North Fork Malheur River. DEQ also created shade targets for ‘non-modeled’ stream reaches. The targets are presented in 25 ‘shade curves’ based on expected native vegetation in different eco-regions.
Historic vegetation is not required along streams, although the shade and function provided by historic vegetation should be targeted. As a general guideline, landowners are encouraged to maintain the widest possible band or buffer of native vegetation along the stream. Streamside vegetation buffers also absorb fertilizer and manure runoff, reduce flood erosion, filter sediment, provide habitat for birds and other wildlife, and may help protect streams from pesticide drift.

**TMDL Water Quality Management Plan**

Excerpts from the *Malheur River Basin TMDL Water Quality Management Plan (WQMP), September 2010* are italicized below:

4.2 Condition Assessment and Problem Description

The Malheur River system is characterized by high levels of nutrients, which trigger algae blooms and depressed oxygen levels that are particularly acute downstream in the Snake River. The lower portion of the river and its tributaries also contain elevated levels of bacteria and the legacy pesticides, dieldrin, and DDT. The upper portions of the Malheur River system do not meet water quality standards for temperature.

4.3 Goals and Objectives

The goal of this WQMP is to reduce nonpoint source pollution in the form of nutrient, bacteria, pesticide, and solar heating to the Malheur River and its tributaries. This goal will be achieved through the implementation of best management practices in agricultural as well as urban areas, and the implementation of riparian vegetation restoration projects. With regard to riparian vegetation restoration, land managers should use the information in the TMDL and referenced documentation as a resource but defer to site-specific conditions when establishing site potential vegetation.

4.4 Proposed Management Strategies

DEQ recognizes that restoration efforts have been underway in the Malheur River Basin for many years. It is also widely recognized that much more work is needed and that success depends on a united proactive approach that involves all stakeholders in the basin. DEQ is reliant upon Designated Management Agencies for programs and projects that will address sources of non-point pollution. The following is a list of conditions that need to be addressed by TMDL implementation plans:

- Healthy riparian vegetation,
- Stable and natural stream channels along with increases in sinuosity and functioning floodplains,
- Upland land management that will support the development of natural stream channels,
- Reductions in nutrient loading (particularly phosphorus) throughout the basin,
- Reductions in bacteria loading,
- Reductions in sediment loading, which will lead to reductions in bacteria, phosphorus, and toxics (legacy pesticides) loading,
- A less “flashy” hydrograph with a reduction in storm-induced runoff along with increased summer base flows above the major reservoirs, and winter base flows below the major reservoirs.

4.5 Timeline for Implementing Management Strategies

DEQ recognizes that it may take from several years to several decades after full implementation of the TMDL before management practices identified in a TMDL implementation plan become fully effective in reducing and controlling forms of pollution such as heat loads from lack of riparian vegetation.

4.9 Identification of Existing Sector-Specific Implementation Plans

Providing information, education, technical assistance, and grant writing assistance to landowners is the primary strategy for ODA and the Soil and Water Conservation Districts to achieve water quality improvement in the Malheur River Basin. The Malheur County and Harney County SWCDs, acting as the
Local Management Agencies, are the lead organizations responsible for implementing this strategy of education and assistance.

4.11 Reasonable Assurance
TMDL implementation plans are not required for irrigation districts within the Malheur River Basin as long as the districts agree to participate in the implementation of the Malheur River Basin [Area Plan]. An implementation plan for the Malheur River Basin TMDL is not required as long as the City of Ontario agrees to support the implementation of the TMDL while conducting activities, which have the potential to impact water quality.

TMDL implementation plans are not required...[from Harney and Malheur counties...at this time as long as the counties agree to support implementation of the TMDL and the Malheur River and Harney [Area Plans].

4.12 Monitoring and Evaluation
It is anticipated that monitoring efforts will consist of some of the following types of activities:

- Reports on the numbers, types and locations of projects, BMPs [Best Management Practices] and educational activities completed.
- Water quality monitoring for parameters such as temperature, sediment, nutrients, bacteria and pesticides.
- Monitoring of riparian condition, percent effective shade, channel type, and channel width/depth to assess progress toward achieving system potential targets established in the temperature TMDL.

5.1 Nutrient, Bacteria and Sediment Load Reduction Activities
Best Management Practices for irrigated agriculture have been developed and implemented on a wide scale. In addition, irrigation systems have been improved by installing concrete-lined irrigation ditches, and piped water delivery systems. Wetlands and sediment ponds have been constructed to trap sediment and reduce nutrient and bacteria concentrations. As described in Section 4.0 of the TMDL document, these actions have resulted measurable reductions in sediment and bacteria concentrations. Reductions in nutrient concentrations have been difficult to document, but the work continues.

Examples of Best Management Practices for Flood Irrigated Lands are listed below (Shock, 2011):

- Irrigation Schedule Optimization
- Sediment Basin and Tail Water Recovery (Pump-Back Systems)
- Polyacrylamide (PAM)
- Mechanical Straw Mulching
- Water Conservation Methods
- Filter Strips
- Gated Pipe
- Surge Irrigation
- Laser Leveling
- Turbulent Fountain Weed Screens
- Underground Outlets for Field Tail Water
- Nutrient Management
- Improved Confined Animal Feeding Operation (CAFO) Practices

1 The LAC also recommends activities that improve efficiency of irrigation water delivery and on-farm distribution systems.
It is unlikely that the 81-87% reduction in total phosphorus calculated for the Lower Malheur River can be practically achieved without very significant commitments of resources to BMP implementation throughout the basin over several decades. However, incremental progress toward the goal will likely have significant benefits to water quality for not only phosphorus but also sediment, pesticides, riparian condition, shade and stream habitat. The goal can be reassessed during 5-year review cycles and modified if deemed appropriate.

5.2 Temperature and Flow Related Mitigation Activities
Possible public and private land non-point source temperature TMDL implementation activities might include some of the following actions:
- Development of alternative forage for livestock displaced by changes in management strategies for riparian recovery and/or fire recovery.
- Development of water reservoirs using reserved water rights.
- Integration of fuel management strategies with riparian vegetation restoration projects.
- In-stream flow restoration related to projects, which increase irrigation system efficiency.
- Aquifer storage projects, which allow the beneficial release of water in late irrigation season.
- Juniper management as a component of watershed restoration.
- Invasive Species Management.
- Feral Horse Management.

2.4.3 Resource Conditions/Assessments

Native American Activities
Humans have influenced resource conditions in the Management Area for thousands of years. Prior to European settlement, ancestors of the Burns-Paiute people sustained themselves with local natural resources. They were called the Wadatika Band, one of several bands of Northern Paiute.

Archeological evidence indicates that native peoples lived primarily near Malheur and Harney lakes 10,000 years ago. They made seasonal migrations in search of food. Small family groups would travel separately. Throughout the year, the groups would hunt deer, elk, mountain sheep, small animals, and birds. In the spring, they would gather roots on the hillsides and meadows and fish for salmon in the Middle Fork of the Malheur River.

The Wadatikas first encountered European fur trappers in the 1820s and Oregon Trail pioneers in the 1840s. Europeans began permanent settlements in the area by the early 1860s. The bands continued their migrations until the U.S. Army broke the seasonal pattern.

By the 1840s, the Northern Paiute bands had acquired horses (Jerofke, 1999). Some reports by early explorers indicate that at least some Paiute bands, in what is now Nevada, had horses before the 1820s. Clearly, horses and other European goods were introduced into the surrounding area by the mid-to-late 1700s (Fowler and Liljeblad, 1986).

After many years and many disputes, the Burns Paiute Reservation was established. Today, individual Tribal members own more than 11,000 acres scattered in areas to the east of the reservation.

