Appendix H
Malheur Lakes Basin Report

1 Basin Description

The Malheur Lakes Basin, located in south-central Oregon, includes seven closed subbasins (Donner und Blitzen, Guano, Harney-Malheur Lake, Alvord Lake, Silver, Silvies, and Thousand-Virgin). The Basin is located mostly in Harney County but extends to a small extent into Grant, Lake, Crook and Malheur Counties in Oregon, and Humboldt and Washoe Counties in Nevada. The Basin, one of the least populated areas of the contiguous United States, encompasses an area of approximately 10,400 square miles including the communities of Wagontire, Riley, Suntex, Burns, Hines, Seneca, Crane, Princeton, Diamond, Frenchglen, and Fields. The dominant land use in the Basin is agriculture and dryland ranching forms the basis of the area's economy. Top commodities include cattle, alfalfa and other hay, horses and mules. Agriculture in the Basin depends heavily on water for irrigation. Very little non-irrigated cropland exists due to the low annual precipitation and the short growing season. Managed livestock grazing occurs throughout the Basin; hay production is common in many of the valley bottoms. Rangeland in the Basin provides significant habitat for sage grouse leks and nesting.

Great Basin redband trout (Oncorhynchus mykiss newberrii) and Tui Chub (Gila bicolor), both special status species, are present in some streams in the sub-basins. The Basin is spotted with playa lakes that rarely contain water for more than a year; and generally do not support fish populations. However, during wet cycles, populations of fish may temporarily live in the playa lakes, which are fed by fish-bearing streams.

Elevations in the Basin range from 4,025' at Harney Lake on the desert floor to over 9,730' at the top of Steens Mountain. The lower elevations of the Basin receive an average of 10 inches of precipitation per year, with the surrounding mountains receiving an average of 40 inches. Freezing temperatures can occur at any time during the year, and maximum temperatures can exceed 100ºF for a few weeks during the summer. The Basin is rich in thermal ground water and thermal spring activity.

A significant portion of the Basin has wetland characteristics and seasonally flooded grass-sedge meadowland. The center of the basin is flat and contains Malheur and Harney Lakes. Malheur Lake is a freshwater lake, while Harney Lake is saline-alkaline. Both lakes cycle between open water in wetter years and marshes in drier years. The wetlands around Malheur Lake and Harney Lake provide habitat for many migratory bird species, including 2.5 million ducks each year.

The Malheur National Wildlife Refuge was established in 1908 as a refuge and breeding ground for migratory water birds. It currently occupies over 186,000 acres. The Refuge, flood-irrigated meadows and seasonal wetlands in the Basin also support numerous breeding species of migratory birds such as Canada geese, cinnamon teal, greater sandhill cranes, longbilled curlews, snipe, willet, Wilson's phalarope, and yellow-headed and red-winged blackbirds. These birds often are present during migration in large numbers. Some examples of the species and number of birds in the Basin are: Snow and Ross' goose (400,000+), Northern pintail (250,000), American widgeon (147,000+), Green-winged teal (65,000+), Lesser sandhill crane (10,000+), Greater sandhill crane (300+), White-faced ibis (2,500+ pairs), Long-billed curlew (1,500+) (numbers are from surveys conducted in the last 10 years by Refuge personnel).

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

Subbasin	Watershed Area (km2)	% Urban/Roads	% Forest	% Cultivated	% Range/Forest Disturbance	%Other
Alvord Lake	5164502	0.3	1.0	0.9	90.3	7.5
Donner und Blitzen	2045437	0.3	7.0	4.0	82.2	6.5
Guano	6626915	0.2	0.4	0.1	92.9	6.3
Harney-Malheur Lakes	3761909	1.6	5.9	15.6	67.2	9.7
Silver	4361200	0.4	7.9	2.9	87.0	1.8
Silvies	3414362	1.4	39.9	10.7	45.0	3.0
Thousand-Virgin	699156	0.0	0.1	0.0	99.8	0.1

