Powder-Brownlee Agricultural Water Quality Management Area Plan

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Developed by the

Oregon Department of Agriculture

Powder Brownlee Local Advisory Committee

With support from the

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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
CNPCP – Coastal Nonpoint Pollution Control Program
CWA – Clean Water Act
CZARA – Coastal Zone Act Reauthorization Amendments
DEQ – Oregon Department of Environmental Quality
DMA – Designated Management Agency
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
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: Implementation Strategies. Presents goal(s), measurable objectives, timelines, and strategies to achieve these goal(s) and objectives.

Chapter 4: 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 related 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 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 603-095-3600). 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 residential 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).

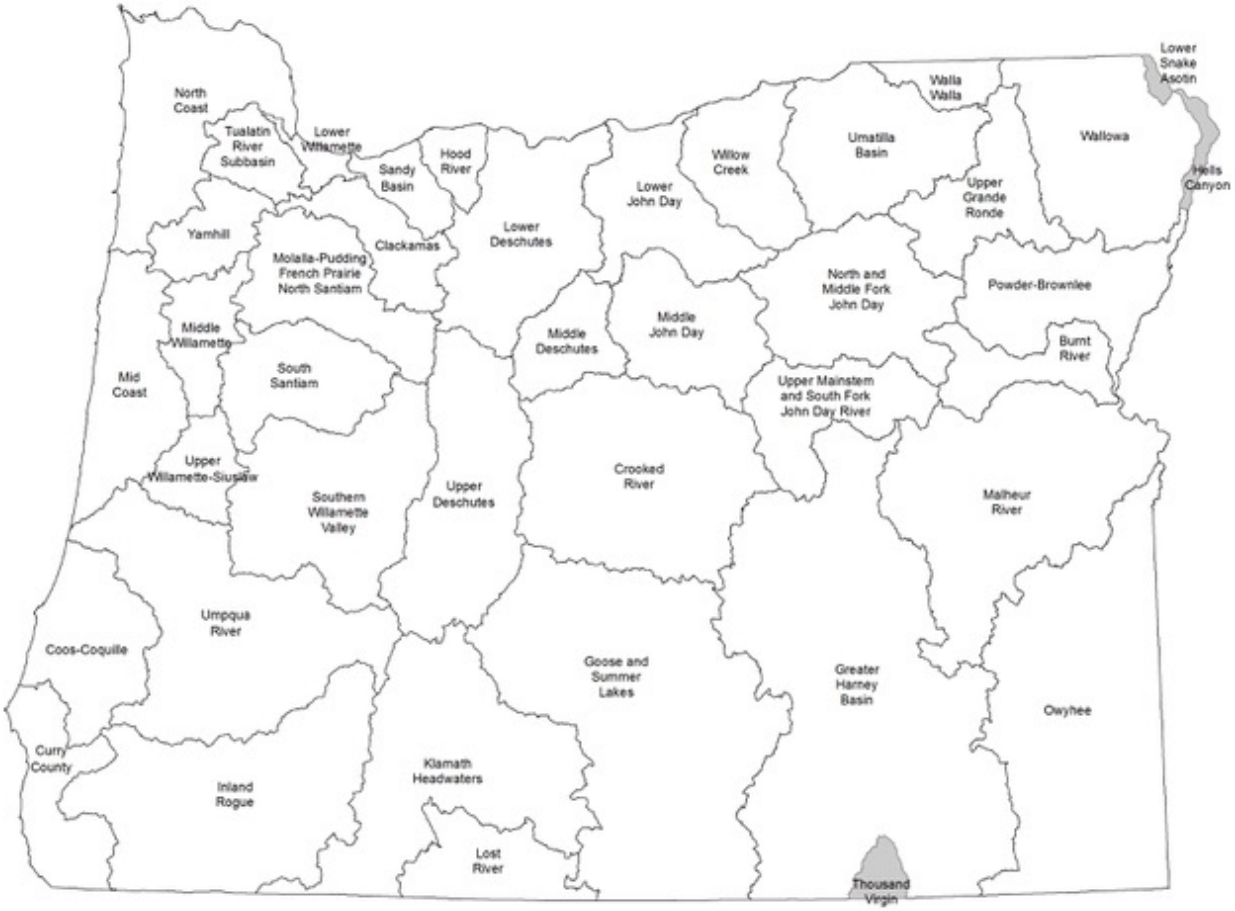
1.2 History of the Ag Water Quality Program

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). The Oregon Legislature passed additional legislation 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
Grey areas are not incorporated into Ag 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 that drive the establishment of an Area Plan include:

- State water quality standards.
- Load allocations for agricultural or nonpoint source pollution assigned under Total Maximum Daily Loads (TMDLs) issued pursuant to the federal Clean Water Act (CWA), Section 303(d).

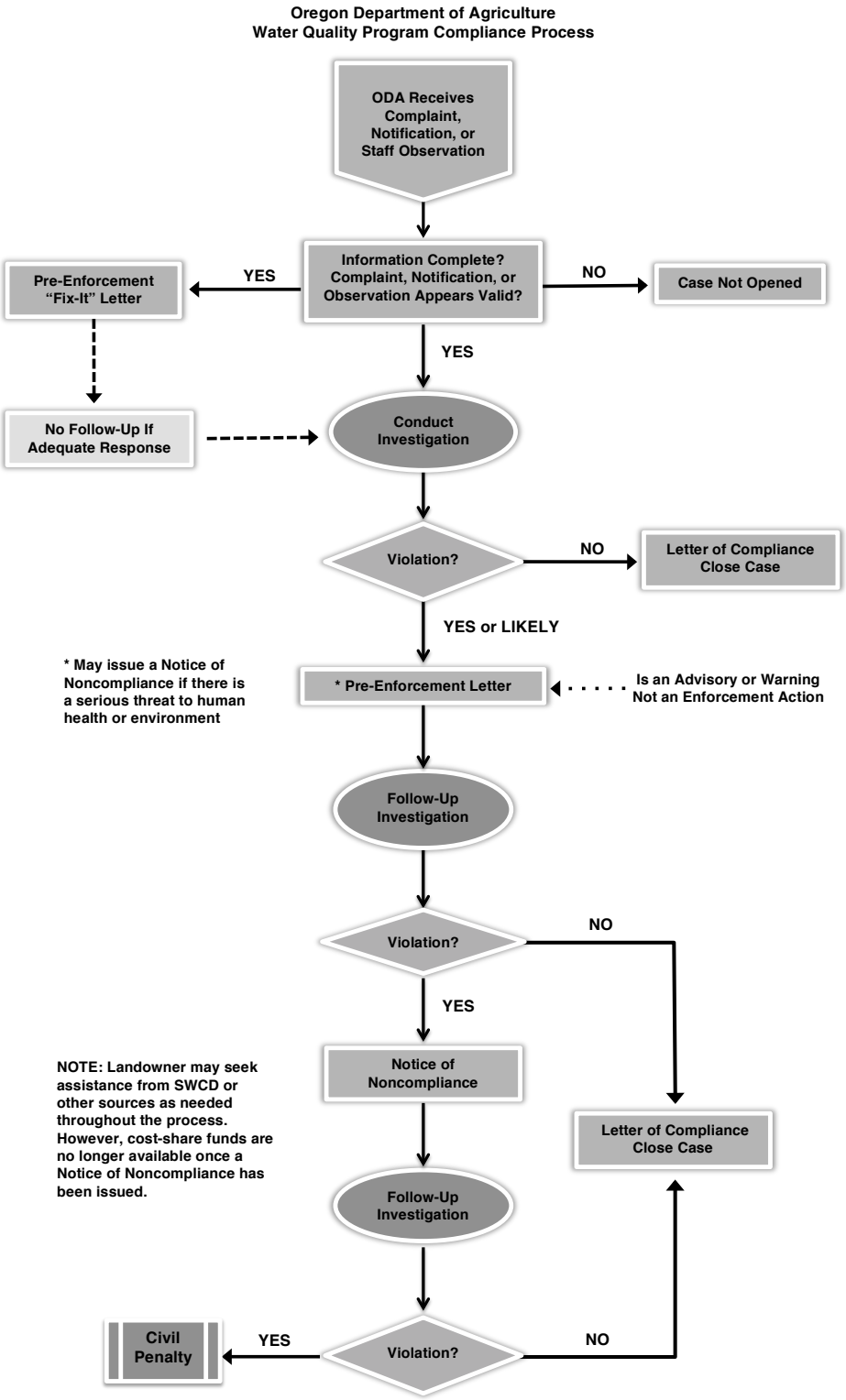
- Approved management measures for Coastal Zone Act Reauthorization Amendments (CZARA).
- Agricultural activities detailed in a Groundwater Management Area (GWMA) Action Plan (if DEQ has established a GWMA and an Action Plan has been developed).

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. 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 Area 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.

Any member of the public may file a complaint, and any public agency may file a notification of a violation of an Area Rule. As a result, ODA may initiate an investigation (See Figure 2).

Figure 2: Compliance Flow Chart



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 Grant Agreement between ODA and each SWCD. Every two years, each SWCD submits a scope of work to ODA to receive funding to implement the Area Plan. 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. The LAC serves in an advisory role to the director of ODA and to the Board of Agriculture. The role of the LAC is to provide a high level of citizen involvement and support in the development, implementation, and biennial reviews of the Area Plan and Area Rules. The LAC's primary role is to provide advice and direction to ODA and the LMA on local agricultural water quality issues as well as evaluate the progress toward achieving the goals and objectives of the Area Plan. LACs are composed primarily of agricultural landowners in the Management Area and must reflect a balance of affected persons.

The LAC is convened at the time of the biennial review, however 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 subsequent revisions of the Area Plan.
- Participate in the development and subsequent 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. However, each landowner in the Management Area is required to comply with the Area Rules. To achieve water quality goals or compliance, landowners may need to select and implement a suite of measures to protect water quality. The actions of each landowner will collectively contribute toward achievement of water quality standards.

Technical assistance, and often financial assistance, is available to landowners who want to work with SWCDs (or other local partners, such as watershed councils) 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 are caused by non-agricultural activities or sources, 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.
- Impacts on water quality and streamside vegetation from wildlife such as waterfowl, elk, and feral horses.
- 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 Plan 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 Plan and Area Rules, as needed, to address comments received. The director of ODA adopted the Area Plan and Area Rules in consultation with the Board of Agriculture.

The Oregon Department of Agriculture, the LACs, and the SWCDs conduct biennial reviews of the Area Plan and Area Rules. Partners, stakeholders, and the general public are invited to participate in the process. Any 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, 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 waterbodies throughout Oregon do not meet state water quality standards. Many of these waterbodies 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. Water quality impairments vary by Management Area and are summarized in Chapter 2.

1.4.3 Impaired Water Bodies and Total Maximum Daily Loads

Every two years, DEQ is required by the CWA to assess water quality in Oregon. CWA Section 303(d) requires DEQ to identify a list of waters that do not meet water quality standards. The resulting list is commonly referred to as the 303(d) list. In accordance with the CWA, DEQ must establish TMDLs for 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 waterbody 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 established for 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 waterbody 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 the TMDL. Biennial reviews and revisions to the Area Plan and Area Rules must address agricultural or nonpoint source load allocations from relevant TMDLs.

For more general and specific information about Oregon's TMDLs, see: www.oregon.gov/deq/wq/tmdls/Pages/default.aspx. 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 (prohibited activities) states that:
"(1) Except as provided in ORS 468B.050 or 468B.053, no person shall:
(a) Cause pollution of any waters of the state or place or cause to be placed any wastes in a location where such wastes are likely to escape or be carried into the waters of the state by any means.
(b) Discharge any wastes into the waters of the state if the discharge reduces the quality of such waters below the water quality standards established by rule for such waters by the Environmental Quality Commission.
(2) No person shall violate the conditions of any waste discharge permit issued under ORS 468B.050."

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:

' "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.' (ORS 468B.005(5)).

