



Oregon Agricultural Water Quality Report

September 2012

Ranchers in Curry County have carefully managed this pasture and streamside area to protect water quality.



Table of Contents

Executive Summary	1
Part I. Program Overview	
Introduction	4
History of the program	5
ODA resources to address water quality	7
Part II: Partnerships	
The ODA-SWCD Partnership	9
Accomplishments by SWCDs	11
Coordination with other agencies and organizations	13
Stakeholder involvement	16
Part III: Program activities and measures of effectiveness	
Outreach and education	18
Compliance with agricultural water quality regulations	20
Relationship to water quality standards and TMDLs	22
Monitoring to evaluate effectiveness	24
Maps	28



Executive Summary



State and USDA funds combined with private funds to make this streamside restoration project possible in Wheeler County.

Oregon's Agricultural Water Quality Management Program (AgWQMP) is administered by the Oregon Department of Agriculture (ODA). Along with Oregon's Forest Practices Act and other nonpoint source water quality programs, as well as the Oregon Department of Environmental Quality's permitting programs for point sources, the AgWQMP is a key part of the state's strategy for improving the condition of our waters. The program also addresses agriculture's commitments in the Oregon Plan for Salmon and Watersheds. By law, the program is charged to prevent and control water pollution from agricultural lands. It is also a key part of the state's overall water quality program, ensuring that farmers and ranchers do their part in meeting water quality standards.

Given that nonpoint source pollution is complex with diffuse and diverse sources, Oregon's program focuses on landscape conditions that provide the functions for healthy watersheds, and uses a variety of technical references, including Natural Resources Conservation Service and other scientifically based resources, to identify the landscape conditions that should be achieved. The landscape-based approach provides landowners with clarity about their responsibilities and focuses on parameters within landowners' control.

Oregon's agricultural water quality program is nationally recognized because of its unique approach to address agriculture's water quality responsibilities. The program requires farmers and ranchers to meet agricultural water quality regulations, but provides many options in how individuals manage their farms and ranches to provide the outcomes necessary to prevent and control pollution. The program has long included extensive stakeholder involvement,

as well as cooperation between diverse public and private partners to meet its mission and goals.

The program has been highly successful, but has also recognized that adaptive management is necessary to document long-term success in implementation more effectively. ODA is now working with partners and stakeholders to address limiting factors strategically. Over the past year, we have been involved in many discussions with stakeholders on alternative ways to assess conditions and measure changes on agricultural lands, ensure compliance with agricultural water quality regulations, systematically implement water quality plans, and build new partnerships and relationships.

The agricultural water quality program has twelve staff to develop, adjust, and implement water quality plans and regulations. Staff work statewide with Oregon's 38,000 farms and ranches, which vary greatly in size, products grown, climate, and ownership. ODA staff focus their work on compliance activities to ensure that farmers and ranchers comply with the regulations. To extend the reach of the program, the department also works with Soil and Water Conservation Districts (SWCDs), builds partnerships with other groups and agencies, and coordinates water quality and land condition monitoring.



Executive Summary

ODA relies on Soil and Water Conservation Districts to implement the program through on-the-ground project work. This is because of the SWCDs' expertise in project design and implementation, their access to technical and financial resources for landowners, and connections with local communities. In addition, Oregon law specifically states that SWCDs are to be involved in the program's planning and implementation work to the maximum extent practicable.

The State of Oregon provides funding to SWCDs to help implement the program through on-the-ground project work with farmers and ranchers. During the 2009-2011 biennium, state funds allowed Oregon's SWCDs to work with farmers, ranchers, and other partners to restore 750 acres of streamside areas, protect 11,921 acres of cropland from erosion, install 27 irrigation system upgrades, and leverage other funds to complete a variety of water quality improvement projects.

A variety of partner agencies and organizations support SWCD projects with technical and financial assistance, and complete additional water quality improvements in agriculture. During 2009 and 2010, Oregon Watershed Enhancement Board funds supported 118,000 acres of irrigation system improvements, 9,081 acres of juniper control projects, and 60,512 acres of cropland erosion control projects. Over the past decade, the USDA Farm Service agency has partnered with the state to restore nearly 40,000 acres of streamside areas along agricultural lands. The USDA Natural Resource Conservation Service provides design standards and technical support for many of these projects, in addition to Farm Bill conservation funds.

In the early 2000s, the program's focus was to get as many agricultural water quality improvement projects on the ground as possible, and document those accomplishments. The program and our partners focused efforts on outreach and technical assistance to put projects in on the ground to achieve immediate benefits for water quality and build the foundation for strong partnerships needed to succeed over the long term. It is clear from the data we have that Oregonians

both public and private have made tremendous investments to protect and improve water quality.

Numerous scientific studies and technical documents from university researchers, the USDA, and other federal agencies show that the types of projects implemented positively affect water quality at the farm scale. At the same time, it has been challenging to document the cumulative impacts of these projects to water quality at larger scales, and to put these accomplishments into context. As the program has matured, it is becoming apparent that the program needs to adapt and gather additional data, and document comprehensive accomplishments to meet Oregon's water quality and fish habitat goals as a result of these initial investments. Comparing the scale of current accomplishments within the larger context will help the state and our partners better track progress to achieve water quality goals and estimate the costs of treating remaining areas.

Recent monitoring efforts have focused on evaluating water quality status and trends through the Oregon Water Quality Index, and tracking riparian condition trends through aerial photos. Over time, data have shown that some areas are improving while others are not. The program is currently updating its monitoring strategy to add additional types of information to the data we currently gather. As part of ongoing efforts to implement the program, the need for a comprehensive assessment has been identified as a next step in the process to assess the status of program implementation. ODA is proactively engaging with stakeholders to identify and leverage additional data to better document attainment of state water quality goals and the level of compliance with regulations.

By law, ODA has authority to adopt and implement regulations as part of the program. Compliance with the regulations is required, but farmers and ranchers may choose the strategies they use to comply. Currently, the program predominantly investigates compliance with the regulations in response to complaints. We are engaging in strategic planning to identify alternatives to a complaint-based approach, and will present alternatives to stakeholders this fall.

Despite a history of outreach and public involvement, the program and its partners perceive that some rural and agricultural landowners are still unaware of agricultural water quality regulations administered by the program. There continues to be a need to develop even more partnerships and alliances with



Executive Summary

farmers, ranchers, rural landowners and agricultural organizations to spread the word about the program. ODA and stakeholders are exploring ways to build these relationships and extend the reach of the limited staffing resources available in the program.

The program is designed to prevent and control pollution from agricultural activities and soil erosion on agricultural and rural lands in order to meet agricultural load allocations in Total Maximum Daily Loads and help meet water quality standards. Implementation of the program through both extensive voluntary efforts and compliance with regulations will help Oregon to meet its water quality goals. The state's perspective is that individual landowners meet their responsibilities under the TMDLs by complying with the program's regulations. However, for the state to meet its responsibility to ensure that agricultural load allocations and water quality standards are met, streamside vegetation needs to reach site capability, which will involve active restoration efforts in some cases. Assessments of site capability based on scientific information can help identify where active restoration efforts are needed.

The program is working with stakeholders to continuously improve local agricultural water quality management area plans through the two-year plan review process and use monitoring data to guide implementation efforts. These ongoing improvements to the plans will allow the state to better track progress towards meeting the state's water quality goals, including implementation-ready TMDLs. However, making these

changes involves significant staff time to engage stakeholders and discuss and refine the changes. The program is actively seeking input from agricultural stakeholders, and other partners including DEQ and conservation organizations, to identify efficient and effective approaches to make these improvements.

We expect to make the program even stronger with more strategic implementation strategies. In May 2012, the Oregon State Board of Agriculture recommended that "ODA's Natural Resource Division develop alternatives to a complaint-based ag water quality program. In addition, staff should identify current processes that could be streamlined, or eliminated, in order to devote more resources to building relationships, plan implementation, and compliance." This action item, along with feedback received from conversations with stakeholders over the past year, prompted the program to engage in strategic planning this summer. The program expects to develop a strategic vision for the program's implementation, and specific options on how to move forward in several program areas, for discussion with stakeholders this fall.

As the program moves forward, we will continue to abide by core principles outlined in past Board resolutions. These include thorough, rigorous, and proactive implementation of water quality programs, addressing fish habitat concerns related to water quality, support for the agricultural water quality program as Oregon agriculture's commitment to the Oregon Plan for Salmon and Watersheds, and a monitoring strategy that tracks whether the program is delivering the water quality improvements expected. We look forward to working with diverse stakeholders to apply these principles strategically to make a successful program even better in the future.

