

Oregon Water Quality Index Summary Report Water Years 2005-2014

(Oct. 1, 2005 through Sept. 30, 2014)

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State of Oregon
**Department of
Environmental
Quality**

**Laboratory and
Environmental
Assessment
Program**

3150 NW 229th,
Suite 150,
Hillsboro, OR 97124
Phone: (503) 693-5700
(800) 452-4011
Fax: (503) 693-4999

Contacts:
Michael Mulvey
Greg Coffeen

www.oregon.gov/DEQ

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



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

Contact:
Greg Coffeen
(503) 693-5725
Coffeen.Greg@deq.state.or.us

OR

Michael Mulvey
(503) 693-5732
Mulvey.Michael@deq.state.or.us

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Executive Summary

This 2014 annual report summarizes water quality status and trends for Oregon's rivers. The Oregon Department of Environmental Quality (DEQ) regularly monitors water quality at a network of river sites across the state. DEQ summarizes these findings here using the Oregon Water Quality Index (OWQI). Of 160 sites in the network, 131 had sufficient data for 10-year status and trend statistics. Overall, 51 percent of river sites monitored have excellent to good water quality status. Over the previous ten years, 30 percent of the sites have improving trends, 3 percent have worsening trends, and 67% have non-changing trends. DEQ uses this report to communicate to elected officials, agency management and the general public about DEQ's overall progress on fulfilling its mission of restoring, maintaining and enhancing the quality of Oregon's water.

This document is meant to be a summary report rather than a detailed analysis about specific geographic areas. DEQ has more information about the water quality of specific basin its web page, including basin assessments (<http://www.deq.state.or.us/wq/watershed/watershed.htm>) and reports on water quality limited streams (<http://www.deq.state.or.us/WQ/TMDLs/basinlist.htm>).

Introduction

This summary report provides a general statistical overview of water quality conditions and trends throughout Oregon through use of the Oregon Water Quality Index. The index, which the state of Oregon has tracked 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 – not lakes, wetlands, estuaries or groundwater resources. Water quality variables included are dissolved oxygen (percent saturation and concentration), biochemical oxygen demand (BOD), pH, total solids, ammonia and nitrate nitrogen, total phosphorus, temperature and bacteria. 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.

To assess the overall water quality of Oregon's rivers, the DEQ Laboratory monitors 160 ambient water quality river sites throughout the state six times a year. These sites provide representative statewide geographical and land use coverage, and include major rivers and streams throughout the state. There are currently 131 monitoring sites in the network with a sufficient data for status and trend reporting. The size of the network periodically changes due to logistical and budgetary constraints. In the winter of 2011, DEQ added 19 additional sites to the network funded by the Oregon Department of Agriculture. These sites are all on agricultural land distributed throughout the state.

For this report, DEQ calculated water quality index results on all samples meeting data quality and quantity criteria taken in Water Years 2005-2014 (Oct. 1, 2005 through Sept. 30, 2014). DEQ calculated seasonal OWQI averages for the summer season (June to September) and fall-winter-spring season (October to May). DEQ used the minimum of these seasonal 10-year averages for scoring purposes. Sites with sufficient data ($N \geq 30$) were analyzed for significant increasing or decreasing 10-year trends. The nonparametric Seasonal-Kendall test was used for trend analysis to ensure that the significant trends that exist were not due to normal seasonal variation. DEQ reported the magnitude and direction of significant trends at the 80 percent or greater confidence level.

The water quality index alone does not describe all the possible stressors to water quality. DEQ is developing water quality basin assessments (status reports and action plans) for basins across the state that look at a wide range of factors affecting water quality (<http://www.deq.state.or.us/wq/watershed/watershed.htm>). These reports provide a more in-depth, technical assessment of the status of water quality, identify important water quality issues in basins, and present an action plan to address those issues. The status and action plans will become DEQ's source for detailed, basin-level information and interpretation of Oregon Water Quality Index and other data, while this summary report will provide a broad overview of water quality within DEQ's ambient network. For basins that do not yet have a completed Status and Action Plan, see basin-specific information in the background chapters of

completed Total Maximum Daily Load (TMDL) documents, on DEQ's website: (<http://www.deq.state.or.us/WQ/TMDLs/basinlist.htm>). People interested in a more detailed and technical analysis of Oregon's water quality than is presented in this report are encouraged to look at the basin assessments and TMDL reports.

OWQI Strengths and Weaknesses

DEQ uses the Oregon Water Quality Index to communicate information on basic, overall water quality of Oregon's rivers in an easy-to-understand, non-technical manner to the public, government officials and the Oregon Legislature. However, the index does not include many possible stressors to rivers. It is simply one of several tools that helps DEQ get a better understanding of Oregon's water quality. For example, the index does not cover toxic contaminants, habitat conditions or biological community health. A single index cannot identify all potential water quality issues in a watershed.

DEQ selected ambient sampling sites to reflect the integrated effects of land uses and point source discharges upstream of them. The data are representative of just the sampling site location and do not represent the specific water quality conditions of other locations in the same basin or of the whole river. Although the ambient river network sites are on more than 50 major rivers and streams across the state (Figure 1), this network is not a randomly selected, statistically valid sample of water quality conditions statewide. DEQ cannot use the results from the network to report conditions for all river miles across the state, only the conditions of the sites monitored.

The ambient network and subsequent water quality index reporting is Oregon's only long-term, systematic, continuously funded statewide river water quality monitoring program. The oldest sites were monitored starting in the late 1940s and many sites in the network contain data going back more than 30 years, allowing for long-term trending in DEQ's progress toward meeting state water quality objectives. It represents a rich source of information for documenting the state's success in restoring, maintaining and enhancing the quality of its rivers.

