

Oregon Water Quality Index Data Summary

Water Years 2006-2015

(Oct. 1, 2006 through Sept. 30, 2015)

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State of Oregon
**Department of
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Introduction

This summary 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*). OWQI scores range from 10 (worst case) to 100 (ideal water quality). Oregon DEQ uses the index to communicate information on 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 criteria collected during Water Years 2006-2015 (Oct. 1, 2006 through Sept. 30, 2015). DEQ calculates seasonal OWQI 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 ($n \geq 30$ 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.deq.state.or.us/lab/wqm/wqimain.htm>.

2015 Water Quality Status and Trend

Status

Oregon Water Quality Index results for water years 2006-2015 show 48 percent of sites in excellent or good status, 17 percent in fair and 35 percent in poor or very poor status for the statewide ambient monitoring network of 163 sites (Figure 1).

Trend

Of the 131 ambient monitoring network sample sites with sufficient data to calculate trends ($n \geq 30$ scores), 21 percent show improving water quality, while 6 percent have declining water quality. Of the sites with improving trends, 53 percent are categorized as fair to very poor status. This is encouraging as continued upward trends may result in improved water quality status for these sites. On the other hand, four of the eight sites with declining water quality are in excellent and good status and should be evaluated further to avoid a decrease in water quality status. The remaining 73 percent of sites have no statistically significant trend.

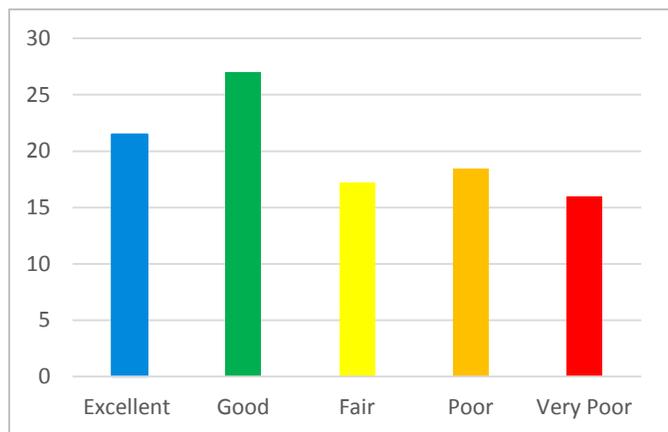


Figure 1. Percent of sites with scores in each Oregon Water Quality Index status.

Where are we seeing improving and declining water quality?

Sites with significantly improving water quality index scores in 2015 were spread across the state. The sites in the Klamath basin have the greatest improvements in water quality, based on the magnitude of the trend, with all sites showing improving trends in the nitrogen sub-index. Many of these sites are in poor or very poor status (10 out of 28 sites; Table 1), indicating that the largest gains in water quality occurred at sites with the most room for improvement. Statewide, seven of the 28 sites with improving OWQI scores in 2015 have improving trends for three or more years in a row (Table1).

Table 1. Sites monitored by DEQ showing significant improving trends in water quality (OWQI) for water years 2006-2015. Sites are listed by basin in alphabetical order. Magnitude indicates the rate of change (i.e. higher numbers equal more rapid change). For the 5 year trend, blue or red squares indicate improving or declining trends.