' "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.' (ORS 468B.005(10)).

' "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.' (ORS 468B.005(9)). Additionally, the definition of "wastes" given in OAR 603-095-0010(53) 'includes but is not limited to commercial fertilizers, soil amendments, composts, animal wastes, vegetative materials or any other wastes.'

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 can improve water quality related to multiple pollutants, including: temperature (heat), sediment, bacteria, nutrients, and toxics (e.g., pesticides, heavy metals, etc.).
- Streamside vegetation provides fish and wildlife habitat.
- Landowners can improve streamside vegetation in ways that are compatible with their operation.
- 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 on agricultural lands. The Area Rules for each Management Area require that agricultural activities allow for the establishment and growth of vegetation consistent with site capability to 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 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 and 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. ODA 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.

Both 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. For more information about the CAFO program, go to 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, Oregon Department of Forestry (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.

Through the PSP, state agencies and local partners work together to monitor pesticides in streams and to improve water quality (www.deq.state.or.us/wq/pesticide/pesticide.htm). 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.

The Oregon Department of Agriculture led the development and implementation of a Pesticides Management Plan (PMP) for the state of Oregon (www.oregon.gov/ODA/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.

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. 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: www.deq.state.or.us/wq/dwp/dwp.htm.

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. 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 and to achieve water quality goals.

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 toward improved water quality. ODA is working with SWCDs, LACs, and other partners to develop and implement strategies that will produce measurable outcomes. ODA is also working with partners to develop monitoring methods to document progress.

1.7.1 Measurable Objectives

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 AgWQ Program is working throughout Oregon with SWCDs and LACs toward establishing long-term measurable objectives to achieve desired conditions. ODA, the LAC, and the SWCD 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.

The State of Oregon continues to improve its ability to use technology to measure current streamside vegetation conditions and compare it to the vegetation needed to meet stream shade targets to keep surface waters cooler. As the State's use of this technology moves forward, ODA will use the information to help LACs and LMAs set measurable objectives for streamside vegetation. These measurable

objectives will be achieved through implementing the Area Plan, with an emphasis on incentive programs.

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 continue making progress toward 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.
- Improved land conditions can be documented immediately.
- Reductions in water quality from agricultural activities are primarily due to changes in land conditions and management activities.
- 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 resulting improvements in water quality.
- Extensive monitoring of water quality would be needed to evaluate progress, which would be cost-prohibitive and could fail to demonstrate improvements in the short term.

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. The Focus Area process is SWCD-led, with ODA oversight. The SWCD delivers systematic, concentrated outreach and technical assistance in the Focus 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 watersheds 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, technical assistance, and to complete 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 the Area Rules. Finally, ODA completes a post-evaluation 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, the LAC, and the 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 located across the major land uses (forestry, agriculture, rural residential, and urban/suburban). DEQ collects water quality samples every other month throughout the year to 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.

At each biennial review, DEQ assesses the status and trends of water quality in relation to water quality standards. Parameters included in the analysis are temperature, pH, and bacteria. DEQ will add additional parameters as the data become available, depending on the water quality concerns of each Management Area. ODA will continue to work with DEQ to cooperatively summarize the data results and how they apply to agricultural activities.

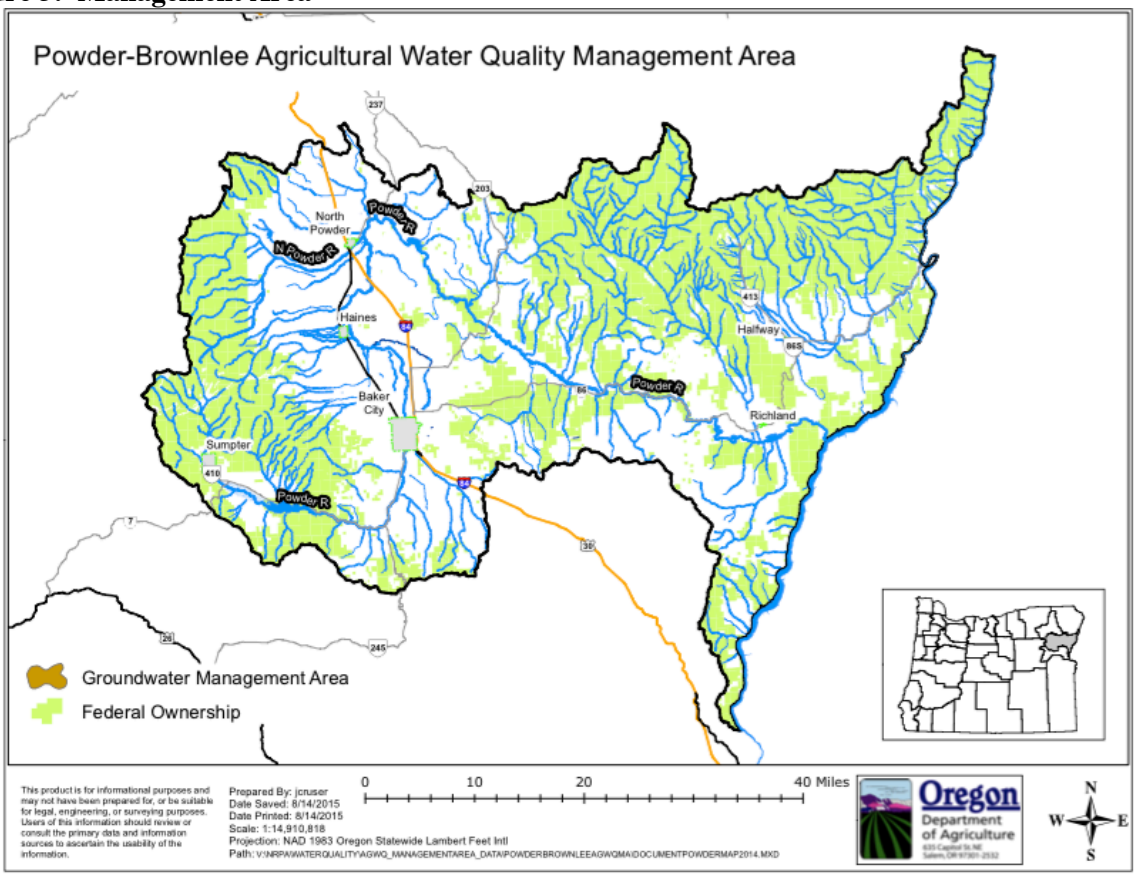
Water quality monitoring is described in Chapter 3, and the data are presented in Chapter 4.

1.8.2 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, water quality monitoring, strategic initiatives, and outreach efforts over the past biennium. ODA and partners evaluate progress toward achieving measurable objectives and milestones, 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 Rules 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

Figure 3: Management Area



2.1 Local Roles

2.1.1 Local Advisory Committee

The Area Plan was developed with the assistance of the LAC. The LAC was formed in 2001 to assist with the development of the Area Plan and Area Rules and with subsequent biennial reviews.

Current LAC members are:

Name	Location	Description
Curtis Martin, Co-Chair	North Powder	BV SWCD, OCA
Tim L. Kerns, Co-Chair	Haines	Baker Co. Commissioner
Peggy Browne	North Powder	Farm Bureau
Dean DeFrees	Sumpter	Rancher, Baker Valley
Kyle Ransom	Richland	Ag business/EVSWCD
Curtis Jacobs	Baker City	Rancher, Keating Valley
Tim A. Kerns	Haines	BV SWCD
Myron Miles	North Powder	BV SWCD, OCA
Ralph Morgan	Baker City	Baker Valley Irrigation District
Clair Pickard	Baker City	Rancher, Keating
Calvin Ransom	Richland	Ag Business
Dan Forsea	Richland	Rancher environmentalist
Riley Martin, ALT	North Powder	Farm Bureau

2.1.2 Local Management Agency

Implementation of the Area Plan is accomplished through an Intergovernmental Grant Agreements between ODA and the Baker Valley, Eagle Valley, and Keating SWCDs. This Intergovernmental Grant Agreement defines the SWCDs as the LMAs for implementation of the Ag Water Quality Program in this Management Area. The SWCDs were also involved in development of the Area Plan and Area Rules.

The LMA implements the Area Plan by conducting the activities detailed in Chapter 3, which are intended to achieve the goals and objectives of the Area Plan.

2.2 Area Plan and Area Rules: Development and History

The Area Plan and Area Rules were approved by the director of ODA in 2003.

Since approval, the LAC met in 2007, 2009, 2011, 2013, and 2016 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

2.3.1 Geographic and Programmatic Scope

This Area Plan applies specifically to lands within the Powder/Brownlee Management Area that are not owned by the federal government and tribal governments, where actions are necessary to prevent and control water pollution from agricultural activities and soil erosion.

2.3.2 Physical Setting

Most of this Management Area lies in Baker County, but the northwestern portion of this Area lies within Union County. The county line follows the North Powder River, which joins the main stem Powder River at Thief Valley Reservoir and then the county boundary runs east overland.

Powder Subbasin

The Powder Subbasin is bounded on the north by the Grande Ronde Subbasin and the Wallowa Mountains, on the west by the Blue Mountains, on the south by the Burnt River Subbasin, and on the east by the Snake River. The Powder River is 144 miles long and drains more than 1,540 square miles before emptying into the Snake River on the Oregon-Idaho border. It begins in the city of Sumpter at the convergence of McCully Fork and Cracker Creek and continues east through Phillips Lake and turns north around Elkhorn Ridge, flowing towards Baker City. Downstream from the town of North Powder, the river flows through Thief Valley Reservoir and turns to flow southeastwardly for its remaining 78 miles. It empties into the Brownlee Reservoir near the town of Richland. Brownlee Dam creates the Brownlee Reservoir on the Snake River (Figure 3).

Brownlee Subbasin

The Brownlee Subbasin encompasses the northeast corner of Baker County. The primary stream in this Subbasin is Pine Creek. It originates in the Eagle Cap Mountains, descends north to south into a broad plain where it passes the town of Halfway. Soon after, it takes a sharp turn to the northeast and eventually joins the Snake River below Oxbow Dam (Figure 3).

2.3.3 History of Natural Resource Management in the Management Area

Interested readers can find a description of early settlement activities in *Appendix C*. The LAC wanted to emphasize that early settlers found many mainstem rivers dry in the late summer months such as the

Powder River. There are diary entries that tell of sheep being driven up the Powder River bed at night, as there was no water between Richland and Keating.

The agriculturists today have water all year due to the installation of impoundment structures. Over the years, local citizens and government agencies have constructed numerous small reservoirs and ponds for irrigation and flood control. This storage capacity has reduced flooding and prolonged the period of time that water flows in the Powder River and some of its tributaries, enhancing water quality along with increased aquatic habitat. Additional stream flows in late summer could be augmented with additional storage, providing improved water quality.

Some of the larger impoundments are:

- Phillips Reservoir with a storage capacity of 90,500 acre-feet,
- Thief Valley Reservoir with a storage capacity of 17,400 acre-feet,
- Wolf Creek Reservoir with a storage capacity of 10,800 acre-feet,
- Pilcher Creek Reservoir with a storage capacity of 5,910 acre-feet.

Right now there are several small storage facilities – Rock Creek, Pine Creek, Killamucue, and Van Patten lakes.

ODA has reserved 33,890 acre-feet for multi-purpose reservoirs in the Powder River subbasin. In the Pine Creek subbasin, 10,000 acre-feet is reserved and in the Eagle Creek subbasin 4,300 acre-feet is reserved.

Beneficial uses of water in the Management Area include irrigation, livestock watering, and municipal use. Irrigation is the primary beneficial use for which water rights are issued. Non-consumptive uses of water include recreation and fish and wildlife habitat. Sources of appropriated water are reservoirs, surface water and groundwater.

