

Oregon Water Quality Index Data Summary

Water Years 2007-2016

(Oct. 1, 2007 through Sept. 30, 2016)

By: Dan Brown

February 2017



**Laboratory and
Environmental
Assessment Program**
3150 NW 229th, Suite 150
Hillsboro, OR 97124
Phone: 503-693-5700
800-52-4011
Fax: 503-693-4999
Contact: Lesley Merrick
www.oregon.gov/DEQ

DEQ is a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.



State of Oregon
**Department of
Environmental
Quality**

Last Updated: 1/30/17

This report prepared by:

Oregon Department of Environmental Quality
Laboratory and Environmental Assessment Program
3150 NW 229th, Suite 150, Hillsboro, Oregon 97124 U.S.A.
1-800-452-4011
www.oregon.gov/deq

Contact:

Lesley Merrick
503-693-5724

merrick.lesley@deq.state.or.us

OR

Dan Brown
503-693-5743

brown.daniel@deq.state.or.us

Alternative formats (Braille, large type) of this document can be made available. Contact DEQ, Portland, at 503-229-5696, or toll-free in Oregon at 1-800-452-4011, ext. 5696

Introduction

This report provides a general statistical overview of water quality status and trends across Oregon through use of 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. Only river water quality is presented in this report. It does not include lakes, wetlands, estuaries 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 Oct. 1, 2007 through Sept. 30, 2016. DEQ calculates seasonal averages for the summer season (June to September) and fall-winter-spring season (October to May) and uses the minimum of these seasonal 10-year averages for scoring purposes. Once scored, sites are given a status designation varying from excellent to very poor. Sites with sufficient data (30 or more scores) are analyzed for significantly improving or declining 10-year trends using the nonparametric Seasonal-Kendall test which factors in the 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>.

2016 Water Quality Status and Trend

Status

Oregon Water Quality Index results for water years 2007-2016 show 50 percent of sites in excellent or good status, 16 percent in fair and 33 percent in poor or very poor status for the statewide ambient monitoring network of 163 sites (Figure 1).

Trend

Of the 133 ambient monitoring network sample sites with sufficient data to calculate trends (30 or more scores), 24 percent show improving water quality, while 6 percent have declining water quality. Of the sites with improving trends, 41 percent are categorized as fair to very poor status. This is down from 53 percent last year, which is encouraging as continued upward trends may result in improved water quality status for these sites. On the other hand, three of the eight sites with declining water quality are in good status and should be evaluated further to avoid a decrease in water quality status. The remaining 70 percent of sites have no statistically significant trend.

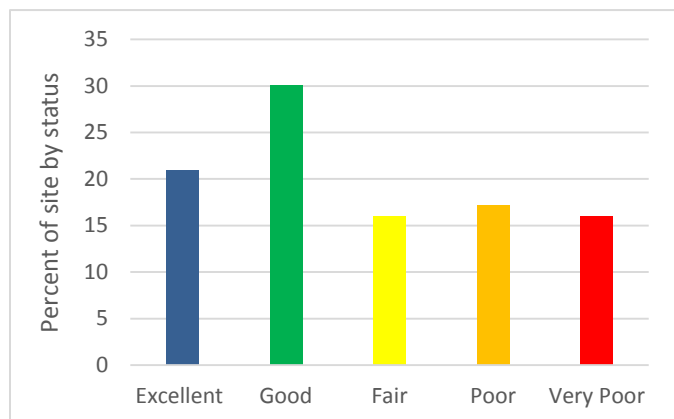


Figure 1. Percent of sites with scores in each Oregon Water Quality Index status.

Where are we seeing improving and declining water quality?

Sites with significantly improving water quality index scores in 2016 were spread across the state. Two sites in the Klamath basin had the greatest improvement in water quality, based on the magnitude of the trend, with both sites showing improving trends in the dissolved oxygen, nitrogen and phosphorus sub-indices. Many of the sites with improving water quality are in fair to very poor status (11 out of 32 sites; Table 1), indicating that the largest gains in water quality occurred at sites with the most room for improvement. Statewide, 14 of the 32 sites with improving OWQI scores in 2016 have had improving trends for three or more consecutive years (Table 1).