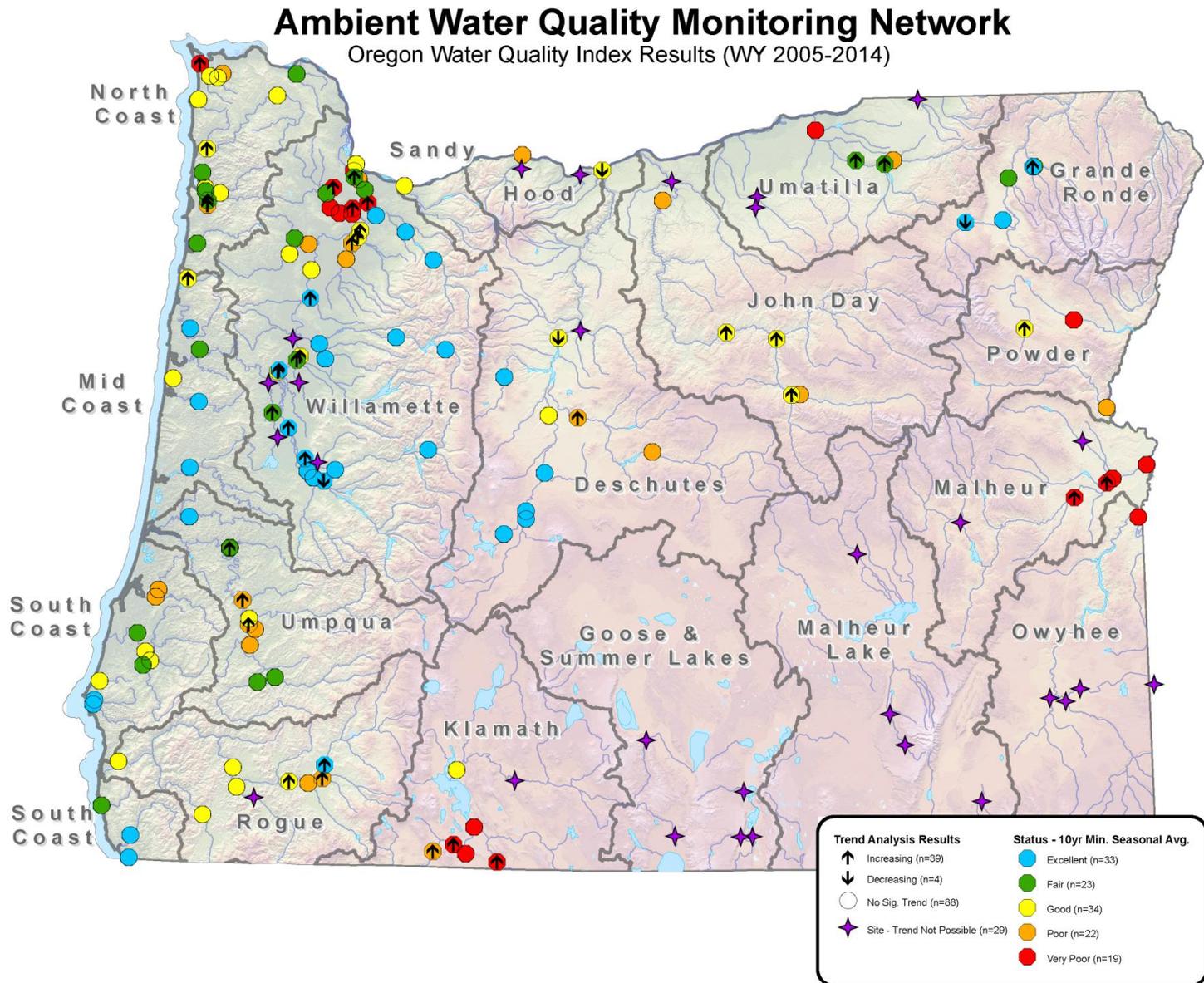


Figure 1. DEQ’s ambient river monitoring network consisted of 160 sites in water year 2014 (Oct. 1, 2013 to Sept. 30, 2014), but only 131 sites had sufficient data for calculating 10-year average status and trends for the 2005 to 2014 water years. The 29 sites with insufficient data include 19 sampled in cooperation with Oregon Department of Agriculture that were recently added to DEQ’s network. Scores for all 160 sites are listed in Appendix A.

Is Oregon meeting its goals for water quality protections?

Oregon has used some form of agency performance measurement for many years. The Oregon Progress Board developed a series of Oregon Benchmarks in the 1990s. The Oregon Legislature established a standardized approach for reporting agency Key Performance Measures, or KPMs, in 2001. DEQ uses the ambient river monitoring network and water quality index to report on the agency’s progress in protecting and improving the quality Oregon’s rivers to the Oregon Legislature on three KPMs, and for the Oregon Progress Board’s benchmark (OBM) reporting. Results for the most recent reporting period are in Table 1. Results for these measures since 1990 are in Figure 2.

Table 1. Legislative Key Performance Measures

#	Legislative Key Performance Measure	2014 Results	Target
OBM 79a KPM 9a	IMPROVING WATER QUALITY - Percent of monitored sites with significantly increasing trends in water quality.	30%	10%
OBM 79b KPM 9b	WORSENING WATER QUALITY - Percent of monitored sites with significantly decreasing trends in water quality	3%	0%
OMB 79c KPM 9c	OVERALL WATER QUALITY STATUS - Percent of monitored sites with water quality in good to excellent condition	51%	45%

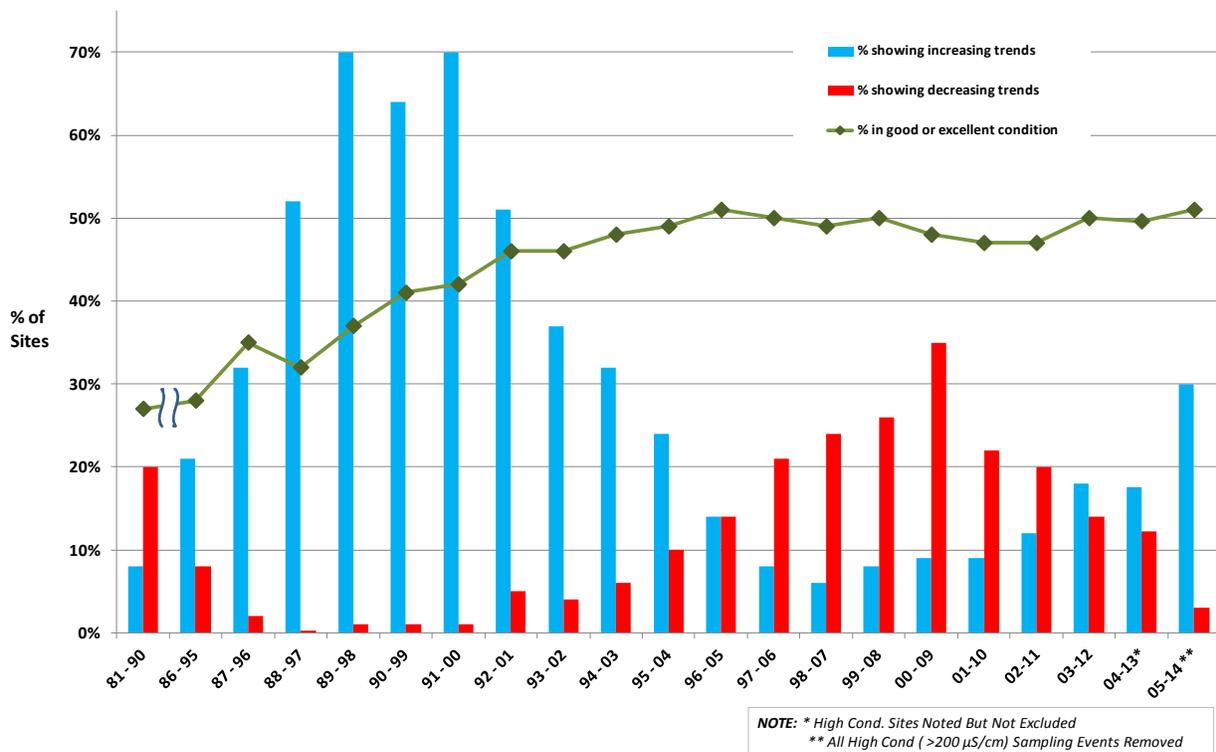


Figure 2. Results for the three Key Performance Measures tracking water quality status and trend throughout Oregon since 1990.

Status

Figure 1 displays the spatial distribution and most current Oregon Water Quality Index status results. The water quality status KPM 9c target is to have 45 percent or more of the monitored sites in good to excellent condition. Since 2001, river conditions in the ambient network have met and exceeded the status benchmark for KPM 9c (Figure 2 and Table 2).

The state showed substantial gains in water quality status from 1990 to 2005, with 10-year averages in the index improving from 27 percent of sites in good/excellent condition up to 51 percent of sites (Figure 2). During this period DEQ developed many clean water plans for basins across the state that did not meet water quality standards. These plans are called Total Maximum Daily Loads or TMDLs. Many of the streams with the biggest improvements were in basins with clean water plans. In many TMDLs, permitted dischargers were required to improve wastewater treatment. There were also improvements made in stormwater management and improvements in practices to protect water quality on agricultural and forest lands during this time period. For the past decade, Oregon Water Quality Index 10-year averages in good or excellent condition have leveled off, ranging from 46 to 51 percent.