Baker County contains an estimated 176,000 irrigated acres (Oregon Water Resources Department). This includes about 20,000 acres in the Burnt River Irrigation District, which is in another agricultural water quality management area. Irrigation methods include the use of hand lines, wheel lines, and pivots. In addition, flood irrigation is still a common practice especially in livestock pastures. Irrigation withdrawals are most concentrated in the lower portions of each watershed.

Many irrigation or water control districts operate in the Powder Subbasin. The following four are the largest**:**

- Baker Valley Irrigation District,
- Lower Powder Irrigation District,
- Powder Valley Water Control District,
- Phillips-Eagle Ditch Improvement District.

Not all farmers and ranchers in the Management Area are part of irrigation districts. For example, the irrigation system on the west side of Baker Valley consists of a large network of ditches that deliver water. Neighborhood user groups maintain and repair these ditches. The farmers filed water rights and built the irrigation ditches starting in 1862 and 1863. Eventually, they filed for all the available stream flows.

2.3.4 History of Conservation in the Management Area

In recent years, private landowners, the Baker Valley, Eagle Valley, and Keating SWCDs, the Powder Watershed Council, and many others have worked cooperatively to promote and implement conservation. The SWCDs have sponsored workshops and tours dealing with irrigation management, weed control, fish screens and more. They have operated a water quality monitoring program designed to help the districts and landowners learn more about their watersheds.

The districts and their partners have sponsored numerous on-the-ground projects. They include:

- Off-stream water developments for livestock,
- Confined Animal Feeding Operation improvements,
- Soil moisture and weather measurements for irrigation management,
- Irrigation pipelines for water and energy conservation,
- Wetland and stream rehabilitation for wildlife and water quality improvements.

2.4 Agricultural Water Quality

2.4.1 Water Quality Issues

Streams in the Powder Basin are included on the 303(d) list of water quality limited waterbodies with TMDLs needed for dissolved oxygen, bacteria, temperature, turbidity, sedimentation, arsenic and mercury. Monitoring is being conducted by DEQ to support TMDL development for these parameters, as well as the total phosphorus load allocations developed in the Snake River-Hells Canyon TMDL.

The complete list of water bodies in the management area that the Environmental Quality Commission has determined to be water quality limited are in Attachment A.

DEQ has begun work to develop TMDLs for the Powder Basin to address the following pollutants:

- Bacteria
- Dissolved oxygen
- Nutrients

The temperature TMDL development work is being deferred until a new water temperature standard is prepared by DEQ and approved by U.S. EPA.

2.4.1.1 Beneficial Uses

Clean water supports many uses. Water quality standards are established to protect beneficial uses of Oregon's waters, which are defined in OAR 304-041-0002(17) and designated for water bodies the Powder/Burnt Basin in 304-041-0260 – Table 260A. Beneficial uses 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, and aesthetic quality.

The following beneficial uses have been identified as potentially adversely affected in the Management Area:

- Salmonid fish rearing and spawning,
- Resident fish and aquatic life.

2.4.1.2 WQ Parameters and 303(d) list

See Appendix A.

2.4.2 Basin TMDLs and Agricultural Load Allocations

DEQ is in the process of developing a TMDL for the Powder Basin.

2.5 Voluntary and Regulatory Measures

Under the Agriculture Water Quality Program, landowners reserve the right to have flexibility in choosing management approaches and practices to address water quality issues on their private property. This LAC recognizes that the rights of private property owners must be adhered to and respected. Landowners may choose to develop management systems to address problems on their own, or they may choose to work with the local SWCD or partnering agency.

Applicability
Under the Agricultural Water Quality Management Act (ORS 568.900 through 568.933), all landowners conducting activities on lands that border or lands that directly influence waters of the state must be in compliance with the Area Rules. A landowner is responsible for only those conditions caused by activities conducted on their land. Conditions resulting from weather events or other circumstances not within the reasonable control of the landowner are considered when making compliance decisions.

OAR 603-095-3640
Prohibited Conditions
(1) A landowner shall be responsible for only those conditions caused by activities conducted on land owned or managed by the landowner. Criteria do not apply to conditions resulting from unusual weather events or other exceptional circumstances that could not have been reasonably anticipated.

2.5.1 Pollution and Waste Management

The objective of this Area Plan is to prevent the introduction of waste materials into bodies of water.

Wastes include livestock manure from situations like seasonal feeding and birthing areas, gathering pastures and corrals, rangelands and pasture, and any other situations not already covered by Oregon's Confined Animal Feeding Operation laws.

Indicators of noncompliance include:

- Runoff flowing through areas of high livestock usage and carrying wastes into waters of the state,
- Livestock waste accumulated in drainage ditches or areas of flooding,
- Fecal coliform (*E. coli*) counts that exceed state water quality standards.

The LAC believes that the current water quality standards are unattainable.

OAR 603-095-3640

(2) Pollution and Waste Management
Effective upon adoption, no person subject to these rules shall violate any provision of ORS 468B.025 or ORS 46B.0b0.

2.5.2 Streamside Conditions

Maintaining and improving riparian vegetation through proper management is an important factor to help achieve our goal of working toward a reduction in any identified undesirable water quality issues related to agricultural activities. Healthy, functioning riparian vegetation communities in the Management Area

will help stabilize stream banks, filter sediments and nutrients, and protect critical aquatic and riparian habitat.

The goal of this Area Plan for landowners and operators is to prevent and control water pollution from agricultural activities. Areas near waterbodies are especially important to water quality and are sensitive to management activities.

The streamside area is defined as the area near the stream where management practices can most directly influence the conditions of the water.

The riparian area is a zone of transition from aquatic to a terrestrial system. Dependent upon the surface or subsurface water, existing or potential soil-vegetation complexes will persist with the influence of surface or subsurface water. A riparian area may be located adjacent to a lake, reservoir, estuary, pothole, spring, bog, wet meadow, muskeg, slough, or ephemeral, intermittent or perennial stream. OAR 603-095-0010(36) defines riparian vegetation as plant communities consisting of plants dependent upon or tolerant of the presence of water near the ground surface for at least part of the year.
Water is the distinguishing characteristic of riparian areas but soil, vegetation, and landform also exert strong influence on these systems. In a healthy riparian ecosystem, these four components interact to produce a wide variety of conditions.

Healthy riparian and streamside areas provide several important ecological functions. These include:

- Dissipation of stream energy associated with high flows and thus influencing the transport of sediment,
- Capture of suspended sediment and bedload that builds streambanks and develops floodplain function
- Retention of floodwater and recharging ground water,
- Stabilization of streambanks through plant root mass,
- Support of biodiversity.

Due to many variables, which naturally occur in eastern Oregon, such as climatic and hydrologic patterns (extreme changes in temperatures, ice jams, very high stream flows, and periods of dewatering), as well as technical and biological challenges (e.g. site capability, beaver, ungulate, and rodent damage), the LAC believes it is unlikely that any of the streams in agricultural areas of the Powder/Brownlee Management Area will meet the state numeric temperature standards.

<u>Site Capable Vegetation</u>
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 on agricultural lands. The Area Rules for each Management Area require that agricultural activities allow for the establishment and growth of vegetation consistent with site capability to 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. Limited exceptions include:

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

Livestock grazing must comply with the Streamside Condition Rule. Compliance with the riparian objectives will help keep wastes from running into waters of the state.

Due to the high percentage of public lands within the basin, the water quality entering into privately owned agriculutral lands is affected by the management practices of government entities and increased fire activity.

OAR 603-095-3640
(3) Streamside Conditions

(a) By January 1, 2006, activities will allow the establishment and development of riparian vegetation, consistent with site capability. Site capability will be determined by ODA in consultation with local resource management experts.

(b) Landowners are not responsible for browsing and grazing by wildlife.

(c) The rule does not specify any activities that must cease and does not require any particular activity to take place.

This Area Rule only applies to the streamside area of natural streams and not to authorized irrigation ditches and diversion points, which are used for the primary purpose of delivering irrigation and stock water to lands that hold a valid water right. The streamside area is defined as the area adjacent to the stream where management practices can most directly influence the conditions of the water.

Grazing, weed control and other common agricultural activities are allowed in riparian areas as long as they allow the establishment and development of riparian vegetation, consistent with site capability, to moderate solar heating, stabilize streambanks, and filter sediment and nutrients from overland flows. Minimal breaks in riparian vegetation for essential management activities and infrastructure, such as water gaps, hardened crossings, and irrigation equipment access, are allowed provided site conditions comply with the Prevention and Control Measures.

2.5.3 Soil Erosion and Sediment Control

An objective of this Area Plan is to implement measures that prevent and control water pollution from agricultural activities and soil erosion. This includes agricultural and rural lands that may not be in close proximity to waterbodies but have the potential to contribute to water quality degradation by runoff of sediment and wastes.

2.5.4 Livestock Management

An objective of this Area Plan is to implement measures that prevent and control water pollution from livestock operations.

Livestock management (including handling facilities, pastures, rangeland, and confinement areas) should be done in a manner that limits soil erosion and minimizes the delivery of sediment and animal wastes to

nearby streams. A grazing management system should promote and maintain adequate vegetative cover, for protection of water quality, by consideration of intensity, frequency, duration, and season of grazing.

Grazing near streams should be managed to prevent negative impacts to streambank stability, allow for recovery of plants, and leave adequate vegetative cover to ensure protection of riparian functions including shade and habitat. Off-stream watering systems, upland water developments, feed and salt/mineral placement are examples of methods to be considered as ways to reduce impacts of livestock to streamside areas. Establishment and spread of noxious weeds should be prevented by appropriate weed control practices and managed grazing as an appropriate tool.

2.5.5 Irrigation Management

An objective under this Area Plan is to implement measures that prevent and control water pollution from irrigation. Diversion of water for irrigation or other uses and the return of that water to the stream are activities that have potential for contributing to water quality issues.

Irrigated lands are lands either riparian, floodplain, or upland upon which water is applied for the purpose of growing crops. Diversion of water from a water body to be applied on land for the purpose of growing crops is a recognized beneficial use of water. Irrigation water use is regulated by the Oregon Water Resources Department (WRD) in the form of water rights, which specify the rate, duty, and season that water can be applied to a particular parcel of land. Refer to WRD Rules (OAR 690 and ORS 536 through 543) for more details.

Irrigation in this basin is done by utilizing stored water, natural flows, and groundwater sources for flood irrigation, drip, or sprinkler application. Irrigation management in this basin recognizes there are positive benefits, in addition to crop growth, occurring from irrigation application - including flow augmentation as water returns back to the stream, cooling and filtering of water through underground percolation, and the recharge of shallow wells and springs due to the connectivity of surface water to groundwater sources. Irrigation water is used more than once as it returns to the stream and is available for in-stream uses or by other irrigators. Both aquatic and wildlife habitat benefit from irrigation induced in-stream flows.

An effective mechanism to improve water quality is increased storage. By capturing, storing, and safely releasing water, water temperature can be decreased, flood waters controlled; water quality enhanced and overall beneficial uses improved for the economy, wildlife, and aquatic habitats.

Chapter 3: Implementation Strategies

Goal

The Goal of the Area Plan is to:
Use voluntary measures to prevent and control water pollution from agricultural activities and soil erosion, and to meet water quality standards.

The LAC believes that the water quality standards are unattainable.

LAC Mission

The Powder/Brownlee LAC and the SWCDs associated with this Plan are committed to:

- Providing leadership for the conservation of the management area's natural resources,
- Promoting the control of soil erosion,
- Promoting and protecting the quality of the state's water,
- Reducing the siltation of stream channels and reservoirs,
- Promoting the wise use of the Management Area's water and other natural resources,
- Preserving and enhancing aquatic and wildlife habitat,
- Protecting the tax base as it applies to the value of agricultural lands,
- Promoting the health, safety, and general welfare of the citizens in the management area through a responsible conservation ethic without depriving basin citizens of their economic stability, private property rights, and way of life.