Part I. Program Overview



This Curry County landowner is restoring a streamside area with support from the USDA, the State of Oregon, and the local SWCD and watershed council.

Introduction

The purpose of the program is to prevent and control water pollution from agricultural activities and soil erosion, and help achieve water quality standards. The program is an important part of agriculture's efforts and responsibilities to meet the Oregon Plan for Salmon and Watersheds. By protecting and improving water quality, agriculture helps improve habitat conditions for salmon.

The legislation creating the program passed in 1993, and the program received funding for regional planners and technical specialists in 1997. The program worked closely with farmers and ranchers, Soil and Water Conservation Districts (SWCDs), the Oregon Department of Environmental Quality (DEQ), as well as other partners, to develop regional water quality plans and associated regulations to protect and improve water quality.

The state's approach to implement the program includes several key policies, which are outlined in the program administrative rules.

- Encourage public and stakeholder involvement
- Conduct outreach and education to encourage farmers and ranchers to adopt strategies that meet the goals of area plans
- Provide farmers and ranchers flexibility in how they comply with requirements
- Pursue enforcement when reasonable attempts at voluntary solutions fail.

The State Board of Agriculture has also developed key principles that guide the program. In several resolutions and action items, the Board:

- Expresses support for implementation of a broad based, proactive program.
- Recommends that agricultural water quality plans be developed, implemented, and enforced in a manner that addresses fish habitat concerns related to water quality.
- Expresses support for agriculture's commitment to the citizens of the state via the agricultural water quality program, including the commitment to implement area plans as agriculture's contribution to the Oregon Plan for Salmon and Watersheds.
- Recommends implementation of a monitoring strategy in the program that tracks status and trend of water quality on agricultural lands, effectiveness of practices to protect water quality, and the success of the industry in achieving water quality goals.
- Recommends that ODA's Natural Resources Division develop alternatives to a complaint-based ag water quality program, and identify current processes that could be streamlined or eliminated to devote more resources to building relationships, plan implementation, and compliance.

As ODA works with stakeholders to build on past program successes and improve the program into the future, we continue to abide by these policies and principles.



Part I. Program Overview



Figure 1: Plans and regulations have been adopted for 38 regions of the state.

History of the program

In 1993, the Oregon Legislature passed the Agricultural Water Quality Management Act (Senate Bill 1010), directing the Oregon Department of Agriculture to develop plans to prevent and control water pollution from agricultural activities and soil erosion and achieve water quality standards. The legislation identified several circumstances that could prompt ODA to develop plans, including a determination by the Environmental Quality Commission to develop Total Maximum Daily Loads for a waterbody, declaration of a groundwater management area, or when a plan was otherwise required by state or federal law. Senate Bill 502 was passed in 1995 to further clarify that ODA is responsible to regulate agriculture with respect to water quality.

In the Agricultural Water Quality Management Act, the Legislature stated its intent that agricultural water quality plans involve SWCDs as local management agencies to the fullest extent practical. It also gave ODA the authority to adopt regulations to implement agricultural water quality plans, and to enter property, after making a reasonable attempt to contact the landowner, to evaluate compliance with the regulations.

Between 1997 and 2004, program staff worked with Local Advisory Committees (LACs) of farmers, ranchers, and other interests, to develop water quality management plans and adopt regulations in 39 regions of the state (Figure 1). In 2011, two of the regions elected to combine into one, leaving 38 regions. Consistent with legislative direction, ODA developed Intergovernmental Agreements with local SWCDs to assist with plan development, provide staff

support to LACs, and conduct outreach, education and technical assistance about the plans and regulations.

ODA then transitioned its focus towards implementing the plans and regulations. Since 2004, the program staff have focused their time in the following areas.

- Educating farmers and ranchers about the plans and regulations.
- Investigating complaints and developing inspection protocols.
- Extending the reach of the program through contracts with local SWCDs to implement the agricultural water quality plans. This is due to SWCDs' expertise in implementing on-the-ground projects and partnerships with the USDA Natural Resources Conservation Service and Farm Service Agency to deliver technical and financial assistance. Much of the SWCDs' technical assistance work was funded with Measure 66 lottery funds.
- Assisting SWCDs with grant applications to implement on-the-ground projects, and providing input on state and federal grant program funding priorities.
- Collecting data on projects accomplished by SWCDs with state funds, collecting and evaluating data on streamside vegetation

Part I. Program Overview

conditions along agricultural lands, and evaluating other agencies' water quality data.

- Evaluating each area plan every two years in consultation with LACs.
- Gathering input on program implementation from stakeholders including the State Board of Agriculture and an agricultural water quality program advisory committee.

During this implementation phase the program has struggled with unstable funding, as well as a lack of funding for monitoring, requiring the program to continuously consider how to prioritize its workload within and between these different areas.

Like many agencies focusing on nonpoint source pollution, the program has been able to show that numerous projects have been successfully used to address water quality issues on agricultural lands. Numerous scientific studies, as well as technical references available from partner agencies such as NRCS, describe the water quality benefits of these projects at the farm scale. However, it has been difficult to document the cumulative effects of these projects through existing monitoring efforts. While we believe the program has been very successful, additional data are needed to be able to

document the cumulative effects of projects on the landscape conditions that protect water quality.

In 2011, as part of an effort to strategically align its work, ODA began working with nine SWCDs on pilot projects to focus assessments, outreach, and technical assistance in small geographic areas. Strategically focused work was identified as a way to maximize use of limited resources and provide measurable changes in landscape conditions and compliance with the regulations.

Recently, the program began to engage stakeholders in adaptive management efforts to implement the program and monitor results more strategically. This year, ODA organized a series of listening sessions to describe some of the feedback received from stakeholders about the limitations of the current program, and gather input on strategies to move forward with compliance work, evaluating effectiveness, and partner and stakeholder relationships. In addition, the Board of Agriculture passed an action item in May 2012 that advised ODA to identify alternatives to a complaint-based compliance investigation program, build relationships with stakeholders, and gain efficiency in program processes. In response to this and other feedback, ODA is developing options for discussion with stakeholders this fall.

Part I. Program Overview



ODA water quality specialists Cheryl Hummon and Beth Pietrzak collect water quality samples during a compliance investigation.

ODA resources to address water quality

Since the program's inception, staffing levels have varied from about twelve to fourteen full-time equivalent positions. For the 2011-2013 biennium, the program received funding for twelve full-time equivalent staff. This includes the Water Quality program manager, administrative support specialist, seven regional water quality specialists, and three technical specialists. In addition, the program shares two technical specialists with other ODA natural resource programs.

In addition to the Agricultural Water Quality Program, the following programs at ODA enhance agriculture's efforts to prevent pollution from agricultural activities.

The SWCD Program administers grant agreements with SWCDs, provides training to build capacity and manage risk, and assists SWCDs with operational issues. The SWCD program and Water Quality program work closely together to focus SWCD grant funds on implementing agricultural water quality management area plans.

The Confined Animal Feeding Operation (CAFO) Program regulates dairies and other operations with confined animals and wastewater treatment facilities. The program inspects permitted operations annually, approves animal waste management plans for permitted facilities, and responds to complaints on permitted CAFOs as well as some non-permitted livestock operations.

ODA's Pesticides Division registers pesticides and fertilizer products in Oregon, licenses pesticide users, conducts education programs about safe and legal pesticide use,

and investigates complaints of alleged pesticide misuse. The Pesticides division works closely with DEQ and the agricultural community on Pesticide Stewardship Partnerships in several regions of Oregon, identifying pesticide water quality concerns and identifying strategies to keep pesticides out of the water.

The noxious weed control and insect pest prevention and management programs in ODA's Plant Division work to exclude and minimize the impacts of invasive insects, plants, and diseases. Several priority weeds, such as knotweeds, can have significant negative impacts on streamside areas, choking out native vegetation that provides more water quality benefits. The noxious weed program administers noxious weed control grants to local organizations to reduce or eliminate high priority weeds.

There are approximately 38,000 farms in Oregon, as well as rural residential properties, under the purview of the Agricultural Water Quality Program. Oregon's farms and ranches are highly diverse, and working successfully across Oregon requires expertise in a variety of climates, types of agricultural products, farming and ranching schedules of operations, and cultures. The State of Oregon's approach to extend the reach of the program beyond its staffing resources has been to partner with several other agencies and organizations, including Oregon's Soil and Water Conservation Districts, the US Department of



Part I. Program Overview

Agriculture, watershed councils, and many other state, federal, and local agencies and organizations. The staff resources and grant funding for on-the-ground projects

available through partnering with these organizations have been critical to implement the program.