Table 1. Sites monitored by DEQ showing significant improving trends in water quality for water years 2007-2016. Sites are listed by basin in alphabetical order. 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	Trend for Past 5 Reporting Years	Sub-Index Status and Trend							
								Temp	pH	DO	BOD	TSS	N	P	Bact
DESCHUTES BASIN															
10508	Deschutes R at Lower Bridge	Range	2007-16	85	Good	↑ 4.2	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
10511	Deschutes R at Mirror Pond (Bend)	Mixed	2007-16	92	Excellent	↑ 2.1	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
10517	Crooked R at Lone Pine Rd	Range	2007-16	72	Poor	↑ 6.7	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
10690	Metolius R at Bridge 99 (Camp Sherman)	Forest	2007-16	91	Excellent	↑ 2.5	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
10696	Little Deschutes R at HWY 42	Forest	2007-16	91	Excellent	↑ 2.7	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
GRANDE RONDE BASIN															
10410	Wallowa R at Minam	Forest	2007-16	85	Good	↑ 3.7	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
10719	Grande Ronde R at HWY 82 (Elgin)	Mixed	2007-16	84	Fair	↑ 2.1	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
11457	Minam R at Minam	Forest	2007-16	95	Excellent	↑ 3.2	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
JOHN DAY BASIN															
11020	S Fk John Day R at Dayville	Range	2007-16	88	Good	↑ 2.2	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
KLAMATH BASIN															
10759	Lost R at HWY 39 (us Merrill)	Agriculture	2007-16	29	Very Poor	↑ 0.8	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
10764	Klamath R ds Big Bend Powerhouse	Forest	2007-16	67	Poor	↑ 15.4	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
10765	Klamath R at Keno	Forest	2007-16	36	Very Poor	↑ 13.0	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
10768	Link R at Mouth (Lake Ewauna)	Mixed	2007-16	41	Very Poor	↑ 5.7	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
MALHEUR BASIN															
10728	Willow Creek at RR Xing east of Vale	Range	2007-16	25	Very Poor	↑ 0.1	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
11480	Malheur R at Little Valley	Range	2007-16	47	Very Poor	↑ 2.1	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
MID COAST BASIN															
33644	North Beaver at Ona Grange	Forest	2007-16	86	Good	↑ 0.4	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
ROGUE BASIN															
10418	Rogue R at Robertson Bridge (Merlin)	Forest	2007-16	86	Good	↑ 1.6	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
10421	Rogue R at Rock Point Bridge (Gold Hill)	Forest	2007-16	86	Good	↑ 5.2	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
10423	Rogue R at Dodge Park	Mixed	2007-16	92	Excellent	↑ 2.8	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
10602	Little Butte Creek at Agate Rd (White City)	Agriculture	2007-16	72	Poor	↑ 6.6	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
SOUTH COAST BASIN															
11493	Pistol R at Pistol R Loop Rd	Forest	2007-16	85	Good	↑ 3.4	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
11905	Elk R at HWY 101	Forest	2007-16	93	Excellent	↑ 1.0	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■
33922	Middle Fk Coquille R at rivermile 1.25 Hwy 42	Forest	2007-16	86	Good	↑ 1.3	■ ■ ■ ■ ■	■	■	■	■	■	■	■	■

