

# Oregon Water Quality Index Data Summary

## Water Years 2011-2020

Oct. 1, 2010 through Sept. 30, 2020

March 2021



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Quality

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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 the state of Oregon has calculated for more than three decades, analyzes a defined set of water quality variables and produces scores describing general water quality throughout Oregon's rivers. This report only presents water quality from the rivers of Oregon. It does not include lakes, wetlands, estuaries, marine waters or groundwater resources. Variables included in the index are 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 (worst case) 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 October 1, 2010 through September 30, 2020. DEQ 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>.

In addition, 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, and Total Maximum Daily Load reports, which are science-based plans to clean up polluted water so that the waterbody meets state water quality standards. While the Integrated Report and TMDL reports 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.

## Impacts to 2020 Data Collection

Travel restrictions due to COVID-19 impacted the sampling of a number of locations in 2020. In response to these restrictions, DEQ staff developed specific sampling protocols that met travel and physical distance guidelines. This effort ensured that not all locations were affected by the travel restrictions. In addition, wildfires that began in September 2020 also restricted access to over 60 sampling locations. Since many of the wildfires began during the last month of the water year, the effect they have on water quality is more likely to be captured during and after water year 2021.

In total, DEQ staff collected 651 samples in 2020 compared to the 890 samples collected in 2019. This represented a 24 percent decrease in fall-winter-spring season samples and a 33 percent decrease in summer season samples from water year 2019. This may affect the minimum seasonal average score used to assign status, however, because the seasonal averages are based on 10 years of data, the effect may be minimal. Table 1 depicts how missed samples may have affected the OWQI score at three locations and one location where no samples were missed. In a normal year, each sampling location in the ambient network is sampled six times. Further analysis and continued monitoring of the sampling locations impacted by COVID and wildfires in 2020 is required to fully understand the effects on OWQI scores and water quality.

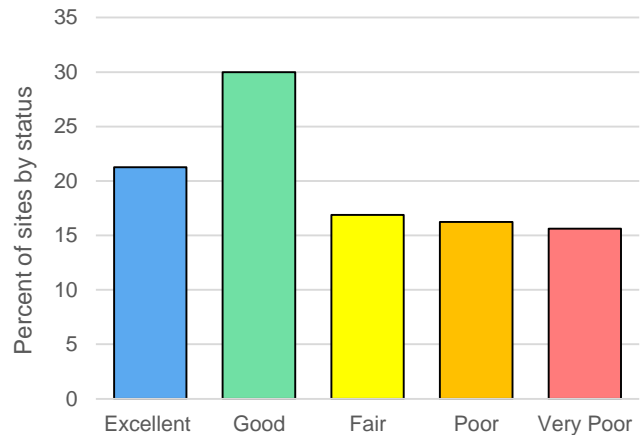
**Table 1. Comparison of OWQI scores at four locations in the Ambient Monitoring Network potentially impacted by travel or access restrictions in 2020.**

Sampling Location	Missed Samples in 2020	OWQI Scores				
		2016	2017	2018	2019	2020
South Yamhill River at HWY 99W	0	84.40	83.83	83.56	82.92	83.48
Rogue River at Rock Point Bridge	3	86.49	87.50	87.75	88.19	87.96
Powder River at HWY 7	5	86.72	87.36	87.39	87.65	87.54
Grande Ronde River at Peach Lane	6	86.58	87.51	87.03	87.27	86.82

# 2020 Water Quality Index Status and Trend

## Status

Oregon Water Quality Index results for water years 2011-2020 show 51 percent of sites in excellent or good status, 17 percent in fair and 32 percent in poor or very poor status for the statewide ambient monitoring network of 160 sites (Figure 1). Three sites reported on in 2015 and 2016 were part of a special study and were dropped from the ambient network at the completion of the study.



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

## Trend

Eight sites of the 19 sites added to the ambient network in 2012 or 2013 reached the required amount of data to be included in the trend analysis (30 or more scores) in 2020. This increased the number of ambient sample sites with sufficient data to calculate trends to 160. Of these, 16 percent showed an improving trend in water quality, while 8 percent had a declining trend in water quality. Of the sites with improving trends, 27 percent are categorized as fair to very poor status. This is up slightly from 38 percent last year. On the other hand, five of the 13 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 76 percent of sites have no statistically significant trend.

## New Trend Sites

As mentioned above, eight sites reached the required amount of data to be included in trend analysis during the 2020 water year, however no significant trend was identified at any of these locations. Each of these sites were added to the ambient monitoring network in either 2012 or 2013 in partnership with Oregon Department of Agriculture. These sites improved the spatial coverage of the OWQI and provided important information on state waters in agricultural areas for ODA. While these sites are in their first year of trend analysis, the status of these sites has been included in previous OWQI data summaries. Table 2 indicates the status of these sites since their inclusion in the ambient monitoring network.