Trends

While Oregon is meeting goals for status of OWQI conditions, the trends in the index scores show a very different story. From 1990 to the years 1998 to 2000, the state saw a steady increase in the percent of sites with increasing (improving quality) OWQI scores from 8 percent to 70 percent (Figure 2). These trends were due to water quality improvements mentioned in the previous paragraph implemented by DEQ and other entities. Things changed dramatically starting in 2001, with a 19 percent drop in the percent of sites showing increasing trends in the index (from 70 percent in 2000 to 51 percent in 2001). The slowing rate of improving sites continued to 2006-2007, where the percent of sites with significantly improving OWQI scores over the previous 10-year period has stabilized between 6 to 9 percent (Figure 2, Table 2). Since then the percent of sites with improving trends has steadily increased with the largest increase in the most recent 10 year period up to 30 percent. With the target for KPM 9a: percent of sites with improving trends set at 10 percent. we continue to achieve that goal.

The opposite pattern is apparent in KPM 9b: percent of sites with decreasing trends (declining quality) in Oregon Water Quality Index scores. From 1990 to 2000 the substantial rise in percent of sites with increasing index trends was paired with a roughly 20 percent drop in the percent of sites with significantly decreasing index scores (Figure 2). Oregon came close to achieving its current KPM 9 b target of 0 percent of sites with declining water quality trends. But again, this pattern changed starting in 2001, with a modest increase up to 4 to 6 percent of sites with significant declines in OWQI. Then from 2004 to 2009 there was a steady rise in the percent of sites with declining OWQI, from 10 percent to 35 percent of sites (Table 2). A potential promising sign is a maintained drop from 35 percent in 2009 to 14 percent in 2012 to 12 percent in 2013 and 3 percent in 2014. The trend in percent of sites with decreasing trends continues to approach the ambitious KPM 9b target of 0 percent sites with decreasing trends

Table 2. Comparison of calculated and target Oregon Water Quality Index benchmarks since 2001. Values in bold met or exceeded target benchmarks. Trends are detected using the nonparametric Seasonal-Kendall test at the 80% or greater confidence level.

Key Performance Measure	Type	Target	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
9c. % of sites in good to excellent condition	Status	45	46	46	48	49	51	50	49	50	48	47	47	50	50 *	51 *
9a. % of sites with significantly increasing trends	Trend	10	51	37	32	24	14	8	6	8	9	9	12	18	18	30
9b. % of sites with significantly decreasing trends	Trend	0	5	4	6	10	14	21	24	26	35	22	20	14	12	3

*Note - Condition status comparison does not include sites <30 sampling events. For 2013 assessment this excludes 19 ODA sites and for 2014 this excludes 19 ODA and 10 DEQ sites.

2014 Water Quality Status and Trends

The current status, trends and magnitude of change in the Oregon Water Quality Index of 160 sites in the state's ambient network are in Appendix A, listed by major basin.

DEQ calculated seasonal-Kendall trends using WQ Hydro (Aroner 2012) for sites with a minimum of 30 data points in a 10-year time period. Trend information in Tables 3, 4 and Appendix A have magnitude and significance. Magnitude is the slope of the trend line over time and is the direction of the change. A positive number means an increasing trend and a negative number means a decreasing trend. The larger the number the steeper the trend line slope and the greater the change. Trend magnitudes not significantly different from zero have a not changing trend, or NT.

Significance is a measure of the certainty of the trend estimate. Higher significance numbers means greater certainty. A significance of 0.95 means there is a 95 percent certainty that the trend actually exists. Trends with significance less than 0.80 are considered not significant and are not presented.

Water Quality Index scores for sites with less than 30 data points in the 10-year period are in Appendix A and have 'NA' for not applicable for the trend. The scores for these sites are averages for the period of time available, not 10-year averages. Only the 131 sites with sufficient data for 10-year average scores and trends are used in the Key Performance Measures (Tables 1 and 2, and Figure 2) and are given color coded condition markers in the map in Figure 2. The locations of non trendable sites are purple stars in Figure 2.

Where are we seeing improving and declining water quality?

Within DEQ's 160 site ambient monitoring network 131 sites had sufficient sampling events for status and trend analysis in 2014. Of those 131 sites, 39 (30 percent) had significant increases in overall water quality (Table 3) and 4 (3 percent) had significant decreases in water quality (Table 4). Sites with significantly increasing index scores in 2014 were spread across the state with some clustering in the Willamette, North Coast, Klamath, Umpqua and upper Rogue basins (Figure 1). The sub-indexes most influencing overall increase trend in the index are nitrogen, phosphorus and pH. Many of these sites were in poor or very poor conditions (15 out of 39 sites; Table 5), showing that the largest gains in general water quality improvements occurred at sites with the most room for improvement.

The four sites with significantly declining water quality were in excellent or good condition. Locations effected by declining water quality include the lower Deschutes, upper Willamette and upper Grande Ronde basins. The sub-indexes most influencing overall decline in the index are nitrogen, phosphorus, pH and dissolved oxygen. DEQ will watch these trends in future years to see if they continue and to see if nutrient and pH patterns change.

The remaining sites showed no significant increasing or decreasing trend in general water quality conditions as measured by the Oregon Water Quality Index over a 10-year period.

Table 3. River sites monitored by DEQ Laboratory showing significant improvements in water quality (Oregon Water Quality Index) for water years 2005-2014. Sites are listed in order from most improved to least improved in water quality.

Monitoring site	Basin	Station	WY	Magnitude ¹	Signif ²	Condition
Klamath R ds Big Bend Powerhouse	Klamath	10764	2005-14	14.6	1.00	Poor
Klamath R at Keno	Klamath	10765	2005-14	10.8	0.98	Very Poor
Umatilla R at Yoakum	Umatilla	10404	2005-14	9.4	0.99	Fair
McKay Creek at Kirk St (Pendleton)	Umatilla	12005	2005-14	6.6	0.91	Fair
Pudding R at HWY 99E (Aurora)	Willamette - Middle	10917	2005-14	6.3	0.84	Poor
Lost R at HWY 39 (us Merrill)	Klamath	10759	2005-14	4.6	1.00	Very Poor
Calapooia R at Queens Rd (Albany)	Willamette - Upper	11180	2005-14	4.5	0.98	Fair
Little Butte Creek at Agate Rd (White City)	Rogue	10602	2005-14	4.2	0.90	Poor
Tillamook R at Bewley Creek Rd	North Coast	13440	2005-14	3.9	0.95	Poor
Powder R at HWY 7 (Baker City)	Powder	11490	2005-14	3.8	0.88	Good
Fanno Creek at Bonita Rd (Tigard)	Willamette - Lower	10469	2005-14	3.6	0.89	Very Poor
McKenzie R at Coburg Rd	Willamette - Upper	10376	2005-14	3.5	0.99	Excellent
Calapooya Creek at Umpqua	Umpqua	10996	2005-14	3.3	0.84	Poor
Salmon R at Otis	Mid Coast	11241	2005-14	3.3	0.91	Good
Beaverton Creek at 216th (Orenco)	Willamette - Lower	10480	2005-14	3.2	0.82	Very Poor
S Umpqua R at Melrose Rd	Umpqua	10442	2005-14	3.1	0.85	Poor
Long Tom R at Stow Pit Rd (Monroe)	Willamette - Upper	11140	2005-14	3.1	0.91	Fair
John Day R at Service Creek	John Day	11478	2005-14	2.5	0.97	Good
Willamette R at Salem	Willamette - Middle	10555	2005-14	2.4	0.98	Excellent
S Fk John Day R at Dayville	John Day	11020	2005-14	2.4	0.96	Good
Willamette R at SP&S RR Bridge (Portland)	Willamette - Lower	10332	2005-14	2.4	0.91	Fair
Umpqua R at Elkton	Umpqua	10437	2005-14	2.4	0.86	Fair
Rogue R at Rock Point Bridge (Gold Hill)	Rogue	10421	2005-14	2.3	0.91	Good
Nehalem R at Foley Rd	North Coast	11856	2005-14	2.3	0.91	Good
Crooked R at Lone Pine Rd	Deschutes	10517	2005-14	2.3	0.88	Poor
Willamette R at Canby Ferry	Willamette - Middle	10339	2005-14	2.1	0.95	Good
Willamette R at Albany	Willamette - Upper	10350	2005-14	2.1	0.94	Good
Willamette R at Corvallis	Willamette - Upper	10352	2005-14	1.8	0.91	Excellent
Mary's R at HWY 99W (Corvallis)	Willamette - Upper	10373	2005-14	1.8	0.84	Good
Rogue R at Dodge Park	Rogue	10423	2005-14	1.7	0.85	Excellent
Minam R at Minam	Grande Ronde	11457	2005-14	1.7	0.83	Excellent