Table 1, continued. Sites monitored by DEQ showing significant improving trends in water quality for water years 2007-2016. Sites are listed by basin in alphabetical order. 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	Trend for Past 5 Reporting Years	Sub-Index Status and Trend									
								Temp	pH	DO	BOD	TS	N	P	Bact		
UMATILLA BASIN																	
10404	Umatilla R at Yoakum	Agriculture	2007-16	80	Fair	↑	8.5	—	—	—	—	—	—	—	—	—	—
WILLAMETTE BASIN - LOWER																	
11201	Columbia Slough at Landfill Rd	Urban	2007-16	46	Very Poor	↑	7.9	—	—	—	—	—	—	—	—	—	—
11321	Johnson Creek at SE 17th Ave. (Portland)	Urban	2007-16	35	Very Poor	↑	0.7	—	—	—	—	—	—	—	—	—	—
WILLAMETTE BASIN - MIDDLE																	
10344	Willamette R at Wheatland Ferry	Agriculture	2007-16	88	Good	↑	1.6	—	—	—	—	—	—	—	—	—	—
10917	Pudding R at HWY 99E (Aurora)	Agriculture	2007-16	65	Poor	↑	4.9	—	—	—	—	—	—	—	—	—	—
12559	N Santiam R at Coopers Ridge Rd	Forest	2007-16	94	Excellent	↑	1.0	—	—	—	—	—	—	—	—	—	—
WILLAMETTE BASIN - UPPER																	
10376	McKenzie R at Coburg Rd	Mixed	2007-16	92	Excellent	↑	2.9	—	—	—	—	—	—	—	—	—	—
10662	McKenzie R at Hendricks Bridge	Forest	2007-16	94	Excellent	↑	1.3	—	—	—	—	—	—	—	—	—	—
12552	McKenzie R at McKenzie Bridge	Forest	2007-16	94	Excellent	↑	2.2	—	—	—	—	—	—	—	—	—	—

While sites with significantly declining water quality index scores in 2016 are also spread across the state, they are less prevalent. Only one site, in the lower Deschutes Basin, showed a declining trend for three or more consecutive years (Table 2). The declining trend at this location is ongoing and further investigation should be conducted. Three sites in the Willamette Basin, currently in good status, showed declining trends for the first time. These sites should be monitored to prevent any further decline in status.

Table 2. Sites monitored by DEQ showing significant declining trends in water quality (OWQI) for water years 2007-2016. Sites are listed by basin in alphabetical order.

Station	Location Description	Land Use	Water Year Range	OWQI Score	OWQI Status	OWQI Trend and Magnitude	Trend for Past 5 Reporting Years	Sub-Index Status and Trend									
								Temp	pH	DO	BOD	TS	N	P	Bact		
DESCHUTES BASIN																	
10411	Deschutes R at Deschutes R Park (Mouth)	Range	2007-16	84	Fair	↓	-3.5	—	—	—	—	—	—	—	—	—	—
OWYHEE BASIN																	
10729	Owyhee R at HWY 201	Agriculture	2007-16	40	Very Poor	↓	-2.5	—	—	—	—	—	—	—	—	—	—
POWDER BASIN																	
10724	Powder R at HWY 86	Range	2007-16	41	Very Poor	↓	-1.2	—	—	—	—	—	—	—	—	—	—
UMPQUA BASIN																	
10443	S Umpqua R at HWY 42 (Winston)	Mixed	2007-16	73	Poor	↓	-2.4	—	—	—	—	—	—	—	—	—	—
WILLAMETTE BASIN - LOWER																	
10459	Tualatin R at HWY 210 (Scholls)	Agriculture	2007-16	40	Very Poor	↓	-0.6	—	—	—	—	—	—	—	—	—	—
WILLAMETTE BASIN - MIDDLE																	
10339	Willamette R at Canby Ferry	Mixed	2007-16	87	Good	↓	-1.6	—	—	—	—	—	—	—	—	—	—
WILLAMETTE BASIN - UPPER																	
10350	Willamette R at Albany	Agriculture	2007-16	89	Good	↓	-1.9	—	—	—	—	—	—	—	—	—	—
10373	Mary's R at HWY 99W (Corvallis)	Agriculture	2007-16	86	Good	↓	-1.9	—	—	—	—	—	—	—	—	—	—

Why is water quality improving or declining?

Trending analysis of the water years 2007-2016 data show a greater proportion of sites with improving trends for phosphorus than any other sub-index variable with 64 percent of the sites with improving trends, followed by temperature with 53 percent of the sites with improving trends (Figure 2). Dissolved oxygen had the greatest percentage of sites with declining trends (19 percent), followed by nitrogen and total solids, both close to 15 percent. With the exception of temperature and phosphorus, most sites showed no significant improving or declining 10-year trends for all other sub-indices.

