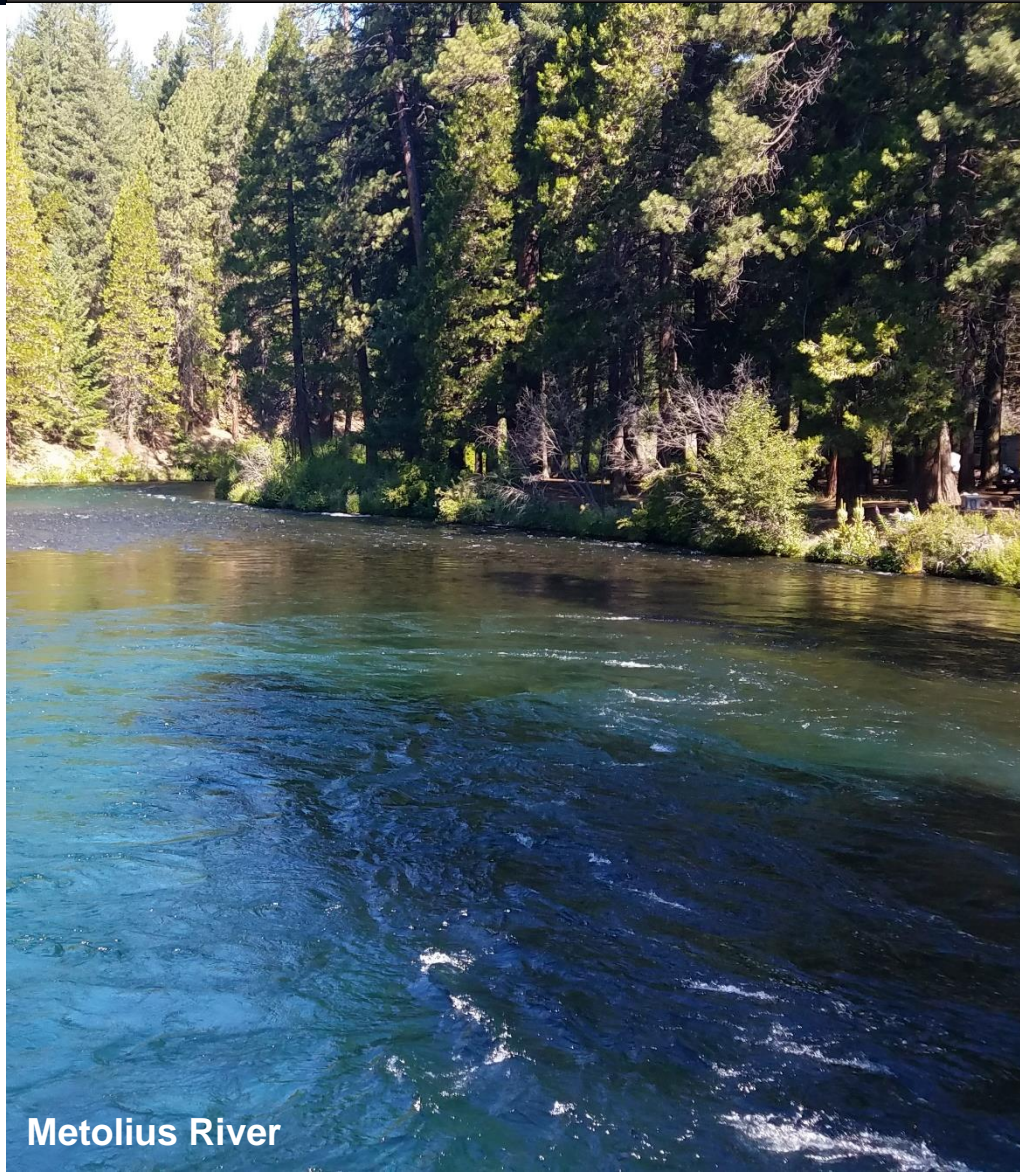




Oregon Water Quality Index Data Summary Water Years 2014-2023

April 2024



Metolius River

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Introduction

This report provides a general statistical overview of water quality status and trends across Oregon using the Oregon Water Quality Index (OWQI). The Index, which DEQ has calculated for more than three decades, analyzes a defined set of discrete water quality variables and produces scores describing general water quality for a network of locations along Oregon's rivers and streams. The state's lakes, wetlands, estuaries, marine waters or groundwater resources. Variables included in the index are as follows: dissolved oxygen (percent saturation and concentration), biochemical oxygen demand (BOD), pH, total solids, ammonia and nitrate nitrogen, total phosphorus, temperature and bacteria (*E. coli*). Index scores range from 10 (poor water quality) to 100 (ideal water quality). DEQ uses the Index to communicate information on the overall water quality of Oregon's rivers in an easy-to-understand, non-technical manner to the public, agency managers and the Oregon Legislature.

For this report, DEQ calculated water quality index results on all samples meeting data quality and quantity requirements collected from Oct. 1, 2014 through Sept. 30, 2023. The agency calculated seasonal averages for the summer season (June through September) and fall-winter-spring season (October through May) and used the minimum of these seasonal 10-year averages for scoring purposes. Once scored, sites were given a status designation varying from "Excellent" to "Very Poor." Sites with sufficient data (30 or more scores) were analyzed for significantly improving or declining 10-year trends using the nonparametric Seasonal-Kendall test, which