Monitoring site	Basin	Station	WY	Magnitude¹	Signif²	Condition
Mollala R at Canby	Willamette - Middle	10637	2005-14	1.7	0.82	Good
Willamette R at HWY 99E (Harrisburg)	Willamette - Upper	10355	2005-14	1.6	0.91	Excellent
Trask R at HWY 101	North Coast	13433	2005-14	1.5	0.82	Fair
N Fk John Day R at Kimberly	John Day	11017	2005-14	1.5	0.87	Good
Johnson Creek at SE 17th Ave. (Portland)	Willamette - Lower	11321	2005-14	1.2	0.97	Very Poor
Skipanon R at HWY 101	North Coast	10812	2005-14	1.0	0.94	Very Poor
Malheur R at Little Valley	Malheur	11480	2005-14	1.0	0.90	Very Poor
Bully Creek at HWY 20 (Vale)	Malheur	11043	2005-14	0.4	0.80	Very Poor

Notes: 1 - Amount of significant change in OWQI scores over the current 10-year period.

2 - Significance Level of Seasonal-Kendall trend analysis results.

Table 4. River sites monitored by DEQ Laboratory showing a significant decrease in water quality (OWQI) for water years 2005-2014. Sites are listed in order from most decreased to least decreased in water quality.

Monitoring site	Basin	Station	WY	Magnitude¹	Signif²	Condition
Middle Fk Willamette R at Jasper Bridge	Willamette - Upper	10386	2005-14	-1.4	0.95	Excellent
Grande Ronde R at Hilgard St Park	Grande Ronde	10720	2005-14	-2.0	0.90	Excellent
Deschutes R at Deschutes R Park (Mouth)	Deschutes	10411	2005-14	-2.2	0.89	Good
Deschutes R at Warm Springs	Deschutes	10506	2005-14	-3.8	0.96	Good

Notes: 1 - Amount of significant change in OWQI scores over the current 10-year period.

2 - Significance Level of Seasonal-Kendall trend analysis results.

Why is water quality improving or declining?

Trending analysis of the water years 2005-2014 data showed a greater proportion of sites with improving trends for nitrogen than any other indicator in the index with 63 percent of the sites with improving trends, followed by phosphorus with 47 percent of the sites with improving trends (Figure 3 and Table 5). Biochemical oxygen demand was the leading declining indicator with 30 percent of the sites with declining trends in BOD. With the exception of nitrogen, most sites showed no significant increasing nor decreasing 10-year trends for all other sub indices.

Figure 3. Sub-index trends.

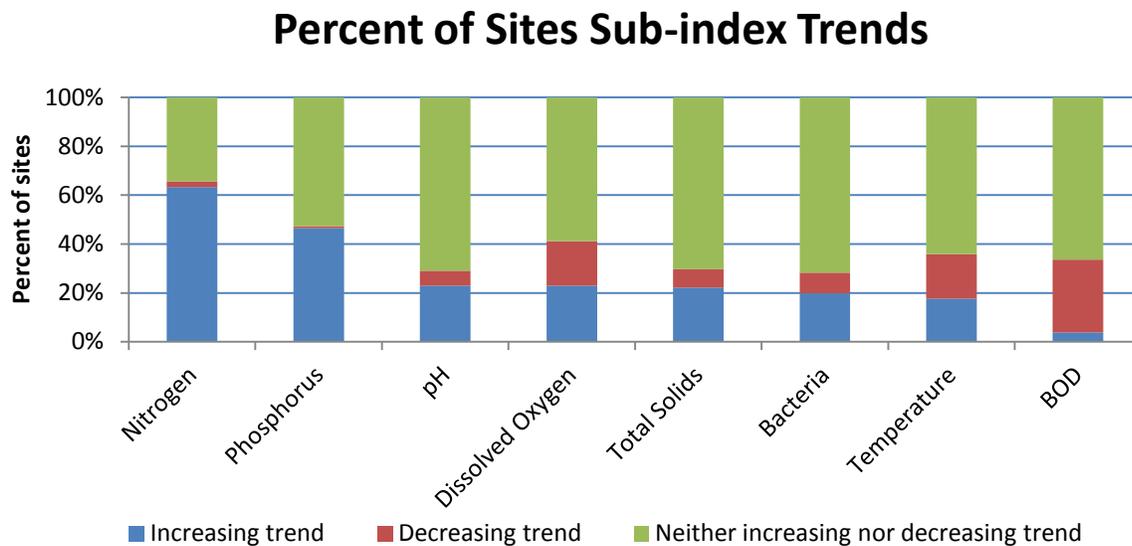


Table 5. Percent of sites in each sub-index with either improving or declining trends for river sites monitored by DEQ Laboratory for water years 2005-2014.

	Nitrogen	Phosphorus	pH	Dissolved Oxygen	Total Solids	Bacteria	Temperature	BOD
Increasing Trend	63%	47%	23%	23%	22%	20%	18%	4%
Decreasing Trend	2%	1%	6%	18%	8%	8%	18%	30%
Neither Increasing nor Decreasing Trend	34%	53%	71%	59%	70%	72%	64%	66%

The changes in percent of sites with increasing and decreasing trends between the 2013 and 2014 reports shown in Figure 2 are particularly interesting. Overall, 37 out of the 131 trendable sites had condition trend changes from decreasing to no trend, or from no trend to increasing trend between the 2013 and 2014 OWQI reports. Although it is beyond the scope of this brief summary report to fully investigate the reasons for this change in these 37 sites, we can offer some general observations. See Appendix B for more information.

- The parameters most responsible for this were nitrogen and phosphorus nutrients, biochemical oxygen demand, pH and total solids. Nitrogen sub scores trends improved for 70 percent of the sites with improved trending status.
- Agricultural, range and forest land uses had the largest proportion of sites that improved trend status. Almost half (48 percent) of all agricultural sites assessed had an improved changed trend status.
- John Day, Umatilla, Grand Ronde and North Coast basins had fairly high proportion of improved trend status sites.
- Nearly half of the ‘good’ condition sites in the 2013 report had an improved change trend status in the 2014 report.

The OWQI and marine-influenced tidal sites

Parameter scoring in the Oregon Water Quality Index is based on water quality standards when standards exist, or on best professional judgment on what constitutes good conditions for parameters without standards. This scoring assumes that the water bodies are freshwater rivers. However, not all ambient river monitoring network sites are freshwater rivers at all times. Some are in estuaries where ocean salt water can mix with river fresh water. The index scoring for total solids assumes that the waters sampled are freshwater and not brackish water, and would ‘unfairly’ score brackish sites more poorly than is appropriate.