Soil Erosion
Historically, upland soils and drainage channels eroded in the basin due to some land use practices and natural causes such as catastrophic storms. Ephemeral drainages (those flowing only during spring runoff and intense summer storms) were deeply incised by gully erosion many years ago. Erosion caused by natural processes, such as flooding, and by concentrated uses still occurs.
Past and current land use management practices have reduced erosion and begun the healing process. Poor agricultural management, both past and present, contributes excessive topsoil and sediment to the Snake River system. However, improved tillage, irrigation, and harvest practices reduce sediment in Management Area waterways. Recent practices of laser leveling, straw mulching, polyacrylamide, filter strips, sediment ponds, and conversion to more efficient irrigation all help retain cropland topsoil, thus reducing and controlling water pollution.

Early livestock use of the Vale-Ontario-Nyssa valleys and surrounding bench lands degraded many range sites. The impacts of continuous livestock use in the 1890s to 1930s caused major shifts in the composition of rangeland vegetation. In addition, low precipitation range sites (9 to 10 inches or less) are very sensitive and are slow to recover.

Riparian Areas
In upper reaches, Kentucky bluegrass and annual grasses have replaced many of the native sedges, rushes, and grasses. Some native riparian areas have been overused by livestock and wildlife and are in poor condition. Drainages have been invaded by juniper and sagebrush due, in many cases, to lowering of the water table and fire suppression. Recent efforts are protecting valuable reaches of riparian habitats through activities such as improved grazing systems.

Road building has influenced streams in the Management Area. When roads were built next to streams, riparian vegetation was often removed and these roads limit the ability to re-establish this vegetation. Reduction of streamside vegetation and road building near streams has caused some loss of proper hydrologic function.

Water diversions and irrigation return flows from agriculture have modified the lower reaches of many streams to accommodate agriculture. Dams and irrigation have altered the natural flow regime of the Management Area. This has several consequences, some of which are positive. For example, reservoir storage means higher flows late in the year and dams capture peak flows, which reduces the potential for stream bank erosion from spring run-off. With less scouring and higher late season flows, riparian vegetation will have a better chance to establish and develop incised channels, especially in the areas that have eroded.

Healthy riparian vegetation benefits farmers and ranchers. Some benefits include increased forage production, reduced streambank erosion, increased late season flows, and stable stream channels.

Noxious Weeds
Noxious weeds are a threat to native ecosystems, competing with native vegetation and changing forage availability for wildlife and livestock. Noxious weeds degrade watershed conditions, often leading to increased runoff and erosion. Weed management is critical in riparian areas to protect water quality. Invasive plant species are also a serious threat to agriculture, impacting both livestock and croplands. Many private landowners are actively controlling or eliminating infestations on their lands. However, control efforts on federal lands lag behind.

In Oregon, noxious weeds have been declared a menace to public welfare. Noxious weeds are present in large enough numbers to be a serious problem in many portions of the Management Area growing along all segments of the Malheur River and its tributaries as well as roadsides.

Higher elevations were relatively free of noxious weeds in the past. However, whitetop and knapweed are presently gaining a foothold in many areas. Yellow star thistle, skeleton weed, and tamarisk pose new threats. Perennial pepperweed grows widely along the South and Middle Forks of the Malheur River;
Scotch thistle poses a danger to the Middle and North Forks of the Malheur River; and Russian knapweed occurs on the North Fork Malheur River.

Along the middle portion of the Malheur River from Juntura to Harper, Scotch thistle and water hemlock are increasing and present real threats of further expansion. Whitetop has become established on many range sites from Juntura to Riverside.

Medusahead rye is commonly found in lower elevation clay soils and has infested many such sites along the South and Main forks of the Malheur River.

Bully Creek is contaminated by Russian knapweed along Indian Creek to Dahle Bridge (over 60 acres). Scotch thistle infests Bully Creek from its headwaters all the way to its mouth at Vale, including the edges of Bully Creek Reservoir. Whitetop also infests thousands of valuable acres of rangeland in this watershed.

Willow Creek is heavily infested with whitetop around Ironside. Scotch thistle grows along the county roads and it is just starting to move off these roads and into the rangeland. Scotch thistle infests Willow Creek from Malheur Reservoir all the way downstream to Vale where it joins the Malheur River. Leafy spurge contaminates Willow Creek from Basin Creek to the diversion dam for the Brogan Ditch. Scotch thistle also infests the land around Pole Creek Reservoir.

The lower portion of the Malheur River is heavily infested with noxious weeds. Perennial pepper weed has taken over some riparian zones. Whitetop, Scotch thistle, Canada thistle, water hemlock, bull thistle, and some Russian knapweed compete with native vegetation. Scotch thistle infests most ditches and adjacent rangeland.

Land managers must use a variety of tools to prevent and control weed infestations in these areas. Some tools available include:

- Livestock grazing,
- Fire,
- Chemical,
- Mechanical, and
- Biological controls.

**Juniper Expansion**

Although western juniper is a native plant, wide expansion of juniper stands threaten the integrity of plant and animal communities and late summer stream flows throughout eastern Oregon. Juniper was naturally restricted to rocky ridges and cliffs where there was little grass to fuel fires, and thus they were protected from fire. Recent efforts to suppress fires have allowed juniper stands to expand and replace more diversified plant and animal communities. Juniper populations are high in parts of the northern and western uplands of the Management Area. Age-class studies conducted elsewhere confirm that most junipers are recent invaders into the landscape.

The more diverse plant communities replaced by juniper support more wildlife and help to provide cleaner, cooler water for streams and forage for livestock. Juniper domination leaves the soil more exposed to rapid runoff and erosion. Juniper may use enough water during the summer to reduce aquifer recharge, an indispensable factor in maintaining late season stream flows. Increased late season flows would help improve water quality.
Only a minority of the land area at the upper elevations in the Management Area may have the potential for storing late winter and early spring precipitation in shallow aquifers. These aquifers slowly release water to upland streams throughout the year, including critical periods in late summer. These same upland areas are being progressively invaded by juniper. OSU Extension in Central Oregon is researching the role of juniper in reducing the capacity of rangelands to store water. Management that emphasizes fire suppression leads to greater juniper invasion and potentially less aquifer recharge. In the Management Area, some areas critical for recharge are already infested with juniper and adjacent areas are full of small trees that could be poised to emerge as major users of deep soil water. Oregon’s commitment to water quality will need to encompass effective juniper control.

**Private Forest Lands**

Forests are located in the northwest corner of the basin. Prior to fire suppression, open ponderosa pine stands dominated. Presently, understory conifers and shrubs crowd the forests. Unnaturally dense stands of trees prevent snowdrift and the deep recharge of aquifers. More frequent fires would reduce this crowding. Thinning is an economically viable option when fire cannot be implemented.

**Livestock**

Gold rushes, mining in southwestern Idaho, and immigration along the Oregon Trail brought settlers into the region. Horses were needed for transportation; cattle and sheep were needed for food. Locally, heavy stocking of domestic livestock probably began with the discovery of gold in 1863. By 1875, cattle, sheep, and horses occupied the grazing land of the basin. Cattle herds expanded in the latter decades of the 1800s as the railroads were extended. By the turn of the century, rangeland deterioration was severe adjacent to areas of settlement at Vale, Harper, Westfall, Brogan, and other settlements along the Malheur River. Land adjacent to these settlements was often grazed year-round including the spring growing season. In addition, historical trailing routes to shipping points at Burns, Riverside, Juntura, Harper, and Vale were used heavily by large numbers of animals.

Higher elevation rangelands were only available for summer use and then only where adequate water was available. Because of the additional livestock management required to use these areas, the intensity of livestock use and resulting impacts were often less than in areas closer to settlements. Many areas remained unavailable to livestock due to lack of water or limited accessibility.