factors in normal seasonal variation. DEQ reports the magnitude and direction of significant trends at the 80 percent or greater confidence level. For more information on the reporting methods and uses of the Index, as well as an interactive map showing site locations, status and trends, visit <http://www.oregon.gov/deq/wq/Pages/WQI.aspx>.

The Water Quality Index is not compared to water quality standards; does not evaluate if beneficial uses are supported; does not have regulatory standing; nor does it attempt to identify pollutant sources contributing to water quality impairments. These points differentiate the Water Quality Index from the Integrated Report, a biennial assessment of Oregon's surface water required by the Clean Water Act. They are also unlike Total Maximum Daily Load reports, which are science-based plans to clean up polluted water so the waterbody meets state water quality standards. Finally, the Water Quality Index points differ from the Oregon Statewide Water Quality Status and Trends Report, which is an annual assessment of Oregon's surface water that includes more parameters and is not calculated as an index. While the Integrated Report, TMDL reports and the Status and Trends Report may incorporate the raw data used in the Water Quality Index, the analyses are different and, under certain circumstances, may identify results that appear to be inconsistent with the Water Quality Index.

2023 Water Quality Index Status and Trend

Status

Oregon Water Quality Index results currently show 50 percent of sites in Excellent or Good status; 14 percent in Fair and 36 percent in Poor or Very Poor status for the statewide ambient monitoring network of 160 sites (Figure 1).

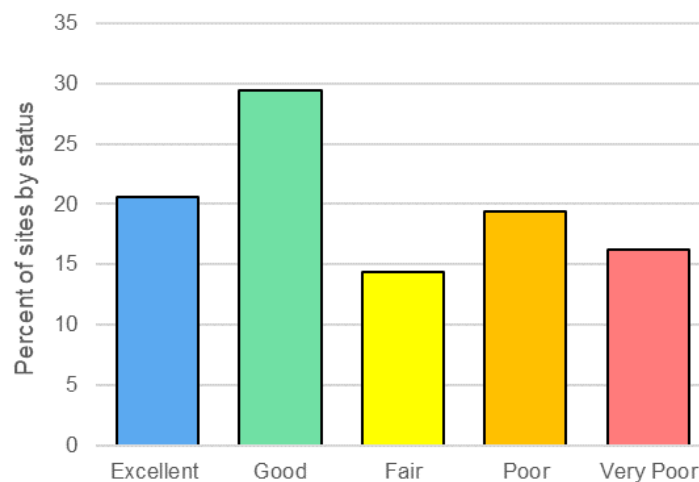


Figure 1. Percentage of sites with scores in each Oregon Water Quality Index status.