Part II: Partnerships



Umatilla SWCD staff help a landowner plant streamside vegetation after a stream channel restoration project. Photo from Umatilla SWCD.

The ODA-SWCD Partnership

The state has leveraged ODA's agricultural water quality program resources considerably by establishing partnerships with SWCDs. SWCDs have a lead role in working directly with farmers and ranchers to implement on-the-ground projects to support Oregon's water quality goals. SWCDs also have strong partnerships with the USDA, watershed councils, and other agencies and organizations, which leverages additional sources of technical and financial support for projects.

The Legislature specified in the program's enabling statute that SWCDs should be involved in plan development and implementation to the fullest extent practical. Since 1997, the Oregon Legislature has committed funding for SWCDs to support development and implementation of agricultural water quality plans. In addition to providing technical assistance to landowners, SWCD support has included helping to set up Local Advisory Committees to advise ODA on the development of area plans and regulations, coordinating the committee meetings and providing leadership during the committee's work, and conducting education and outreach about the plan and regulation development process.

This biennium, the Legislature committed \$5.1 million for SWCDs. Each SWCD works with its regional water quality specialist to develop a "scope of work" agreement that describes how each SWCD will use the state funding. ODA and SWCD staff spend a significant amount of time negotiating the scopes of work, as well as tracking and reporting progress. Some stakeholders have identified the scope of work process as an

The ODA-SWCD partnership summary

Strengths

- Local source of technical and administrative expertise for landowners.
- Proactively work with landowners to voluntarily address water quality concerns.
- Strong relationships with local community, farmers and ranchers.
- Strong relationships with technical and financial assistance agencies, including USDA.
- Projects completed by SWCDs are technically sound and based on scientific research.
- Some SWCDs have leveraged many other funds to address water quality and natural resource issues.

Weaknesses

- Capacity issues limit ability of some SWCDs to build relationships with the local community, farmers and ranchers, and to provide assistance on water quality issues.
- It has been difficult to document the cumulative impacts of SWCD projects to water quality and landscape conditions through existing monitoring efforts.

Part II: Partnerships

area where efficiency improvements could be made. Others have commented that they would prefer more flexibility in how they are allowed to spend the funds.

ODA and SWCDs have also discussed the need to report progress in a more comprehensive way. Current accomplishments are reported in terms of acres or stream miles treated, but are not currently compared with the total acreage or stream miles that is still in need of treatment. Providing this context will help provide a better estimate going forward of the resources needed to address remaining water quality issues, and help ODA and SWCDs evaluate progress to achieve state water quality goals. ODA is evaluating alternatives to the current Scope of Work negotiation and accomplishments reporting process, and plans to present options to the Board of Agriculture

this fall. We also expect extensive discussions with the Oregon Association of Conservation Districts, Soil and Water Conservation Commission, and Soil and Water Conservation Districts about these options.

As described in the next section, SWCDs and their partners have completed numerous water quality improvement projects. These projects are designed and implemented using the best available science from partner agencies such as the USDA-Natural Resources Conservation Service. Scientific research at the site-specific level affirms that various activities provide water quality benefits, and some of this research is reviewed in the Monitoring section of this report. However, it has been difficult to document the cumulative impacts of these projects through existing monitoring efforts.

Part II: Partnerships



The Wasco County SWCD and NRCS have collaborated with landowners to convert to no-till cropping systems, preventing soil erosion and saving fuel.

Accomplishments by SWCDs

For many decades, SWCDs have helped landowners complete a wide variety of projects to protect and improve water quality. The funding that became available for SWCDs in 1997 helped build their capacity to do more of this work. Their work with farmers and ranchers is critical to implement the agricultural water quality program.

SWCDs have access to a variety of technical and financial resources. The USDA-NRCS is a key resource for designs and technical standards for water quality improvement projects. NRCS technical documents describe the water quality and habitat benefits of projects, helping SWCD staff and landowners identify options that meet water quality goals. Both the USDA Natural Resources Conservation Service and Farm Service Agency are important sources of funding for SWCD projects.

If an SWCD uses state funds to support technical staff time on a project, the completed projects are included in the SWCD quarterly reports to ODA. Following is a summary of selected SWCD accomplishments reported to ODA during the 2009-2011 biennium.

Streamside restoration projects. SWCDs work with farmers and ranchers to evaluate existing streamside vegetation and if necessary, develop plans and projects to improve the vegetation. This can include changing cropping strategies, grazing management strategies, planting and protecting streamside vegetation, and establishing off-site watering facilities. Streamside vegetation planting projects often

involve considerable site preparation and maintenance to ensure project success. Many projects involve multi-stakeholder cooperation and contributions.

SWCDs reported the following accomplishments to ODA during 2009-2011

- 750 acres of riparian restoration
- 295,000 feet of fencing
- 140 livestock watering facilities.

Nutrient and manure management. SWCDs work with farmers to use fertilizer and manure at the right time of year, at the appropriate rate, and in the best location to maximize the value of those nutrients and protect water quality. Storing manure under cover and planning where and when it will be used helps keep nutrients and bacteria out of the water. Precision fertilizer application systems provide the same water quality benefits and help growers get the most value out of the fertilizer they buy.

Accomplishments

- 2,200 acres of nutrient management
- 13 comprehensive nutrient management plans
- 25 manure storage and composting facilities.

Erosion control and soil quality. SWCDs help farmers prevent soil loss and build soil health through no-till farming, reduced tillage, and rotating types of crops. Other practices help capture soil, keeping it out of the water. In addition to reducing soil



Part II: Partnerships

runoff into the water, these projects can reduce the volume of stormwater runoff to streams and rivers, keeping more water in the soil during the dry season and reducing harmful flooding.

Accomplishments

- 11,921 acres of no-till and other conservation cropping strategies
- 192,270 feet of erosion control terraces
- 152 sediment control basins.

Range and pasture management. In central and eastern Oregon, western juniper has become “too much of a good thing.” Absence of fire has allowed juniper to spread into grasslands, consuming a lot of water, reducing rangeland plants that cover the soil, and in some cases even drying up streams. Many SWCDs have made juniper control a priority. SWCDs also help landowners manage livestock grazing to keep pasture and rangeland plants healthy and minimize soil erosion.

Accomplishments

- 13,200 acres of weed and juniper control treatments
- 50 livestock water facilities (these are in addition to the ones reported in the riparian restoration section).

Irrigation efficiency. A major initiative in some parts of central and eastern Oregon has involved converting flood and furrow irrigated fields to sprinkler irrigation. These efforts often involve piping large water delivery canals and laterals as well as helping farmers plan and invest in sprinkler systems. In many areas of Oregon, SWCDs are also helping farmers manage diverse irrigation systems, including sprinkler, flood, furrow, and drip systems, to maximize water use efficiency.

Accomplishments

- 27 irrigation system upgrades
- 4,600 acres of efficient irrigation water management
- 52 pipeline projects (these may be for a canal, lateral, individual sprinkler or livestock watering facility)

Pesticide management. SWCDs help farmers and ranchers monitor plant and insect pests, try new pest control technologies, access biological controls such as insects that eat noxious weeds, participate in pesticide collection events, conduct water quality monitoring for legacy and current use pesticides and control noxious weeds and animal pests. SWCDs have also collaborated with DEQ and other partners to hold pesticide collection events.

Accomplishments

- 2,400 acres of pest management and biological weed control.

Part II: Partnerships



With assistance from 319 funds, Malheur County Extension worked with the Malheur County SWCD to promote no-till farming, helping to reduce soil erosion and save fuel. Farmer Cory Maag rented the drill to seed this field near Willow Creek in Malheur County.

Coordination with other agencies and organizations

In addition to SWCDs, ODA works closely with several other agencies and organizations that support the implementation of the program.

The Oregon Department of Environmental Quality and the Environmental Quality Commission.

DEQ is responsible to identify waterbodies that do not meet water quality standards and develop Total Maximum Daily Loads for those waterbodies to attain standards. A TMDL is the maximum amount of pollution a waterbody can absorb while meeting water quality standards.

Agricultural water quality plans describe strategies for agriculture to meet its responsibilities in the TMDLs. Prior to each biennial review of an area plan and regulations, ODA consults with DEQ and seeks feedback on the plan and regulations' adequacy to meet TMDL allocations. ODA and DEQ revised a Memorandum of Agreement in 2012 describing how the agencies will work together to implement the Clean Water Act on agricultural and rural lands.

