Appendix G
Malheur Basin Report

1 Basin Description

The Malheur River is a tributary of the Snake River located in Eastern Oregon along the border with Idaho. The Malheur River Basin is approximately 4,700 square miles and the main channel of the river is approximately 190 miles long. The Malheur River Basin is divided into four subbasins: Upper Malheur, Lower Malheur, Willow Creek and Bully Creek.

A majority of the land in the Malheur River Basin is public, managed mainly by the Bureau of Land Management, U.S. Forest Service and the State of Oregon. Rangeland is the dominant use in the basin along with some forested lands in the northwest portion of the basin, and irrigated agricultural land concentrated in the lower valleys to the east near Idaho. The climate is semi-arid, and agriculture is very dependent on the use of water stored in reservoirs that are filled by streams draining the southern Blue Mountains. Efforts to improve water quality in the basin have mainly focused on improving irrigation efficiency and minimizing irrigation-induced erosion, along with improvements to riparian vegetation condition.

Table G-1: 2011 Land use and land cover for each subbasin in the Malheur.

Subbasin	Watershed Area (km2)	% Urban/Roads	% Forest	% Cultivated	% Range/Forest Disturbance	%Other
Bully	1517622	0.7	1.0	3.0	93.5	1.7
Lower Malheur	2456621	1.5	0.3	8.8	88.9	0.5
Middle Snake-Payette	415216	9.2	0.1	59.5	30.7	0.6
Upper Malheur	6289276	0.2	18.8	0.6	79.0	1.4
Willow	1967545	1.5	3.3	7.6	87.2	0.4