Trend

The Skipanon River at Highway 101 and South Fork Blitzen River at Blitzen Crossing monitoring locations did not have the required data (30 or more scores) in this data window to calculate a trend. However, the river’s site is tidally influenced. High conductivity samples are not included in the analysis because they do not accurately reflect ambient water quality as this study is intended. Also, the Blitzen River site is one of the most remote locations in the ambient network and access can be difficult during much of the year. For this reason, the Blitzen River did not have the required data and could not be analyzed for trends. Of the 158 locations where trend analysis could be completed, 7 percent showed an improving trend in water quality, while 24 percent had a declining trend in water quality (Figure 2). Of the sites with improving trends, 73 percent are categorized as fair to very poor status. This is up from 54 percent last year. On the other hand, 50 percent of the sites with declining water quality are categorized as excellent or good status and should be evaluated further to avoid a decrease in water quality status. The remaining 69 percent of sites have no statistically significant trends.

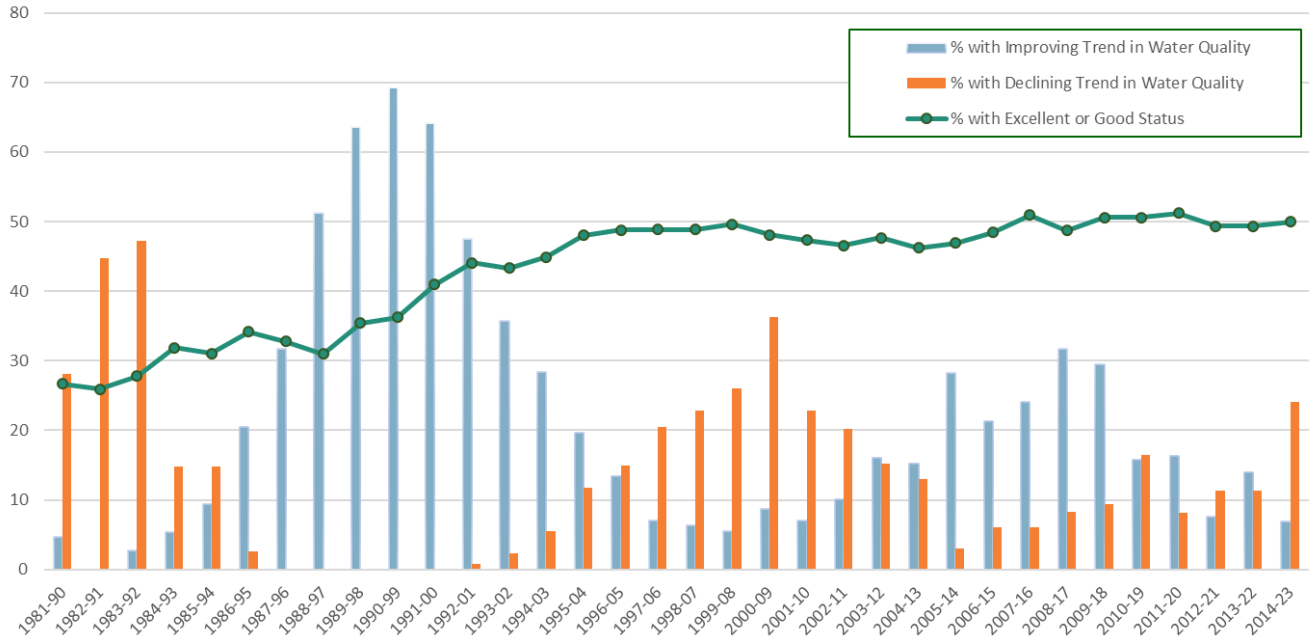


Figure 2. Percentages of sites with Improving or Declining trends and the percentage of sites with Excellent or Good status during the OWQI reporting period. Sites determined to have no trend in a reporting period are not shown.

Where are we seeing improving and declining water quality?

Improving Trends

Sites with significantly improving water quality index trends in 2023 were spread across the state (Table 1). The site that showed the greatest improvement, based on the magnitude of the trend, was Trout Creek, downstream from Mud Springs Creek in the Deschutes Basin. The average Improving trend magnitude was higher at sites in Fair to Very Poor status (sample size = 8, average = 4.4) than at sites in Good or Excellent status (sample size = 3, average = 2.0), indicating that the largest gains in water quality occurred at sites most in need of improvement.