To achieve its purpose and goals, the LAC establishes the following **long-term water quality related** objectives for agricultural land in the Management Area:

1. Prevent water polution from agricultural activities.
2. Maintain or improve bank stability and the ability of riparian vegetation to function within the capabilities of the site.
3. Continue to Implement water quality practices within the basin and focus area to improve water quality.

To achieve its purpose and goals, the LAC establishes the following **long-term water quality related** strategies for agricultural land in the Management Area:

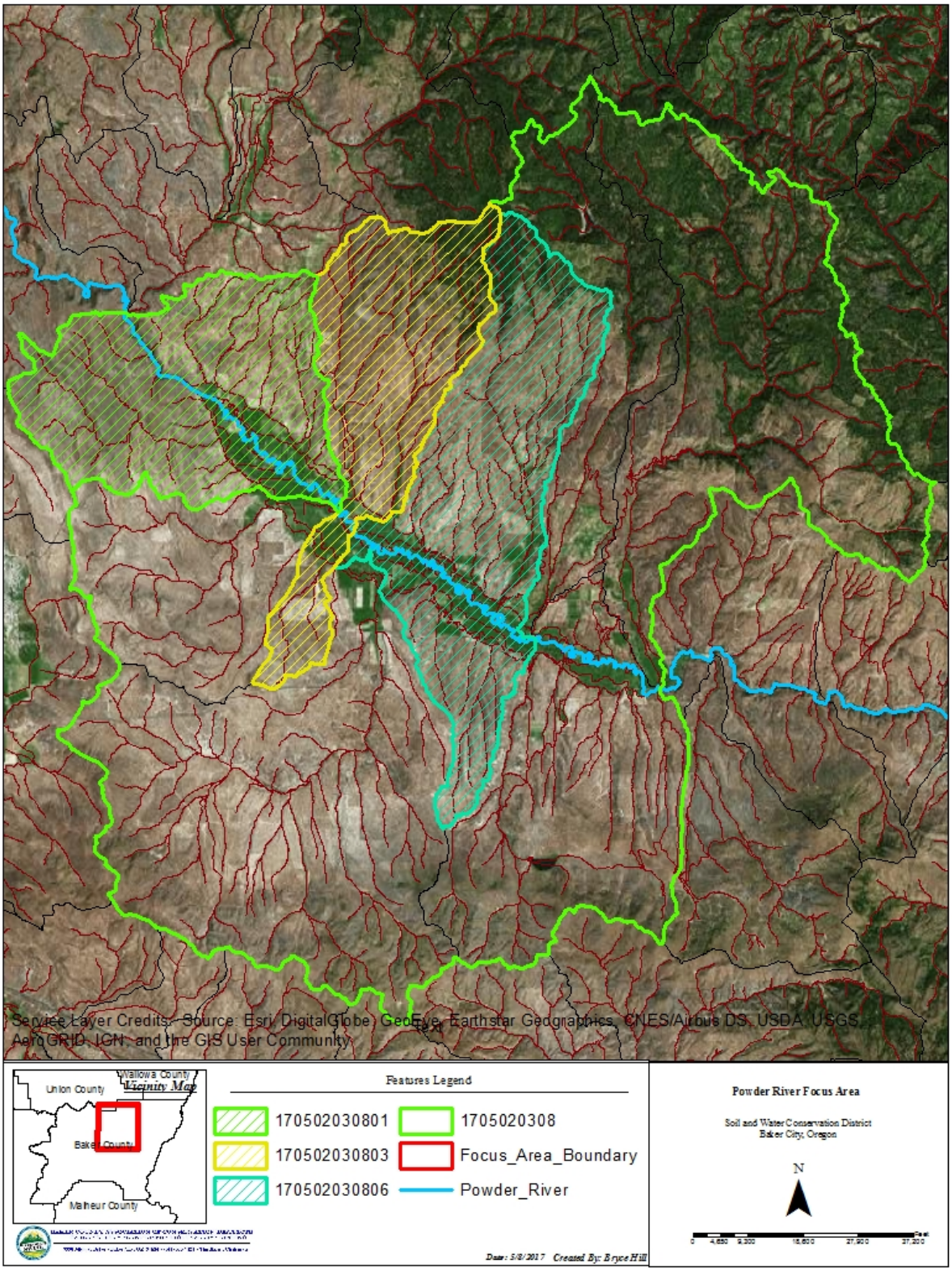
1. Continue to visually assess areas and assist landowners,within the focus area and management area.
2. Aid landowners in proper grazing management as a tool to enhance water quality.

3.1 Measurable Objectives

3.1.1 Focus Area(s)

Rock Creek (near Baker City) was the previous Focus Area.

The Keating/Eagle Valley/Baker Valley SWCDs selected the Lower Powder Focus Area for the 2017-2019 biennium. The Focus Area consists of the Powder River and its tributaries starting below the Wild and Scenic Area downstream of Thief Valley Dam and extending downstream to the lower end of the Keating Valley (see map below).



ODA will use their Streamside Vegetation Assessment (SVA) to characterize the type of ground cover within 35 feet of the stream. The metric is the percent of the different types of land cover (agricultural

Infrastructure and bare ground due to agricultural activities, grass, agricultural grass, shrubs, trees, and water) viewed on aerial photographs.

The ODA visually assesses land conditions by examining available aerial photography and ground truth from public viewpoints followed by site visit determination. Land will be classified as:

- Class I = Little to no resource concerns = LOW priority
- Class II = Few resource concerns = MEDIUM priority
- Class III = Numerous resource concerns = HIGH priority

Measurable objectives will be presented in the 2020 Area Plan after the pre-assessment has been done.

Measurable Objectives are likely to look something like:

- 90% of the agricultural areas in the Focus Area will have streamside vegetation likely to provide the water quality functions (shade, bank stability, and filtration of overland flow) of the area's site-capable vegetation.
    - Current Condition: TBD
    - Milestone 1: 10% improvement
    - Milestone 2: 10% improvement
    - Milestone X: 90%

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

3.2 Strategies and Activities

The SWCDs and ODA are responsible for implementing the Area Plan. The Baker Valley, Eagle Valley, and Keating SWCDs, as the LMAs, will maintain an Intergovernmental Agreement with ODA that outlines their responsibilities for providing educational outreach and technical assistance.

Education and cooperation are key to the success of this Plan. The SWCDs will work to provide farmers and ranchers in the Management Area with information about the goals and objectives of this Plan.

Individual farmers and ranchers in the Management Area may request assistance to determine what can be done to meet the goals and objectives of the Plan by contacting the local office of the SWCDs or the NRCS.

The Baker Valley, Eagle Valley, and Keating SWCD will:

- Participate in developing and delivering outreach and education programs designed to provide public awareness and understanding of water quality issues.
- Develop reports, projects, demonstrations and tours to showcase successful management practices and systems.
- Provide technical and financial assistance to the agricultural community to implement recommended practices, monitoring and education.

3.3 Monitoring and Evaluation

The SWCDs, ODA, and the LAC are responsible for determining whether the goals will be met within the time frames identified in the Area Plan. Progress and success of implementation efforts will be assessed through compliance with Area Rules and voluntary activities to meet Area Plan objectives and goals, and water quality changes over time. *Results will be reported in Chapter 4 at biennial reviews.*

Data collected by the SWCD at 18 sites between 1995 and 2002 documents past conditions (Appendix D). Continued monitoring is essential to determine trends in water quality over time as conditions improve due to changes in management or natural conditions.

Currently, water quality data are being collected by DEQ and Idaho Power. DEQ monitors two sites as part of its ambient program (Section 1.8.1): Powder River at Highway 7 in Baker City and Powder River at the Highway 76 bridge below Keating. Idaho Power has flow and continuous temperature data from two sites on the Powder River, 11.6 and 22 miles above the mouth.

Currently, the LMA is using visual assesment as the primary monitoring tool for landscape conditions. All assessments of streamside vegetation are dictated by site capability.

A monitoring program should include:

- Continue and expand, as necessary, water quality monitoring to establish baseline conditions and trends: (Responsible parties: local SWCDs)
- Tracking of Area Plan implementation and compliance with the Area Rules (Responsible parties: ODA, Baker Valley/Eagle Valley/Keating SWCD, Powder/Brownlee LAC)
- Evaluation of Area Plan effectiveness (improvements in water quality and land conditions) (Responsible parties: ODA, Baker Valley/Eagle Valley/Keating SWCD, Powder/Brownlee LAC)
- Identification of areas and annual and long-range strategies for Area Plan implementation.

Trend monitoring will be used to determine long-term changes in water quality. It requires the establishment of "stable" sites and collection of a data record over time for comparison to baseline or initial information. Ideally, areas picked for baseline monitoring will also be used for trend monitoring. In the Powder/Brownlee area, most of these sites have already been established by DEQ and Idaho Power.

DEQ completed a status and trends analysis for the Management Area (http://www.oregon.gov/deq/wq/programs/Pages/wqstatustrends.aspx). The report will be updated for future biennial reviews.

Representatives of the LAC, ODA, the SWCDs, and other agencies and groups conducting monitoring in the Basin will coordinate water quality monitoring. Area Plan success will be evaluated by the LAC, ODA, and the SWCDs.

The Oregon Plan for Salmon and Watersheds' Water Quality Monitoring Technical Guide Book (July, 1999) is the state's preferred reference manual. Specific monitoring protocols will depend on the condition being assessed.

For a description of monitoring and evaluation results, see Chapter 4.

3.4 Biennial Reviews

The LAC, ODA, and the SWCDs will conduct biennial reviews of the progress of implementation of the Area Plan, including enforcement actions taken. The LAC will submit written reports to the Board of Agriculture and the Director, summarizing any meetings held, advisory committee members present, actions taken, and progress and impediments toward achievement of Area Plan goals. If necessary, they will provide recommendations to the Board and the Director regarding modifications to the Area Plan that may be necessary to achieve goals and objectives.

During the biennial review process, ODA, the SWCDs, and the LAC will review:

- The activities that have occurred to achieve Plan goals and objectives in the Management Area and the Focus Area,
- Water quality and land condition assessment and monitoring data in the Management Area and the Focus Area,
- Compliance activities conducted by ODA in the Management Area.

As part of the review, ODA, the LMA and the LAC will discuss the following questions.

- Are all of our Plan objectives measurable?
- Have we met the goals and objectives in the Plan?
- Were the strategies identified during the last biennial review completed?
- Were all violations that were found during ODA compliance inspections resolved or are they in the process of being resolved?
- What are water quality conditions and trends at agriculturally influenced monitoring sites?
- What are conditions and trends in agricultural land conditions that affect water quality?
- Are additional data needed to understand water quality and land conditions and trends?
- What do assessment and monitoring results tell us about where work should be focused for the next two years?
- How is the implementation strategy of focused work in small areas working? What changes have taken place in land conditions in the Focus Areas?
- How can the LAC help make the small area implementation strategy work better or help accelerate implementation of the Area Plan?

3.5 Landowner Participation

The following guidelines apply for landowner participation in implementation and review of the plan:

- Landowners will receive copies of the Plan and monitoring summaries upon request.
    - Comments from the public and landowners will be received and responses given.
    - Adaptive management specific to the landowners' needs should be used to strive to avoid negative conditions or achieve positive conditions described in of Section 2.5, Voluntary and Regulatory Measures.
    - Landowners and producers will be offered the opportunity for adaptive management.
- Property rights will be observed as guaranteed by the US and Oregon Constitution.
- Landowners will maintain ownership of privately collected data by them, or their agents on their property.
- Assistance for problem resolutions will be provided by the SWCDs to landowners upon request.
- Background information and research publications relevant to the water quality issues should be made available by the SWCDs.
- Specialized assistance from professional scientists, researchers, extension agents, or others will be sought by ODA and the SWCDs when questions and concerns require such assistance.
- ODA will assist the landowner in interpretation of data, or other information.
- Secondary characteristics of soil type, hydraulic function, plant community, geological attributes, or other factors can be used to compliment any data and data analysis that meets the goals and objectives of the Area Plan in these areas.
- Landowners may provide information and/or cooperation and maintain options to adapt management actions that meet the Area Plan objectives.