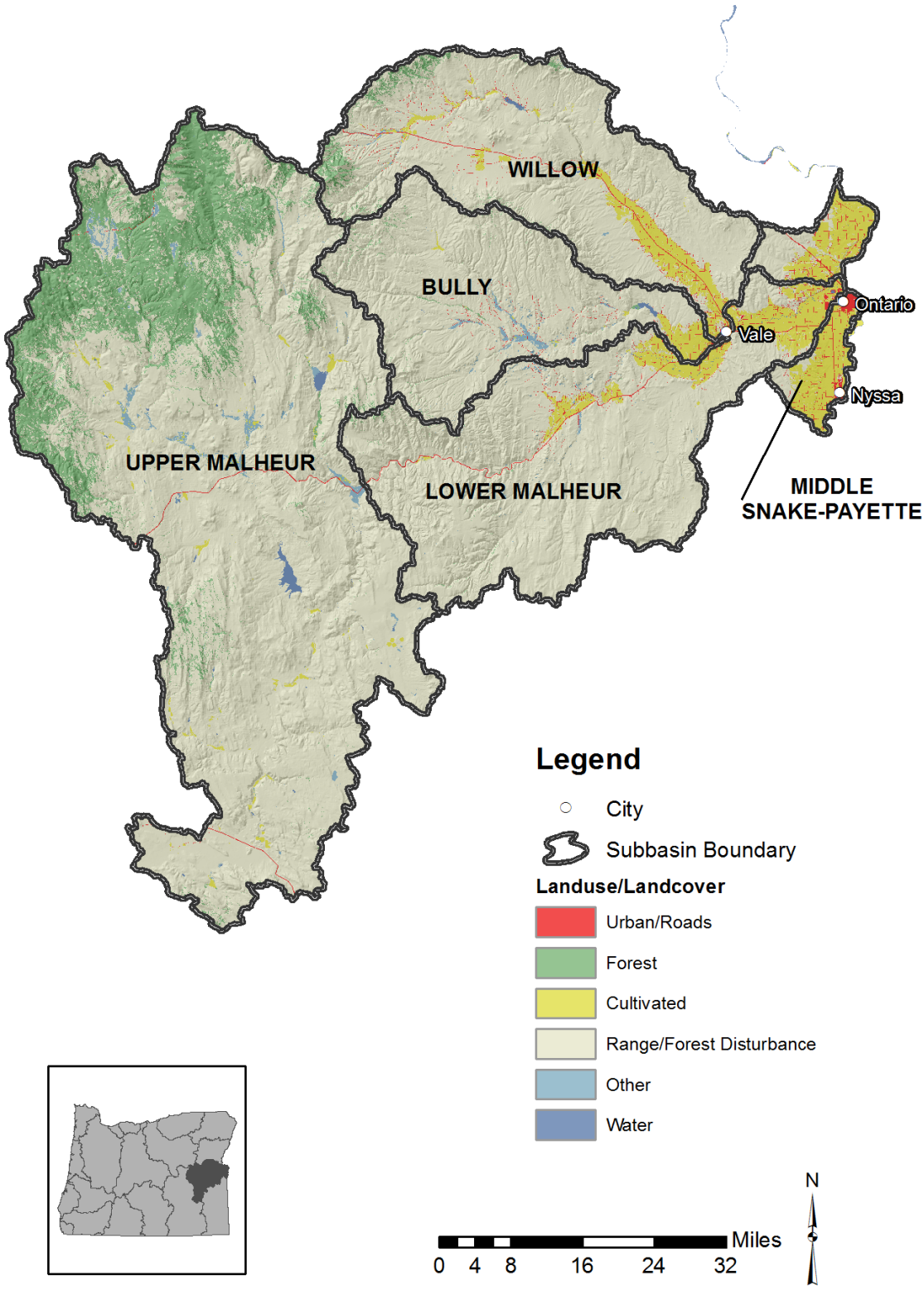

Figure G-1: Landuse in the the Malheur administrative basin.

1.1 Basin Contacts

Table G-2: Oregon DEQ basin contact.

Administrative Area	DEQ Basin Coordinator
Malheur	John Dadoly: 541-278-4616: dadoly.john@deq.state.or.us

2 Water Quality Impairments and TMDLs

2.1 Water Quality Impaired Stream Segments

Under section 303(d) of the Clean Water Act, states, territories and authorized tribes must submit lists of impaired waters. Impaired waters are those that do not attain water quality standards or support all designated uses. The law requires that states establish priority rankings for waters on the lists and develop Total Maximum Daily Loads (TMDLs) for these waters. Table G-3 identifies the number of Malheur Basin waterbody segments impaired by parameter from the 2012 Integrated Report and and the number of segments with approved TMDLs. Sources: ODEQ, USEPA

Table G-3: Number of impaired stream segments with and without a TMDL as identified in Oregon's 2012 Integrated Report and Assessment database

Parameter	Segments without a TMDL	Segments with a TMDL
Arsenic	4	0
Biological Criteria	7	0
Chlorophyll a	0	3
DDT 4,4	1	0
Dieldrin	1	0
Dissolved Oxygen	4	0
E. Coli	0	4
Fecal Coliform	0	7
Iron	1	0
Temperature	0	21

2.2 Total Maximum Daily Load Watershed Plans

The federal Clean Water Act requires that water pollutant reduction plans, called Total Maximum Daily Loads (TMDLs), be developed for water bodies that are listed in Category 5 of the Integrated Report (303(d) List). TMDLs describe the maximum amount of pollutants that can enter the river or stream and still meet water quality standards.

TMDLs take into account the pollution from major sources including discharges from industry and sewage treatment facilities, runoff from farms, forests and urban areas, and natural sources. TMDLs include a margin of safety to account for uncertainty, and may include a reserve capacity that allows for

future discharges to a river or stream. DEQ typically develops TMDLs on a watershed, subbasin, or basin level and occasionally at the reach level depending on the type and extent of impairments.

The Water Quality Management Plan (WQMP) is the framework for TMDL implementation that is issued by Oregon along with the TMDL (Oregon Administrative Rules 340-042-0040(l)). The TMDL and WQMP serve as a multi-sector plan and provides the blueprint for TMDL related implementation activities. Table G-4 lists the TMDLs that have been approved in the Malheur Basin.

Table G-4: Approved TMDLs in the Malheur Basin and the impairments addressed by those TMDLs.

TMDL Document Name	Impairments Addressed
Malheur River Basin TMDL and WQMP	Bacteria (water contact recreation), Chlorophyll a, Dissolved Oxygen, pH, Temperature

3 Implementation Highlights

3.1 Section 319 Grants

Federal Section 319(h) funds are provided annually through the EPA to states for the development and implementation of each state's Nonpoint Source Management Program. In Oregon a portion of 319 grant funding is "passed through" to support community or partner projects that address Oregon's nonpoint source program priorities. Generally, DEQ requires grantees to report annually on the progress made implementing their grant project. This section highlights those outputs and accomplishments reported to DEQ in 2017. Note this section does not identify or include projects proposed and awarded a grant in 2017. Outputs and accomplishments for those projects will be reported to DEQ in future years once they have been implemented. For a listing of projects proposed and awarded a grant in 2017 see Section 3.6.2 of the main report.