Station	Location Description	Land Use	OWQI Score	OWQI Status	OWQI Trend and Magnitude	OWQI Trend for Past 10 Reporting Years	Sub-Index Status and Trend									
							T	pH	D	B	TS	N	P	E		
DESCHUTES BASIN																
36776	Trout Creek ds of Mud Springs Creek	Agriculture	46	Very Poor	↑	6.5										
MALHEUR BASIN																
11480	Malheur R at Little Valley	Range	59	Very Poor	↑	5.6										
MID COAST BASIN																
11263	Alea R at Thissell Rd	Forest	89	Good	↑	2.3										
NORTH COAST BASIN																
10523	Nestucca R at Cloverdale	Forest	86	Good	↑	1.9										
13411	Miami R at Moss Creek Rd	Forest	88	Good	↑	1.7										
UMATILLA BASIN																
36785	Rhea Creek at Bergevin Rd. or Morter Rd	Agriculture	66	Poor	↑	5.7										
WILLAMETTE BASIN - LOWER																
10458	Tualatin R at Elsner Rd	Agriculture	43	Very Poor	↑	4.8										
10461	Tualatin R at Rood Bridge	Agriculture	79	Poor	↑	1.9										
10480	Beaverton Creek at 216th (Oreco)	Urban	44	Very Poor	↑	4.4										
11321	Johnson Creek at SE 17th Ave. (Portland)	Urban	41	Very Poor	↑	1.7										
WILLAMETTE BASIN - MIDDLE																
10929	McKenzie R at Hendricks Bridge	Forest	79	Poor	↑	4.5										

Table 1. Sites monitored by DEQ showing significant improving trends in water quality for water years 2014-2023. Sites are listed by basin. Magnitude indicates the rate of change (i.e., higher numbers equal more rapid change). For the 10-year trend, blue or red squares indicate Improving or Declining trends. For sub-index status, blue indicates Excellent, green indicates Good, yellow indicates Fair, orange indicates Poor, and red indicates Very Poor status. Sub-index codes: T = Temperature, D = Dissolved Oxygen, B = BOD, TS = Total Solids, N = Nitrogen, P = Phosphorous and E = *E. coli*.

Declining Trends

Statewide, 38 sites show a Declining trend, with 16 of those sites showing a Declining trend for the first time in 10 years (Table 2). The site showing the strongest decline in water quality, based on the magnitude of the trend, was Willow Creek at Rhea Rd. in the Umatilla Basin (Table 2). The average Declining trend magnitude was higher at sites in Fair to Very Poor status (sample size = 19, average = -4.5) than at sites in Good or Excellent status (sample size = 19, average = -2.3), indicating that the largest drops in water quality occurred at sites most in need of improvement.