Oregon Administrative Rules (OAR 340-041-002 (22)) define estuarine waters as all mixed fresh and oceanic waters in estuaries or bays from the point of oceanic water intrusion inland to a line connecting the outermost points of headlands or protective jetties. In applying water quality standards in marine and estuarine waters DEQ chemically defines estuarine waters as having specific conductivity greater than 200 uS/cm (Oregon Department of Environmental Quality. 2014). Generally, specific conductivity of Oregon coastal rivers is typically around 60 uS/cm.

Several of the ambient river stations are tidally influenced and a few sites close to the ocean regularly experience some degree of salt water intrusion, especially during high tides and low stream flow periods in summer and fall. DEQ looked carefully at each of these rivers to see if there was a sampling location far enough upstream to avoid any salt or brackish water while still having a cost-effective location low enough in the basin that integrated water quality impacts from the larger basin. Unfortunately, DEQ was not able to find such locations for some of these rivers.

Starting with this 2014 report, DEQ will exclude samples from tidal coastal rivers with conductivities greater than 200 uS/cm. The five sites with high conductivity during low stream flow periods in summer and fall data were excluded and are listed in Table 4. Included are site scoring and trending both with and without the higher conductivity samples. Scores for these sites before the 2014 report are unchanged and use all the sample data.

Table 6 presents differences in site scoring between using all the samples and excluding higher conductivity samples. Overall, excluding the high conductivity samples improved the OWQI scores for four sites and declined the score very slightly for one site, the Skipanon River. The average score improved by more than 12 points. There were no changes in 10-year trends. Parameters responsible for these improved scores were total solids and dissolved oxygen. While this change will make a difference in the site assessments it appears to have little, if any, impact on the overall assessment as reported in Figure 2 since it involves relatively few sites. This change represents a minor adjustment in assessment methodology involving a relatively few sites that should not significantly affect comparisons between current and future assessments with past assessments.

Table 6. Tidally influenced coastal sites that had marine or brackish water in water year 2014.

Samples used	Station	Site	Basin	OWQI score	OWQI condition	10-year trend
No salty samples	10812	Skipanon R., HWY 101	North Coast	35	Very Poor	Inc
All samples	10812	Skipanon R., HWY 101	North Coast	36	Very Poor	Inc
No salty samples	10817	Lewis & Clark R., Logan Rd	North Coast	85	Good	NT
All samples	10817	Lewis & Clark R., Logan Rd	North Coast	83	Fair	NT
No salty samples	11493	Pistol R., Pistol R. Loop Rd.	South Coast	81	Fair	NT
All samples	11493	Pistol R., Pistol R. Loop Rd.	South Coast	72	Poor	NT
No salty samples	13570	Millicoma R., Rooke Higgins Boat Ramp	South Coast	71	Poor	NT
All samples	13570	Millicoma R., Rooke Higgins Boat Ramp	South Coast	53	Very Poor	NT
No salty samples	13574	South Fk. Coos R., Anson Rogers Br.	South Coast	78	Poor	NT
All samples	13574	South Fk. Coos R., Anson Rogers Br.	South Coast	44	Very Poor	NT

Appendix A: Oregon Water Quality Index Scores by Basin



Ten-year status (condition) and trends for DEQ's ambient network sites, for 2005 - 2014 water years.

Site name	Station	Land use	WY	OWQI	Condition	Trend ¹	Magnitude ²
COLUMBIA BASIN							
Columbia R at Marker 47 (us Willamette)	10616	Mixed	2005-14	86	Good	NT	-2
DESCHUTES BASIN							
Crooked R at Lone Pine Rd	10517	Range	2005-14	71	Poor	Inc	2
Deschutes R at Lower Bridge	10508	Range	2005-14	85	Good	NT	
Little Deschutes R at HWY 42	10696	Forest	2005-14	91	Excellent	NT	
Crooked R at Conant Basin Rd	11477	Range	2005-14	79	Poor	NT	
Metolius R at Bridge 99 (Camp Sherman)	10690	Forest	2005-14	90	Excellent	NT	
Deschutes R at Mirror Pond (Bend)	10511	Mixed	2005-14	91	Excellent	NT	
Deschutes R at Harper Bridge (Sunriver)	10686	Forest	2005-14	92	Excellent	NT	
Deschutes R at Pringle Falls	10688	Forest	2005-14	92	Excellent	NT	
Deschutes R at Deschutes R Park (Mouth)	10411	Range	2005-14	85	Good	Dec	-2
Deschutes R at Warm Springs	10506	Range	2005-14	86	Good	Dec	-4
Trout Creek ds of Mud Springs Creek	36776*	Range	2011-14	50	Very Poor	NA	
GOOSE AND SUMMER LAKES							
Twentymile Creek at HWY 140 (east of Adel, OR)	12266*	Range	2013-14	14	Very Poor	NA	
Chewaucan River 2.4 miles u/s of Paisley, OR	33930*	Range	2013-14	81	Fair	NA	
Deep Creek west of Adel, OR	12267*	Range	2013-14	88	Good	NA	
Honey Creek at Plush, OR	10741*	Range	2013-14	53	Very Poor	NA	
Thomas Creek at Stock Drive Rd	36778*	Agriculture	2011-14	65	Poor	NA	
GRAND RONDE BASIN							
Minam R at Minam	11457	Forest	2005-14	94	Excellent	Inc	2
Grande Ronde R at HWY 82 (Elgin)	10719	Mixed	2005-14	82	Fair	NT	
Grande Ronde R at Peach Ln (Island City)	11521	Agriculture	2005-14	90	Excellent	NT	
Wallowa R at Minam	10410	Forest	2005-14	84	Fair	NT	
Grande Ronde R at Hilgard St Park	10720	Forest	2005-14	91	Excellent	Dec	-2

Notes: 1 - "Inc" = significantly increasing trend, "Dec" = significantly decreasing trend, "NT" = trend neither increasing nor decreasing, "NA" = Insufficient data for trending.

2 - Amount of significant change in OWQI scores over the current 10-year period.

Ten-year status (condition) and trends for DEQ's ambient network sites, for 2005 - 2014 water years.

Site name	Station	Land use	WY	OWQI	Condition	Trend ¹	Magnitude ²
HOOD BASIN							
Hood River at Hood River	12012	Mixed	2005-14	77	Poor	NT	
Neal Creek at Fir Mountain Rd	33603*	Mixed	2011-14	85	Good	NA	
JOHN DAY BASIN							
Rock Creek near mouth	36787*	Range	2011-14	85	Good	NA	
John Day R at Service Creek	11478	Range	2005-14	86	Good	Inc	3
S Fk John Day R at Dayville	11020	Range	2005-14	87	Good	Inc	2
N Fk John Day R at Kimberly	11017	Range	2005-14	89	Good	Inc	1
John Day R at HWY 206	11386	Range	2005-14	78	Poor	NT	
John Day R us Dayville	11479	Range	2005-14	79	Poor	NT	
KLAMATH BASIN							
Klamath R ds Big Bend Powerhouse	10764	Forest	2005-14	62	Poor	Inc	15
Klamath R at Keno	10765	Forest	2005-14	33	Very Poor	Inc	11
Lost R at HWY 39 (us Merrill)	10759	Agriculture	2005-14	30	Very Poor	Inc	5
Link R at Mouth (Lake Ewauna)	10768	Mixed	2005-14	42	Very Poor	NT	
Sprague River at Sprague River Rd	21535*	Range	2011-14	85	Good	NA	
Klamath Strait at USBR Pump Station F	10763	Agriculture	2005-14	20	Very Poor	NT	
Williamson R at Williamson R Store	10770	Mixed	2005-14	89	Good	NT	
MALHEUR BASIN							
Malheur River at HWY 20 (Drewsey)	11047*	Range	2012-14	34	Very Poor	NA	
Malheur R at Little Valley	11480	Range	2005-14	44	Very Poor	Inc	1
Bully Creek at HWY 20 (Vale)	11043	Agriculture	2005-14	28	Very Poor	Inc	<1
Malheur R at HWY 30 (Mouth)	10407	Agriculture	2005-14	22	Very Poor	NT	
Willow Creek at RR Xing east of Vale	10728	Range	2005-14	25	Very Poor	NT	
Willow Creek north of Jamieson, OR	33266*	Range	2011-14	30	Very Poor	NA	

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Ten-year status (condition) and trends for DEQ’s ambient network sites, for 2005 - 2014 water years.