Station	Location Description	Land Use	Water Year Range	OWQI Score	OWQI Condition	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																
10517	Crooked R at Lone Pine Rd	Range	2006-15	72	Poor	↑	4.4	■	■	■	■	■	■	■	■	■
10696	Little Deschutes R at HWY 42	Forest	2006-15	91	Excellent	↑	2.8	■	■	■	■	■	■	■	■	■
10690	Metolius R at Bridge 99 (Camp Sherman)	Forest	2006-15	91	Excellent	↑	1.0	■	■	■	■	■	■	■	■	■
GRANDE RONDE BASIN																
10719	Grande Ronde R at HWY 82 (Elgin)	Mixed	2006-15	81	Fair	↑	3.0	■	■	■	■	■	■	■	■	■
11457	Minam R at Minam	Forest	2006-15	95	Excellent	↑	1.9	■	■	■	■	■	■	■	■	■
KLAMATH BASIN																
10764	Klamath R ds Big Bend Powerhouse	Forest	2006-15	63	Poor	↑	17.6	■	■	■	■	■	■	■	■	■
10765	Klamath R at Keno	Mixed	2006-15	34	Very Poor	↑	11.1	■	■	■	■	■	■	■	■	■
10759	Lost R at HWY 39 (us Merrill)	Agriculture	2006-15	29	Very Poor	↑	1.5	■	■	■	■	■	■	■	■	■
10768	Link R at Mouth (Lake Ewauna)	Mixed	2006-15	40	Very Poor	↑	7.1	■	■	■	■	■	■	■	■	■
JOHN DAY BASIN																
11020	S Fk John Day R at Dayville	Range	2006-15	87	Good	↑	3.3	■	■	■	■	■	■	■	■	■
11478	John Day R at Service Creek	Range	2006-15	86	Good	↑	2.6	■	■	■	■	■	■	■	■	■
NORTH COAST BASIN																
13440	Tillamook R at Bewley Creek Rd	Forest	2006-15	68	Poor	↑	3.9	■	■	■	■	■	■	■	■	■
MID COAST BASIN																
11241	Salmon R at Otis	Forest	2006-15	88	Good	↑	2.5	■	■	■	■	■	■	■	■	■
ROGUE BASIN																
10602	Little Butte Creek at Agate Rd (White City)	Agriculture	2006-15	71	Poor	↑	7.0	■	■	■	■	■	■	■	■	■
10423	Rogue R at Dodge Park	Mixed	2006-15	93	Excellent	↑	2.6	■	■	■	■	■	■	■	■	■
10418	Rogue R at Robertson Bridge (Merlin)	Forest	2006-15	87	Good	↑	1.5	■	■	■	■	■	■	■	■	■
10421	Rogue R at Rock Point Bridge (Gold Hill)	Forest	2006-15	86	Good	↑	4.8	■	■	■	■	■	■	■	■	■
SOUTH COAST BASIN																
11493	Pistol R at Pistol R Loop Rd	Forest	2006-15	81	Fair	↑	1.9	■	■	■	■	■	■	■	■	■
UMATILLA BASIN																
12005	McKay Creek at Kirk St (Pendleton)	Mixed	2006-15	82	Fair	↑	3.4	■	■	■	■	■	■	■	■	■
10404	Umatilla R at Yoakum	Agriculture	2006-15	80	Fair	↑	9.0	■	■	■	■	■	■	■	■	■
WILLAMETTE BASIN - LOWER																
10469	Fanno Creek at Bonita Rd (Tigard)	Urban	2006-15	58	Very Poor	↑	3.3	■	■	■	■	■	■	■	■	■
11321	Johnson Creek at SE 17th Ave. (Portland)	Urban	2006-15	33	Very Poor	↑	1.1	■	■	■	■	■	■	■	■	■
WILLAMETTE BASIN - MIDDLE																
10637	Mollala R at Canby	Agriculture	2006-15	88	Good	↑	2.9	■	■	■	■	■	■	■	■	■
10917	Pudding R at HWY 99E (Aurora)	Agriculture	2006-15	66	Poor	↑	8.6	■	■	■	■	■	■	■	■	■
10344	Willamette R at Wheatland Ferry	Agriculture	2006-15	86	Good	↑	2.0	■	■	■	■	■	■	■	■	■
WILLAMETTE BASIN - UPPER																
11180	Calapooia R at Queens Rd (Albany)	Agriculture	2006-16	81	Fair	↑	3.0	■	■	■	■	■	■	■	■	■
10376	McKenzie R at Coburg Rd	Mixed	2006-15	92	Excellent	↑	3.7	■	■	■	■	■	■	■	■	■
12552	McKenzie R at McKenzie Bridge	Forest	2006-15	93	Excellent	↑	1.0	■	■	■	■	■	■	■	■	■

While sites with significantly declining water quality index scores in 2015 are also spread across the state, they are less prevalent. In the 2006-2015 results four sites, in the lower Deschutes, upper Grande Ronde and upper Willamette basins, show declining trends for four or more consecutive years (Table 2). The declining trends at these locations appear to be persistent and further investigation should be conducted.