Station	Location Description	Land Use	OWQI Score	OWQI Status	OWQI Trend and Magnitude	OWQI Trend for Past 10 Reporting Years	Sub-Index Status and Trend							
							T	pH	D	B	TS	N	P	E
DESCHUTES BASIN														
10506	Deschutes R at Warm Springs	Range	86	Good	↓ -2.0		↑	↑	↑	↑	↑	↑	↑	
10511	Deschutes R at Mirror Pond (Bend)	Mixed	92	Excellent	↓ -1.7		↑	↑	↑	↑	↑	↑	↑	
10517	Crooked R at Lone Pine Rd	Range	76	Poor	↓ -5.2		↓	↓	↓	↓	↓	↓	↓	
10686	Deschutes R at Harper Bridge (Sunriver)	Forest	91	Excellent	↓ -1.4		↑	↑	↑	↑	↑	↑	↑	
10688	Deschutes R at Pringle Falls	Forest	89	Good	↓ -1.7		↑	↓	↓	↓	↑	↓	↓	
10696	Little Deschutes R at HWY 42	Forest	91	Excellent	↓ -1.5		↑	↑	↓	↑	↑	↑	↑	
11477	Crooked R at Conant Basin Rd	Range	78	Poor	↓ -2.0		↑	↓	↓	↓	↑	↑	↑	
GOOSE AND SUMMER LAKES BASIN														
33930	Chewaucan River 2.4 miles u/s of Paisley, OR	Range	83	Fair	↓ -3.9		↑	↑	↑	↓	↑	↓	↓	
GRANDE RONDE BASIN														
10719	Grande Ronde R at HWY 82 (Elgin)	Mixed	81	Fair	↓ -4.2		↓	↓	↓	↓	↓	↓	↓	
10720	Grande Ronde R at Hilgard St Park	Forest	86	Good	↓ -1.8		↑	↑	↓	↓	↑	↑	↑	
11457	Minam R at Minam	Forest	91	Excellent	↓ -2.3		↑	↓	↑	↑	↑	↑	↑	
11521	Grande Ronde R at Peach Ln (Island City)	Agriculture	85	Good	↓ -3.2		↑	↑	↓	↑	↓	↑	↑	
JOHN DAY BASIN														
36787	Rock Creek near mouth	Agriculture	82	Fair	↓ -4.9		↓	↓	↓	↓	↑	↓	↓	
KLAMATH BASIN														
10765	Klamath R at Keno	Mixed	42	Very Poor	↓ -6.9		↑	↓	↓	↑	↓	↓	↓	
MALHEUR BASIN														
11047	Malheur River at HWY 20 (Drewsey)	Agriculture	32	Very Poor	↓ -1.1		↑	↓	↓	↓	↓	↓	↓	
OWYHEE BASIN														
10730	Owyhee R at Rome (Hwy 95)	Range	82	Fair	↓ -1.2		↓	↓	↓	↑	↓	↓	↓	
11050	Jordan Creek at Arock Rd	Agriculture	74	Poor	↓ -2.6		↓	↓	↓	↓	↓	↓	↑	
12261	Jordan Creek us of Jordan Valley	Range	81	Fair	↓ -1.3		↓	↓	↓	↑	↓	↓	↓	
ROGUE BASIN														
10418	Rogue R at Robertson Bridge (Merlin)	Forest	86	Good	↓ -2.1		↑	↑	↓	↓	↓	↓	↓	
10421	Rogue R at Rock Point Bridge (Gold Hill)	Forest	86	Good	↓ -2.9		↑	↓	↓	↓	↓	↓	↓	
10423	Rogue R at Dodge Park	Mixed	91	Excellent	↓ -2.4		↑	↓	↓	↓	↓	↑	↑	
10602	Little Butte Creek at Agate Rd (White City)	Agriculture	73	Poor	↓ -4.4		↑	↓	↓	↓	↓	↓	↓	
36805	Applegate River at Murphy, OR	Agriculture	90	Excellent	↓ -2.8		↑	↑	↓	↓	↑	↑	↑	

Table 2. Sites monitored by DEQ showing significant Declining trends in water quality for water years 2014-2023. Sites are listed by basin. Magnitude indicates the rate of change (i.e., higher numbers equal more rapid change). For the 10-year trend, blue or red squares indicate Improving or Declining trends. For sub-index status, blue indicates Excellent, green indicates Good, yellow indicates Fair, orange indicates Poor, and red indicates Very Poor status. Sub-index codes: T = Temperature, D = Dissolved Oxygen, B = BOD, TS = Total Solids, N = Nitrogen, P = Phosphorous and E = *E. coli*.