In 2017, there were four 319 projects active that reported project outputs and accomplishments to DEQ. Combined the projects have a total grant budget of $117,520. Table G-5 describes the projects and the reported outputs.

Table G-5: Project outputs reported in 2017 for Section 319 pass through grants.

Project Name	Grantee	Project Description	Reported Outputs
NMC WQ Improvement Outreach and BMP Demo Project	Malheur SWCD	Outreach and agricultural BMP demonstration through construction of a sediment retention pond for ag drain	LIDAR survey was conducted but project was not completed due to extreme weather events. Most of grant money was returned.
Getting the Word Out in the Malheur Basin	Malheur WC	Outreach to Ag producers re wq issues and solutions	held outreach meetings, reported findings in annual report
Willow Creek Gage Station	NA	Build and operate flow gage on lower Willow Creek.	developed design, held stakeholder meeting to finalze location

Project Name	Grantee	Project Description	Reported Outputs
Getting the Word Out in the Malheur Basin Phase II	Malheur WC	Outreach to Ag producers re wq issues and solutions	continued on work from Phase 1 held grazing mangement seminar.

3.2 Clean Water State Revolving Fund (CWSRF)

The Clean Water State Revolving Fund loan program provides below market rate loans to public agencies for the planning, design and construction of various projects that prevent or mitigate water pollution. Eligible agencies include federally recognized Indian tribal governments, cities, counties, sanitary districts, soil and water conservation districts, irrigation districts, various special districts and intergovernmental entities. DEQ partners with Oregon communities to implement projects that attain and maintain water quality standards, and are necessary to protect beneficial uses. This section highlights the ongoing projects and the outputs and accomplishments reported to DEQ in 2017.

In 2017 there were no nonpoint source related Clean Water State Revolving Fund projects with reported outputs in the Malheur.

3.3 Source Water Protection Grants

The Oregon Health Authority regulates drinking water under state law and the Safe Drinking Water Act and works cooperatively with DEQ on source water protection efforts. Using the Drinking Water Revolving Loan Fund, OHA funds Source Water Protection Grants (up to $30,000 per public water system) for source water protection activities, monitoring, and planning in Drinking Water Source Areas. In addition, loans are available for improving drinking water treatment, source water protection activities, or land acquisition in source areas. Oregon's Infrastructure Finance Authority is responsible for administering these projects. The loan fund set-asides also fund five Drinking Water Protection positions at DEQ that provide technical assistance to public water systems and communities while they develop and implement strategies that reduce the risk within the delineated source water areas. This section highlights the ongoing projects and the outputs and accomplishments reported to DEQ in 2017.

In 2017 there were no nonpoint source related Safe Drinking Water State Revolving Fund projects with reported outputs in the Malheur.

3.4 Drinking Water Provider Partnership Grants

Oregon DEQ participates in the Drinking Water Providers Partnership (DWPP) with USDA Forest Service Region 6, EPA Region 10, the U.S. Bureau of Land Management OR/WA Office, the Washington Department of Health, Geos Institute and WildEarth Guardians. Together, these partners coordinate a competitive grant solicitation and award program for environmental conservation and restoration projects in municipal watersheds across the Northwest. The Drinking Water Providers Partnership made the first of the annual awards in 2016 and most projects have a focus on nonpoint sources of pollution. The goal of the Partnership and the funding is to develop and support local partnerships to restore and protect the health of watersheds which communities depend upon for drinking water while also benefiting aquatic and riparian ecosystems, including the native fish that inhabit them. This section highlights the ongoing projects and the outputs and accomplishments reported to the DWPP in 2017.

In 2017 there were no active Drinking Water Providers Partnership projects with reported outputs in the Malheur.

3.5 OWEB Grant Funded Projects

The Oregon Watershed Enhancement Board (OWEB) is a state agency that provides grants to help Oregonians take care of local streams, rivers, wetlands, and natural areas. These grant projects often address nonpoint sources of pollution and are thus included in this report.