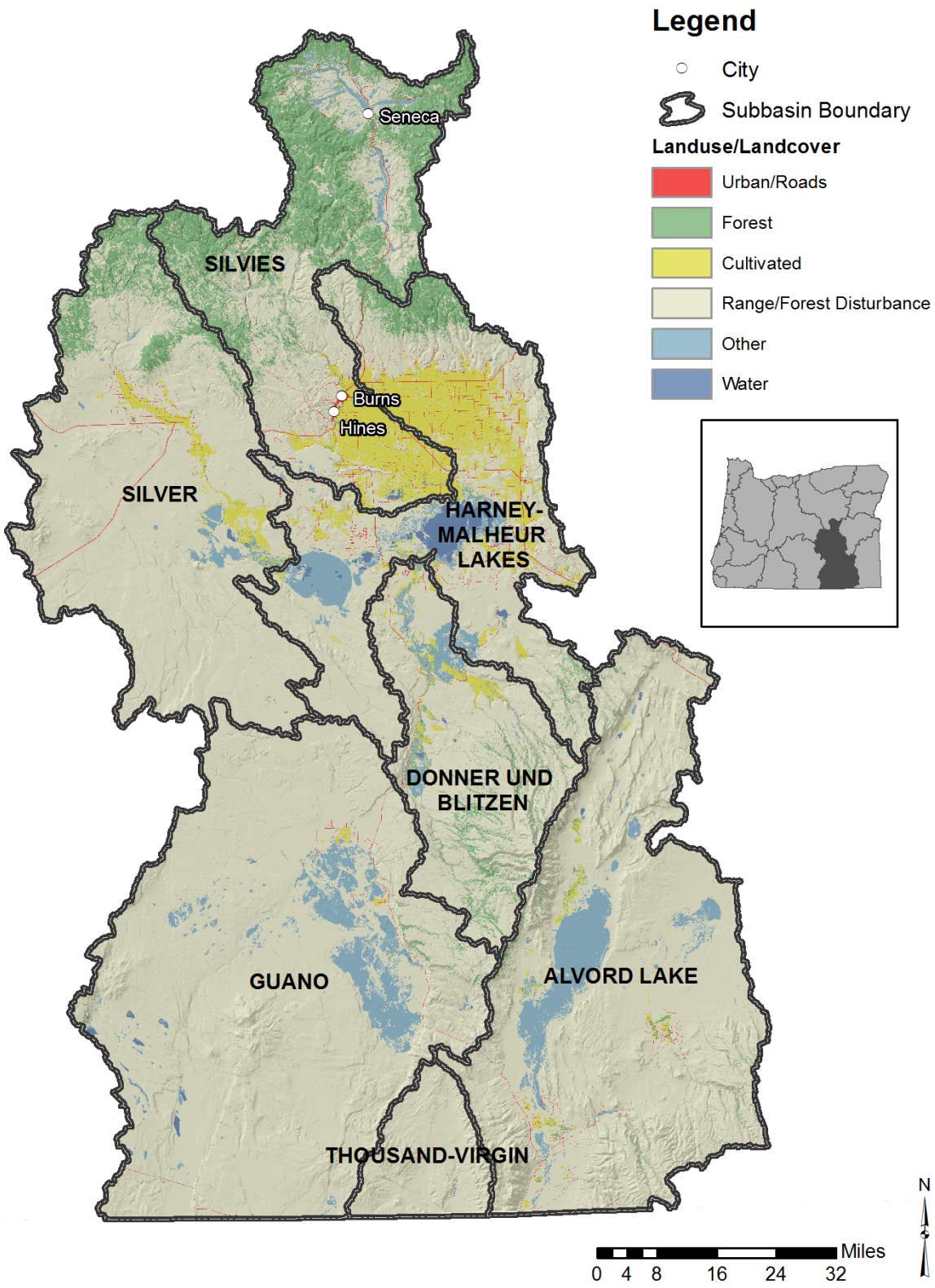

Figure H-1: Landuse in the the Malheur Lakes administrative basin.

1.1 Basin Contacts

Table H-2: Oregon DEQ basin contact.

Administrative Area	DEQ Basin Coordinator
Malheur Lakes	Eric Nigg: 541-633-2035: nigg.eric@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 H-3 identifies the number of Malheur Lakes Basin waterbody segments impaired by parameter from the 2012 Integrated Report and and the number of segments with approved TMDLs. Sources: ODEQ, USEPA

Table H-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
Biological Criteria	8	0
Dissolved Oxygen	1	1
Iron	1	0
Temperature	35	6

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 H-4 lists the TMDLs that have been approved in the Malheur Lakes Basin.

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

TMDL Document Name	Impairments Addressed
Alvord Lake Subbasin TMDL and WQMP	Dissolved Oxygen, 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 no 319 projects with reported outputs in the Malheur Lakes.

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 Lakes.

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 Lakes.

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 Lakes.

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 three OWEB funded projects completed in 2016 with a total cash and inkind budget of $197,645. The bar graph in Figure H-2 shows the total cash and inkind budget for the different project types in each Malheur Lakes subbasin. Table H-5 describes the projects and the reported outputs.