Station	Location Description	Land Use	OWQI Score	OWQI Status	OWQI Trend and Magnitude	OWQI Trend for Past 10 Reporting Years	Sub-Index Status and Trend							
							T	pH	D	B	TS	N	P	E
UMATILLA BASIN														
10404	Umatilla R at Yoakum	Agriculture	81	Fair	↓ -6.6		↑	↓	↓	↓	↓	↓	↓	
10406	Umatilla R at HWY 11 (Pendleton)	Agriculture	73	Poor	↓ -4.8		↑	↓	↓	↓	↓	↓	↓	
11489	Umatilla R at Westland Rd (Herriston)	Agriculture	52	Very Poor	↓ -6.1		↑	↓	↓	↓	↓	↓	↓	
36784	Willow Creek at Rhea Rd	Agriculture	68	Poor	↓ -11.1		↑	↓	↓	↓	↓	↓	↓	
WILLAMETTE BASIN - MIDDLE														
10555	Willamette R at Salem	Mixed	89	Good	↓ -2.5		↑	↑	↑	↑	↑	↑	↑	
10637	Mollala R at Canby	Agriculture	88	Good	↓ -2.2		↑	↑	↑	↑	↑	↑	↑	
10640	Pudding R at HWY 211 (Woodburn)	Agriculture	57	Very Poor	↓ -2.9		↑	↓	↓	↓	↓	↓	↓	
10792	N Santiam R at Greens Bridge	Agriculture	94	Excellent	↓ -1.6		↑	↑	↑	↑	↑	↑	↑	
10917	Pudding R at HWY 99E (Aurora)	Agriculture	63	Poor	↓ -6.7		↑	↓	↓	↓	↓	↓	↓	
36875	Luckiamute River at Buena Vista Rd	Agriculture	86	Good	↓ -3.0		↑	↑	↑	↑	↑	↑	↑	
WILLAMETTE BASIN - UPPER														
10350	Willamette R at Albany	Agriculture	89	Good	↓ -3.0		↑	↑	↑	↑	↑	↑	↑	
10355	Willamette R at HWY 99E (Harrisburg)	Agriculture	92	Excellent	↓ -2.5		↑	↑	↑	↑	↑	↑	↑	
10376	McKenzie R at Coburg Rd	Mixed	93	Excellent	↓ -2.3		↑	↓	↓	↓	↓	↓	↓	
11180	Calapooia R at Queens Rd (Albany)	Agriculture	77	Poor	↓ -3.4		↑	↑	↑	↑	↑	↑	↑	
36788	Amazon Creek at High Pass Rd	Agriculture	48	Very Poor	↓ -5.6		↑	↑	↑	↑	↑	↑	↑	

Table 2, continued.

Which water quality sub-indices are improving or declining?

Trends analysis of water year 2023 data indicates pH had the highest percentage of improving sub-index scores at 38 percent (Figure 3). Except for last year, the percentage of sites showing improvement has been declining. The analysis of the data from the 2023 OWQI reporting period shows Improving trends increasing by one percent from data analyzed during the 2022 OWQI reporting period. Most of this improvement occurred in the Agricultural land use type, which had 27 more Improving sub-index trends than the last reporting period.

BOD had the highest percentage of Declining sub-index scores, followed by nitrogen and dissolved oxygen. There were 44 fewer Improving sub-index trends for BOD during this reporting period compared to the 2022 OWQI reporting period, 18 of which were lost in the Forest and Agriculture land use types (effects of land use explained below).

The 2023 OWQI reporting period had 42 percent more Declining sub-index trends than the 2022 OWQI reporting period. This is the first time since 2011 the percentage of Declining subindex

scores across all parameters has reached 40 percent. This increase in Declining trends was most notable in the Forest and Agriculture land use types; there were 24 more Declining trends for the Agriculture land use and 21 more Declining trends for the Forest land use when comparing 2023 to the 2022 OWQI reporting period.

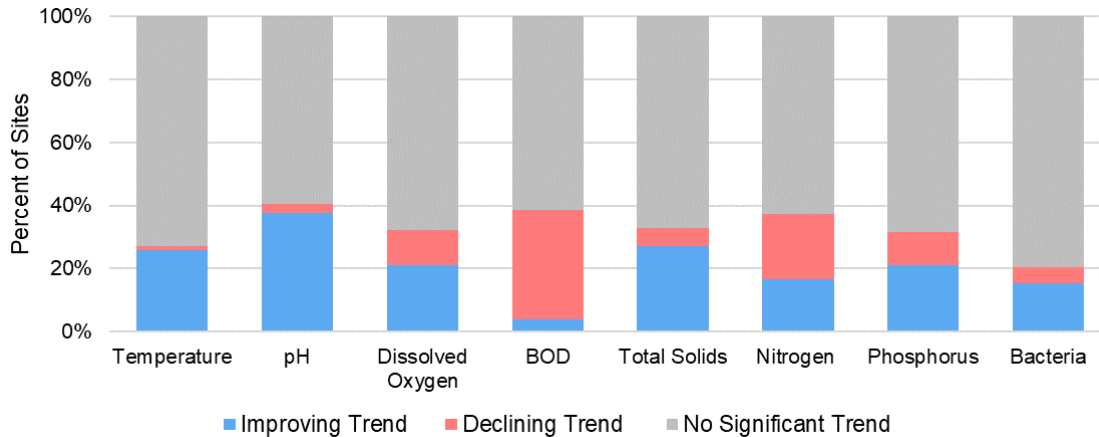


Figure 3. Sub-index trends for the 2023 water year (October 1, 2014 to September 30, 2023).