The Section 319 program at EPA, administered in Oregon by DEQ, distributes important funding for water quality protection projects in agriculture. During 2009 and 2010, 319 funds were provided to several organizations that helped

cost-share water quality improvement projects in agriculture, including the following.

- Malheur County Extension promoted reduced tillage on cropland in the Malheur and Owyhee watersheds.
- The Tillamook Soil and Water Conservation District helped farmers install streamside fencing, provide off-channel watering and plant vegetation along agricultural lands in Tillamook County.
- The Nehalem Watershed Council supported streamside restoration projects in the Upper Nehalem watershed.

DEQ estimates that 2009 and 2010 projects reduced nitrogen and phosphorus loading into streams by 62,518 and 25,461 pounds per year, respectively, and reduced sediment loading to streams by 20,853 pounds. Most of these projects occurred on or along agricultural lands.

DEQ has also collaborated with the agricultural community and other agencies and organizations on Pesticide Stewardship Partnerships, which address pesticide water quality issues. As part of this effort, DEQ and partners including SWCDs have held pesticide collection events which involved collection and proper disposal of 74,660 pounds of pesticides. DEQ and partners also conducted water quality monitoring to identify pesticides of concern in these areas and target education efforts.

Part II: Partnerships

The Oregon Watershed Enhancement Board. OWEB grants support a variety of projects on agricultural lands that help farmers and ranchers comply with water quality regulations and protect and enhance water quality. These grants are a major source of funding for projects accomplished by SWCDs and watershed councils. In addition, OWEB funds support outreach, coordination, and technical assistance activities at SWCDs and watershed councils to achieve Oregon's water quality and habitat goals. This biennium, \$5.1 million in state funds was budgeted for Oregon's SWCDs for outreach, coordination, and technical assistance, and \$5.1 million was also budgeted for Oregon's watershed councils.

ODA staff participate on regional teams which review and rank OWEB grant applications.

ODA collaborates with OWEB to administer and distribute technical assistance funds to SWCDs, and support the Oregon Conservation Reserve Enhancement Program (CREP).

Below are some highlights from agricultural projects completed with support from OWEB during 2009 and 2010.

- 454 acres of riparian plantings on agricultural lands along 64.5 miles of stream
- 45,369 feet of erosion control terraces, and 15,143 acres of other erosion control projects on farmlands
- 118,005 acres of irrigation system improvements
- 9,081 acres of juniper control.

USDA-Natural Resources Conservation Service. NRCS funding and technical assistance support agricultural projects that protect and improve water quality. NRCS distributes funding through a variety of Farm Bill conservation programs, and sets funding priorities in consultation with local partners. Where resources allow, ODA participates in local funding priority discussions as well as on the state technical advisory committee.

USDA-Farm Service Agency. FSA supports several programs that set aside environmentally sensitive lands from agricultural production and provide rent and cost-share to participating farmers and ranchers. These programs have been very important in Oregon to control erosion and restore streamside areas. With support from FSA and OWEB, 39,925 acres of riparian areas have been restored along agricultural lands through the Conservation Reserve Enhancement Program (CREP). ODA and OWEB coordinate technical assistance grants through SWCDs to help complete CREP projects and partner with FSA to improve program delivery.

On February 15, 2012, ODA joined OWEB, DEQ and NRCS as signatories to the Conservation Effectiveness Partnership Agreement, which describes how the agencies will share project information and environmental data to assess the effectiveness of projects in protecting and improving natural resources. Each agency is interested in evaluating the effectiveness of its programs and in improving program effectiveness. The agencies' programs are so interrelated that it is difficult to determine the relative impacts of the programs separately - it makes more sense to evaluate them collectively as the agencies are doing. It is not unusual for a water quality improvement project to involve all of these agencies contributing in some way - either directly through project cost-share or indirectly through funding a local technician to help a farmer or rancher complete the project.

Other efforts that support the Agricultural Water Quality Program

Efforts by landowners and the private sector. Oregon's farmers and ranchers have a long history of stewardship, including protecting riparian areas, carefully applying fertilizers and pesticides, and controlling erosion. Many farmers and ranchers have managed their lands to protect water quality without assistance from outside organizations. Others have worked hand in hand with conservation partners to continuously improve conditions on their lands. Farmers and ranchers also often receive assistance from the private sector on fertilizer application technologies, irrigation water equipment and management, and other strategies.

Currently, ODA and other agencies are able to track what has been implemented in cooperation with conservation partners with public funding, although existing tracking systems have some flaws and

Part II: Partnerships

overlap. Landowner accomplishments that are done without public assistance currently go unreported.

Watershed councils. Watershed councils also work with farmers and ranchers to improve water quality and fish and wildlife habitat, and assess and monitor watershed conditions. Many councils work closely with the SWCDs in their area.

OSU Extension. OSU Extension faculty provide technical advice to farmers and ranchers on land management strategies that protect and improve water quality. OSU Extension also conducts a variety of education programs for farmers and ranchers.

Bonneville Power Administration. BPA fish and wildlife grants have supported technicians at SWCDs to help landowners fence streamside areas, and have also directly cost-shared streamside fencing.

Coordination with other agencies summary

Strengths

- Many sources of funding and assistance for water quality improvement projects in agriculture.
- State funds have leveraged significant federal and other funds for water quality projects.
- Agencies and organizations generally work together well and have collaborated on many projects.
- Several agencies are partnering to improve sharing of project information and data.

Weaknesses

- Currently, water quality projects completed by agricultural landowners without public assistance go unreported.
- Multiple reporting systems for projects lead to some overlap and/or data gaps.

Part II: Partnerships



ODA water quality specialist Sheila Marcoe speaks with Malheur Watershed Council chair Jerry Erstrom about water quality improvement projects in the Willow Creek watershed near Vale, Oregon.

Stakeholder involvement

The program values stakeholder involvement at the local, regional, and statewide level. Beginning in 2004, the Agricultural Water Quality Program Advisory Committee has met at least annually to review program implementation and advise the state on future direction. The committee includes representatives of a variety of organizations and agencies, including the Oregon Association of Conservation Districts, Oregon Farm Bureau, Oregon Environmental Council, Association of Oregon Counties, Association of Clean Water Agencies, Oregon Wheat League, Freshwater Trust, and Oregon Cattlemen's Association.

Throughout the program's history, the Board of Agriculture has had an important role sharing information about the program with local communities and bringing back issues for discussion with ODA. ODA has sought concurrence from the Board before adopting each set of plans and regulations, and consults with the Board prior to revising the regulations. We will work very closely with the Board as the program explores more strategic implementation options.

Local Advisory Committees (LACs), which advised ODA during the initial plan and regulations development process, continue to participate in biennial reviews of plans and rules. In some areas, LAC member participation in biennial reviews has dwindled over time. ODA is working to keep these important stakeholders engaged, replacing members who are no longer available to serve with new members.

Following each biennial review, the LAC submits a report to the Board of Agriculture describing progress in plan implementation and impediments towards achieving the

plan goals. Water quality program staff prepare draft reports for LAC approval and include accomplishment summaries from SWCDs and other partners. Accomplishment summaries are impressive, listing numbers and types of projects and education activities completed since the previous review. At the same time, it is difficult to put accomplishments into context. For

Stakeholder involvement summary

Strengths

- Program built with extensive stakeholder input.
- Many engaged landowners.
- Impressive project accomplishments to achieve goals in area plans.

Weaknesses

- Need for program staff to maintain and improve relationships with agricultural community.
- Stakeholder involvement has dwindled over time in many regions.
- Current biennial review process consumes a significant amount of staff time.
- There is no context currently to compare project accomplishments with where we started, where we are going, and how much work remains to be done.

Part II: Partnerships

example, a reported accomplishment of 10 restored stream miles could be put into context by comparing it with the total stream miles in the area and the number of stream miles that still need to be restored.

Because of SWCDs' critical role in implementing agricultural water quality plans, and because of the contractual relationships between ODA and SWCDs, ODA consults with SWCDs frequently through a variety of venues, including the Soil and Water Conservation Commission and the Oregon Association of Conservation Districts board. ODA staff frequently attend SWCD board meetings to discuss progress in implementing Scope

of Work tasks, ODA implementation activities, and new initiatives within the program.

Limited resources have made it difficult for program staff to maintain and build relationships with farmers and ranchers, agricultural organizations, and other partners such as OSU Extension, watershed councils, and other non-profit groups at the local level.