**Table 2. Status of new trend sites from the date established.**

Station	Location Description	Basin	Land Use	Water Year Range	OWQI Status									
					2012	2013	2014	2015	2016	2017	2018	2019	2020	
10741	Honey Creek at Plush, OR	Oregon Closed Lakes	Range	2013-20		Fair	Very Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor
12261	Jordan Creek us of Jordan Valley	Owyhee	Range	2013-20		Fair	Fair	Good	Fair	Good	Good	Good	Good	Good
12264	Whitehorse Creek at Whitehorse Ranch Rd	Oregon Closed Lakes	Range	2013-20		Poor	Very Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor
12266	Twentymile Creek at HWY 140 (east of Adel, OR)	Oregon Closed Lakes	Range	2013-20		Very Poor	Very Poor	Very Poor	Very Poor	Very Poor	Very Poor	Very Poor	Very Poor	Very Poor
12267	Deep Creek west of Adel, OR	Oregon Closed Lakes	Range	2013-20		Good	Good	Good	Good	Good	Good	Good	Good	Good
13014	SF Blitzen R at Blitzen Crossing	Oregon Closed Lakes	Range	2013-20		Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent	Excellent
33929	Silvies River at West Loop Road	Oregon Closed Lakes	Range	2013-20		Fair	Fair	Good	Good	Good	Good	Good	Good	Good
36783	Crooked Creek at Kiger Rd	Owyhee	Range	2012-20		Fair	Fair	Fair	Poor	Poor	Poor	Poor	Poor	Poor

# Where are we seeing improving and declining water quality?

Sites with significantly improving water quality index trends in 2020 were spread across the state (Table 3). The site that showed the greatest improvement, based on the magnitude of the trend, was Malheur River at Little Valley in the Malheur Basin. While this site is still in Very Poor condition it has improved from an OWQI score of 43 in 2013 to an OWQI score of 55 in 2020. Three sites, Grande Ronde River at Peach Lane, Willow Creek north of Jamieson, OR, and Donner und Blitzen River at Page Springs Campground, are showing an improving trend for the first time since trending was possible at these locations. The average improving trend magnitude was higher at sites in fair to very poor status than at sites in good or excellent status indicating that the largest gains in water quality occurred at sites most in need of improvement (Excellent or Good, n = 19,  $\bar{x}$  = 1.7, Fair to Very Poor n = 7,  $\bar{x}$  = 6.7).

**Table 3. Sites monitored by DEQ showing significant improving trends in water quality for water years 2011-2020. Sites are listed by basin. Magnitude indicates the rate of change (i.e. higher numbers equal more rapid change). For the five-year trend, blue or red squares indicate improving or declining trends.**

Station	Location Description	Land Use	Water Year Range	OWQI Score	OWQI Status	OWQI Trend and Magnitude	OWQI Trend for Past 10 Reporting Years	Sub-Index Status and Trend							
								Temp	pH	DO	BOD	TS	N	P	Bact
<b>DESCHUTES BASIN</b>															
10506	Deschutes R at Warm Springs	Range	2011-20	85	Good	↑ 1.7		↑	↑	↓	↓	↑	↑		
10511	Deschutes R at Mirror Pond (Bend)	Mixed	2011-20	92	Excellent	↑ 1.3		↑	↑	↑	↑	↑	↑		
10688	Deschutes R at Pringle Falls	Forest	2011-20	90	Excellent	↑ 1.8		↑	↑	↑	↑	↑	↑		
10690	Metolius R at Bridge 99 (Camp Sherman)	Forest	2011-20	91	Excellent	↑ 1.5		↑	↑	↑	↑	↑	↑		
<b>GRANDE RONDE BASIN</b>															
10410	Wallowa R at Minam	Forest	2011-20	86	Good	↑ 1.8		↑	↑	↑	↓	↑	↑		
11521	Grande Ronde R at Peach Ln (Island City)	Agriculture	2011-20	87	Good	↑ 2.4		↑	↑	↑	↑	↑	↑		
<b>JOHN DAY BASIN</b>															
11386	John Day R at HWY 206	Range	2011-20	80	Fair	↑ 3.7		↑	↑	↑	↑	↑	↑		
11478	John Day R at Service Creek	Range	2011-20	86	Good	↑ 2.3		↑	↑	↑	↑	↑	↑		
<b>KLAMATH BASIN</b>															
10770	Williamson R at Williamson R Store	Mixed	2011-20	89	Good	↑ 1.8		↑	↑	↑	↑	↑	↑		
<b>MALHEUR BASIN</b>															
11480	Malheur R at Little Valley	Range	2011-20	55	Very Poor	↑ 13.5		↑	↑	↑	↑	↑	↑		
33266	Willow Creek north of Jamieson, OR	Range	2012-20	36	Very Poor	↑ 0.9		↑	↑	↑	↑	↑	↑		
<b>MID COAST BASIN</b>															
11241	Salmon R at Otis	Forest	2011-20	90	Excellent	↑ 1.4		↑	↑	↑	↑	↑	↑		
33644	North Beaver at Ona Grange	Forest	2011-20	83	Fair	↑ 2.1		↑	↑	↑	↑	↑	↑		