Table 2. Sites monitored by DEQ showing significant declining trends in water quality (OWQI) for water years 2006-2015. Sites are listed by basin in alphabetical order.

Station	Location Description	Land Use	Water Year Range	OWQI Score	OWQI Condition	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	2006-15	84	Fair	↓	-3.1	↓ ↓ ↓ ↓ ↓	↑	↓	↓	↓	↓	↑	↑	↓
10506	Deschutes R at Warm Springs	Range	2006-15	86	Good	↓	-1.8	↓ ↓ ↓ ↓ ↓	↓	↓	↓	↓	↓	↓	↓	↓
GRANDE RONDE BASIN																
10720	Grande Ronde R at Hilgard St Park	Forest	2006-15	88	Good	↓	-2.2	↓ ↓ ↓ ↓ ↓	↓	↓	↓	↓	↓	↓	↓	↓
NORTH COAST BASIN																
34019	Nehalem R at Birenkfeld	Forest	2007-15	85	Good	↓	-2.4	↓ ↓ ↓ ↓ ↓	↓	↓	↓	↓	↓	↓	↓	↓
OWYHEE BASIN																
10729	Owyhee R at HWY 201	Agriculture	2006-15	39	Very Poor	↓	-1.6	↓ ↓ ↓ ↓ ↓	↓	↓	↓	↓	↓	↓	↓	↓
POWDER BASIN																
10724	Powder R at HWY 86	Range	2006-15	44	Very Poor	↓	-1.3	↓ ↓ ↓ ↓ ↓	↓	↓	↓	↓	↓	↓	↓	↓
SOUTH COAST BASIN																
13574	S Fk Coos R at Anson Rogers Bridge	Forest	2006-15	78	Poor	↓	-1.8	↓ ↓ ↓ ↓ ↓	↓	↓	↓	↓	↓	↓	↓	↓
UPPER WILLAMETTE BASIN																
10386	Middle Fk Willamette R at Jasper Bridge	Mixed	2006-15	94	Excellent	↓	-1.7	↓ ↓ ↓ ↓ ↓	↓	↓	↓	↓	↓	↓	↓	↓

Why is water quality improving or declining?

Trending analysis of the water years 2006-2015 data show a greater proportion of sites with improving trends for phosphorus than any other sub-index variable with 56 percent of the sites with improving trends, followed by nitrogen and temperature with 38 percent of the sites with improving trends (Figure 2). Total solids and dissolved oxygen have the greatest percentage of sites with declining trends, both at 19 percent. With the exception of phosphorus, most sites showed no significant improving or declining 10-year trends for all other sub-indices.