However, if we focus some of our limited resources toward maintaining and building these relationships in the future, it could mean more partners to help us implement the program. We welcome input on how to prioritize building relationships with individuals and organizations in local agricultural communities.

Part III: Program activities and measures of effectiveness



This project resulted from cooperative outreach efforts between ODA and Christmas tree growers. The Christmas tree farmer contacted ODA for advice on how to prevent an erosion problem during the upcoming winter. After considering several options, the farm spread straw on the field and planted a winter cover crop. This solution successfully prevented winter erosion and soil runoff from the property. The farmer was advised to contact ODA by another grower who is involved in the industry organization.

Outreach and education

The program and partners strive to inform farmers and ranchers that the plans and regulations exist, how agricultural activities affect water quality, and where to go for technical and financial assistance. The state's philosophy, reflected in the policy statements in program administrative rule (OAR 603 -090-0000(5)(c)) is that if farmers and ranchers are aware of the need to protect water quality and how to achieve water quality protection on their operations, the vast majority will take initiative to make any necessary adjustments to conditions on their land.

After plans and regulations were adopted, the program and our partners focused on educating landowners about the plans and regulations, and getting projects on the ground. Soil and Water Conservation Districts have taken the lead to educate farmers and ranchers in their areas about strategies to protect water quality. SWCDs provide information to farmers and ranchers through workshops, newsletter and newspaper articles, presentations to local agricultural groups, Web sites, and one-on-one contacts during site visits or farmer visits in the SWCD office. Each SWCD's staffing resources and capacity influences the amount of outreach that it can conduct.

During the 2009-2011 biennium, SWCDs reported contacting about 79,000 landowners and providing technical assistance to 14,500 of those landowners. SWCDs delivered 670 presentations to 12,740 attendees, and published 333 news articles. ODA staff often

participate in these efforts, providing information about agricultural water quality plans and regulations.

Outreach and education summary

Strengths

- SWCDs conduct a significant amount of outreach, serving as the local connection with agricultural community
- Pilot projects have identified one-on-one contacts with landowners as a more effective, measurable strategy to encourage water quality improvements

Weaknesses

- There is still widespread lack of awareness of the water quality program and what is required
- ODA water quality program staff have not had the time to conduct the level of outreach that was conducted during plan and regulation development
- In the past, it has been difficult to measure the impacts of outreach activities and understand which strategies have been effective

Part III: Program activities and measures of effectiveness

ODA staff have also developed several informational campaigns targeted towards growers of specific products, such as Christmas tree and nursery growers, cattle ranchers in central and Eastern Oregon, and small acreage horse farms. ODA has participated in informational campaigns led by other partners, such as OSU Extension. For example, OSU Extension presented a series of successful workshops in central and eastern Oregon called "Cows and Creeks."

Despite nearly fifteen years of outreach and education about water quality plans and regulations, ODA and partners perceive that many landowners still do not know that the water quality program exists, or if they are aware of the program, have not taken action to achieve compliance.

There are many possible reasons for this.

- While some landowners are very connected to informational networks, such as their local Farm Bureau chapter or OSU Extension office, others do not receive information through traditional sources. It is difficult to reach some landowners through traditional outreach methods. This is especially true for small acreage or non-commercial operations.

- Staff reductions have meant less resources available for outreach within the water quality program. The program has relied on SWCDs, and to a lesser extent other partners, to help distribute messages about agricultural activities and water quality.
- Outreach efforts that have occurred have not necessarily been focused on regulations—they have been more broadly focused on the benefits to agriculture of land management strategies that protect water quality.

Recently, stakeholders have recommended refocusing outreach and education efforts to inform landowners that there are regulations, and that compliance with the regulations is required. Stakeholders have also recommended making more use of web tools to reach landowners about the program, and using pictures to make compliance expectations more clear.

ODA staff have also worked with SWCDs on pilot projects to focus work in small geographic areas and individually contact farmers and ranchers in each pilot area. This outreach strategy has allowed better measurement of the effectiveness of outreach and education strategies to encourage participation in water quality improvement projects.

Part III: Program activities and measures of effectiveness



ODA staff conducted an inspection at this farm after receiving a complaint about eroded soil entering waters of the state. Staff documented excessive levels of erosion and muddy runoff flowing off of the field into waters of the state. The farm received a warning that noted the violation. The farmer has since avoided planting the field in the late fall to maintain cover over the soil.

Compliance with agricultural water quality regulations

As permitted in statute, the state adopted regulations to implement each agricultural water quality management area plan. The regulations apply to agricultural activities on all agricultural and rural lands. Farms and ranches ranging from 2-acre horse operations to thousand-acre wheat farms are subject to the regulations.

There are some variations between each set of area regulations, but each set consistently includes the following requirements.

- Every set of regulations prohibits violating Oregon's anti-pollution statute, ORS 468B. The statute prohibits causing pollution or placing waste in or where it can enter a surface or ground water. By including this in each set of regulations, ODA has equivalent regulatory direction for nonpoint source water pollution to that of DEQ.
- Because stream temperature concerns were identified in each region of Oregon, each set of regulations includes a requirement to allow streamside vegetation to grow and establish. The type of vegetation expected is consistent with the capability of the site, which varies greatly from place to place.

Farmers and ranchers must comply with the regulations, but how they comply is up to them. For example, regulations require farmers to prevent pollution from soil erosion. A farmer may choose to prevent

Table 1. Types of Water Quality Concerns Identified in Complaints or during investigations (multiple concerns on the same property are noted in each applicable category)

Water Quality Concern	Number of times issue identified in complaint or investigation
Potential manure runoff to surface or groundwater	227
Potential sediment runoff to surface water	132
Riparian area management concerns	144
Other issues	31
Other 468B potential violations	50

Table 2. Compliance actions issued at initial visit and after follow-up visits

Compliance Action	Issued after first visit	Issued after follow-up visits
No full investigation performed (No water quality concerns identified or not in ODA jurisdiction)	117	N/A
Letter of Compliance (initiated in 2004)	80	74
Water Quality Advisory	122	19
Letter of Warning	88	17
Notice of Noncompliance	4	9
Civil Penalty	1	3
Referred to another agency/program	39	0

Part III: Program activities and measures of effectiveness

erosion or control eroded soil in myriad ways to keep it out of streams, including no-till farming, installing sediment basins to catch eroded soil, farming along the contour of the field, and many other strategies. Farmers may achieve compliance on their own, or help is available from several sources, including local SWCDs.

ODA invites the local SWCD to participate in each compliance investigation. SWCD technicians can provide suggestions during an investigation for strategies to correct water quality problems, and work with a farmer or rancher after the investigation to address problems identified. Some farmers and ranchers choose to contact the local SWCD for assistance to correct problems, while others do not.

The program has well-developed compliance policies and protocols which are outlined in a compliance investigation manual. Staff enter land to conduct investigations with permission from the landowner or operator. ODA also has authority to seek a warrant to enter land if permission to access land is denied, consistent with protocols used by DEQ and EPA. During the investigation, staff interview the landowner or operator, document observations, and gather data and photographs while onsite. Staff write thorough investigation reports which are reviewed by several other staff to ensure consistency. The program then sends a letter to the landowner describing their compliance status.

If a problem is found during an investigation, the state's philosophy is to give the landowner an opportunity to correct the problem before taking formal enforcement action. This approach has been very successful, and the program is generally able to attain compliance through advisories and warnings. Formal compliance actions are rare.

Table 1 summarizes the types of water quality issues identified in complaints or during onsite investigations, and Table 2 summarizes the type of compliance document issued by ODA to the landowner or operator. Only Notices of Noncompliance and Civil Penalties are considered formal enforcement actions.

The other types of documents in the tables either notify the landowner that his or her land is in compliance with the regulations, has potential water quality concerns, or is in violation of the regulations. Generally, the program conducts investigations in response to complaints. Program statutes and rules state that ODA may conduct investigations for several reasons, including receiving a complaint, observing a problem, or receiving a notification from another agency.

The majority of complaints come from populated areas where neighbors are close together. Many complaints relate to issues such as uncovered manure piles or muddy confinement areas on small horse and other livestock farms. These types of complaints represent about 25% of the program's compliance workload, with each investigation involving numerous hours of staff time.

ODA has received feedback from stakeholders about a need for a more proactive and strategic approach, as an alternative to a complaint-based program. Such an approach could gain greater water quality benefits with the program's limited staff resources. We have initiated a strategic planning effort and are identifying several alternatives to the program's current approach to compliance work that will be discussed with the Board, stakeholders, and policymakers.