The impacts of livestock grazing from the 1860s through the 1940s were concentrated at low elevations where temperatures were hottest, rainfall the lowest, and the dry season the longest. In these areas, native vegetation communities were replaced with introduced annuals and weedy species. Today, these areas continue to have the greatest need for reestablishment of perennial vegetation.

An account of a trip in 1901 from Winnemucca, Nevada to Ontario, Oregon written by Dr. David Griffiths gives some perspective of what range conditions were and how much progress has been made since this time. He noted that shepherders and some cattlemen ran large numbers of animals in the area and that management consisted of competition to get to the best grass first. According to Griffiths, quarrels over pasturage were common, and when feed was short, some areas were grazed more than once per season. During this era, large numbers of livestock were in the area. Griffiths estimated that more than 180,000 sheep were in the Steens Mountain area alone in addition to cattle. Needless to say, feed was short.

Numerous range improvements to enhance livestock distribution patterns have taken place since the 1930s and continue today. The authorization of the Taylor Grazing Act in 1934 spurred many of these changes. Under this Act, the Secretary of the Interior was to create and enforce rules for using the public lands with the following goal: “To preserve the land and its resources from destruction or unnecessary injury, to provide for the orderly use, improvement, and development of the range.”
A special appropriations bill passed in 1962 funded the Vale Project, a countywide program of land treatments to rehabilitate rangeland resources. Through the end of the Vale Project in 1973, brush control treatments covered 506,570 acres and seeding was implemented on 267,193 acres. Additionally, 1,994 miles of fence were built, 583 small water-retention reservoirs built, 440 springs developed, 28 wells drilled, 463 miles of pipeline laid (including 537 troughs), and 360 cattle guards installed.

Vegetation treatment projects in Malheur County between 1999 and passage of the 1978 Public Rangelands Improvement Act controlled brush on 678,976 acres; seedlings were established on 393,424 acres. Most of these numbers account for what occurred on federal land. The improvements on private land have been extensive but accurate records are not available.

### 2.5 Voluntary and Regulatory Measures

This Area Plan provides farmers, ranchers, and other agricultural land users in the Management Area a tool to achieve the following conditions on the land they occupy and manage:

1. Minimize delivery of sediment, nutrients, and bacteria to streams.
2. Minimize delivery of nitrates and pesticides to groundwater.
3. Sediment in irrigation return flows within acceptable levels.
4. Stream bank erosion within acceptable levels.
5. Adequate riparian vegetation for bank stability and stream shading consistent with vegetative site capability.
6. Sufficient vegetation on rangelands and pastures to filter sediment, utilize nutrients, control soil erosion, optimize infiltration of water into the soil profile, and minimize the rate and maximize the duration of runoff from precipitation.

Voluntary efforts are the focus of the ODA, Malheur County SWCD and LAC. However, a landowner may refuse to take advantage of voluntary compliance opportunities. In this case, ODA has enforcement authority to ensure pollution control. According to the Management Area Regulations (OAR 603-095-0940), “A landowner shall be responsible for only those conditions caused by agricultural activities conducted on land controlled by the landowner. A landowner is not responsible for prohibited conditions resulting from actions by another landowner. Conditions resulting from unusual weather events (equaling or exceeding a 25-year storm event) or other exceptional circumstances are not the responsibility of the landowner. Limited duration activities may be exempted from these conditions subject to prior approval by the department.”

### #1 - Pollution Control and Waste Management

Agricultural activities can affect surface water nutrient concentrations in many ways. Improper application of fertilizer can contaminate shallow groundwater, which in turn can pollute domestic wells and surface water. Surface water can be polluted directly by irrigation return flows carrying high levels of nutrients or bacteria. Improper management of accumulated manure can contribute bacteria and nutrients to surface water.

**Objective:** Reduce waste discharge to the maximum extent practicable.

**Performance Criteria**

1. Runoff is diverted away from accumulated waste or areas of high animal usage.
2. Accumulated manure is placed on low-permeability surfaces, such as concrete, clays, or compacted silts where water does not pond.
3. Animals are confined where there is little chance of transporting pollutants to waters of the state.
4. Crop nutrients are applied at agronomic rates.
5. Irrigation water is cleaned or captured before it enters streams.

Prohibited Condition (OAR 603-095-0940(2))

**Effective upon adoption:** No person subject to these rules shall violate any provision of ORS 468B.025 or ORS 468B.050.

**#2 – Sediment in Irrigation Return Flows**

Sediment is defined as soil particles, both mineral and organic, that are in suspension, are being transported, or have been moved from the site of origin by flowing water or gravity. Excessive levels of sediment in tailwater discharges can harm aquatic life and can carry nutrients, particularly phosphorus, into streams and rivers.

The LAC and ODA worked hard to develop a reasonable approach to controlling sediment levels in irrigation return flows. This is a particular concern in the Management Area because of the existing primarily furrow irrigation system.

**Objective:** Control irrigation surface water return flows so they minimize degradating water quality on the stream into which they flow.

**Performance Criterion**

Sediment is captured from irrigation runoff before it enters rivers and streams.

Prohibited Condition (OAR 603-095-0940(3))

(a) After January 1, 2006, irrigation surface water return flow to waters of the state shall not cause an excessive, systematic, or persistent increase in sediment levels already present in the receiving waters, except where the return flows do not cause the receiving waters to exceed established sediment standards.

(b) A landowner conducting irrigation activities in accordance with a plan approved in writing by the department or its designee shall be deemed to be in compliance with this rule.

**#3 - Riparian Area Management**

Vegetation, both in the uplands and in the riparian area, plays a critical role in water quality. Generally, healthy plant communities:

- Hold soil in place,
- Protect streambanks,
- Capture, store, and safely release precipitation,
- Filter nutrients from both the groundwater and surface runoff, and
- Provide shade to moderate water temperatures.

Stable streambanks reduce sedimentation and nutrient inputs into streams. They help moderate water temperatures because average water depth is greater, and banks in good condition provide cover and resting places for fish as well.

In addition to the water quality benefits, healthy terrestrial vegetation contributes to improved fish habitat. Riparian vegetation protects spawning, rearing, and holding areas by trapping sediment that could smother eggs and by improving the recruitment of large woody debris. This debris helps to create pools for fish to rest in, provides hiding cover, and habitat diversity. Vegetation provides organic debris to feed aquatic insects, which are an essential element in the diets of many fish.
Riparian vegetation, consistent with site capability, is a cost-effective means of reducing stream bank erosion and heating from solar radiation. Research and practical examples have shown that land managers can maintain riparian health and conduct agricultural activities as well.

Objectives: Riparian vegetation provides 1) sufficient root mass for stream bank stability, and 2) shading to reduce the solar heating rate of surface water. Riparian systems withstand a 25-year event.

Performance Criteria
An effort to systematically assess current conditions and determine vegetative site capability in the planning area will be done at a future date.

Technical criteria to determine attainment of this condition include but are not limited to:
1. Ongoing natural recruitment of riparian vegetation is evident.
2. Management activities minimize the degradation of established native vegetation.
3. Management activities maintain at least 50% of each year’s growth of woody vegetation; both trees and shrubs.
4. Management activities maintain streambank integrity through 25-year flood events.

Prohibited Conditions (OAR 603-095-0940(4) and (5))

(4)(a) By January 1, 2006, no person may cause active streambank erosion beyond the level that would be anticipated from natural disturbances given existing hydrologic characteristics. 
(5)(a) By January 1, 2006, no conditions are allowed that prevent the establishment and development of adequate riparian vegetation consistent with vegetative site capability to control water pollution by providing control of erosion, filtering of sediments, moderation of solar heating and infiltration of water into the soil profile.