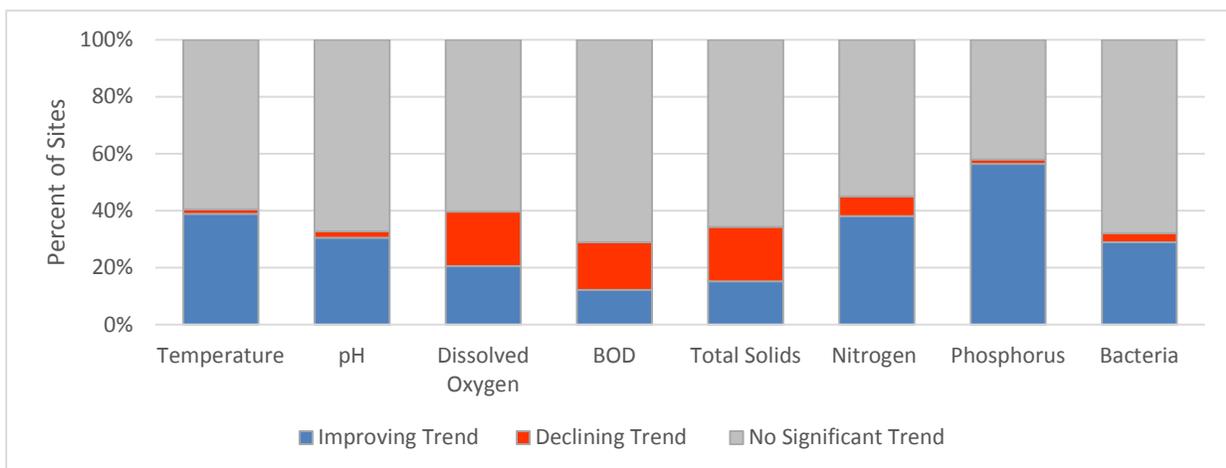


Figure 2. Sub-Index Trends.

How does land use influence status?

Comparing the percent of sites in each water quality status to dominant land use 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.

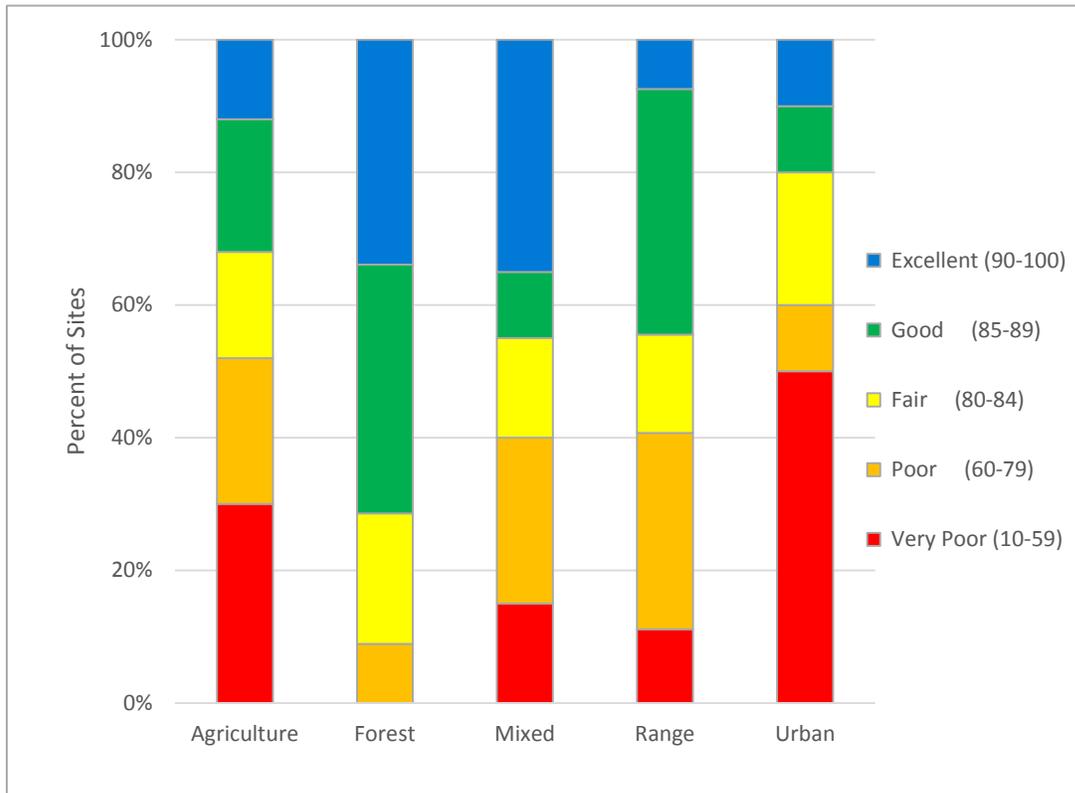


Figure 3. Influence of land use on water quality.

What more information on the Oregon Water Quality Index?

Visit <http://www.deq.state.or.us/lab/wqm/wqimain.htm> for links to these resources:

- Interactive map showing 2006-2015 status and trends for all monitoring sites
- Downloadable data summaries for all sites organized by basin
- Document on Reporting Methods and Uses of the OWQI
- Downloadable Excel file of 2015 Raw data and historical status and trends
- Documentation of the development and calculations methods of the index