Site name	Station	Land use	WY	OWQI	Condition	Trend ¹	Magnitude ²
MALHEUR Lake							
Whitehorse Creek at Whitehorse Ranch Rd	12264*	Range	2013-14	58	Very Poor	NA	
Silvies River at West Loop Road	33929*	Range	2013-14	84	Fair	NA	
Donner & Blitzen River at Page Springs Campground	12265*	Range	2013-14	94	Excellent	NA	
SF Blitzen R at Blitzen Crossing	13014*	Range	2013-14	93	Excellent	NA	
MID COAST BASIN							
Salmon R at Otis	11241	Forest	2005-14	88	Good	Inc	3
North Beaver at Ona Grange	33644	Forest	2006-14	86	Good	NT	
Yaquina R ds Chitwood	11476	Forest	2005-14	82	Fair	NT	
Siletz R 5 miles ds Siletz	10391	Forest	2005-14	90	Excellent	NT	
Aalsea R at Thissell Rd	11263	Forest	2005-14	90	Excellent	NT	
Siuslaw R at Tide Wayside	33642	Forest	2006-14	92	Excellent	NT	
Middle Columbia							
Fifteen mile creek at Petersburg, OR	28333*	Range	2011-14	77	Poor	NA	
NORTH COAST BASIN							
Tillamook R at Bewley Creek Rd	13440	Mixed	2005-14	66	Poor	Inc	4
Nehalem R at Foley Rd	11856	Forest	2005-14	85	Good	Inc	2
Nestucca R at Cloverdale	10523	Forest	2005-14	83	Fair	NT	
Trask R at HWY 101	13433	Mixed	2005-14	83	Fair	Inc	2
Miami R at Moss Creek Rd	13411	Forest	2005-14	84	Fair	NT	
Skipanon R at HWY 101	10812	Mixed	2005-14	35	Very Poor	Inc	1
Kilchis R at Alderbrook Rd	13417	Forest	2005-14	87	Good	NT	
Wilson R at HWY 101	13421	Mixed	2005-14	84	Fair	NT	
Clatskanie R at HWY 30 (Clatskanie)	11434	Forest	2005-14	83	Fair	NT	

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Ten-year status (condition) and trends for DEQ's ambient network sites, for 2005 - 2014 water years.

Site name	Station	Land use	WY	OWQI	Condition	Trend ¹	Magnitude ²
NORTH COAST BASIN (Cont.)							
Youngs R at Youngs R Loop Rd	12187	Forest	2005-14	87	Good	NT	
Wilson R at HWY 6	13424	Forest	2005-14	86	Good	NT	
Klaskanine R at Youngs R Loop Rd (Olney)	11904	Forest	2005-14	63	Poor	NT	
Lewis & Clark R at Logan rd	10817	Forest	2005-14	85	Good	NT	
Nehalem R at Birenkfeld	34019	Forest	2006-14	86	Good	NT	
Necanicum R at Forest Lake RV Camp	10521	Forest	2005-14	89	Good	NT	
OWYHEE BASIN							
Owyhee R at Rome (Hwy 95)	10730*	Range	2013-14	81	Fair	NA	
Jordan Creek at Arock Rd	11050*	Range	2011-14	75	Poor	NA	
Jordan Creek us of Jordan Valley	12261*	Range	2013-14	82	Fair	NA	
Crooked Creek at Kiger Rd	36783*	Range	2011-14	81	Fair	NA	
Owyhee R at HWY 201	10729	Agriculture	2005-14	40	Very Poor	NT	
POWDER BASIN							
Powder R at HWY 7 (Baker City)	11490	Range	2005-14	86	Good	Inc	4
Burnt R ds Huntington	11494	Range	2005-14	70	Poor	NT	
Powder R at HWY 86	10724	Range	2005-14	45	Very Poor	NT	
ROGUE BASIN							
Applegate River at Murphy, OR	36805*	Forest	2012-14	90	Excellent	NA	
Little Butte Creek at Agate Rd (White City)	10602	Agriculture	2005-14	71	Poor	Inc	4
Rogue R at Rock Point Bridge (Gold Hill)	10421	Forest	2005-14	85	Good	Inc	2
Bear Creek at Kirtland Rd	11051	Mixed	2005-14	63	Poor	NT	
Rogue R at Dodge Park	10423	Mixed	2005-14	93	Excellent	Inc	2
Applegate R at HWY 199	10428	Forest	2005-14	88	Good	NT	
Rogue R at Robertson Bridge (Merlin)	10418	Forest	2005-14	87	Good	NT	
Rogue R at Lobster Point Bridge	10414	Forest	2005-14	88	Good	NT	
Illinois R ds Kerby	11482	Forest	2005-14	88	Good	NT	

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Ten-year status (condition) and trends for DEQ's ambient network sites, for 2005 - 2014 water years.

Site name	Station	Land use	WY	OWQI	Condition	Trend ¹	Magnitude ²
SANDY BASIN							
Sandy R at Troutdale Bridge	10674	Mixed	2005-14	85	Good	NT	
SOUTH COAST BASIN							
Pistol R at Pistol R Loop Rd	11493	Forest	2005-14	81	Fair	NT	
Floras Creek at HWY 101	12590	Forest	2005-14	86	Good	NT	
Coquille R at Sturdivant Park Dock	10596	Forest	2005-14	84	Fair	NT	
Middle Fk Coquille R at rivermile 1.25 Hwy 42	33922	Forest	2005-14	85	Good	NT	
Millicoma R at Rooke Higgins Boat Ramp	13570	Forest	2005-14	71	Poor	NT	
N Fk Coquille R at HWY 42	10393	Forest	2005-14	87	Good	NT	
Elk R at HWY 101	11905	Forest	2005-14	93	Excellent	NT	
Winchuck R us HWY 101	10537	Forest	2005-14	94	Excellent	NT	
Sixes R at HWY 101	10533	Forest	2005-14	90	Excellent	NT	
S Fk Coquille R at Broadbent	11486	Forest	2005-14	84	Fair	NT	
Chetco R at USGS Gage	11483	Forest	2005-14	90	Excellent	NT	
S Fk Coos R at Anson Rogers Bridge	13574	Forest	2005-14	78	Poor	NT	
UMATILLA BASIN							
Willow Creek at Rhea Rd	36784*	Agriculture	2011-14	71	Poor	NA	
Umatilla R at Yoakum	10404	Agriculture	2005-14	80	Fair	Inc	9
McKay Creek at Kirk St (Pendleton)	12005	Mixed	2005-14	81	Fair	Inc	7
Umatilla R at HWY 11 (Pendleton)	10406	Agriculture	2005-14	77	Poor	NT	
Umatilla R at Westland Rd (Hermiston)	11489	Mixed	2005-14	54	Very Poor	NT	
Pine Creek at Hudson Bay Substation Rd	36786*	Agriculture	2011-14	46	Very Poor	NA	
Rhea Creek at Bergevin Rd. or Morter Rd	36785*	Agriculture	2011-14	55	Very Poor	NA	

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Ten-year status (condition) and trends for DEQ's ambient network sites, for 2005 - 2014 water years.