**Table 3, continued. Sites monitored by DEQ showing significant improving trends in water quality for water years 2011-2020. Sites are listed by basin. Magnitude indicates the rate of change (i.e. higher numbers equal more rapid change). For the five-year trend, blue or red squares indicate improving or declining trends.**

Station	Location Description	Land Use	Water Year Range	OWQI Score	OWQI Status	OWQI Trend and Magnitude	OWQI Trend for Past 10 Reporting Years	Sub-Index Status and Trend										
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<b>NORTH COAST BASIN</b>																		
10521	Necanicum R at Forest Lake RV Camp	Forest	2011-20	92	Excellent	↑ 1.5		↑										
11856	Nehalem R at Foley Rd	Forest	2011-20	89	Good	↑ 1.6		↑										
13411	Miami R at Moss Creek Rd	Forest	2011-20	87	Good	↑ 1.8		↑										
13424	Wilson R at HWY 6	Forest	2011-20	91	Excellent	↑ 2.2		↑										
13433	Trask R at HWY 101	Mixed	2011-20	86	Good	↑ 1.9		↑										
<b>OREGON CLOSED LAKES</b>																		
12265	Donner & Blitzen River at Page Springs Campground	Range	2013-20	92	Excellent	↑ 2.9												
<b>OWYHEE BASIN</b>																		
10729	Owyhee R at HWY 201	Agriculture	2011-20	50	Very Poor	↑ 8.2												
<b>ROGUE BASIN</b>																		
10418	Rogue R at Robertson Bridge (Merlin)	Forest	2011-20	87	Good	↑ 1.4		↑										
<b>UMATILLA BASIN</b>																		
36785	Rhea Creek at Bergevin Rd. or Morter Rd	Agriculture	2012-20	63	Poor	↑ 8.2												
<b>UMPQUA BASIN</b>																		
10997	Cow Creek at Mouth (Riddle)	Forest	2011-20	86	Good	↑ 2.1		↑										
<b>WILLAMETTE BASIN - LOWER</b>																		
11201	Columbia Slough at Landfill Rd	Urban	2011-20	51	Very Poor	↑ 10.7		↓										
<b>WILLAMETTE BASIN - MIDDLE</b>																		
12559	N Santiam R at Coopers Ridge Rd	Forest	2011-20	95	Excellent	↑ 0.8		↑										
<b>WILLAMETTE BASIN - UPPER</b>																		
10662	McKenzie R at Hendricks Bridge	Forest	2011-20	94	Excellent	↑ 1.4												

Six of the 13 sites with declining trends in 2020 are located in the Willamette Basin. Statewide, seven sites had declining trends for the first time in more than a year, including three in the Willamette Basin (Table 4). Two sites (Neal Creek at Fir Mountain Road and South Fork Coquille River at Broadbent) have shown a declining trend for four consecutive years. The Neal Creek site has been among the most rapidly declining sites in each of the last four years. Only three of the 14 sites in the Willamette Basin with declining trends in water quality in 2019 continued to show declining trends in 2020. That includes six sites that had shown declining trends for three or more consecutive years.