#4 - Rangeland and Pasture Management
Desirable upland native vegetation functions as a water trap and filter, where rain and snowmelt is captured and incorporated into the sub-surface soil layers. Any decline in range condition, as measured by the NRCS’s site guides, affect water infiltration rates into the sub-soil where surface runoff may supersed infiltration. Reducing infiltration rates lead to damaging floods, erosion, and lower late season flows. Although riparian areas are vital to water quality, they comprise only a small percentage of the landscape. It is important for water quality purposes to maintain and improve the condition of all vegetation in the watershed.

Objective: Protect and improve range conditions.

Performance Criteria
1. Plant community is dominated neither by invasive annual plant species nor by overgrowth of native woody species.
2. Plant cover (plants plus plant litter) is adequate to protect site.
3. Distribution and amount of bare ground does not exceed what is expected for site.
4. Livestock utilization patterns do not exhibit excessive, sustained use in key areas.
5. Plant vigor levels and regeneration are sufficient to protect long-term site integrity.
Prohibited Condition (OAR 603-095-0940(6))

(a) By January 1, 2006, vegetative condition on rangelands and pasturelands shall be managed such that the functionality of the watershed is not impaired. Watershed function includes the ability of vegetation to filter sediment, utilize nutrients, control soil erosion, optimize infiltration of water to the soil profile, and minimize the rate and maximize the duration of runoff from precipitation.
(b) A landowner conducting range and pasture management activities in accordance with a plan approved in writing by the department or its designee shall be deemed to be in compliance with this rule.

The following regulations provide for resolution of complaints.

Complaints and Investigations (OAR 603-095-1160)

(1) When the department (ODA) receives notice of an apparent occurrence of agricultural pollution through a written complaint, its own observation, through notification by another agency, or by other means, the department may conduct an investigation. The department may, at its discretion, coordinate inspection activities with the appropriate Local Management Agency.
(2) Each notice of an alleged occurrence of agricultural pollution will be evaluated in accordance with the criteria in ORS 568.900 to 568.933 or any rules adopted thereunder to determine whether an investigation is warranted.
(3) Any person allegedly being damaged or otherwise adversely affected by agricultural pollution or alleging any violation of ORS 568.900 to 568.933 or any rules adopted thereunder may file a complaint with the department.
(4) The department will evaluate or investigate a complaint filed by a person under section OAR 603-095-1160(3) if the complaint is in writing, signed and dated by the complainant and indicates the location and description of:
(a) The waters of the state allegedly being damaged or impacted; and
(b) The property allegedly being managed under conditions violating criteria described in ORS 568.900 to 568.933 or any rules adopted thereunder.
(5) As used in section OAR 603-095-1160(4), “person” does not include any local, state or federal agency.
(6) Notwithstanding OAR 603-095-1160, the department may investigate at any time any complaint if the department determines that the violation alleged in the complaint may present an immediate threat to the public health or safety.
(7) If the department determines that a violation of ORS 568.900 to 568.933 or any rules adopted thereunder has occurred, the landowner may be subject to the enforcement procedures of the department outlined in OARs 603-090-0060 through 603-090-0120.
Chapter 3: Strategic Initiatives

Goal

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

The primary methods to protect water quality in the Management Area are:
- Keep soil in place on both crop and rangelands
- Keep streambanks vegetated

Landowners are expected to achieve the following conditions on the land they occupy and manage:
1. Minimize delivery of sediment, nutrients, and bacteria to streams.
2. Minimize delivery of nitrates and pesticides to groundwater.
3. Sediment in irrigation return flows within acceptable levels.
4. Stream bank erosion within acceptable levels.
5. Adequate riparian vegetation for bank stability and stream shading consistent with vegetative site capability.
6. Sufficient vegetation on rangelands and pastures to filter sediment, utilize nutrients, control soil erosion, optimize infiltration of water into the soil profile, and minimize the rate and maximize the duration of runoff from precipitation.

While emphasizing commodity production, partners must ensure that surface water and groundwater influenced by agricultural activities comply with or are making measurable progress toward achieving water quality standards.

Progress towards the goal depends on increased public support of landowners to implement projects and to the agencies and other entities that support these efforts.

Farmers, ranchers, and other agricultural land users have made much progress towards meeting these conditions and they must continue to adapt their management techniques so that they can control the conditions on their property.

3.1 Measurable Objectives

To measure progress, ODA, in consultation with the LAC, DEQ, and the Malheur County SWCD will identify timelines and interim benchmarks for agriculture to strive for over designated time periods and at a scale suitable for measuring progress. The benchmarks will be documented in the Area Plan and reported in the biennial reports prepared for the Board of Agriculture. ODA will consult with DEQ on the adequacy of the Area Plan in making significant progress toward meeting water quality standards and the pollutant reduction targets set in the TMDLs.

Measurable objectives have been identified for the Focus Areas (see section 3.3); these objectives will be refined over time.

3.1.1 Focus Areas

There is one Focus Area and one Special Emphasis Area in this Management Area.
3.1.1.1 Coyote Gulch/Hyline Bench Focus Area (Malheur County SWCD)

The Coyote Gulch area consists of about 17,000 acres that drain to the Snake River via Shepherd and Coyote gulches (pink outline). The Focus Area used to consist of this entire area, however, it was narrowed in January 2017 to the green area on the map: the NRCS Hyline Bench Conservation Implementation Strategy Area (CIS).

Figure 4: Shepherd and Coyote Gulch Area

The CIS consists approximately of the irrigated land between the Owyhee Irrigation District Main Canal and Highway 201. This area is being addressed in five phases, starting in the south. Each of the five areas drains to a specific lateral. Laterals will be piped and landowners will improve irrigation water management to minimize runoff and use irrigation water most efficiently. The northern areas drain to Shepherd Gulch; the southern areas to Coyote Gulch. It is hoped that work in the entire Focus Area will be completed in about 10 years.

Water quality has been monitored since 2013 (pink squares). The North Canal location characterizes the delivery water to the Focus Area. In 2013 and 2014, the SWCD collected samples approximately monthly year-round. In 2015 and 2016, the SWCD sampled only during the irrigation season due to budget cuts. Parameters were:
- Total phosphorus,
- Total suspended solids, and
- E. coli

Figure 5: Log 10 – Phosphorus Sample

Phosphorus and total suspended solids were highest in the spring and summer (irrigation season). They also increased significantly as samples moved from the North Canal to the mouths of the drains.

Almost all phosphorus sampled from the Main Canal was below the Snake River-Hells Canyon TMDL target of 0.07 mg/L of total phosphorus. All samples of phosphorus from
the irrigated lands exceeded the target; all the minimum values recorded exceeded the target by at least 67 percent.

Several *E. coli* samples exceeded Oregon’s grab sample criterion of 406 colonies per 100/mL and the averages were relatively low. However, the samples with high values could indicate some potential problems with bacteria entering the drain water.

The clear correlation between total suspended solids and total phosphorus indicates the drain water is receiving high levels of sediment that is carrying high amounts of phosphorus during the irrigation season. These levels are high enough to cause concern for water quality problems in the Snake River and eventually the Columbia River. It is likely that irrigation-induced erosion from furrow irrigation is the cause of the high levels of solids and nutrients in the drain water. Bacteria levels are of concern but less so compared to the nutrient and sediment problems.

All irrigated acreage is assessed as indicated in the following tables.

**Table 3a: Sediment: Categories for assessing likelihood of contributing sediment to irrigation runoff**

<table>
<thead>
<tr>
<th>Class</th>
<th>Visible signs of field irrigation-induced erosion</th>
<th>Irrigation water leaving the control of the landowner and/or entering commingled water</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>None or minimal</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Class 2</td>
<td>Yes</td>
<td>Clear or none</td>
<td></td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>Dirty</td>
<td>Water entering field from neighbor</td>
</tr>
<tr>
<td>Class 3</td>
<td>Yes</td>
<td>Dirty</td>
<td></td>
</tr>
</tbody>
</table>

**Table 3b: Livestock manure: Categories for assessing likelihood of contributing bacteria to irrigation runoff**

<table>
<thead>
<tr>
<th>Class</th>
<th>Vegetated buffer zone</th>
<th>Timing of grazing in relation to wet periods (rain and irrigation)</th>
<th>Bare areas in pasture within 50 feet of waterbody</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>Yes</td>
<td>Timed to avoid runoff of potential pollutants</td>
<td>No</td>
</tr>
<tr>
<td>Class 2</td>
<td>Yes</td>
<td>Shortly before wet periods, resulting in potential runoff</td>
<td>No</td>
</tr>
<tr>
<td>Class 3</td>
<td>No</td>
<td>During wet periods resulting in runoff</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Current efforts are focused on Phases A and B.