Based on the most recent data available in OWEB's Oregon Watershed Restoration Inventory (OWRI) database, there were 23 OWEB funded projects completed in 2016 with a total cash and inkind budget of $1,758,521. The bar graph in Figure G-2 shows the total cash and inkind budget for the different project types in each Malheur subbasin. Table G-6 describes the projects and the reported outputs.

Learn more about OWEB grant programs at https://www.oregon.gov/OWEB/grants/Pages/grant-programs.aspx.

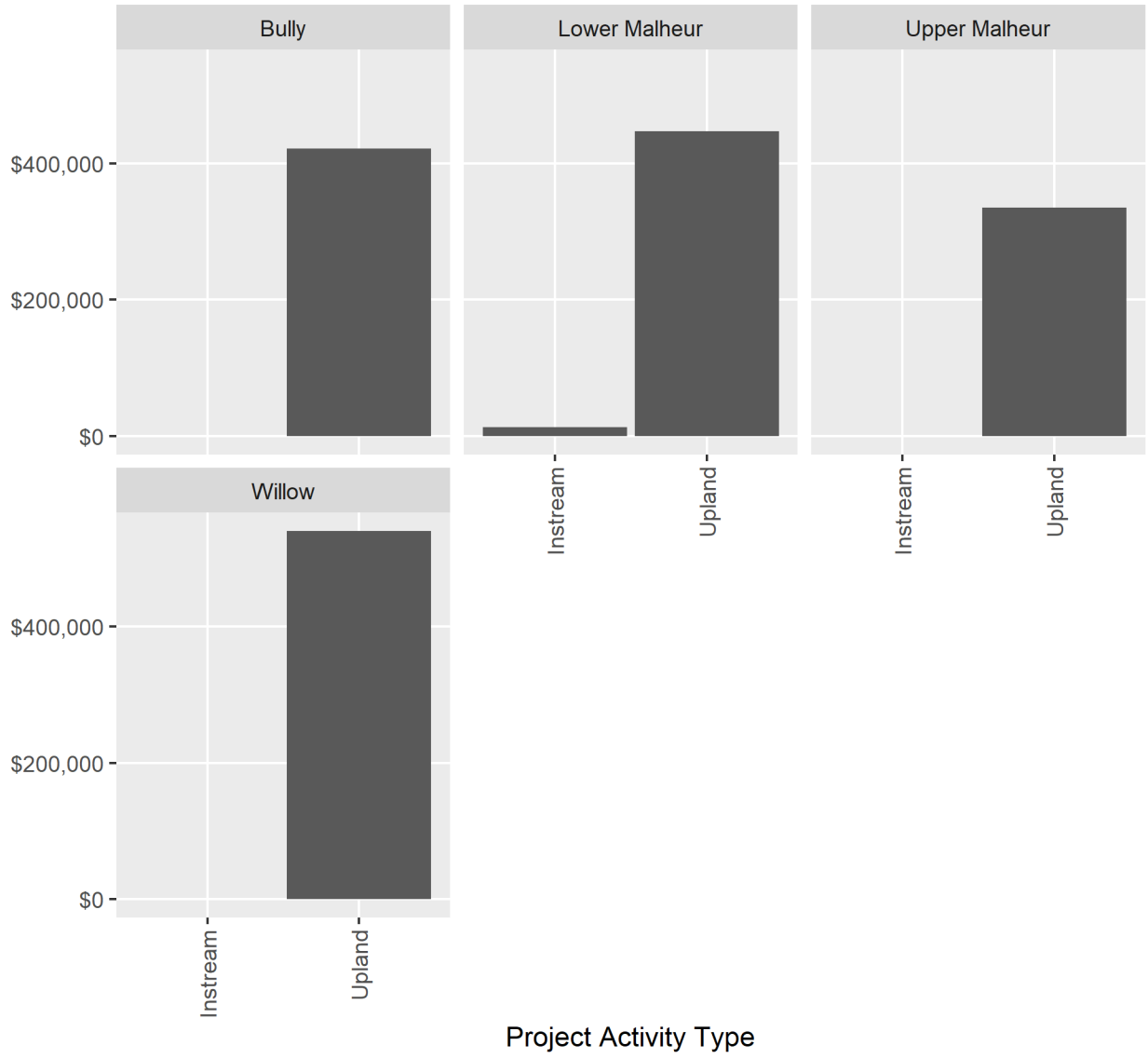

Figure G-2: Cash and inkind dollars spent in each subbasin for different project types completed in 2016, the most recent year data is available in OWEB's OWRI database.