**Table 4. Sites monitored by DEQ showing significant declining trends in water quality for water years 2011-2020. Sites are listed by basin. Magnitude indicates the rate of change (i.e. higher numbers equal more rapid change). For the five-year trend, blue or red squares indicate improving or declining trends.**

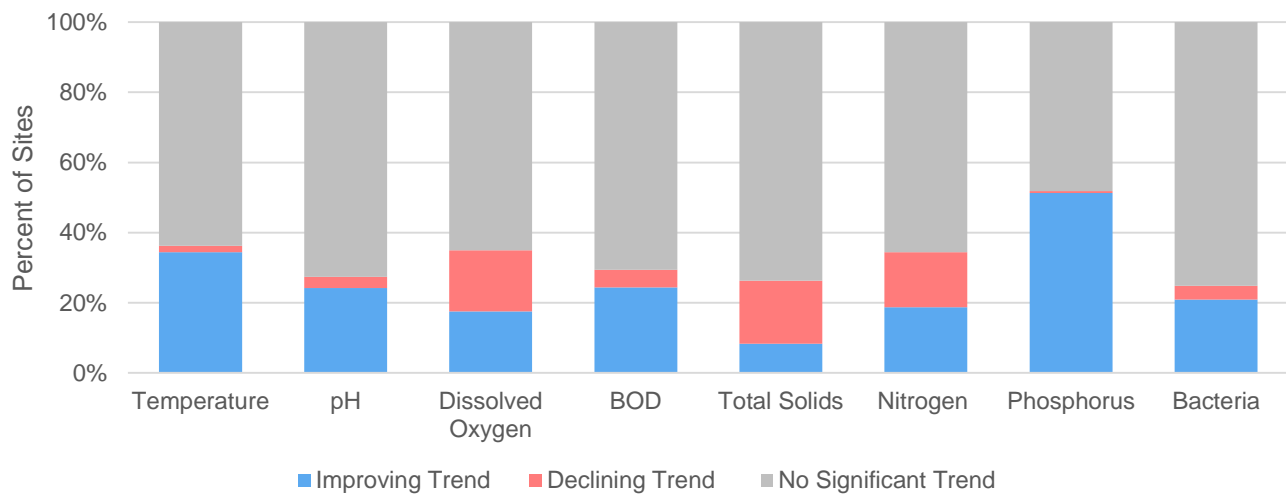
Station	Location Description	Land Use	Water Year Range	OWQI Score	OWQI Status	OWQI Trend and Magnitude	OWQI Trend for Past 10 Reporting Years	Sub-Index Status and Trend										
								Temp	pH	DO	BOD	TS	N	P	Bact			
<b>DESCHUTES BASIN</b>																		
10411	Deschutes R at Deschutes R Park (Mouth)	Range	2011-20	83	Fair	↓ -2.2		↓										
<b>HOOD BASIN</b>																		
33603	Neal Creek at Fir Mountain Rd	Mixed	2012-20	83	Fair	↓ -4.4		↑										
<b>KLAMATH BASIN</b>																		
10759	Lost R at HWY 39 (us Merrill)	Agriculture	2011-20	34	Very Poor	↓ -0.9												
<b>NORTH COAST BASIN</b>																		
13440	Tillamook R at Bewley Creek Rd	Mixed	2011-20	80	Fair	↓ -3.2		↑										
34019	Nehalem R at Birenfeld	Forest	2011-20	85	Good	↓ -2.0												
<b>SOUTH COAST BASIN</b>																		
11486	S Fk Coquille R at Broadbent	Forest	2011-20	85	Good	↓ -3.0												
<b>UMPQUA BASIN</b>																		
10996	Calapooya Creek at Umpqua	Forest	2011-20	80	Fair	↓ -3.1		↑										

**Table 4, continued. Sites monitored by DEQ showing significant declining trends in water quality for water years 2011-2020. Sites are listed by basin. Magnitude indicates the rate of change (i.e. higher numbers equal more rapid change). For the five-year trend, blue or red squares indicate improving or declining trends.**

Station	Location Description	Land Use	Water Year Range	OWQI Score	OWQI Status	OWQI Trend and Magnitude	OWQI Trend for Past 10 Reporting Years	Sub-Index Status and Trend									
								Temp	pH	DO	BOD	TS	N	P	Bact		
<b>WILLAMETTE BASIN - LOWER</b>																	
10456	Tualatin R at Boones Ferry Rd	Urban	2011-20	37	Very Poor	↓ -0.8	-----	■	■	■	■	■	■	■	■	■	
10611	Willamette R at Hawthorne Bridge	Urban	2011-20	85	Good	↓ -2.4	■ ■ ■	■	■	■	■	■	■	■	■	■	
<b>WILLAMETTE BASIN - MIDDLE</b>																	
10363	Yamhill R at Dayton	Agriculture	2011-20	73	Poor	↓ -4.3	-----	■	■	■	■	■	■	■	■	■	
10640	Pudding R at HWY 211 (Woodburn)	Agriculture	2011-20	61	Poor	↓ -3.7	-----	■	■	■	■	■	■	■	■	■	
<b>WILLAMETTE BASIN - UPPER</b>																	
10355	Willamette R at HWY 99E (Harrisburg)	Agriculture	2011-20	92	Excellent	↓ -1.2	■	■	■	■	■	■	■	■	■	■	
11275	Coast Fk Willamette R st Mt. Pisgah Park	Mixed	2011-20	89	Good	↓ -1.6	-----	■	■	■	■	■	■	■	■	■	