Compliance program summary

Strengths

- Well-developed investigation and data collection protocols
- High level of staff training
- Landowners have an opportunity to correct problems before formal enforcement action is taken
- Very high level of complaint resolution without formal enforcement actions.

Weaknesses

- Stakeholder feedback that complaint-based system is inadequate
- Complaints concentrated in population centers
- Complaints not necessarily focused on most significant water quality problems
- There is not a comprehensive assessment of the level of compliance with agricultural water quality regulations

Part III: Program activities and measures of effectiveness



This Coos County project is an example of a site where voluntary, active restoration efforts by landowners are needed to remove invasive vegetation and plant desirable vegetation to achieve water quality goals. Invasive plants at this site, such as Himalayan blackberry, make it difficult for desirable vegetation to establish on its own. The landowner is participating in a grant program that provides cost-share to establish desirable vegetation and control invasive weeds.

Relationship to water quality standards and TMDLs

Agricultural water quality plans and regulations are intended to fulfill agriculture's responsibilities to meet agricultural load allocations in Total Maximum Daily Loads and help achieve water quality standards. This applies to both traditional and implementation-ready TMDLs. The plans and regulations also fulfill agricultural responsibilities under several other water quality mandates, including the Coastal Zone Act Reauthorization Amendments and Groundwater Management Area Plans.

The program has been working with LACs, DEQ, and SWCDs to add more measurable goals, objectives, and strategies into the area plans through the biennial review process. The state believes that well-defined goals, objectives and strategies will allow the program to better evaluate progress to meet agricultural load allocations in TMDLs and help achieve water quality standards. They are also expected to fulfill agricultural load allocations in implementation-ready TMDLs, which assess sources of water quality impairment at a finer scale, and include more specific and measurable goals, milestones and timelines. These revisions often involve several meetings with the LACs and increased staff time to prepare documents and reports. The program welcomes input on how we should prioritize our efforts to create more measurable goals, objectives and strategies as part of the biennial review process.

Landscape-based streamside vegetation regulations adopted by the program serve as surrogates for meeting Oregon's water quality standard for temperature.

If a landowner is in compliance with the ODA riparian regulations, they are considered to be meeting the water quality standard for temperature on their operation. The regulations require farmers and ranchers to allow vegetation to grow and establish, consistent with the capability of the site, to provide water quality benefits such as streambank stability, filtration of pollutants from overland flows, and shade.

Other program regulations are intended to achieve water quality standards for other parameters, including bacteria, sediment, and nutrients. An anti-pollution regulation referencing Oregon Revised Statute 468B.025 and 468B.050 is included in each set of area regulations. Some areas also have specific regulations related to cropland erosion, manure management, and fertilizer and irrigation water management. Compliance with these rules can be measured by evaluating landscape conditions as well as water quality above and below the site in question.

The state's approach in developing the regulations was not to require landowners to plant streamside vegetation. A farmer or rancher is in compliance with the riparian regulations as long as his or her agricultural activities do not interfere with riparian vegetation establishment.

Individual landowners are responsible to comply with the ODA regulations. By complying with the

Part III: Program activities and measures of effectiveness

ODA regulations, individual landowners fulfill their responsibilities under the Total Maximum Daily Loads. Landowners are not individually responsible to achieve agricultural load allocations in TMDLs to meet the goals and objectives of the Area Plans. It is the state's responsibility to ensure that collectively, agriculture achieves agricultural load allocations in TMDLs and for contributes to achieving and maintaining water quality standards.

Agricultural load allocations in temperature TMDLs will be achieved when streamside vegetation conditions meet the site capability or provide water quality protection consistent with site-capable vegetation. In some cases, it may take voluntary, active restoration efforts by landowners to plant desirable vegetation in order to achieve agricultural load allocations in TMDLs.

For example, in some areas of Oregon, invasive species such as Himalayan blackberry prevent site-capable vegetation from establishing in streamside areas, even in the absence of agricultural activities. Individual landowners are not required by the regulations to take action in a case where invasive weeds, not agricultural activities, prevent site-capable vegetation from establishing. This means that some sites will be in compliance with streamside vegetation regulations, but may not provide the functions of filtering

pollution from runoff, streambank stability, and shade because invasive weeds prevent them from moving towards site capable vegetation. State, federal, and local resources are available to help landowners implement voluntary strategies to control invasive vegetation and establish desirable streamside vegetation.

Relationship to water quality standards and TMDLs summary

Strengths

- Landscape-based condition is a surrogate for meeting temperature standard; much more clear and fair to landowners.
- Does not require landowners to plant trees to attain compliance, reducing regulatory burden.
- The program is working to build measurable goals and objectives into plans in order to ensure agriculture collectively meets agricultural load allocations.

Weaknesses

- A comprehensive assessment of the level of compliance with agricultural water quality regulations is not available.
- Relies on voluntary efforts to attain temperature load allocations in some cases.
- Incorporating measurable goals and objectives into plans during biennial reviews requires a significant amount of staff and stakeholder time.

Part III: Program activities and measures of effectiveness

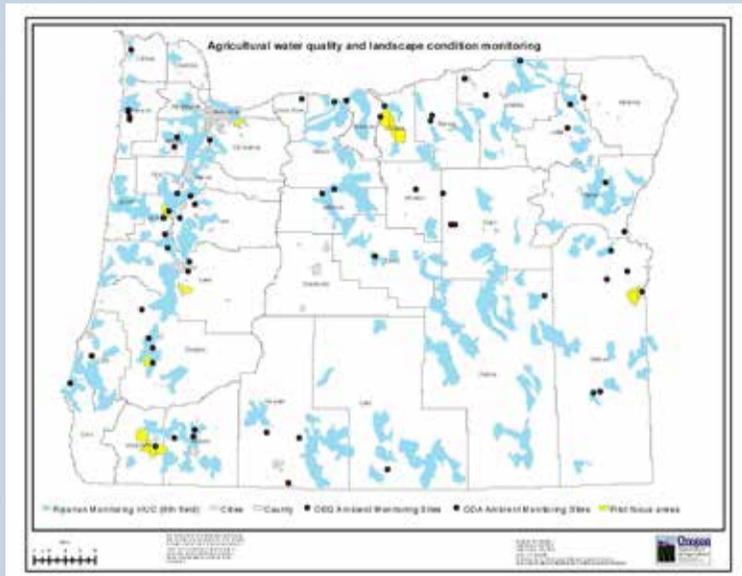


Figure 2: This map shows small geographic focus areas, riparian monitoring watersheds, and ODA and DEQ monitoring sites in agricultural watersheds.

Monitoring to evaluate effectiveness

Monitoring plays an increasingly important role in the strategic implementation of the agricultural water quality program. Monitoring data supports adaptive management of the program at the local area plan level as well as the statewide level.

ODA is currently collaborating with other natural resource agencies to identify long-term monitoring needs to support Governor Kitzhaber's 10-year plan for Oregon. In addition, ODA joined OWEB, DEQ, and NRCS as signatories to the Conservation Effectiveness Partnership in 2012. Both efforts involve interagency collaboration to identify areas of the state where resources should be focused to achieve water quality and habitat goals, and monitoring and evaluating landscape and water quality conditions.

This section describes the program's key monitoring questions, the data that are available to help answer these questions, and additional data that would fill gaps. Figure 2 displays some of the program's key activities to answer these questions.

Question: Are the investments farmers, ranchers, and conservation partners are making achieving protection of water quality?

For many years, the program has tracked agricultural water quality improvement projects completed by SWCDs and other agencies and organizations. SWCDs provide quarterly reports to ODA describing projects accomplished

with state technical assistance funds. These reports document the number and/or acreage of projects implemented, the types of projects completed, and the watersheds where projects were completed.

SWCD reports clearly show that landowners and many other partners have implemented numerous projects to achieve desired conditions on farms and ranches around Oregon. Scientific studies at the farm scale and documents produced by NRCS and other technical agencies show that these projects have water quality benefits.