3.6 Enforcement Process and Resolution of Complaints

ODA is responsibile for enforcing Rules derived from the Area Plan. Fines and civil penalties are used as a last resort in the effort to address management impacts on water quality. This is consistent with the direction given to ODA through the Administrative Rules for the Agricultural Water Quality Management Program (OAR 603-090-0000 through 603-090-0120). This Area Plan describes the enforcement policy because ODA has that authority when reasonable attempts at voluntary solutions have failed.

The primary focus of the Area Plan is education toward voluntary compliance with the Area Plan and even the enforcement procedure is designed to educate first and penalize only as a last resort. In the event that a situation comes to the attention of ODA, which may be in violation of the Area Rules, certain procedures will be followed as indicated in the following section.

603-095-3660 Complaints and Investigations
(1) When the department receives notice of an alleged occurrence of agricultural pollution through a written complaint, its own observation, through notification by another agency, or by other means, the department may conduct an investigation. The department may, at its discretion, coordinate investigation activities with the appropriate Local Management Agency.
(2) Each notice of an alleged occurrence of agricultural pollution shall 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 603-095-3660(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 603-095-3660(4), "person" does not include any local, state or federal agency.
(6) Notwithstanding OAR 603-095-3660, 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.

Statutory Authority: ORS 561.190 - 561.191, ORS 568.912
Stats. Implemented: ORS 568.900 - 568.933

Refer to *OAR 603-095-0010 through 0040* for general rules that apply to definitions, purpose, general policies, and appeals; *OAR 603-090-0000 through 0120* for specific action requirements, requests for alternate measures, enforcement procedures, and actions.

Refer to Chapter 1 for a flow chart of ODA's compliance protocols and Appendix B for definitions of terms.

Except for flagrant[1] conveyance of pollutants or flagrant removal of riparian vegetation necessary for stream bank stability and shading at any point in the process, the landowner may choose to address a problem and not incur civil penalties under the Area Rules.

ODA will use the following process when there is a potential complaint, a complaint is received, or a visual assessment is completed by the ODA Ag Water Quality Specialist:

1.) Complaint received, or visual assessment completed.
    a. Water Quality Specialist contacts the District Manager of the respective SWCD (LMA) to inform them of the potential water quality issue.
    b. SWCD has the opportunity to research whether the landowner is currently pursuing assistance or working with a partner agency on their property. If so, the SWCD has the option of contacting the partner agency or landowner to explain the issue and accompanying ODA to verify the water quality issue and to offer assistance. If the landowner has no current relationship with a partner agency or the SWCD, the Ag Water Quality Specialist will then contact the landowner and schedule a site visit, extending an invitation to the District Manager to attend.
    c. When the site visit is completed, if the complaint or visual assessment is valid and the landowner is willing to move forward working with the SWCD or partner agency to correct the issue, or potential issue, the Ag Water Quality Specialist will allow the SWCD to take the enhancement lead with the landowner.
    d. If the landowner is unwilling to move forward to take corrective measures for the water quality issue, ODA will take the appropriate compliance action.
    e. If there is no water quality issue, the Ag Water Quality Specialist will write a letter to the landowner, with a copy forwarded to the SWCD, explaining that there is no issue.

[1] As defined in OAR 340-012-0030 - any documented violation where the respondent had actual knowledge of the law and had consciously set out to commit the violation.

Chapter 4: Implementation, Monitoring, and Adaptive Management

4.1 Progress Toward Measurable Objectives

4.1.1 Focus Area

Measurable objectives will be established after the pre-assesment.

4.2 Activities and Accomplishments

Accomplishments reported by Implementation Strategies	
Goals • Prevent and control water pollution from agricultural activities and soil erosion and achieve applicable water quality standards; • Work toward a reduction in any identified undesirable water quality areas by attempting to prevent and control characteristics on agricultural lands in the plan area that contribute to undesirable water quality; • Continue and expand, if necessary, the current water quality monitoring program established by the SWCD and the Burnt River Irrigation District; and • Apply the lessons learned from the Burnt River Temperature Study	
Water Quality Objectives • Streambank erosion remains within expected levels; • Maintain or improve the ability of riparian vegetation to provide streambank stability, filtration of overland flow, and moderation of solar heating within the capabilities of the site; • No visible sediment loss from cropland through precipitation or irrigation induced erosion and; • Continue and expand, if necessary, the current monitoring program as outlined in the Burnt River Temperature Study	
Implementation Strategies	**Accomplishments**
Community and Landowner Engagement	▪Summer Newsletter- 450 Recipients ▪Idaho Power Riparian Program Brochure Available for Distribution ▪Newspaper Articles- 6 Submitted ▪Spring Newsletter- 444 Recipients ▪Outdoor School (Soils Class- 2 years) – 410 Students (Total) ▪NACD Poster Contest- 24 Contestants ▪Staff Training (Rain, Soil Health, Livestock Water, OWEB, CONNECT, Irrigation JAA, Permits, Grant Writing, IP Mapping)- 66 Hours ▪Cub Scouts Presentation on Water Cycle-10 Students ▪University of Idaho Range Tour- 17 Students ▪Baker FFA Chapter Outreach ▪LAC Coordination
Technical Assistance	▪Site Visits- 146 Individuals ▪Monitoring- 12 Reports ▪New Funding Applications- 31 Applications ▪Ag Water Quality- 11 Projects (3,309 Acres) ▪Total Landowners Provided Technical Assistance- 505 Individuals

	Individual Projects/Activities worked on during 15/17 Biennium: ▪Sage Grouse Initiative ▪Candidate Conservation Agreement with Assurances ▪2015/2016 Annual Dinner and Awards ▪NRCS Work Group ▪Writing Courses ▪Idaho Power Small Grants ▪Soil and Water Commission Meetings ▪Idaho National Association of Conservation Districts Meeting ▪Oregon Association of Conservation Districts Meetings/Work ▪Baker County Commission Meeting ▪Special Districts Association Conference ▪RCPP/USFWS ▪SWAT Completion ▪Technical Writer Contract ▪All Counties Sage Grouse Meetings ▪OACD Conference ▪Special Districts Safety Grant ▪Water Testing Bottles Made Available ▪Basin-Wide Newsletter (via email) ▪Medusahead Training
Funding and Grants	OWEB: $203,126.55 (all three Districts in the Basin) NRCS: $2,953,706.11 (obligated funds for all of Baker County) SWCD: $0.00 ODFW: $0.00 USFWS:$17,262.00 CREP: $0.00
Monitoring and Evaluation	12 Monitoring Reports Completed and Submitted

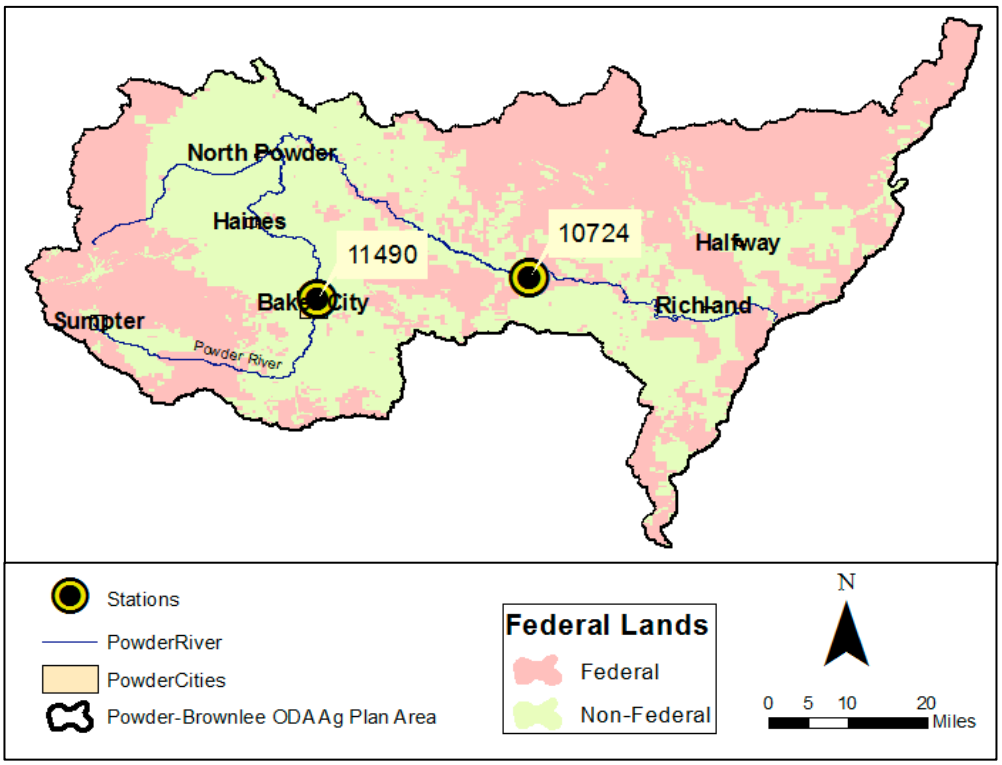
4.3 Monitoring—Status and Trends

4.3.1 Water Quality

Water quality in this basin is directly dictated by the time of year and the volume of water in streams. (See Appendix D). The LAC recognizes there are often factors that are not being considered when collecting data, including:

- Volume of water,
- Point source inputs,
- Elevation and topography,
- Location within the basin,
- Historical on-the-ground knowledge of fish species known to inhabit streams i.e.; historical evidence contradicts that certain fish species ever existed in certain streams,
- Competing species habitats.

For this biennial review, DEQ reviewed data from over 65 sites used by DEQ, BLM, and Baker SWCD. Two had sufficient data for status and trends analysis (Powder River at Highways 86 and 7). (DEQ Powder-Brownlee 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. 36pp. 2017.)



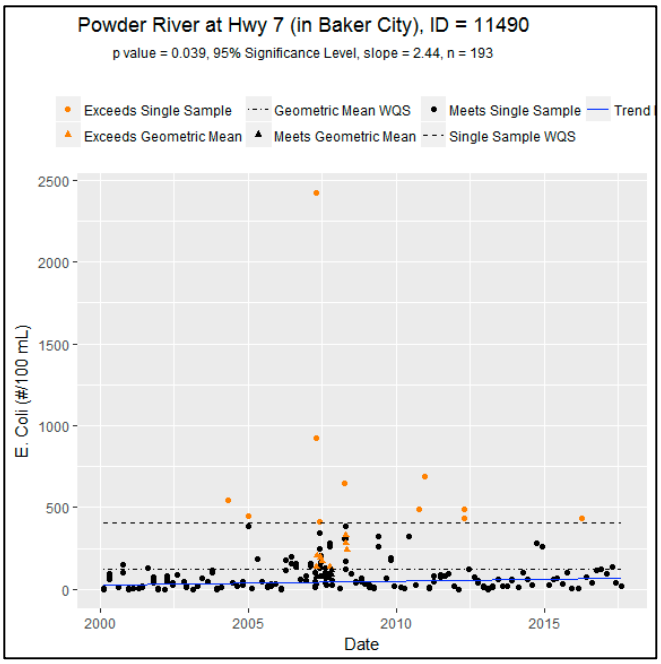
The Department of Environmental Quality's report shows that concerns are related to *E. coli* and phosphorus (highlighted in grey and discussed below).