How does land use influence status?

Land use type is determined based on the dominant way the land is used in a five-mile buffer upstream of the monitoring site. The “Mixed land use” type was assigned when none of the established land use designations made up more than 50 percent of the five-mile buffer. The “Forest land use” type for water quality monitoring purposes includes all lands designated under a general category, which could possibly be downstream of private industrial forest lands (some harvested recently, others not), state forests (harvestable and/or non-harvestable), state parks, protected areas and federal forest lands. The OWQI is not intended to assess water quality in actively managed private timber lands.

The Forest land use type continued to have the highest percentage of Excellent and Good status sites, along with the Mixed land use type (Figure 4). This reporting period is the second consecutive year that at least 40 percent of sites in the Range land use type had a status of Excellent or Good. Although 80 percent of sites with an Urban land use type have a status of Fair to Very Poor, the percent of sites with a status of Excellent or Good increased to 20 percent in 2023, up from 10 percent in 2022. Status shown in Figure 4, and throughout the report, is a result of a combination of the sub-index scores. So, while the overall status may be Excellent or Good, some sub-index scores may reflect Fair or Poor water quality status.

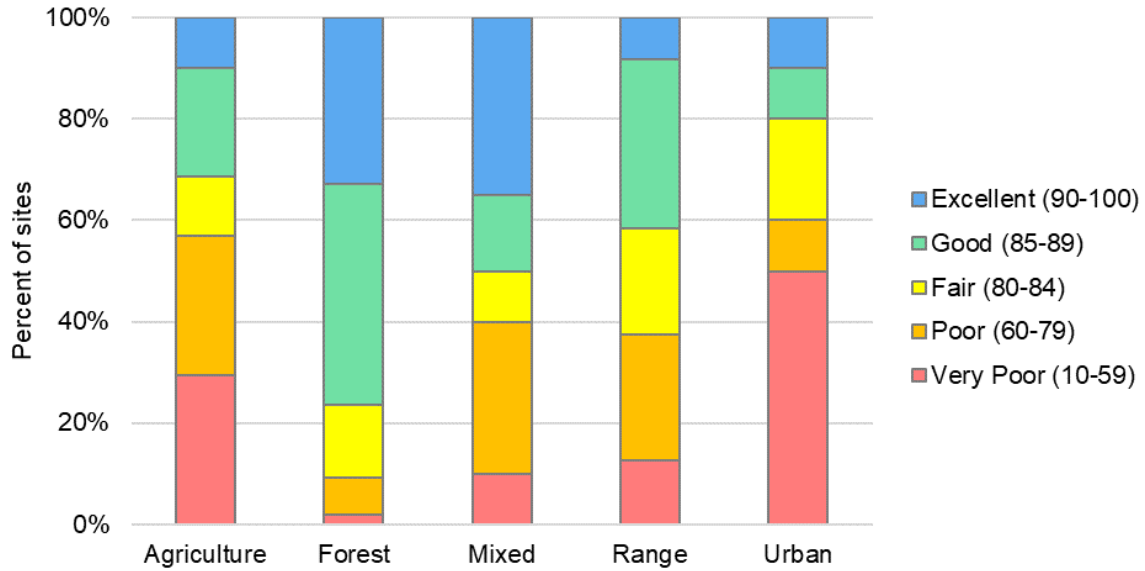


Figure 4. Influence of land use on water quality on OWQI scores.

Want more information on the Oregon Water Quality Index?

Visit <http://www.oregon.gov/deq/wq/Pages/WQI.aspx> for links to these resources:

- Interactive story map showing 2014-2023 status and trends for all monitoring sites
- Downloadable data summaries for all sites organized by basin
- Document on Reporting Methods and Uses of the Oregon Water Quality Index
- Downloadable Excel file of 2023 raw data and historical status and trends
- Documentation of the development and calculation methods of the index