For example, multiple studies have shown that establishing and maintaining woody plants can moderate stream temperatures, depending on the capability of the site and other factors such as stream flow (Broadmeadow and Nisbet 2004, Liquori and Jackson 2001, Malcolm et al 2004). Other studies have documented the effectiveness of streamside vegetation in reducing inputs of bacteria, nutrients and sediment into streams (Knox et al 2007, Tate et al 2006, Meals 2000, Clausen et al 2000, McDowell and Wilcock 2007, Wigington et al 2003). Williams and Wuest (2011) documented significantly reduced erosion and sediment runoff from no-till study areas in the Wildhorse Creek watershed in Northeast Oregon. Kleinman et al (2001) found that cover crops reduced phosphorus runoff by reducing soil erosion. Yates et al (2007) evaluated the effects of multiple water quality improvement strategies and found that small watersheds with relatively high strategy implementation

Part III: Program activities and measures of effectiveness

had improved ecosystem quality compared with watersheds with low or no implementation.

Despite a wealth of research documenting the benefits of these strategies at the small scale, researchers, funding agencies, and policymakers across the county have found it much more difficult to measure the water quality benefits of projects implemented across the landscape at a larger scale. This year, the Council for Agricultural Science and Technology published a comprehensive review of the challenges in documenting improvements to water quality from agricultural projects. This paper (Cruse 2012) and other similar reviews (Tomer and Locke 2011, Meals et al 2010) discuss why it is so challenging to document water quality improvements from agricultural projects at the basin scale, including a lack of targeting strategies in areas where they are most needed, lag times in water quality responses to changes in landscape conditions, inaccurate information about the sources of water quality problems, and strategy implementation to address single water quality problems rather than a broader set of issues. Cruse et al emphasize that historic changes to waterbodies such as channelization can make it more difficult to achieve water quality goals. They also state that long-term, large-scale stream restoration may be necessary to achieve these outcomes. Multiple authors recommend research and monitoring at multiple scales to verify that water quality improvements strategies are having the desired effects.

A more comprehensive assessment has been identified as a need to fully document Oregon agricultural producers' investments to protect water quality and identify areas in need of improvement. In addition, ODA is collaborating with OWEB, DEQ, and NRCS through the Conservation Effectiveness Partnership to identify and evaluate areas where grant funds have supported broad landscape improvements.

Question: Are agricultural lands in compliance with riparian regulations? Are agricultural lands in compliance with the other regulations?

Currently, data from three main program areas provide some answers to this question.

Complaint investigations. ODA tracks information about complaints alleging violations of water quality regulations, including the number of complaints received, resulting compliance action, and when the case was resolved. Complaint investigations identify some lands that are in compliance with the rules and some lands that are not. Currently, compliance investigation data provide very limited information about the level of compliance with the regulations around Oregon, because the program predominantly conducts investigations in response to complaints and occasionally initiates investigations after it observes a possible violation. Complaints cover a very small percentage of agricultural lands in Oregon and tend to be concentrated in more populated areas.

Aerial photo monitoring of streamside conditions. ODA tracks streamside conditions through high-resolution aerial photos of about 10 to 15 percent of the land in each agricultural water quality management area (Figure 2 shows the location of monitored areas). Staff evaluate the photos and assign a score to the monitored areas, based on the type of vegetation present. The riparian index scores generated through aerial photo evaluations generally show if riparian vegetation is improving. However, these scores do not tell whether a site is in compliance with local water quality regulations.

Assessing landscape conditions in small geographic areas. ODA is working with SWCDs to assess landscape conditions in small geographic areas (nine pilot areas shown in Figure 2). These assessments provide a comprehensive summary of the amount of land in compliance with the regulations, in the areas where they are conducted. So far, assessments have mainly evaluated riparian vegetation, but some have also looked at erosion, pasture management, and manure management.

Table 3 summarizes the results of preliminary land condition assessments in the small geographic areas. In each small area, land conditions are classified as Level 1 (likely out of compliance with streamside vegetation regulations), Level 2 (likely in compliance with streamside vegetation regulations, but not yet at desired conditions), and Level 3 (in compliance with

Part III: Program activities and measures of effectiveness

streamside vegetation regulations, and at desired vegetation conditions consistent with the capability of the site). When the acreages in each category were added together for all areas and divided by the total acreage of all the areas, 32 percent of the acres assessed were likely out of compliance (Level 1), and 67 percent of the acres were likely in compliance (Levels 2 and 3).

ODA has requested and gathered feedback on possible strategies to gather more comprehensive information about the level of compliance with agricultural water quality regulations, and will continue engaging with stakeholders to discuss additional alternatives.

Question: is water quality improving in agricultural watersheds?

ODA works in collaboration with DEQ and several other agencies and organizations to track water quality trends. DEQ calculates overall water quality at 42 water quality monitoring sites around Oregon that have a significant agricultural influence, and provides the Oregon Water Quality Index scores to ODA.

Oregon Water Quality Index data for the 42 agricultural sites show a mix of water quality conditions and trends (Figure 3). Oregon Water Quality Index average scores for 2010 were classified as “excellent” for 4 of the 42 sites, “good” for 11 of the sites, “fair” for 11 of the sites, “poor” for 9 of the sites, and “very poor” for 7 of the sites.

In 2010, Oregon Water Quality Index scores showed 10-year improving trends at 4 of the sites, no 10-year trends at 28 of the sites, and worsening 10-year trends at 10 sites. Although their 2010 average scores were still poor and very poor, two sites on the Burnt and Powder Rivers showed relatively large increases in water quality index scores over the 10-year period. The two sites with the greatest decrease in water quality were the Wallowa River at Minam and the Grande Ronde River at Highway 82.

The data show that water quality conditions and trends vary in agricultural areas around the state. The data do

not tell us the cause of continued impairments and whether sources include agricultural activities.

ODA received funding in the 2011 legislative session to contract with DEQ to monitor water quality at 19 additional agricultural sites around Oregon. DEQ will also calculate the Oregon Water Quality Index for these sites.

Instream water quality data may not capture improvements in landscape conditions on agricultural lands for some time. Several studies have documented “lag times” between the time water quality improvement projects occur and

Monitoring summary

Strengths

- Several localized monitoring projects have helped SWCDs, watershed councils, ODA and other partners identify areas where outreach and technical assistance should be focused to address water quality concerns.
- Project data clearly show that landowners and conservation partners are making investments to improve water quality.
- Research and technical resources available at the farm scale show that projects improve water quality.
- Water quality and aerial photo monitoring track water quality and landscape conditions at a high level.
- ODA is currently working with DEQ to develop more comprehensive monitoring and evaluation strategies.
- ODA is partnering with other state and federal agencies to jointly identify focus areas and track changes in habitat and water quality.

Weaknesses

- Current level of compliance with the regulations is unknown.
- It has been difficult to document the cumulative impacts of water quality improvement projects.
- The ambient monitoring network provides general water quality trends over time, but does not identify sources of pollution and by itself is not able to evaluate agriculture’s compliance with water quality standards.
- Water quality data have not shown widespread improvement in agricultural watersheds.
- There is no universal repository for data.

Part III: Program activities and measures of effectiveness

the time that improvements are noticed in water quality in a watershed. This is why ODA monitors landscape conditions such as riparian vegetation, in addition to evaluating water quality data.

ODA also contacts SWCDs, watershed councils, United States Geological Survey, and other agencies and organizations that conduct monitoring, so those data can be incorporated into effectiveness evaluations. We are pursuing additional opportunities to work with these partners to share data.

Question: are there areas where focused work has led to an improvement in water quality or landscape conditions?

ODA is working with SWCDs to focus some of their time in small geographic areas to more strategically track changes in landscape conditions. Nine SWCDs are involved in pilot projects in small areas to assess conditions, focus outreach and technical assistance to landowners in the small areas, and re-assess conditions. Focusing some resources in a small area allows the SWCD to contact each landowner individually and offer technical assistance for riparian restoration and other projects. It can also help us determine the most effective ways to contact landowners and achieve compliance with the regulations. Tracking change in a

small geographic area can give us an idea of how much change we could expect in a larger geographic area if the SWCD had the resources to conduct more outreach with each landowner throughout the larger area.

Question: where are areas and issues where work should be focused?

Several SWCDs and watershed councils have completed very successful monitoring projects that allowed them to better focus their work. For example, the Malheur County SWCD is monitoring irrigation drains with support from DEQ, OWEB, and ODA to prioritize areas to work. On the South Coast, the watershed council led a phased monitoring effort that helped identify geographic areas to focus on as well as high priority project types. These projects depend on continued grant funding from state and federal sources.

ODA is working with SWCDs and other partners to evaluate landscape conditions and identify future small geographic areas where work can be focused. Focusing work allows ODA and partners to implement each area plan systematically, dividing up the plan area into smaller pieces and working consecutively in each piece. Land condition assessments in focus areas generate data that ODA and partners can extrapolate more broadly to draw conclusions about land conditions in other parts of each plan area.