Site name	Station	Land use	WY	OWQI	Condition	Trend ¹	Magnitude ²
UMPQUA BASIN							
Calapooya Creek at Umpqua	10996	Forest	2005-14	78	Poor	Inc	3
S Umpqua R at Melrose Rd	10442	Mixed	2005-14	65	Poor	Inc	3
Umpqua R at Elkton	10437	Forest	2005-14	84	Fair	Inc	2
S Umpqua R at Stewart Park Rd (Roseburg)	11522	Mixed	2005-14	75	Poor	NT	
S Umpqua R at HWY 42 (Winston)	10443	Mixed	2005-14	73	Poor	NT	
N Umpqua R at Garden Valley Rd	10451	Mixed	2005-14	87	Good	NT	
Elk Creek at Elkton	10441	Forest	2005-14	81	Fair	NT	
S Umpqua R at Days Creek Cutoff Rd	11484	Forest	2005-14	80	Fair	NT	
Cow Creek at Mouth (Riddle)	10997	Forest	2005-14	82	Fair	NT	
Smith River 4.4 miles ds smith river falls	11491	Forest	2006-14	90	Excellent	NT	
WILLAMETTE BASIN--LOWER							
Columbia Slough at Landfill Rd	11201	Urban	2005-14	48	Very Poor	NT	
Fanno Creek at Bonita Rd (Tigard)	10469	Urban	2005-14	58	Very Poor	Inc	4
Beaverton Creek at 216th (Orenco)	10480	Urban	2005-14	49	Very Poor	Inc	3
Willamette R at SP&S RR Bridge (Portland)	10332	Urban	2005-14	83	Fair	Inc	2
Willamette R at Hawthorne Bridge	10611	Urban	2005-14	83	Fair	NT	
Johnson Creek at SE 17th Ave. (Portland)	11321	Urban	2005-14	33	Very Poor	Inc	1
Tualatin R at Rood Bridge	10461	Mixed	2005-14	81	Fair	NT	
Clackamas R at Memaloose Rd	14008	Forest	2005-14	94	Excellent	NT	
Clackamas R at Mclver Park (Upper Boat Ramp)	13070	Mixed	2005-14	93	Excellent	NT	
Tualatin R at Boones Ferry Rd	10456	Urban	2005-14	39	Very Poor	NT	
Tualatin R at Elsner Rd	10458	Mixed	2005-14	48	Very Poor	NT	
Tualatin R at HWY 210 (Scholls)	10459	Agriculture	2005-14	43	Very Poor	NT	
Clackamas R at High Rocks	11233	Urban	2005-14	92	Excellent	NT	
Swan Island Channel (Willamette R)	10801	Urban	2005-14	73	Poor	NT	

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Ten-year status (condition) and trends for DEQ’s ambient network sites, for 2005 - 2014 water years.

Site name	Station	Land use	WY	OWQI	Condition	Trend ¹	Magnitude ²
WILLAMETTE BASIN--MIDDLE							
Luckiamute River at Buena Vista Rd	36875*	Agriculture	2011-14	88	Good	NA	
Pudding R at HWY 99E (Aurora)	10917	Agriculture	2005-14	66	Poor	Inc	6
Willamette R at Salem	10555	Urban	2005-14	90	Excellent	Inc	2
Willamette R at Canby Ferry	10339	Mixed	2005-14	88	Good	Inc	2
Mollala R at Canby	10637	Agriculture	2005-14	88	Good	Inc	2
Pudding R at HWY 211 (Woodburn)	10640	Agriculture	2005-14	64	Poor	NT	
Willamette R at Wheatland Ferry	10344	Agriculture	2005-14	86	Good	NT	
N Yamhill R at Poverty Bend Rd	10929	Agriculture	2005-14	80	Fair	NT	
S Yamhill R at HWY 99W	10948	Agriculture	2005-14	85	Good	NT	
S Santiam R at HWY 226 (Crabtree)	10366	Agriculture	2005-14	94	Excellent	NT	
N Santiam R at Coopers Ridge Rd	12559	Forest	2005-14	94	Excellent	NT	
Yamhill R at Dayton	10363	Agriculture	2005-14	79	Poor	NT	
N Santiam R at Gates School Rd	12553	Forest	2005-14	94	Excellent	NT	
N Santiam R at Greens Bridge	10792	Agriculture	2005-14	94	Excellent	NT	
WILLAMETTE BASIN--UPPER							
Amazon Creek at High Pass Rd	36788*	Agriculture	2011-14	38	Very Poor	NA	
Mohawk R. at Hill Rd.	10663*	Mixed	2012-14	91	Excellent	NA	
Calapooia Creek at HWY 99E	11182*	Agriculture	2011-14	87	Good	NA	
Calapooia R at Queens Rd (Albany)	11180	Agriculture	2005-14	82	Fair	Inc	4
McKenzie R at Coburg Rd	10376	Mixed	2005-14	92	Excellent	Inc	4

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Ten-year status (condition) and trends for DEQ's ambient network sites, for 2005 - 2014 water years.

Site name	Station	Land use	WY	OWQI	Condition	Trend ¹	Magnitude ²
WILLAMETTE BASIN--UPPER (Cont.)							
Long Tom R at Stow Pit Rd (Monroe)	11140	Agriculture	2005-14	81	Fair	Inc	3
Willamette R at Albany	10350	Agriculture	2005-14	89	Good	Inc	2
Willamette R at Corvallis	10352	Agriculture	2005-14	90	Excellent	Inc	2
Mary's R at HWY 99W (Corvallis)	10373	Agriculture	2005-14	86	Good	Inc	2
Willamette R at HWY 99E (Harrisburg)	10355	Agriculture	2005-14	92	Excellent	Inc	2
Muddy creek south of Corvallis at Airport Ave	36790*	Agriculture	2011-14	79	Poor	NA	
McKenzie R at McKenzie Bridge	12552	Forest	2005-14	93	Excellent	NT	
Willamette R at HWY 126 (Springfield)	10359	Urban	2005-14	92	Excellent	NT	
McKenzie R at Hendricks Bridge	10662	Forest	2005-14	93	Excellent	NT	
Coast Fk Willamette R at Mt. Pisgah Park	11275	Mixed	2005-14	92	Excellent	NT	
Middle Fk Willamette R at Jasper Bridge	10386	Mixed	2005-14	94	Excellent	Dec	-1

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2 - Amount of significant change in OWQI scores over the current 10-year period.

Appendix B: Comparing 2013 to 2014 Trends Changes



Comparing 2013 and 2014

The changes in percent of sites with increasing and decreasing water quality trends between the 2013 and 2014 reports shown in Figure 2 are particularly interesting. Overall, 37 out of the 131 trendable sites had condition trend changes from decreasing to no trend, or from no trend to increasing trend between the 2013 and 2014 OWQI reports. Although it is beyond the scope of this brief summary report to fully investigate the reasons for changes in these 37 sites, we can offer some general observations.

- The parameters most responsible for this were nitrogen and phosphorus nutrients, biochemical oxygen demand, pH and total solids. Nitrogen sub scores trends improved for 70 percent of the sites with improved trending status.
- Agricultural, range and forest land uses had the largest proportion of sites that improved trend status. Almost half (48 percent) of all agricultural sites assessed had an improved changed trend status.
- The John Day, Umatilla, Grand Ronde and North Coast basins had fairly high proportion of improved trend status sites.
- Nearly half of the ‘good’ condition sites in the 2013 report had an improved change trend status in the 2014 report.