A primary question for the Coyote Gulch Area is: How much will pollution at the mouth of Coyote Gulch be reduced after all Class 3 acreage improves to Class 2?

**Measurable Objectives for mouth of Coyote Gulch**

Current conditions:
1. Class 3 = 2,893 acres
2. Sediment and total phosphorus loads are 4,203 and 15.1 pounds/day, respectively, during the irrigation season
3. *E. coli* concentrations average 1,333 colonies/100 mL

June 30, 2017 milestone:
1. Reduce Class 3 acres by 10% to 2,604 acres
By June 30, 2027, the goals are to accomplish the following:

1. Reduce Class 3 acres by 90% to 289 acres
2. Reduce sediment and total phosphorus loads during irrigation season by 20%
3. Reduce \( E. \ coli \) concentration below 406 colonies/100 mL

Phosphorus and sediment loads will be compared against the average of the loads from samples collected in June, July, and August in 2015 and 2016.

3.1.1.2 Willow Creek Special Emphasis Area (Malheur Watershed Council)

The Willow Creek Working Group; Malheur Watershed Council; irrigators; Vale; Warm Springs, Owyhee, and Orchard irrigation districts; and many other partners have been working on water quality improvement projects in the Willow Creek watershed for over a decade. Landowners in the watershed have been very open to completing a variety of projects, including irrigation system efficiency upgrades, pump back systems, polyacrylamide applications for erosion control, manure management, no-till and strip-till cropping systems, rotational grazing, streamside fencing, off-stream watering, and other projects that improve water quality.

3.1.2 GWMA

The goal of the GWMA Action Plan is to reduce nitrate concentrations to 7 mg/L. No milestones have been set by DEQ.

3.1.3 Strategic Implementation Area

In 2018, ODA selected the Lower North Fork Malheur River as the first SIA in the Management Area. This SIA consists of 153,000 acres, of which approximately 45,000 are private agricultural lands (grazed rangelands and irrigated pastures). ODA staff evaluated 173 tax lots, of which only three were classified as potential violations, and two as opportunities for improvement. Primary water quality concerns were: insufficient streamside vegetation due to excessive livestock use and runoff from heavy use areas entering irrigation ditches. ODA held an informational Open House for landowners in December 2018 and the Malheur County SWCD has started working with landowners to address concerns. Water releases from Beulah Reservoir may affect the success of streamside projects below the reservoir.
3.2 Strategies and Activities

Conservation partners plan to achieve the Area Plan goal by:

- Encouraging voluntary compliance by agricultural producers with federal and state requirements through educational programs, conservation planning, technical assistance, and financial assistance.

The strategy relies on existing and expanded programs, while focusing on proactive planning for conditions that are the most significant controllable sources of nutrients, sediment, bacteria, and other sources of pollution.

Education and conservation planning are the heart of the implementation strategy. However, if a situation occurs where a landowner’s management is causing a water quality problem and all attempts at encouraging voluntary correction fail, the ODA also has enforcement authority to ensure correction of the problem.

3.2.1 Education

The Malheur County SWCD coordinates education efforts and works with partner agencies such as ODA, NRCS, OSU Extension Service, Malheur Experiment Station, and Malheur Watershed Council to carry out the education strategies outlined in this Plan. The focus of the educational effort is:

- Describing historical changes in land management practices,
- Conservation planning,
• Prevention, restoration, and enhancement using effective management practices,
• Proper management of small acreages,
• Programs and project funds available for conservation efforts,
• Riparian areas – issues and considerations, and
• Water quality conditions.

Tasks:
1. Conduct education programs to promote awareness of water quality issues and their solutions:
   a. Conduct workshops on water quality issues and the conservation practices that will help improve water quality.
   b. Develop demonstration projects to showcase successful conservation practices and systems.
   c. Organize tours of demonstration projects for agricultural managers and producers.
   d. Produce and distribute brochures about water quality issues.
   e. Encourage agricultural operators to share their Effective management practices with others by speaking at meetings and participating in tours.
2. Develop an ongoing media program to inform Management Area public and agricultural operators of conservation issues and events:
   a. Submit news articles and public service announcements to area newspapers, radio stations, and newsletters. In particular, target the agricultural programs on the radio.
   b. Invite media to conservation tours and workshops.
3. Build partnerships with agribusiness to promote conservation:
   a. Co-sponsor workshops and tours.
   b. Share education materials with agribusiness field representatives.

3.2.2 Conservation Practices and Technical Assistance

While the success of the plan depends on the cooperation of agencies and volunteer organizations, only individual producers can adopt conservation measures to improve water quality. Many producers are already preventing and controlling water pollution. However, more people need to adopt better management strategies. The LAC has chosen to call these strategies Effective Management Practices. Our definition is:

• Effective and practicable means of preventing or reducing the amount of pollution to a level compatible with watershed plan goals. Effective Management Practices may include structural and nonstructural practices, conservation practices, and operation and maintenance procedures.
• Actions taken by each individual agricultural operation to achieve production and water quality goals. Landowners are encouraged to develop and implement conservation plans.

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 Conservation Plan.

A Conservation Plan is a comprehensive land management plan formulated by the farm operator and used for making decisions about applying Effective Management Practices to conserve soil, water, plant, and animal resources on all or part of a farm. The Conservation Plan addresses site-specific problems through the selection of individual Effective Management Practices or Effective Management Systems to be implemented for the protection of natural resources.

Landowners or operators, consultants, or technicians available through the SWCD, NRCS or other conservation partners may draw up a Conservation Plan. A Conservation Plan does not guarantee
compliance with the Area Rules, unless it is submitted to ODA and approved as containing sufficient specific measures to prevent and control the prohibited conditions described in the Area Rules.

Tasks:
1. Foster the development of new Effective Management Practices
   a. Continue developing innovations in drip and other types of irrigation.
   b. Determine the effects on stream flows and on grazing of the conversion from sage and juniper dominated communities to communities dominated by herbaceous plants.
   c. Determine site capabilities of riparian areas to support water quality.
      i. Determine and map riparian site capability.
      ii. Publicize better understanding of southeastern Oregon ecosystems and their site capabilities to the general public and to the agricultural community in particular.
   d. Determine the season and intensity of grazing in riparian zones compatible with the maintenance and vigorous recovery of riparian vegetation and stream functions.
   e. Determine which combination of treatments is needed to achieve effective weed control on public and private land to protect agriculture and water quality.
      i. Continue existing educational programs promoting weed identification and control.
      ii. Determine what forage species could be combined with biological and/or herbicide control measures to compete with noxious weeds.
      iii. Apply for grant money to supplement private landowner weed control efforts.
   f. Examine how to manage constructed wetlands placed within surface drainage ditches and at the ditch outlets to prevent and control sediment and nutrient inputs into rivers and creeks.

3.2.3 Financial Assistance

Conservation partners, including landowners, need adequate funding for administration and implementation of the program.