Table 3. Rates of compliance as extrapolated from SWCD land condition assessments in nine pilot small geographic focus areas. Levels 2 and 3 are considered in compliance with streamside vegetation regulations.

SWCD	Watershed	Small area	Streamside assessment results (percent of acreage)			
			Level 1	Level 2	Level 3	Not in agricultural use
Benton	Middle Willamette	Oak Creek	29	0	46	26
Clackamas	Clackamas	Doane and Dolan Creeks	62	34	4	0
Curry	South Coast	Langlois Creek	33	9	58	0
Douglas	Umpqua	Morgan Creek	18	27	55	0
Gilliam	Lower John Day	Hay Creek	54	32	14	0
Josephine	Inland Rogue	Lower Applegate River	7	17	75	0
Marion	Molalla-Pudding	Zollner Creek	28	16	56	0
Upper Willamette	Southern Willamette	Gettings Creek	85	0	15	0
Average (based on original acreage)			32	21	46	0

Part III: Program activities and measures of effectiveness

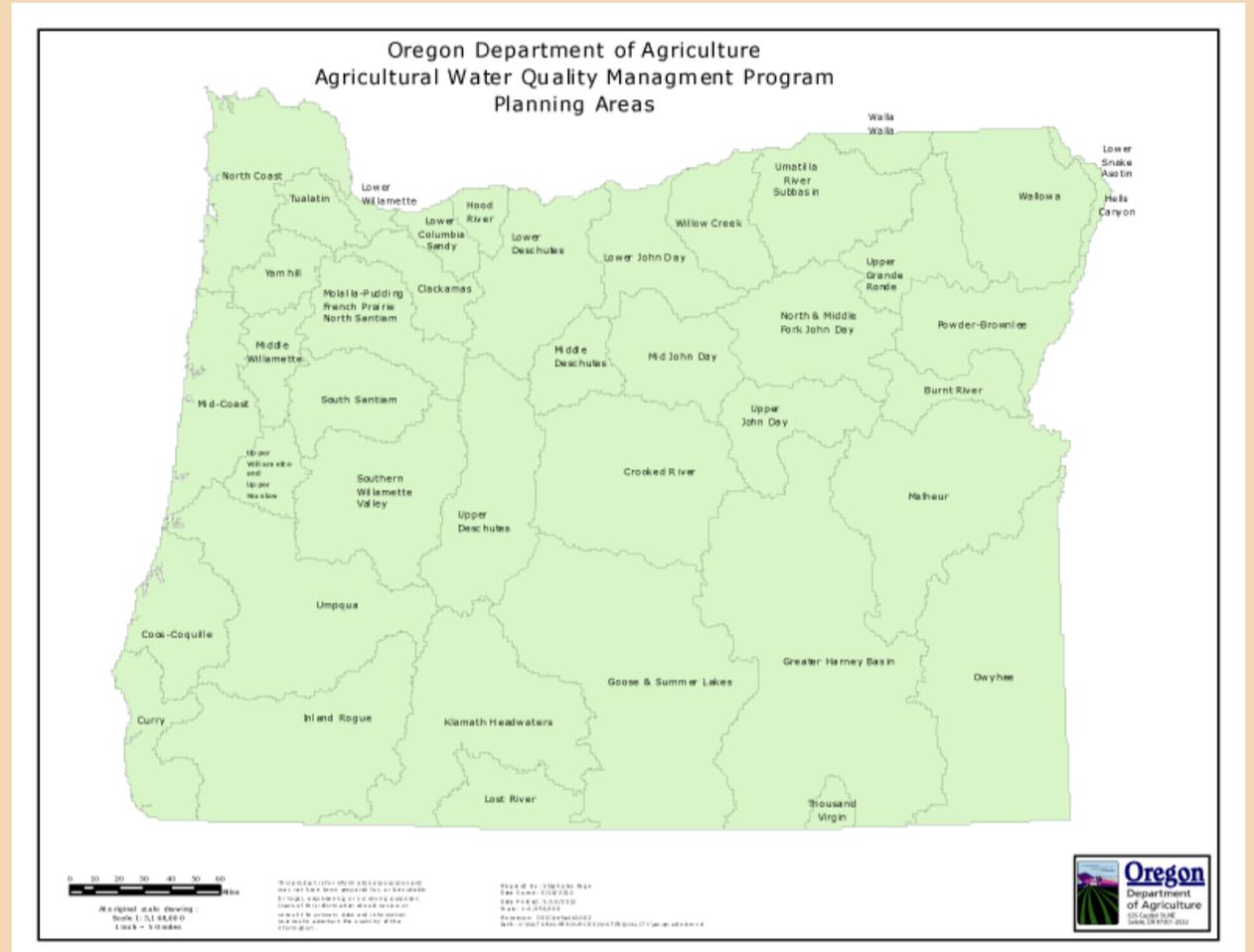
References

- Broadmeadow, S., and T.R. Nisbet. 2004. The effects of riparian forest management on the freshwater environment: a literature review of best management practice. *Hydrology and Earth System Sciences* 8:286-305.
- Clausen, J.C., K. Guillard, C.M. Sigmund, and K. Martin Dors. 2000. Water quality changes from riparian buffer restoration in Connecticut. *Journal of Environmental Quality* 29:1751-1761.
- Cruse, R. et al. 2012. Assessing the health of streams in agricultural landscapes: the impacts of land management change on water quality. Council for Agricultural Science and Technology, Ames, Iowa.
- Kleinman, P.A.A., P. Salon, and A.N. Sharpley. 2001. Evaluating alternative cover crops for the control of runoff phosphorus losses. *ASA-CSSA-SSSA Abstracts*, Soil Science Society of America, Madison, WI.
- Knox, A.K., K.W. Tate, R.A. Dahlgren, and E.R. Atwill. 2007. Management reduces *E. coli* in irrigated pasture runoff. *California Agriculture* 61:159-165.
- Liquori, M., and C.R. Jackson. 2001. Channel response from shrub-dominated riparian communities and associated effects on salmonid habitat. *Journal of the American Water Resources Association* 37:1639-1651.
- Malcolm, I.A., C. Soulsby, A.F. Youngson, D.M. Hannah, I.S. McLaren, and A. Thorne. 2004. Hydrological influences on hyporheic water quality: implications for salmon egg management. *Hydrological processes* 18:1543-1560.
- McDowell, RW and RJ Wilcock. 2007. Sources of sediment and P in streamflow of a highly productive dairy farmed catchment. *Journal of Environmental Quality* 36: 540-548.
- Meals, D.W. 2000. Lake Champlain Basin Agricultural Watersheds Section 319 National Monitoring Program Project, Year 6 Annual Report: May 1998-September 1999. Vermont Department of Environmental Conservation, Waterbury, VT.
- Meals, DW, Dressing, SA and TE Davenport. 2010. Lag times in water quality response to BMPs: a review. *Journal of Environmental Quality* 39:85-96.
- Tate, KW, ER Atwell, JW Bartolome, and G. Nader. 2006. Significant *E. coli* attenuation by vegetative buffers on annual grasslands. *Journal of Environmental Quality* 35:795-805.
- Tomer, MD and MA Locke. 2011. The challenge of documenting water quality benefits of conservation practices: a review of USDA-ARS's conservation effects assessment project watershed studies. *Water Science and Technology* 64:300-310.
- Wigington, J.P., S.M. Griffith, J.A. Field, J.E. Baham, W.R. Horwath, J. Owen, J.H. Davis, S.C. Rain and J.J. Steiner. 2003. Nitrate removal effectiveness of a riparian buffer along a small agricultural stream in western Oregon. *Journal of Environmental Quality* 32:162-170.
- Williams, J.D. and S.B. Wuest. 2011. Tillage and no-tillage conservation effectiveness in the intermediate precipitation zone of the inland Pacific Northwest, United States. *Journal of Soil and Water Conservation* 66:242-249.
- Yates, A.G., R.C. Bailey, and J.A. Schwindt. 2007. Effectiveness of best management practices in improving stream ecosystem quality. *Hydrobiologia* 583(1):331-344.

Part III: Program activities and measures of effectiveness

Maps

Figure 1. Map of the 38 regions where ODA has adopted agricultural water quality plans and regulations.



Maps

Figure 3. Map showing agriculturally influenced DEQ water quality monitoring sites, water quality status, and water quality trends at those sites. Map courtesy of Oregon DEQ.