Table G-6: OWEB grant funded projects completed in 2016, the most recent year data is available in the OWEB OWRI database.

Subbasin	Project Name	Project Type	Project Description	Participants	Reported Outputs
Bully	Eight Fields Water Quality Improvement	Upland	Irrigation system improved: converted from dirt ditch to pipeline delivery; Irrigation system improved: converted from flood to sprinkler irrigation	Malheur Watershed Council, OWEB, Private Landowners, Vale Oregon Irrigation District	126 acres treated (upland activities)
Bully	River's Edge Runoff Elimination	Upland	Irrigation system improved: converted from flood to sprinkler irrigation	Malheur Watershed Council, OWEB, Private Landowners	52 acres treated (upland activities)
Bully	Siphon Irrigation Efficiency Improvement	Upland	Irrigation system improved: converted from flood to sprinkler irrigation	Malheur Watershed Council, OWEB, Private Landowners	40 acres treated (upland activities)
Lower Malheur	Putting Cottonwood Creek in its Place	Instream	Stream bank stabilized: bioengineering	Malheur SWCD, Malheur Watershed Council, OWEB, Private Landowners	0.1 miles of stream treated (instream activities)
Lower Malheur	Bench Ground Flood to Sprinkler	Upland	Irrigation system improved: converted from flood to sprinkler irrigation	Malheur Watershed Council, OWEB, Private Landowners	39 acres treated (upland activities)
Lower Malheur	Bully Creek Conversion to Sprinklers	Upland	Irrigation system improved: converted from flood to sprinkler irrigation	Malheur Watershed Council, OWEB, Private Landowners	19.5 acres treated (upland activities)
Lower Malheur	Family Farm Sprinkler Conversion	Upland	Irrigation system improved: converted from flood to sprinkler irrigation	Malheur Watershed Council, OWEB, Private Landowners	60 acres treated (upland activities)

Subbasin	Project Name	Project Type	Project Description	Participants	Reported Outputs
Lower Malheur	Grove School Piping	Upland	Irrigation system improved: converted from flood to sprinkler irrigation	Malheur Watershed Council, OWEB, Private Landowners	35 acres treated (upland activities)
Lower Malheur	Haystack Conversion to Sprinkler	Upland	Irrigation system improved: converted from flood to sprinkler irrigation	Malheur Watershed Council, OWEB, Private Landowners	92 acres treated (upland activities)
Lower Malheur	Pasture Irrigation Efficiency Improvement	Upland	Irrigation system improved: converted from flood to sprinkler irrigation	Malheur Watershed Council, OWEB, Private Landowners	17 acres treated (upland activities)
Lower Malheur	Small Farm Conversion to Sprinklers	Upland	Irrigation system improved: converted from flood to sprinkler irrigation	Malheur Watershed Council, OWEB, Private Landowners	12.3 acres treated (upland activities)
Upper Malheur	Bendire Invasive Control & Improvement	Upland	Grazing management: livestock rotation (pasture forage improvement through rotational livestock grazing); Off-channel watering sites developed; Upland fencing; Upland shrubs or herbaceous vegetation planted/reseeded; Upland treated for juniper by clearing, burning, thinning, or removal; Upland treated for non-native or noxious plant species	Malheur SWCD, OWEB, Private Landowners	760 acres treated (upland activities)
Upper Malheur	MLB Wood Be Gone	Upland	Grazing management: livestock rotation (pasture forage improvement through rotational livestock grazing); Upland treated for juniper by clearing, burning, thinning, or removal	Malheur SWCD, NRCS, OWEB, Private Landowners	1000 acres treated (upland activities)