Tasks:
1. Ensure adequate administration of the Area Plan.
   a. Malheur County SWCD includes Area Plan implementation in its annual and long-range work plans.
   b. Find funding to implement projects.
      ii. Submit grant applications to USDA, US EPA, DEQ, ODA, and other funding sources for demonstration and conservation projects.
      iii. Submit progress reports to grant sources.
      iv. Form partnerships with the agribusiness sector for additional funding.
      v. Promote USDA incentive-based cost-share programs to assist producers with conservation plan implementation.

3.3 Monitoring and Evaluation

This section describes current monitoring and evaluation activities. Results are presented in Chapter 4.

3.3.1 Surface Water and Landscape Conditions

Landowners need the means to determine where the problems are and what they can do to correct them.
Multiple partners are monitoring the watershed to 1) understand pollutant dynamics, 2) decide where to focus on-the-ground work, and 3) show improvements as a result of livestock, nutrient, and irrigation management. With this information, the LAC, the SWCD, and ODA will continue to refine and improve this Area Plan.

The Malheur County SWCD, Malheur Watershed Council, OSU, NRCS, ODA, and additional partners work together on the following tasks to support landowner efforts:

1. Evaluate changes in land and water quality conditions.
   a. Inventory and assess baseline watershed conditions and sources of pollution in the Management Area. Stream flows and water quality are tracked by the Malheur County SWCD, Malheur Watershed Council, DEQ, Bureau of Reclamation, US Geologic Survey, and Idaho Power. Landscape conditions are tracked by ODA and the Malheur County SWCD.
   b. Establish a plan of monitoring streams and surface water areas that accurately reflects current water quality conditions. DEQ and ODA are leading this effort.
   c. Inform partners and landowners of monitoring results.
      i. Presentations to irrigation districts by Malheur County SWCD,
      ii. Presentations to LAC and summaries in Area Plans,
      iii. Reports on WID and Nevada-Blanton monitoring projects provided by ODA,
      iv. Monitoring reports on Malheur Watershed Council website,
      v. The Malheur Watershed Council has hired a contractor to develop a monitoring strategy.

2. Determine number of producers implementing Effective Management Practices.
   a. Document the number of plans written and the acreage involved and the types of practices implemented. The SWCD does this in Focus Areas; the Malheur Watershed Council have provided reports for Willow Creek.

3. ODA monitors prohibited conditions in the Management Area.
   a. Document the number of complaints.
   b. Inventory key areas in the watershed for prohibited conditions. ODA has selected the lower North Fork Malheur River as its first Strategic Implementation Area.

3.3.1 Malheur River and its Tributaries
The Malheur Watershed Council continues to monitor on a basin-wide scale including a return to sites previously sampled by DEQ in preparation for the 2010 Malheur River TMDL. The Council is also partnering with the Malheur County SWCD on some monitoring to better coordinate efforts across the basin.

3.3.2 Irrigation Drains and Landscape Conditions

The SWCD continues to focus water quality monitoring efforts on irrigation-related water quality in the lower Lower Malheur River and drains to the Snake on the Oregon Slope and around Ontario.

In 2013-2015, monitoring was focused on the Nevada-Blanton Drainshed west of Ontario, which consists of approximately 6,000 acres between the Malheur River, Nevada Ditch, and Blanton Drain. The Blanton Drain contributes high amounts of phosphorus and sediment to the Malheur River, second only to Willow Creek. The goal is to reduce sediment and phosphorus inputs into the Malheur River from the Blanton Drain by 50 percent by an as-yet-undetermined date, however, this area has not been made a priority by the irrigation district.
The SWCD is monitoring upland conditions in their Focus Areas by evaluating irrigated lands for likelihood of irrigation runoff and contribution of pollutants to waterways (see Section 3.1.1.1). Their current Focus Areas are Coyote Gulch and Morgan Avenue.

### 3.3.1.3 Historical Water Quality Database

ODA staff worked with the Malheur Watershed Council, Malheur Co SWCD, DEQ, OSU Experiment Station, Idaho Power, and Bureau of Reclamation to gather all flow and water quality data collected in the Management Area through 2016. The result is almost 11,000 samples collected from over 150 locations since 1960. The spreadsheet and GIS files are available on request. These data are in the process of being analyzed to determine:

- Long-term water quality trends,
- Priority areas for on-the-ground projects,
- Background levels of nutrients and sediment,
- Data gaps,
- Future monitoring activities.

### 3.3.1.4 DEQ

- DEQ monitors six sites in the Management Area as part of their ambient monitoring network (Malheur River at Ontario, Little Valley, and Drewsey; Willow Creek at Vale and Jamieson; and Bully Creek at Hwy 20).

- DEQ retrieved data from DEQ, EPA, and USGS databases for January 1, 2000 to October 1, 2018 for the Management Area. DEQ determined status for stations with data from 2016 through 2018 and trends for stations with at least eight years of data. Their report is summarized in Chapter 4 and can be found at [http://www.oregon.gov/deq/wq/programs/Pages/wqstatustrends.aspx](http://www.oregon.gov/deq/wq/programs/Pages/wqstatustrends.aspx). The report will be updated for future biennial reviews.

### 3.3.2 GWMA

DEQ continues to collect data from the well network four times per year. The most recent comprehensive Trend Analysis Report is dated August 2015 and includes data through 2012. There has been no subsequent report.

All monitoring results are presented in Chapter 4.
Chapter 4: Implementation, Monitoring, and Adaptive Management

4.1 Progress Toward Measurable Objectives

4.1.1 Coyote/Hyline Bench Focus Area

Within the Coyote/Hyline Focus Area the percentage of land in Cass 1 has more than doubled since 2015. While there is no discernable changes in orthophosphorus, total phosphorus, or total suspended solids concentrations at the monitoring location on the Coyote Drain at Pioneer Road. We know at least a quarter of the drainshed for that monitoring location is likely not included in the Focus Area, therefore, comparisons cannot be made between changes on the landscape and at Coyote.

Table 4: Land Condition

<table>
<thead>
<tr>
<th>Class</th>
<th>Land Condition: % of Acreage (6,156 acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2015</td>
</tr>
<tr>
<td>1: least potential for pollution</td>
<td>15</td>
</tr>
<tr>
<td>2: moderate potential</td>
<td>22</td>
</tr>
<tr>
<td>3: most potential</td>
<td>62</td>
</tr>
</tbody>
</table>

4.1.2 Willow Creek Special Emphasis Area

Funding agencies have invested close to $8 million in improvements in the watershed with landowners and irrigation districts contributing more than $8.5 million in-kind cash, labor and equipment use. Work in this area continues with four miles of lateral piping planned over the next couple of years.

The Malheur Watershed Council compiled the following accomplishments from 2003 through 2015:

- 100+ miles of laterals piped, serving 30,000 acres,
- 18 miles of mainlines and delivery systems piped,
- 4.5 miles of drains and canals piped,
- 15 pump-back systems serving 1,175 acres,
- 12,000 acres converted from flood to sprinkler, resulting in yield increases up to 35%,
- 20 off-stream watering troughs,
- 2 miles of pipe for troughs,
- 2.5 miles of cross-fencing,
- 300 head feedlot moved from streamside,
- 15 miles of riparian and wetland protection fencing,
- 3 wetland filter ponds,
- 755 acres of rangeland improved.

As a result:

- 124,320 pounds of phosphorus kept out of streams annually,
- 240,000 tons of soil kept out of streams,
- 183 billion colonies of E. coli per acre kept out of field runoff,
- 20,000-40,000 a-ft saved annually due to irrigation improvements,
- In a normal water year, maintain the minimum 3,000 acre-feet pool in Beulah Reservoir established to protect bull trout.
During 2015-2017, the Malheur Watershed Council (MWC) completed projects covering 285 acres. The main focus of these projects was to protect water quality by preventing contaminated runoff from entering surface water, and irrigation efficiency improvement by converting flood irrigation systems to sprinklers. In 2015, MWC updated their Malheur Basin Action Plan after conducting several regional public meetings to get feedback on what the local landowners felt were the problems and how they wanted to address them. The Council has continued to pipe large irrigation laterals in the Vale Oregon Irrigation District area. One recently finished project piped 8,780 feet of lateral and they received funding to begin piping another 21,400 feet along 17 laterals over the next three years. MWC conducted a series of regional town hall style meetings to get in touch with landowners in some new areas. We wanted feedback from locals on their biggest concerns and most important issues. The area Small Grant Team, funded through OWEB and led by MWC, allocated $100,000 on watershed improvement projects covering 255 acres. Under this program, landowners have supplied more than $516,000 of in-kind contributions.