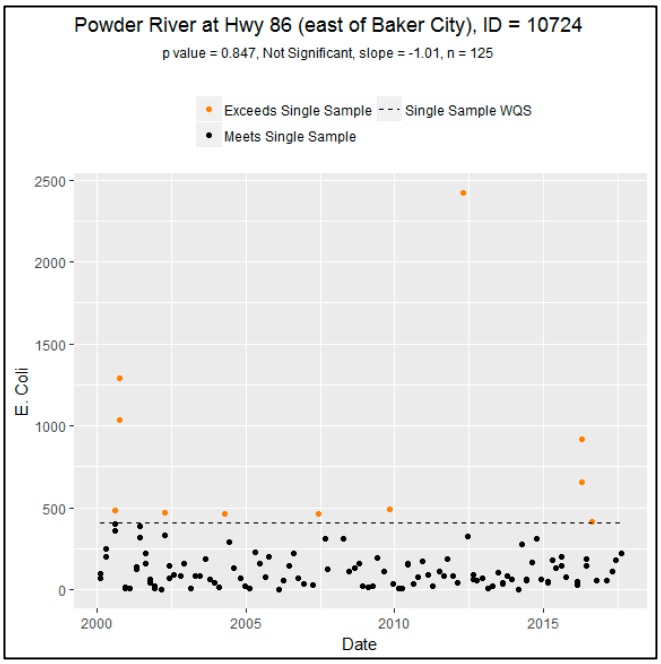
Site ID	Site Description	*E. coli*	pH	Dissolved Oxygen	Total Suspended Solids	Total Phosphorus
		# exceeding standard/N*			# >50 NTU/N**	# > 0.07 mg/L**
36786	**Powder River @ Hwy 7 (in Baker City)**	10/129 9/15***	1/110	0/103	4/103	23/110
10724	**Powder River @ Hwy 86 (below Keating)**	9/99	1/104	1/103	3/101	98/100

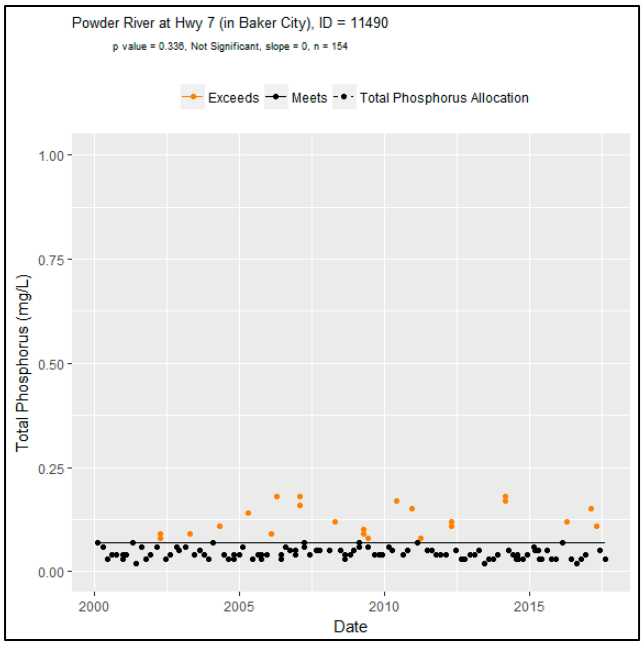
*N = # of observations
** TMDL load allocations
*** Bacteria standard: 30-day log mean of 126 per 100 milliliters, based on a minimum of five samples

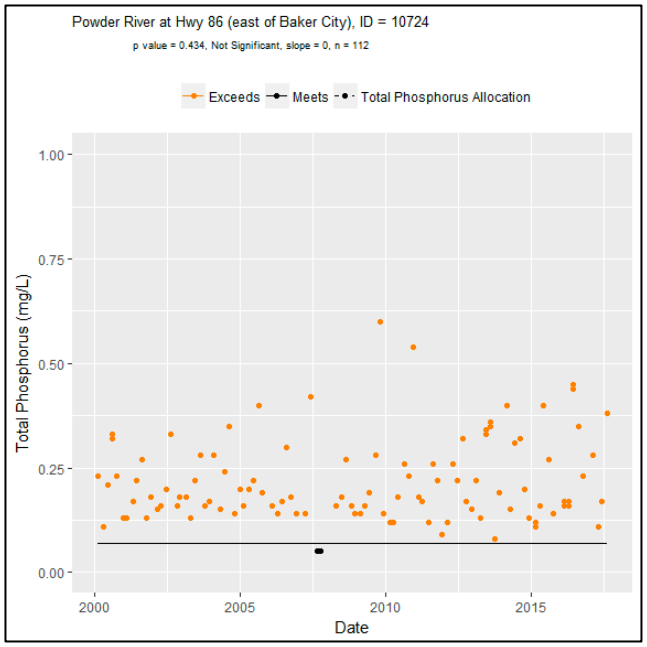
Graphs of the highlighted analyses were discussed at the biennial review to get more insight into the data.

Both *E. coli* and phosphorus increase between Baker and Keating. But the number of scope of exceedances of the *E. coli* standard were small compared to exceedances of the phosphorus load allocation. Total phosphorus is lowest in headwater streams and increases as it flows through agricultural lands towards Keating.









4.3.2 Land Conditions

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

Riparian Index Scores from Analysis of Aerial Photographs for 2007 and 2012				
Stream	**Measured Scores**		**% Difference (if notable)**	**Comments about analyzed reach**
	2007	**2012**		
Beagle Creek	44.76	43.13	- 4	Narrow channel with good flow. Three diversions present along this reach. Most of the reach has a dense cover of riparian trees, except for the bottom 5%.
Daly Creek	33.96	35.72	+ 5	Stream was running bank full with some large wood visible in channel. Entire reach is stable and in good condition. Two diversions present.
Ebell Creek	34.87	35.43		Narrow channel, mostly stable. One diversion visible.
Gentry Creek	31.12	31.40		Mostly an engineered channel, with multiple impoundments. Lower and middle reaches are ditched. Some non-ditched areas show bank erosion.
Houghton Creek	32.81			Upper 75% is a narrow meandering stream, but lower section widens out and is incised. Only intermittent flow visible.
Love Creek	31.82	31.95		Narrow, slightly sinuous stream. Large numbers of cattle visible and appear to have free access to the creek. Stream banks generally look stable.
Magpie Creek	45.45	45.22		Upper 60% is a dry, partially indistinct channel. Lower section has visible water, a wider channel, and many cattle in the stream and along riparian grasslands.
Ruckles Creek	32.98	33.17		Middle section of the stream barely has a channel. Upper section flows through irrigated fields, lower section is ditched but with riparian trees.
Sag Creek	33.25	33.79		Nearly all of this stream has been channelized. May be used as an irrigation conveyance.
Second Creek	36.03			Upper 50% is a narrow channel, lower half is a series of impoundments connected by a poorly defined channel that was dry when photographed.
Sutton Creek	36.32	37.06		Most of this reach is stable and in good condition though some areas show damage due to cattle access, and cattle are visible.

A total of 11 streams were assessed in this basin in 2007. Riparian index scores for these streams ranged from a high of 45.45 for Magpie Creek, to a low of 31.12 for Gentry Creek. Beagle Creek had the largest percentage of tree cover, with one band at 56 percent. Two of the streams had essentially no tree coverage. Second Creek had the highest percentage of bare land with one band at 11 percent, while two streams had no bare land. Sag Creek had the greatest amount of bare/agriculture land with one band at 13 percent. Most of the streams were dominated by grass/agriculture cover, except Magpie Creek, which was dominated by shrub/agriculture (52 to 90%).

Of the nine streams assessed in the Powder Basin in 2012, only two had notable changes in landscape cover. Beagle Creek showed a 4 percent decrease in Riparian Index Score due to loss of tree cover in both the left and right bands. Daly Creek had a significant increase in shrub and shrub/agriculture cover, with a corresponding decrease in grass/agriculture. Aerial photographs will be analyzed for the last time in 2017 due to funding. Results will be presented at the next biennial review.

4.4 Biennial Reviews and Adaptive Management

The January 30, 2018, biennial review consisted mostly of a discussion of implementation activities and efforts to show progress through measurable objectives. The LAC was pleased with the work that has

been completed in the Rock Creek Area of the Powder Brownlee Management Area. The LAC has changed directions and is moving into the lower Powder River area.

The LAC identified the following impediments:

- Lack of funding to move forward with projects to improve water quality and quantity.
- A need for interim data meetings do discuss trends.

The LAC recommended that ODA work with conservation partners to:

- Analyze water quality data for the Management Area and present the results at a interim bieenial meeting in 2019.

The Oregon Department of Agriculture has investigated three compliance cases in this Management Area in the last two years:

- A landowner removed large trees along a quarter mile of stream to allow better flow for irrigation water. ODA responded with a Notice of Noncompliance and a Plan of Correction that required him to replant the banks with shrubs and grasses. Re-vegetation efforts are complete and landowner was issued a Letter of Compliance.
- A landowner was investigated for causing sediment to enter a stream due to no setback from winter feeding area. ODA responded with a notice of Noncompliance and a Plan of Correction. The landowner piped the water away from the feeding area and sloped the feeding area to allow for runoff to spread on adjacent field. A Letter of Compliance was issued.
- A landowner was investigated for overgrazing of riparian vegetation on a mile of stream. ODA responded with a Notice of Noncompliance and a Plan of Correction that required him to change his timing of grazing to allow for natural regrowth and fenced off a large water gap and created a smaller water gap. Timing and duration of grazing has been followed. Revegetation is occurring. Fencing of new water gap to be completed winter of 2018.

APPENDIX A: Waterbodies on the 2012 303(d) List

POWDER RIVER SUBBASIN

Waterbody	River Miles	Season	Parameter
Anthony Creek	0 - 16	Summer	Temperature – Bull Trout (10.0°C)
California Gulch	0 – 4.4	Summer	Temperature - Rearing (17.8°C)
Cracker Creek	0 – 10.3	Jan 1 – May 15	Dissolved Oxygen
Dean Creek	.4 – 5.2	Summer	Temperature - Rearing (17.8°C)
Dutch Flat Creek	0 - 9.2	Year Round	Biological Criteria
Eagle Creek	0 – 21.1	Summer	Bacteria – E.Coli
East Fork Goose Creek	0 – 2.7	Spring/Summer	Turbidity
Elk Creek	0 - 7.7	Summer	Temperature - Rearing (17.8°C)
Indian Creek	0 – 5.2	Summer	Temperature –Bull Trout (10.0°C)
North Powder River	0 – 18.3	Summer	Temperature - Rearing (17.8°C)
North Powder River	0 – 24.3	Year Round	Bacteria – E.Coli
Phillips Reservoir	130 – 138.2	Year Round	Dissolved Oxygen
Phillips Reservoir *	***130 – 138.2***	***Year Round***	***Mercury***
Powder River	0 – 146.3	Year Round	Arsenic
Powder River	0 - 69	Summer	Temperature - Rearing (17.8°C)
Powder River	71.9 – 115.6	Summer	Temperature - Rearing (17.8°C)
Powder River	0 - 130	Year Round	Bacteria – E.Coli
Powder River	115.6 - 130	Year Round	Bacteria – Fecal Coliform
Powder River	0 - 130	Jan 1 – May 15	Dissolved Oxygen
Sawmill Creek	0 – 2.5	Year Round	Sedimentation
Sawmill Creek	0 – 2.5	Year Round	Temperature – Redband (20.0°C)
Silver Creek	0 – 6.1	Summer	Temperature - Bull Trout (10.0°C)
Sutton Creek	0 – 15.9	Year Round	Temperature - Redband (20.0°C)

* Added In 2012

BROWNLEE RESERVOIR SUBBASIN

Waterbody	River Miles	Season	Parameter
Aspen Creek	0 – 1.6	Summer	Temperature – Bull Trout (10.0° C)
Beecher Creek	0 - 2.4	Summer	Temperature – Rearing (17.8°C)
Big Elk Creek	0 – 2.1	Summer	Temperature - Bull Trout (10.0° C)
Clear Creek	0 – 8.7	Summer	Temperature - Bull Trout (10.0° C)
East Pine Creek	0 – 12.2	Summer	Temperature - Rearing (17.8°C)
East Pine Creek	12.2 – 18.7	Summer	Temperature - Bull Trout (10.0° C)
Elk Creek	0 – 9.5	Summer	Temperature - Bull Trout (10.0° C)
Lake Fork Creek	0 – 10.4	Summer	Temperature - Rearing (17.8°C)
Meadow Creek	0 – 3.3	Summer	Temperature - Bull Trout (10.0° C)
Morgan Creek	0 – 6.1	Year Round	Temperature – Redband (20.0° C)
Okanogan Creek	0 – 1.3	Summer	Temperature - Rearing (17.8°C)
Pine Creek	0 – 30.2	Year Round	Temperature – Redband (20.0° C)
Quicksand Creek	0 – 3.6	Year Round	Temperature – Redband (20.0° C)
Trail Creek	0 – 1.6	Summer	Temperature - Bull Trout (10.0° C)

APPENDIX B: Definitions

"Pollution" has the meaning given in ORS 468B.005(3) which states: 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 conveyance 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.