# Which water quality sub-indices are improving or declining?

Trend analysis of 2020 water year data indicate that phosphorus had the highest percentage of improving sub-index scores at 51 percent (Figure 2). Total solids, dissolved oxygen, and nitrogen had the highest percentage of declining sub-index scores. This is the sixth consecutive year in which these sub-indices have had the highest percentage of declining scores. Declining trends in the temperature and phosphorus sub-indices were found for the first time since 2017 and 2018, respectively.

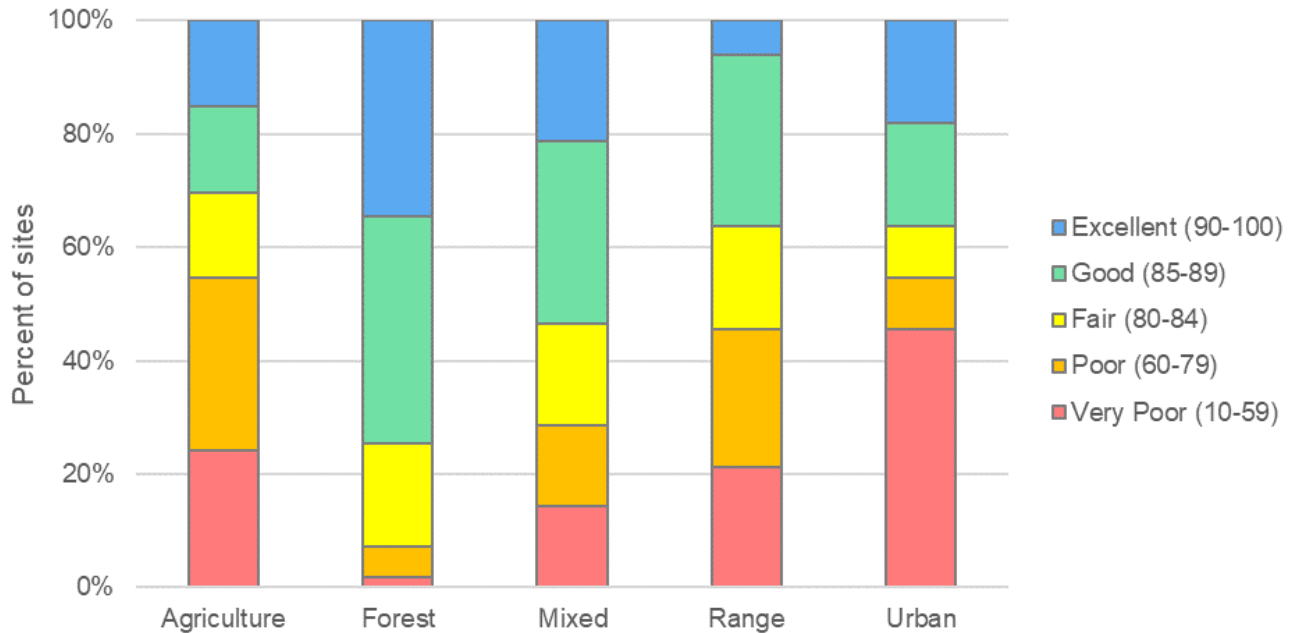


**Figure 2. Sub-index trends for the 2020 water year (October 1, 2019 to September 30, 2020).**

# How does land use influence status?

Land use type is determined based on the dominant land use in a five-mile buffer upstream of the monitoring site. The mixed land use type was assigned when none of the other four land use designations made up more than 50 percent of the five-mile buffer. The “forest land use type” for water quality monitoring purposes encompasses all lands designated under a general umbrella, 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 Water Quality Index is not intended to assess water quality in actively managed private timber lands.



**Figure 3. Influence of land use on water quality.**

As in recent years, the forest land use type continues to have the highest percentage of excellent and good status sites (Figure 3). More than 60 percent of sites in the agriculture, range, and urban land use types had a status of fair to very poor for the third consecutive year. This is the first year that the mixed land use type has had less than 50 percent of sites in fair to very poor status since water year 2015, and the first that urban has had over 30 percent in excellent to good status since water year 2017. The status shown in this figure, 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.

## 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 map showing 2011-2020 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 2020 raw data and historical status and trends
- Documentation of the development and calculations methods of the index