Subbasin	Project Name	Project Type	Project Description	Participants	Reported Outputs
Willow	Anderson Camp Watershed Enhancement	Upland	Off-channel watering sites developed; Upland shrubs or herbaceous vegetation planted/reseeded; Upland treated for non-native or noxious plant species; Upland trees planted	Morrow SWCD, NRCS, Private Landowners	275 acres treated (upland activities)
Willow	Felda Irrigation Efficiency Improvement Project	Upland	Irrigation system improved: converted from dirt ditch to pipeline delivery	Morrow SWCD, OWEB, Private Landowners	25.3 acres treated (upland activities)
Willow	Jamieson Livestock Waste Water Elimination Phase 2	Upland	Irrigation system improved: converted from flood to sprinkler irrigation	Malheur Watershed Council, OWEB, Private Landowners	51 acres treated (upland activities)
Willow	Jamieson Water Quality & Wildlife Enhancement	Upland	Irrigation system improved: converted from flood to sprinkler irrigation; Upland shrubs or herbaceous vegetation planted/reseeded	Malheur SWCD, OWEB, Private Landowners	75 acres treated (upland activities)
Willow	Jones Irrigation Efficiency Improvement Project	Upland	Irrigation system improved: converted from dirt ditch to pipeline delivery	Morrow SWCD, OWEB, Private Landowners	14.75 acres treated (upland activities)
Willow	KDR Upland Water Storage Project	Upland	Off-channel watering sites developed; Upland treated for non-native or noxious plant species; Other upland vegetation management	Morrow SWCD, NRCS, OWEB, Private Landowners	17 acres treated (upland activities)
Willow	Lower Willow Creek Water Quality	Upland	Irrigation system improved: converted from flood to sprinkler irrigation; Irrigation system improved: water measurement devices installed	Malheur SWCD, OWEB, Private Landowners	27 acres treated (upland activities)
Willow	Padberg Pasture Enhancement	Upland	Upland fencing	Morrow SWCD, OWEB, Private Landowners	600 acres treated (upland activities)

Subbasin	Project Name	Project Type	Project Description	Participants	Reported Outputs
Willow	Third Avenue Mainline	Upland	Irrigation system improved: converted from flood to sprinkler irrigation	Malheur Watershed Council, OWEB, Private Landowners	72 acres treated (upland activities)
Willow	Turner Creek Irrigation Conversion	Upland	Irrigation system improved: converted from flood to sprinkler irrigation	Malheur Watershed Council, OWEB, Private Landowners	15.8 acres treated (upland activities)

3.6 TMDL Implementation Highlights

TMDL implementation actions taken by Designated Management Agencies (DMAs) or third parties are described in the table below. Most of these actions were summarized from annual reports submitted by DMAs to DEQ in calendar year 2017.

Table G-7: TMDL implementation activities reported in 2017 by Designated Management Agencies or third parties.

TMDL	DMA or Third Party	Reported Actions
Malheur River Basin TMDLs	Vale Oregon Irrigation District and Malheur Watershed Council	The Malheur Watershed Council, Vale Oregon Irrigation District, and other partners are nearing completion of an irrigation conversion project in the Willow Creek Valley in the lower Malheur River Basin that has spanned approximately 10 years. Grant funds from OWEB, US Bureau of Reclamation, and other sources have funded the piping of over 100 miles of open lateral ditches and 18 miles of mainlines and delivery systems. These projects serve over 30,000 acres of cropland and have facilitated over 12,000 acres of conversion of flood irrigation to sprinkler irrigation. The piping and conversion projects greatly reduce soil erosion from ditches as well as irrigation induced erosion from croplands. It is expected that many more acres will be converted to sprinkler or drip irrigation now that the piping is in place. Conversion to these technologies conserves irrigation water and eliminates runoff from fields that contributes sediment, bacteria and nutrient loading to streams helping to meet the goals of the TMDL. Many of the new lateral pipelines in the Willow Creek area are pressurized due to the significant drop in elevation from the main irrigation canal to the valley floor. this pressure is often sufficient to power sprinkler systems with little to no electricity use for pumping of water. In addition, water has been conserved in Beulah Reservoir on the North Fork Malheur River facilitating a conservation pool for over-wintering bull trout.

TMDL	DMA or Third Party	Reported Actions
Malheur River Basin TMDLs	Bureau of Reclamation	Installed fencing around Bully Reservoir in order to exclude livestock and reduce bacteria and phosphorus loading into the reservoir. As a result of the exclusion, willow and cottonwood trees have begun to grow in these areas.

Figure G-3: An area along the Bully Reservoir shoreline in 2006 prior to the fencing being installed (left photo) and again in 2015 after the fencing was installed (right photo).