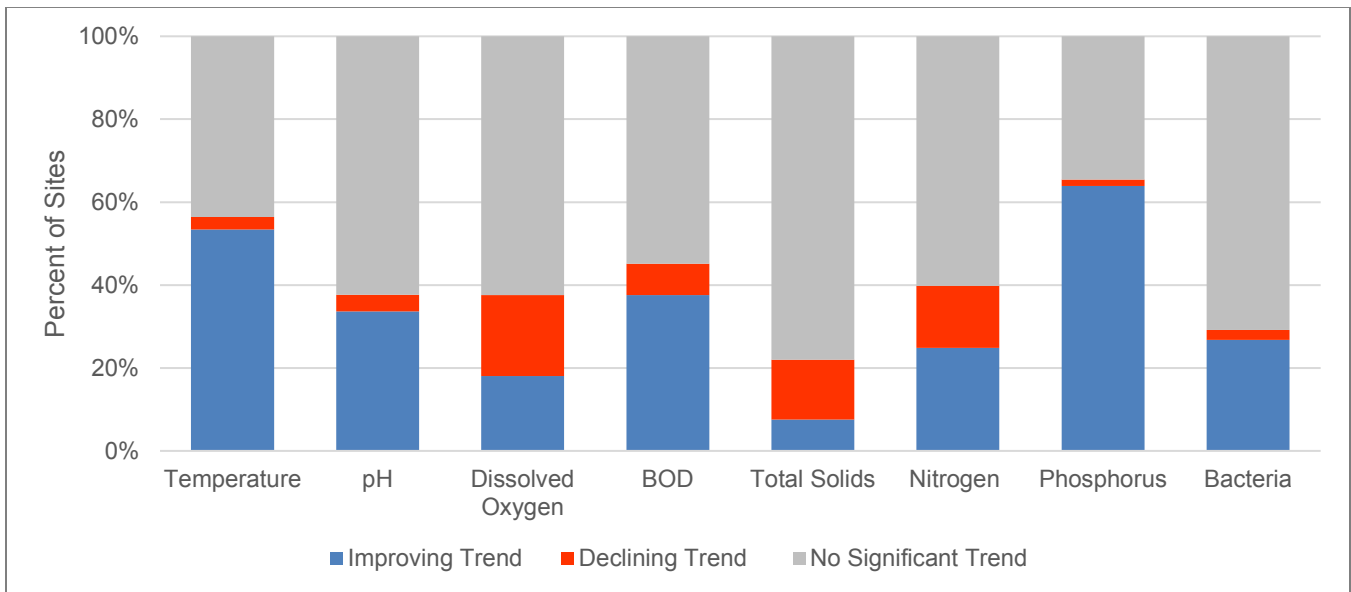


Figure 2. Sub-Index trends for the 2016 water year (October 1, 2015 to September 30, 2016).

How does land use influence status?

Comparing the percent of sites in each water quality status category to the dominant land use type in a five-mile buffer upstream of the monitoring site shows that rivers and streams in urban and agriculture areas have the greatest number of sites in poor to very poor water quality. The forest land use type has the highest percentage of excellent and good water quality sites followed by the mixed land use type. 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.

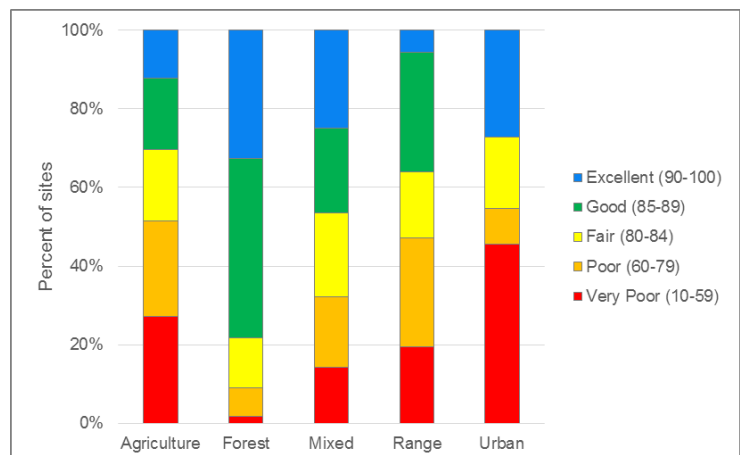


Figure 3. Influence of land use on water quality.

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 2007-2016 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 2016 Raw data and historical status and trends
- Documentation of the development and calculations methods of the index