### 4.1.3 Northern Malheur County GWMA

DEQ continues to collect data from the well network four times per year. The most recent comprehensive Trend Analysis Report is dated August 2015 and includes data through 2012. There has been no subsequent report.

### 4.2 Activities and Accomplishments

The goal of this Area Plan is to improve water quality by reducing sediment, nutrient, and bacteria and improving riparian vegetation. As DEQ indicates in their TMDL, improvements in water quality may take years to document.

Cooperative Actions:
The various agencies working in the Malheur Watershed cooperate with ranchers on initiatives to control juniper and invasive weeds and provide noxious weed identification and weed control education.
Malheur County has the most active irrigation education program in Oregon with many research studies, field demonstrations, field days, workshops, and new publications for growers and ranchers.

In addition, the Harney County SWCD has implemented projects in the upper part of the Management Area.

Oregon State University Extension and Experiment Station staff focused efforts on irrigation:

- Continued work on micro-irrigation strategies for various crops,
- Tracked *E. coli* in irrigation water in response to the Food Safety Modernization Act,
- Encouraged use of evapotranspiration values and soil moisture monitoring technologies including remote platforms to help with irrigation scheduling,
- Collaborated on bus tours and local outreach meetings with the Malheur Watershed Council.

### Table 5: Cooperative Actions in Malheur Watershed

<table>
<thead>
<tr>
<th>Condition Addressed</th>
<th>Monitoring</th>
<th>Outreach/Education</th>
<th>Implementation-Completed</th>
</tr>
</thead>
</table>
| Irrigation-induced erosion           | - Sampling 4 drains in Coyote Gulch Focus Area                             | - Landowner meeting for Jacobson Gulch area with NRCS, Malheur Watershed Council, | In progress:
|                                      | - Sampling 22 drains for Total Phosphorous, Ortho-phosphorous, Total Suspended Solids, *E. coli* | - Shared water quality data with Extension, producers, ODA for FSMA and continuation on the Malheur FSMA Committee | - Install 2 pivots in Coyote Gulch Focus Area
|                                      |                                                                           |                                                                                   | - Irrigation system in Juntura                                                          |
| Riparian conditions in the upper watershed |                                                                           |                                                                                   | - Stabilized 4,600 feet of Little Malheur streambank with rootwads, willow planting, willows, and fencing of willows.                                    |
|                                      |                                                                           |                                                                                   | Projects that are not complete but being implemented:
|                                      |                                                                           |                                                                                   | - Remove 831 acres of juniper with snags being placed in washed out riparian areas;    |
|                                      |                                                                           |                                                                                   | - Remove 3,001 acres of juniper; reseed 500 acres;                                    |
|                                      |                                                                           |                                                                                   | - Plan for 5,000 acres on uplands, treat 200 acres with a fire strip and replant burned area with native and non-native seed. Fence off 1 mile of riparian area with a buck and pole fence. Install solar system to pump from well to a trough outside riparian area; |
|                                      |                                                                           |                                                                                   | - 2 miles of riparian work with Malheur Watershed on Clover Creek. Remove juniper from 105 acres of aspen. Remove 60 acres of juniper from riparian area; |
| Bacteria/nutrients from livestock    | See above                                                                 |                                                                                   | - 20,258 feet of wildlife fencing to create a 140 acre riparian pasture along 1.6 mile of creek, willow planting and aspen. Spring development with solar for 4 troughs in 4 different pastures to spread cattle grazing and a 6000 gallon storage tank; |
|                                      |                                                                           |                                                                                   | - Treat 3,001 acres of juniper with 500 acres of reseeding;                          |
|                                      |                                                                           |                                                                                   | - Burn and spray 500 acres of Medusahead with replanting;                           |
|                                      |                                                                           |                                                                                   | - North Fork streambank stabilization 1,800 feet with rock wadis, rock willow planting tree planting with Malheur Watershed Council.            |
4.3 Monitoring—Status and Trends

4.3.1 Water Quality

Nevada-Blanton
A detailed analysis of three years of data from 12 stations resulted in the following conclusions:

- The Nevada-Blanton drain network is a net contributor of sediment (total suspended solids) and phosphorus to the Malheur River.
- Most sediment and phosphorus removed from the Malheur River by the Nevada Ditch leaves the Nevada before it ends but they return in the Wood and especially Blanton Drain portions of the system.
- The West Blanton Drain contributes large amounts of sediment and phosphorus to the Blanton Drain.
- The 2011 Warm Springs Irrigation District study conducted by ODA and the Malheur SWCD identified Shoestring as significant source of TSS and P to the Malheur via the Blanton. However, the 2013-2015 data suggest sediment and phosphorus leave before the end of the Nevada Ditch, and return in the Wood and Blanton Drains.
- Options:
  - 1) Patrons of both WID and OOID change irrigation water management.
  - 2) Install and maintain sediment ponds on West Blanton and Blanton.
  - 3) Research the reason for high dissolved phosphorus drains including the West Blanton.

DEQ Status and Trends Report
For this biennial review, DEQ reviewed data from 81 monitoring stations, of which 6 had sufficient data for this status and trends analysis (DEQ, Malheur River AgWQ Management Area: DEQ’s Water Quality Status and Trends Analysis for the Oregon Department of Agriculture’s Biennial Review of Agricultural Area Rules and Plan. 62pp. 2018). The analysis is an incomplete picture of water quality in the Management Area because it does not include any of the data collected by the Malheur County SWCD and Malheur Watershed Council. DEQ expects to include these data in their next report.

The main agricultural water quality concerns identified in this report are highlighted in grey and discussed below. See the DEQ report for all maps and graphs (https://www.oregon.gov/deq/wq/programs/Pages/wqstatustrends.aspx).

Table 6: Main Ag Water Quality Concerns Identified

<table>
<thead>
<tr>
<th>Site ID</th>
<th>Site Description</th>
<th>E. coli (mpn/100mL)</th>
<th>pH</th>
<th>Dissolved Oxygen (mg/L)</th>
<th>Total Phosphorus (mg/L)</th>
<th>Total Suspended Solids (mg/L)</th>
<th># exceeding standard/N¹</th>
<th># exceeding TMDL target²/N³</th>
</tr>
</thead>
<tbody>
<tr>
<td>10407</td>
<td>Malheur River @ Ontario</td>
<td>11/107¹,²,³</td>
<td>0/115¹,²,³</td>
<td>5/115¹,²,³</td>
<td>39/112</td>
<td>28/38¹,²,³</td>
<td>0/115¹,²,³</td>
<td>0/115¹,²,³</td>
</tr>
<tr>
<td>11480</td>
<td>Malheur Rvr nr Little Valley</td>
<td>6/110¹,²,³</td>
<td>2/118</td>
<td>1/120</td>
<td>39/112</td>
<td>1/38</td>
<td>2/110¹,²,³</td>
<td>2/110¹,²,³</td>
</tr>
<tr>
<td>11047</td>
<td>Malheur River @ Drewsey</td>
<td>3/40²,³</td>
<td>0/40</td>
<td>1/40</td>
<td>20/40</td>
<td>0/19</td>
<td>0/40</td>
<td>0/40</td>
</tr>
<tr>
<td>10728</td>
<td>Willow Creek @ Vale</td>
<td>42/110</td>
<td>0/119</td>
<td>0/119</td>
<td>40/113</td>
<td>21/39³</td>
<td>42/110</td>
<td>42/110</td>
</tr>
<tr>
<td>33266</td>
<td>Willow Creek @ Jamieson</td>
<td>4/40</td>
<td>0/46</td>
<td>0/45</td>
<td>14/40²,³</td>
<td>5/14</td>
<td>4/40</td>
<td>4/40</td>
</tr>
<tr>
<td>11043</td>
<td>Bully Creek @ Hwy 20</td>
<td>7/107</td>
<td>0/109</td>
<td>3/109³</td>
<td>37/109³</td>
<td>2/37</td>
<td>7/107</td>
<td>7/107</td>
</tr>
</tbody>
</table>