"Wastes" has the meaning given in ORS 468B.005(7) which states: 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. Other substances, which will or may cause pollution, include commercial fertilizers, soil amendments, composts, animal wastes and vegetative materials.

"Adaptive management" means making adjustments in management based on feedback from monitoring.

Compliance Definitions

A **Letter of Compliance (LOC)** tells the owner/operator that at the time of the inspector's site visit, the property was in compliance with all Area Rules and there were no conditions observed during the investigation, that are likely to cause a water quality problem in the near future.

A **Water Quality Advisory (WQA)** means the owner/operator is in compliance because there were no violations of Area Rules documented at the time of the inspector's visit, but the conditions on the property have the potential to violate the Area Rules in the future.

A Water Quality Advisory letter includes a description of the conditions that have the potential to violate the Area Rules, the statute or rule that may be violated, consequences of future documented violations, and a schedule of recommended corrective actions. The letter may also refer the landowner to other sources of technical assistance, and summarize other issues discussed during the investigation. The inspector will usually follow up to see if the changes effectively reduced the potential for a water quality problem.

A **Letter of Warning (LOW)** means the inspector found a violation of Area Rules during the investigation, but the pollution-causing activity was not egregious and was not done intentionally to cause water pollution. The Letter of Warning is an unofficial compliance action (not defined in Administrative Rule) that gives the landowner or operator at least one opportunity to correct the problem before he/she receives a Notice of Noncompliance. A Letter of Warning is not considered an enforcement action by the State.

A **Letter of Warning** includes a description of the conditions that violate the Area Rules, the statute or rule that is violated, consequences of future documented violations, and a schedule of recommended corrective actions. The letter may also refer the landowner to other sources of technical assistance, and summarize other issues discussed during the investigation. Although the landowner has the flexibility to choose the recommended actions or other practices best suited to correct the problem on the operation, the inspector will follow up to see if the violation has been addressed.

A Notice of Noncompliance (NON) means the inspector found a violation of Area Rules during the investigation, and the violation was either (1) egregious or done to intentionally cause water pollution, or (2) a second violation after being issued a Letter of Warning. A Notice of Noncompliance includes a description of the conditions that violate the Area Rules, the statute or rule that is violated, consequences of current documented violations, and a schedule of required corrective actions. The letter may also refer the landowner to other sources of technical assistance, and summarize other issues discussed during the investigation.

A **Plan of Correction** (POC) usually accompanies a NON if the corrective actions require more than 30 days and directs the landowner to take specific steps to correct the problem. An inspector will follow up to confirm the landowner completed the required corrective actions and effectively addressed the violation.

A **Civil Penalty (CP)** is a fee that is assessed to a landowner whose agricultural activities caused either a willful and intentional violation of Area Rules, or who repeatedly failed to take steps to correct a violation. Oregon Department of Agriculture's Division 90 rules include a matrix for calculating the value of civil penalties for the Water Quality Program.

Sources of Impairment - from the DEQ Powder Basin Water Quality Status Report and Action Plan Summary - October 2013

Bacteria
Recent water quality data from sites located throughout the Powder Basin indicate that excessive bacteria levels are a widespread problem. Irrigation season bacteria levels are generally higher than non-irrigation season levels, with the exception of the two North Powder River sites where non-irrigation season levels are higher. High bacteria levels in water bodies are a concern because they pose a human health risk by enabling the spread of disease. Many projects have already been implemented in the basin to reduce bacteria loading from livestock and other sources.

Nutrients
The Snake River Hells Canyon TMDL established a limit on phosphorus concentrations at the mouths of the Powder and Burnt Rivers. Conservation projects in the Powder Basin have addressed impacts from excess nutrients and algae growth through projects such as nutrient management practices on farms, irrigation system improvements, and feedlot improvements. The phosphorus limits will be further examined and developed in the Powder basin TMDL.

Temperature
Increases in temperature, changes in stream flow, and stream habitat degradation can harm fish and other aquatic life, and have been identified as basin-wide concerns. Temperature monitoring is being conducted in the basin by DEQ and other stakeholders such as the U.S. Forest Service and the Powder Basin Watershed Council, with the goal of providing data for a temperature TMDL. Stakeholders in the basin have implemented projects to address temperature impacts by restoring stream channels, stabilizing stream banks, planting riparian vegetation, changing livestock management, and thinning juniper stands.

Sedimentation and Turbidity
Stream channels in portions of the Powder Basin have been observed to have embedded gravel conditions where the space between gravel particles is filled with fine sediment and one stream segment is 303(d) listed for excess turbidity caused by excess suspended sediment load. Many of these streams were originally identified as having water quality concerns related to non-point source pollution in DEQ's 1988 Assessment of NPS-Related Water Quality Problems. The major nonpoint source water quality problems identified in this report were related to riparian vegetation removal and associated high stream

temperatures, and increased erosion leading to sedimentation. Excess sedimentation can be controlled through Best Management Practices (BMP) that can reduce erosion on farms, forests, roads, and urban areas.

Toxics

Sources of arsenic and mercury in the basin include natural geologic deposits and historic mining areas. Aerial deposition from local and global sources is also a major source of mercury in the basin.

APPENDIX C: History of Irrigation Management in the Management Area

People have been irrigating crops in the Powder/Brownlee Management Area for many years. Isaac Hiatt, writing a history of the county in 1893, said that a limited amount of irrigation had occurred since the first pioneers settled in the area in the early 1860s but that no extensive irrigation projects had been started up to that time. He speculated that "when the time comes that water is no longer needed for mining purposes, the ditches may be of more permanent value to the county by using the water for irrigating the land to which it can be conveyed." This is indeed what happened. The early miners dug an extensive array of ditches, and when mining stopped, farmers and ranchers used these ditches to bring water to their fields. Some of the ditches are still used today.

Hiatt envisioned a series of reservoirs at the head of the ditches to supply water through the growing season. His writings contain lengthy discussions of flooding and drought. For example, in June 1862 a party of settlers came to the junction of the North Powder and Powder Rivers and could not cross because of the water flowing out over the valley. They had to move upstream and constructed the first bridge across the Powder River, which soon became a toll bridge. However, the next spring in 1863 water was so short the miners were squabbling over the supply. Because of this shortage, Hiatt reported that the first "right to water" was filed in 1863 by a group of miners. They claimed 250-inches from Elk Creek.

The early settlers recognized the potential for agriculture in the management area if water could be brought to where it was needed. For example Hiatt (1893) wrote that some farmers in the Powder River Valley had converted sagebrush and greasewood into "the best meadow land. These are examples of what can be done by cultivating and irrigating." He estimated the potential number of irrigated acres could be 221,000, which is very close to today's 176,000 acres under irrigation.

The Baker Irrigation project was begun by private entities in the 1890s. This initial work consisted of building several small canals to deliver water to the fields. The Baker Irrigation District was formed in the 1930s and one of the first projects was to construct the Lilley Canal and the Lilley Pumping plant, which are located about 10 miles north of Baker City on the Powder River. In most years, irrigation water ran short by the end of the season; in 1967, Mason Dam was constructed and it created Phillips Reservoir.

In the lower Powder River area, irrigators began organizing ditch companies in the 1880s. The first was the Basche Ditch. The Lower Powder Irrigation District is thought to have been established in the 1930s. The districts' purpose was to distribute irrigation water to the farmlands in the Keating Valley. The Thief Valley Dam, the irrigation districts' only storage facility, was constructed in the early 1930s. Thief Valley was the first dam built on the Powder River. It is not considered to be a multi-purpose reservoir. The irrigators can completely drain the reservoir if they want.

The irrigation district delivers water from the reservoir via the lower Powder River where there are three smaller dams used to divert water into canals. Currently, the District includes 32 users and supports 7,300 irrigated acres.

The Powder Valley Water Control District was formed in 1962. It incorporates property in both Baker and Union Counties and covers about 350 square miles. Its function is to provide irrigation water to roughly 15,000 acres.

Much of the water for the Powder Valley Water Control District is supplied by Wolf Creek and Pilcher Creek reservoirs. The Wolf Creek dam is five miles northwest of North Powder; construction was

completed in 1975. Pilcher Creek dam impounds Pilcher Creek about seven miles west of North Powder. Several pipelines are part of the district and they help distribute water to the irrigators. Using pipelines allows gravity pressure to run sprinklers.

When water runs short, it is divided among the irrigators by priority date. The earliest dates have the highest priority. Those irrigators on the west side of Baker Valley with priority dates of 1874 or older generally have water nearly all irrigation season. Those with 1880 through 1890 water rights have water early in the season during high stream flow times. Generally, the later water rights, 1900 and after, are served for only a short time and do not necessarily get served every year. Late in the summer, on some creeks, water becomes so scarce that only small heads of water are put into each ditch to provide drinking water for livestock.

History of natural resource management in the Powder/Brownlee Management Area

One of the earliest recorded explorations of the Powder River area was in 1811. Wilson Price Hunt led the John Jacob Astor overland expedition and passed through Baker Valley known then as The Lone Tree Valley. Hunt is responsible for the first crossing of the Blue Mountains to the Columbia thus establishing a passage for the western end of the Oregon Trail the major travel route to the West. He arrived in Astoria in 1812.

The purpose of these early expeditions was to find beaver and establish trading posts. Beaver populations declined rapidly during this time but have since recovered to some extent in recent years.

From 1841 through 1869, more than 250,000 Americans took the Oregon Trail to the West starting their journey in Independence, Missouri. Nearing the end of their journey, they arrived at Farewell Bend on the Snake River and proceeded to conquer the treacherous Burnt River Canyon. The trail ahead led them across Virtue Flat to Flagstaff Hill and into Powder River Valley.

In August 1845, a group of wagons led by Stephen Meek left the Oregon Trail for a shortcut to western Oregon. After suffering many hardships and deaths, the survivors reached The Dalles in October. While camped at a tributary of the John Day River, small yellow pebbles were found along the water's edge. Not realizing that the pebbles were gold, they were left behind in an old blue bucket and the legend of the "Lost Blue Bucket Mine" was born.

In 1861, gold was discovered in Baker County. Four men, searching for the fabled "Lost Blue Bucket Mine," found gold in Griffin Gulch, south of where Baker City is now located.

In the spring of 1862, the town of Auburn was laid out in Blue Canyon and soon grew to a population of about 5,000 people. Several other towns were founded in the same year.

At roughly this same time, the first farms and ranches were established in the area to feed the miners and town people. Some examples of the early agricultural activities follow.

Cowboys named Knight, Abbott, and Packwood drove a herd of cattle to supply beef to people in the area in the summer 1861. They crossed the Snake River in the Brownlee area and came upon a major tributary to the Powder River. They happened to shoot an eagle here and named the tributary Eagle Creek (Hiatt, 1893).

On June 16, 1862, Hardin Estes and Fred Dill filed the first claim to the Powder River Valley and they started a ranch near Washington Gulch. William Baldock arrived in September 1862 and saw an abundance of wild grass. He found a market for hay and cut many tons by hand that fall and winter. He

charged between $50 and $60 per ton and he had $400 in cash after expenses and providing for his family that winter (Hiatt, 1893).