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

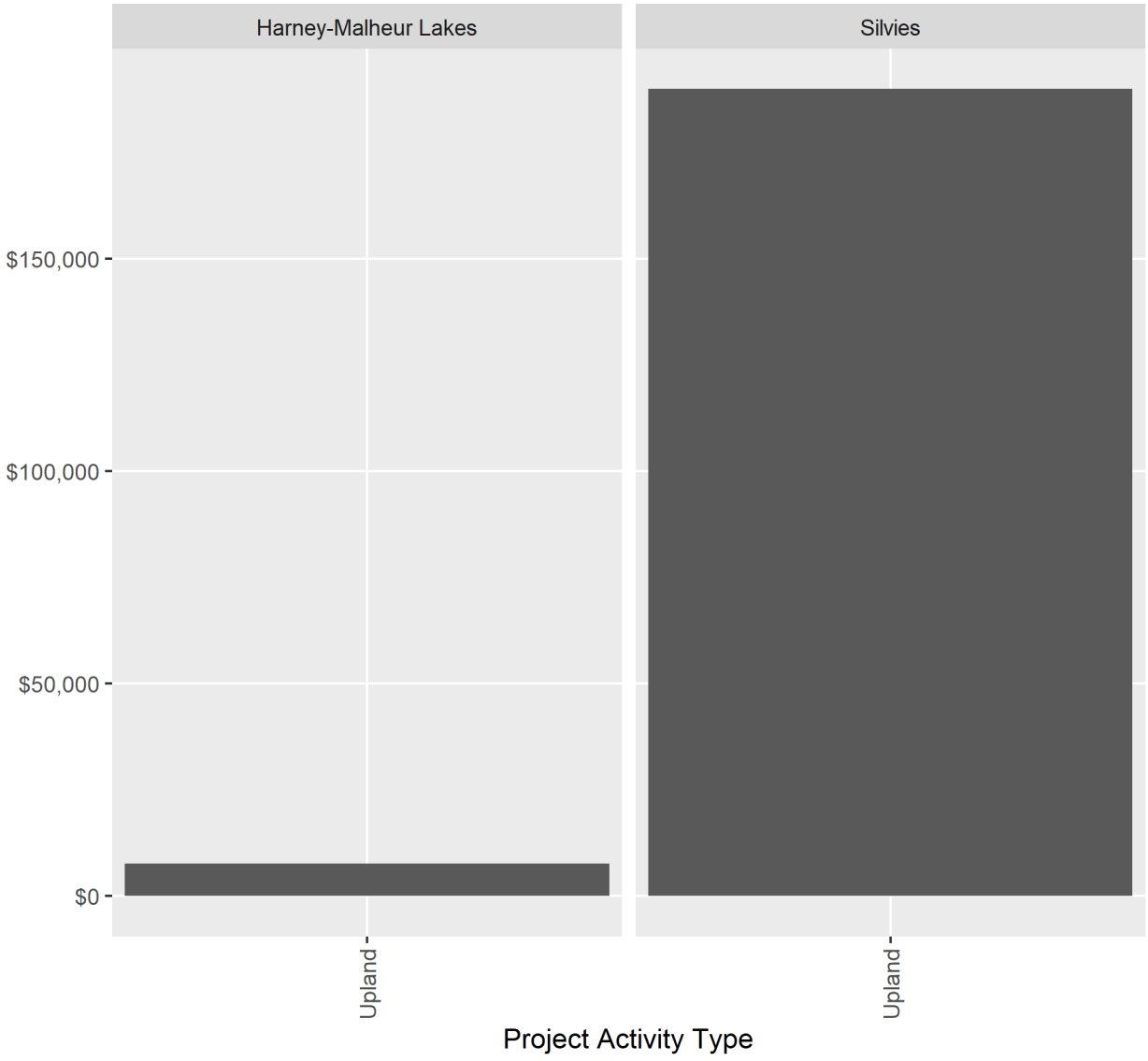

Figure H-2: Cash and inkind dollars spent in each subbasin for different project types completed in 2016, the most recent year data is available in OWEB's OWRI database.

Table H-5: 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
Harney-Malheur Lakes	Craft Point Juniper Burning	Upland	Upland treated for juniper by clearing, burning, thinning, or removal	Harney County Watershed Council, ODFW, OWEB, Private Landowners	233 acres treated (upland activities)

Subbasin	Project Name	Project Type	Project Description	Participants	Reported Outputs
Silvies	Soldier Creek Upland Improvement	Upland	Upland treated for juniper by clearing, burning, thinning, or removal	Harney SWCD, OWEB, Private Landowners, USFWS	75 acres treated (upland activities)
Silvies	Thousand Springs Riparian & Upland restoration	Upland	Off-channel watering sites developed; Upland fencing; Upland treated for juniper by clearing, burning, thinning, or removal	Harney SWCD, OWEB, Private Landowners	557 acres treated (upland activities)