¹ N = total # of observations
² 0.07 mg/L total phosphorus May-September
³ 50 mg/L TSS
⁴ Statistically significant degrading trend
⁵ Statistically significant improving trend
⁶ Statistically significant seasonal patterns
**E. coli:** Numbers have been decreasing significantly in the Malheur River at Little Valley and Drewsey. In the last 18 years, the trend has decreased from around 175 mpn/100mL (standard is 406) to almost 0 at Drewsey, and from around 100 to 75 at Little Valley. However, numbers have been slowly increasing over time at the mouth of the Malheur River (trend from around 100 to 150 mpn/100mL). Willow Creek is a significant contributor of *E. coli* to the Malheur River, and there are likely additional contributors. *E. coli* enter Willow Creek mostly between Jamieson and Vale.

pH: All stations met the standard.

Dissolved oxygen: Unlike much of the state, dissolved oxygen was of little concern at the stations in this analysis. That is because the criterion at these stations is 6 mg/L, the lowest in the state, because the Malheur River is classified as the only warm water fishery in the state. Dissolved oxygen has increased by 1-2 mg/L at Little Valley, the mouth of Willow Creek, and in Bully Creek. However, it has decreased by 1 mg/L at the mouth of the Malheur.

Temperature: No temperatures were analyzed.

Total Phosphorus: as expected, this was the parameter of greatest concern. Median concentrations increased about 0.12 mg/L between monitoring stations while moving down the rivers and were greatest at the mouths of rivers, below irrigated cropland. Medians in the Malheur River doubled between Drewsey and Little Valley. At the mouth, only five of the values were less than 0.25 mg/L. The lowest values were measured at Drewsey, which is the monitoring station highest in the watershed, but one quarter of the values still exceeded 0.25 mg/L. Fortunately, concentrations have been significantly decreasing at Little Valley, Jamieson, and in Bully Creek.

**Total Suspended Sediment (TSS):** Values were highest at mouths of rivers. Highest values were in Willow Creek and at the mouth of the Malheur River. Concentrations increased from about 40 to 80 mg/L at the mouth of Willow Creek, but that may be because flows have decreased in Willow Creek due to irrigation improvements. Concentrations also increased from about 75 to 100 mg/L at the mouth of the Malheur River.

**Table 7: Total Phosphorus/Total Suspended Sediment**

<table>
<thead>
<tr>
<th>Location</th>
<th>Median (mgL)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>Phosphorus</td>
</tr>
<tr>
<td>Malheur River @ Ontario</td>
<td>0.35</td>
</tr>
<tr>
<td>Malheur River @ Little Valley</td>
<td>0.24</td>
</tr>
<tr>
<td>Malheur River @ Drewsey</td>
<td>0.12</td>
</tr>
<tr>
<td>Willow Creek @ Vale</td>
<td>0.39</td>
</tr>
<tr>
<td>Willow Creek @ Jamieson</td>
<td>0.25</td>
</tr>
<tr>
<td>Bully Creek @ Hwy 20</td>
<td>0.30</td>
</tr>
</tbody>
</table>

The results show an increase of phosphorus and sediment concentrations as one moves down the Malheur River watershed. Unfortunately, DEQ has not calculated loads using the many available stream gages, so this analysis does not show whether the total amounts of pollutants in the watershed and delivered to the Snake River have decreased over time.
Upper Malheur Phosphorus Study
The MWC collected 118 samples from six sites in the upper portion of the Malheur watershed. The purpose was to determine phosphorus levels prior to irrigated agricultural influences.

Most of the values were below the TMDL target of 0.07 mg/L. Median values from Wolf Creek, Little Malheur River, and North Fork Malheur River were around 0.03 to 0.05 mg/L. However, most of the values from Calamity and Beaver Dam Creek exceeded the target and their median values were approximately 0.11 mg/L. Values were consistent year-to-year.

4.3.2 Land Conditions

Both upland and streamside conditions were identified by the LAC as contributing to water quality. ODA has a protocol for mapping current vegetative cover along streams. There are currently no plans to map or assess upland conditions.

Aerial photographs from 2007 and 2012 were analyzed for seven streams reaches per the methodology presented in Section 1.8.1. The higher the score, the more trees and shrubs compared to grass and bare ground. The length of each reach varied from about three to four miles.

<table>
<thead>
<tr>
<th>Stream</th>
<th>Scores</th>
<th>Comments About Analyzed Reach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crane Creek</td>
<td>31.0</td>
<td>Some large diversions; part of reach flows through a corral with bare soil; channel braiding near mouth.</td>
</tr>
<tr>
<td>Gum Creek</td>
<td>43.6</td>
<td>Sinuous channel, middle reach is dry. Lower 15% has eroding banks, partly incised.</td>
</tr>
<tr>
<td>North Clover Creek</td>
<td>34.8</td>
<td>Mostly very stable, but lower 10% is ditched and eroding.</td>
</tr>
<tr>
<td>South Fork Malheur River</td>
<td>30.6</td>
<td>Mostly stable, but lower reach has four diversions that divert large amounts of flow.</td>
</tr>
<tr>
<td>Stinkingwater Creek</td>
<td>30.8</td>
<td>Channel is stable, but water is green as though too much algae or other aquatic vegetation is present.</td>
</tr>
<tr>
<td>Swamp Creek</td>
<td>40.2</td>
<td>Lower 10% has large point bars that are becoming vegetated, indicating past erosion problems. Upper portion is relatively stable. Few small diversions.</td>
</tr>
<tr>
<td>Wolf Creek</td>
<td>33.4</td>
<td>Sinuous channel with some cut-off meanders. Historic channels visible are even more sinuous. One large diversion. Channel in very good condition.</td>
</tr>
</tbody>
</table>

Riparian index scores in 2007 ranged from a low for the South Fork Malheur River to a high for Gum Creek. Tree cover never exceeded four percent in any bands. Bare ground was greatest in one band of Crane Creek (16 percent), though one band in the South Fork Malheur had 10 percent bare ground. Bare/agriculture was also highest in one band of the South Fork Malheur. About half the streams were dominated by grass/agriculture, while the other half were dominantly shrub/agriculture.

The 2012 data showed no significant changes (generally, ODA considers a five percent change as significant). Gum Creek had a decrease in bare cover, resulting in an increase in grass/agriculture, but it also had a decrease in shrub cover, leading to a two percent decline.

4.4 Biennial Reviews and Adaptive Management

The January 17, 2019, biennial review consisted mostly of a discussion of implementation activities, especially in the Focus Area and Special Emphasis Area. There was also discussion about the new Strategic Implementation Area on the North Fork Malheur.
A discussion was also held on forming a monitoring group to better facilitate the monitoring goals in the Malheur Management Area. It was decided that ODA and DEQ would put together a template for a Long Range Plan and bring to the LAC and local working groups the summer of 2019 to prioritize future monitoring areas. The LAC also discussed the opportunity to bring new LAC members into the group to better reflect the agricultural interests due to previous members passing away or no longer participating.
REFERENCES