Table 1B. Thirty-seven sites with improving 10-year trend status between 2013 and 2014 in order of most improving sub indicies to least. NT= No trend, Inc=Increasing trend, Dec = Decreasing trend

Basin	Trend change from 2013 → 2014	Station	Site	Land Use	Parameters responsible for 2013 → 2014 change									
					Nitrogen	Phosphorus	BOD	pH	Total Solids	Dissolved Oxygen	Temperature	Bacteria		
North Coast	Dec → NT	11904	Klaskanine R., Youngs R. Loop Rd. (Olney)	Forest										
North Coast	Dec → NT	10521	Necanicum R., Forest Lake RV Camp	Forest										
North Coast	Dec → NT	12187	Youngs R., Youngs R. Loop Rd.	Forest										
North Coast	NT → Inc	11856	Nehalem R., Foley Rd.	Forest										
North Coast	NT → Inc	13440	Tillamook R., Bewley Ck. Rd.	Mixed										
North Coast	NT → Inc	13433	Trask R., HWY 101	Mixed										
Mid Coast	NT → Inc	11241	Salmon R., Otis	Forest										
Willamette - Lower	Dec → NT	10459	Tualatin R., HWY 210 (Scholls)	Agriculture										
Willamette - Middle	Dec → NT	10792	N. Santiam R., Greens Br.	Agriculture										
Willamette - Middle	NT → Inc	10917	Pudding R., HWY 99E (Aurora)	Agriculture										
Willamette - Middle	NT → Inc	10637	Mollala R., Canby	Agriculture										
Willamette - Middle	NT → Inc	10555	Willamette R., Salem	Urban										
Willamette - Upper	NT → Inc	10373	Mary's R., HWY 99W (Corvallis)	Agriculture										
Willamette - Upper	NT → Inc	11140	Long Tom R., Stow Pit Rd. (Monroe)	Agriculture										
Willamette - Upper	NT → Inc	10350	Willamette R., Albany	Agriculture										
Willamette - Upper	NT → Inc	10355	Willamette R., HWY 99E (Harrisburg)	Agriculture										
Willamette - Upper	NT → Inc	10352	Willamette R. Corvallis	Agriculture										
Willamette - Upper	Dec → NT	10662	McKenzie R. Hendricks Br.	Forest										
Willamette - Upper	NT → Inc	11180	Calapooia R., Queens Rd. (Albany)	Agriculture										
Umpqua	NT → Inc	10437	Umpqua R., Elkton	Forest										
Rogue	NT → Inc	10602	Little Butte Ck., Agate Rd. (White City)	Agriculture										
Rogue	NT → Inc	10423	Rogue R., Dodge Pk.	Mixed										
Rogue	NT → Inc	10421	Rogue R., Rock Point Br. (Gold Hill)	Forest										
Deschutes	Dec → NT	10686	Deschutes R., Harper Br. (Sunriver)	Forest										
Deschutes	Dec → NT	10688	Deschutes R., Pringle Falls	Forest										
John Day	NT → Inc	11017	N. Fk. John Day R., Kimberly	Range										
John Day	NT → Inc	11478	John Day R., Service Ck.	Range										
John Day	Dec → NT	11479	John Day R. u/s Dayville	Range										
John Day	NT → Inc	11020	S. Fk. John Day R., Dayville	Range										
Klamath	Dec → NT	10770	Williamson R., Williamson R. Store	Mixed										
Klamath	NT → Inc	10765	Klamath R., Keno	Forest										
Umatilla	NT → Inc	10404	Umatilla R., Yoakum	Agriculture										
Umatilla	NT → Inc	12005	McKay Ck., Kirk St. (Pendleton)	Mixed										
Grande Ronde	NT → Inc	11457	Minam R., Minam	Forest										
Grande Ronde	Dec → NT	10410	Wallowa R. @ Minam	Forest										
Powder	NT → Inc	11490	Powder R. @ HWY 7 (Baker City)	Range										

Table 2B. Land use of sites with 10-year trend status between 2013 and 2014.

Land use	Improved trend status 2013-2014	Total sites	Percent of sites
Agriculture	12	25	48
Range	5	15	33
Forest	13	54	24
Mixed	6	26	23
Urban	1	11	9
Grand Total	37	131	28

Table 3B. OWQI sub index parameters responsible for 10-year trend status improvement between 2013 and 2014.

Parameter	Number of sites	Percent of improved sites
Nitrogen	26	70
Phosphorus	22	59
BOD	20	54
pH	16	43
DO	14	38
Temp	11	30
Bacteria	6	16
Total Solids	15	41

Table 4B. Sites with improved 10-year trend status between 2013 and 2014 by major basin.

Basin	Improved trend status 2013-2014	Total sites	Percent
Columbia	1	1	100
John Day	4	5	80
Umatilla	2	4	50
Grande Ronde	2	5	40
North Coast	6	15	40
Rogue	3	8	38
Klamath	2	6	33
Powder	1	3	33
Willamette	12	39	31
- Lower	1	14	7
-Middle	4	13	31
-Upper	7	12	58
Deschutes	2	10	20
Mid Coast	1	6	17
Umpqua	1	10	10
Hood	0	1	0
Malheur	0	4	0
Owyhee	0	1	0
Sandy	0	1	0
South Coast	0	12	0
Grand Total	37	131	28

Table 5B. The 2013 OWQI condition for sites with improved 10-year trend status between 2013 and 2014.

OWQI Condition category 2013	Improving	Total	Percent improved
Excellent	9	33	27
Good	15	32	47
Fair	5	24	21
Poor	6	20	30
Very Poor	2	22	14
Grand Total	37	131	28

References

- Aroner, E.R., 2012.** WQHYDRO-Water Quality/Hydrology/Graphics/Analysis System User's Manual. WQHYDRO consulting, Portland, Oregon. www.wqhydro.com
- Cude, Curtis G., 2002.** Oregon Water Quality Index: A tool for evaluating water quality management effectiveness. Journal of the American Water Resources Association (JAWRA) 37 (1): 125-137.
- Cude, Curtis G., 2005.** Accommodating Change of Bacterial Indicators in Long Term Water Quality Datasets. Journal of the American Water Resources Association (JAWRA) 41(1): 47-54.
- Oregon Department of Forestry, 2010.** Oregon's Forest Atlas 2010 online edition. Oregon generalized land cover map. Accessed March 14, 2015. http://www.oregon.gov/odf/resource_planning/forestatlas/oregon_land_use.jpg.
- Oregon Department of Environmental Quality, 2014.** [Methodology for Oregon's 2012 Water Quality Report and List of Water Quality Limited Waters](http://www.oregon.gov/deq/WQ/Pages/Assessment/2012report.aspx) (October 2014), Accessed March 19, 2015. <http://www.oregon.gov/deq/WQ/Pages/Assessment/2012report.aspx>.
- Oregon Department of State Lands, 2012.** Oregon Wetland Monitoring and Assessment Strategy. Oregon Department of State Lands, Wetlands and Waterways Conservation Division. Salem Oregon. http://www.oregon.gov/dsl/WETLAND/docs/oregon_monitoring_assessment_strategy.pdf.
- U.S. Department of Agriculture, 2007.** Economic Research Service, Major Uses of Land in the United States, 2007. web page. Updated Dec. 23, 2014. Accessed March 16, 2015. <http://www.ers.usda.gov/data-products/major-land-uses/maps-and-state-rankings-of-major-land-uses.aspx>.
- U.S. Environmental Protection Agency (USEPA), 2002.** Washington, D.C. "[National Water Quality Inventory: Report to Congress; 2002 Reporting Cycle](#),". Document No. EPA-841-R-07-001.