Joseph Kinnison came to the Powder River Valley in July 1862 and according to Hiatt (1893), he was the first to "plow a furrow" in Baker County the following spring of 1863. He had 40 acres in cultivation and grew a variety vegetables and other produce. Despite a late spring frost, he had a successful first year and made $4,000.

To facilitate mining, agricultural activities, and transportation, settlers began to build roads and ditches. For example, in 1863 the Sisley Toll Road was built from Weatherby to connect with the Old's Ferry Toll Road to the Snake River and the Old's Ferry. In the same year, the 125 mile long Eldorado Ditch, probably the world's longest hand-dug ditch, was surveyed and started.

For the next 20 years or so, the work of development continued at a steady pace. The local economy got a boost when in 1884 prospectors discovered gold near Cornucopia and the transcontinental railroad reached Baker City. By 1890, the population of Baker City was 6,663; larger than either Boise or Spokane.

Settlers had been logging from the beginning to build their houses with some land clearing for farming and for mining activities. Commercial logging began growing in the 1880s and 90s. Evidence of this is from 1890 the Sumpter Valley Railway was incorporated to carry logs from Sumpter Valley to the Baker City sawmills, and in 1892, the Oregon Lumber Company completed a sawmill in Baker City. By 1896, the Sumpter Valley Railroad reached Sumpter. By 1901, the population of Sumpter was 3,000 with over 80 businesses.

Agriculture in the area was expanding. As noted in the irrigation section, the Baker irrigation project was begun in the 1890s. An example of the importance of agriculture was the extension of the Sumpter Valley Railroad to Prairie City in 1910 to serve ranchers and farmers as well as lumber and mining.

Grazing

Skinner Kirby (1989) and Ernest Hudspeth (1979) have written personal accounts of ranching life in the early 1900's. Both of these memoirs are rich in detail about every day life. The summary that follows highlights some of their relevant observations.

They describe activities of homesteaders clearing small plots of land to grow vegetables and some hay. They sold or traded excess produce to stores in town, and in return, they got flour, salt, sugar, and other items they could not produce themselves. Each family raised a few pigs, chickens, and cows for meat.

Kirby (1989) wrote about his father working for several cattle operations in addition to running his own small place. The herds were large - a 1,000 head or more. It was also common for people like the Kirby family to buy cows from the Malheur area and drive them into the Baker Valley to graze in the summer and be sold that fall. As Kirby said, "The range was wide open and grass was plentiful."

Kirby described the range conditions prior to 1916 as the grass being stirrup high with very little sagebrush and no cheat grass. He said, "its hard for people today to imagine how the grass and flowers were at that time."

In time, cattle and sheep herds became so large that intense competition for range occurred. Livestock were harassed and killed, fistfights were common and a few people were murdered because of the range wars. Kirby attests that the Homestead Act of 1916 made things worse. More people arrived and sheep and cattle herds grew.

The grass was being overgrazed and cheat grass was increasing. Kirby called this the beginning of the "Great Change."

> "No one seemed to care anything about it, just dog-eat-dog, and grab here and there to get along until the hills were crawling with cattle, sheep, and horses."

Kirby estimated that in the 1920s and 30s there were about 100 bands of sheep in Baker County. If a typical band was around 1,200, that means there were more than 100,000 sheep in the area.

However, Kirby attributed as much as 50% of the damage to uncared for horses roaming the range year round. Thousands of horses were loose and many began to suffer from starvation. In 1926, the Humane Society pushed to have the horses gathered. In the spring of 1927, local ranchers worked together to gather the horses. Kirby participated in a roundup of nearly 7,000 animals.

Range conditions were getting so bad in the west that in 1934 Congress passed the Taylor Grazing Act. One of the main purposes of the Act was to stop transient livestock operators from grazing the public lands. The range was divided into allotments and each allotment assigned to an operator with an allowable number of livestock. Kirby, writing in 1989, felt that much progress had been made in restoring the range but much more work remained to be done.

Crop production

The livestock industry has always been the dominant agricultural industry in the management area. However, ever since Joseph Kinnison started his small produce farm in 1863, a variety of crops have been grown in the Baker area. The first farmers, like Kinnison, grew produce for local markets or for their own consumption. Hiatt (1893) said that farmers were called "begas" because they sold rutabagas to the miners the second winter after the first gold discovery. The next year the farmers produced too many rutabagas and ruined the market.

Homesteaders arriving at the turn of the century continued this style of farming. Kirby (1989) recalled his mother and father growing a wide variety of crops on their small homestead mostly for themselves to eat. Potatoes were their main cash crop.

Some produce was shipped out of the area. Hiatt (1893) wrote about orchards shipping thousands of boxes of fruit out on the Snake River. The main orchard producing areas were along the Snake River, north and south from what is now Huntington.

As more and more irrigation projects were completed, more acres of rangeland were converted to cropland. Hay was the primary crop. Farmers also grew a significant amount of dry land crops such as winter wheat.

Thirty to 40 years ago there were many more acres of wheat grown in the management area than there are today. As of 2001, wheat accounted for only three percent of agricultural commodity sales in Baker County. Local residents believe that climate change has caused some of the reduction in wheat production. Hiatt (1893), Kirby (1989), and Hudspeth (1979) described frequent heavy snows and very cold temperatures that are rarely seen today. So it may be that the climate has shifted to be warmer and dryer.

Mining Industry

The mining industry was beginning to have trouble in the 1910s. Miners began looking for new ways of extracting gold and other minerals. Dredging in the Sumpter Valley began in 1913, temporarily revitalizing the industry. Evidence of past mining is still seen in the dredge tailings lining the lower

stretches of McCully Fork and Cracker Creek and covering the flood plain of the Powder River from Sumpter to Phillips Lake.

Besides the dredge tailings, the effects of the dredging are still felt today. A tremendous amount of silt was transported through the river system because of the dredging. Long time residents observed that the Powder ran muddy all year when the dredge was in operation. Much of the silt in Thief Valley Reservoir came from the dredging operations. The irrigation district has worked with DEQ to reduce turbidity problems when the reservoir is emptied. The silt collected in other parts of the valley too and has changed the configuration of the river.

A fire, which started in the kitchen of the Capital Hotel, destroyed much of Sumpter. The town's water supply failed thirty minutes after the start of the fire and dynamite was finally used to stop the flames. The fire, combined with the shutdown of the gold mines, ended the boom in Sumpter. The year was 1917.

The Sumpter Valley Railroad stayed to serve the agricultural and lumbering needs of the communities, and with the more modern machinery, they were able to re-work some of the huge dumps of rock. The community also was shortly revived during the 30s depression period when the price of gold rose and some of the mining activity returned, but with the advent of World War II, the prosperity of the old mining regions began to fade.

The source of the material in this section was the Dictionary of Oregon History and the Baker County Historical Society.

APPENDIX D: Summary of SWCD Monitoring Data

The SWCDs have maintained a database of water quality information during 1995-2002. Water temperature and other water quality information were collected at six sites on the upper Powder River mainstem between Phillips Reservoir and North Powder, Oregon; seven sites on the lower Powder River mainstem located below Thief Valley Reservoir to a site approximately 100 meters above the confluence of the Powder River with Brownlee Reservoir. Four sites were located on Pine Creek, and during 2002, sites were also established on Eagle Creek at two places.

The baseline inventory incorporates a sampling design that allows statistical testing with objective results that separate differences between sites located throughout the Basin. Differences in water quality samples between sites were stratified for influences due to elevation and distance between sites.

A total of 18 permanent sites were evaluated to determine the natural heating cycle and increases in water temperatures that occur above the expected natural thermal cycle. Thermal gradients were calculated for sites based on topographic elevation and rates of thermal increase and decrease during the summer periods June, July, and August. The detailed temperature records (by hours and days) were compared by sites on a daily, monthly, and annual basis using several types of statistical analyses.

Testing results indicate that each site responded to the natural heating and cooling cycle described by the laws of thermodynamics. The Powder River main stem, Wolf Creek, Pine Creek and Eagle Creek maintained a ubiquitous thermal pattern during each year when the sites were compared.

Stream temperatures increased during the summer months as elevation decreased. The rate of heating below Mason Dam was significantly different than other sites located downstream. Water entering the river system from Mason Dam outlet displays little temperature variation between daytime and nighttime temperatures. In the first 20 miles downstream, water temperatures are at or near the temperature standard of 68ºF on a daily basis.

A similar pattern was recorded below Thief Valley Reservoir. Water temperatures remained fairly consistent on a daily basis with minimal variation between the overnight low and maximum temperatures throughout the years 1995-2002.

Monthly water temperature differences in 1995 through 2002 were strongly associated with air temperature differences. Water temperature patterns followed air temperature patterns consistent with the decrease in elevation and decreases in stream velocity through reaches with high sinuosity. All sites displayed stream temperatures patterns reflective of the climatic influences associated with the Baker Valley geographic location.

The data indicated that the minimum overnight water temperatures are a major factor governing water temperatures. If the 5 a.m. water temperatures are above 64ºF, it is not possible for the daily maximum to cool and drop below 64ºF during the day. Overnight temperatures are governed by the air temperatures over the area during the 5 p.m. to 5 a.m. period.

Meteorological conditions were dominant when compared to existing anthropogenic attributes that may influence water temperature in the Powder River watershed. Climatic conditions determine the feasible range of water temperature and are a dominant component of the equilibrium temperature for the environment.

None of the segments were identified as having skewed patterns outside of the natural heating limits. It is likely that the state temperature standards are inappropriate for the Baker SWCD area and needs to be refined to better reflect the local environment and focus on the land activities; it should be replaced with a focus on water conditions exhibited in the sampling records caused by natural factors.

Thermal pollution due to insufficient riparian vegetation within the study area was not verified in the data testing. There was no evidence of a thermal pollution problem when sites were tested for the time involved in temperature increases at each site. Water temperature increases are not equal to the air temperature increases but are proportional.

Daily increases in water temperature were summarized by periods during the day: 5 a.m. to 9 a.m., 9 a.m. to 1p.m. and 1 p.m. to 5 p.m. The results of the statistical testing for the daily changes on the Powder Basin sites indicated that the water temperatures generally did not increase until the air temperatures increased 15ºF or more after 5 a.m. when the minimum low water temperature was established. The pattern was consistent throughout the study years at each site throughout the summer months.

The result of air temperatures increasing at least 15ºF before water temperatures increase 1ºF after the overnight low at 5 a.m. is consistent with the thermodynamic principles. The law establishes that a heating process takes place at a measurable rate when a large thermal reservoir is available for the exchange of energy from the highest concentration to the lowest.

The Baker Valley, Keating, and Eagle Valley District stream temperature patterns are similar to the results noted on the Burnt River (Borman and Larson, 2002) and other watersheds in Oregon (Larson and Larson, 1997 & 2002).

The Burnt River Study incorporated a model and field data, which demonstrated that flood irrigation and dam management enhances stream characteristics desirable in the Snake River Province watersheds. Without reservoir storage, the stream flows during the summer and fall would be much lower than current levels.

The Baker Valley, Keating, and Eagle Valley District data inventories of nutrients were examined but analyses were not conducted on the data due to the variability and insufficient number of samples required for comparison of the means. Oregon DEQ data was also examined; both data sets lack an adequate number of samples to be able to place a 90 percent confidence in the data.

A different strategy for sampling in future years is recommended. The “grab” type field sampling should be conducted in a way that will account for daily variations and assure a 90 percent confidence that the sample is not a sampling anomaly.

The effect of the stream temperature and water quality parameters such as phosphate, nitrates, pH, and dissolved oxygen on fish and aquatic life are best evaluated through the research studies focused on adaptations and physiological responses of species to changing stream conditions on a daily basis. Continued monitoring of the streams is needed to establish natural nutrient and stream chemistry levels that will meet the basin beneficial uses.

The SWCDs, acting as LMAs, will create a new monitoring plan in conjunction with the focus area and seek partners and funding to facilitate the monitoring.