

Background

Data collected through the Siuslaw Volunteer Water Quality Monitoring Program (VWQMP) is entered into the SWC Water Quality database and sent to the Oregon DEQ Volunteer Monitoring Coordinator for storage in a statewide database. 2014 Monthly data is uploaded to the SWC Water Quality Geodatabase and posted to the SWC website as scatterplots, with previous data represented in line and bar graphs. Field data sheets for each water quality monitoring site are archived at the SWC. Please refer to the attached scatterplots for the 2014 grab data and line graphs for historic grab data and 2014 continuous temperature data.

Table 1. Site descriptions and latitude, longitude coordinates for the sixteen monitoring sites for the Siuslaw Watershed Volunteer Water Quality Monitoring Program

Site ID #	Site Name/Location	Coordinates
FB-2	Florence Boat Dock, Old Town Florence, RM 5	43° 58.051'N, 124° 06.077'W
SS-3	South Slough, below tide gate, RM 2	43° 57.073'N, 124° 03.598'W
NF-M	North Fork Siuslaw River, Minerva	44°.058332'N, 123°.979993'W
MD-6	Mapleton Public Dock, RM 20	44° 01.818'N, 123° 51.450'W
KC-7	Karnowsky Creek, County Bridge above confluence with Siuslaw River	44° 0.2034'N, 123° 59.7534'W
LO-10	North Fork of Upper Siuslaw at Territorial Road bridge, Lorane, RM 4.25	43° 50.1132'N, 123° 14.3688'W
CH-11	Chickahominy Creek, Walton, RM 4	44° 2.7834'N, 123° 34.5708'W
TL-12	Lake Creek above Triangle Lake, 4 RM above Triangle Lake	44° 11.7391'N, 123° 31.0612'W
DW-13	Deadwood Creek, Hwy 36 bridge above confluence with Lake Creek	44° 5.7036' N, 123° 45.5616'W
BT-14	Below Triangle Lake on Lake Creek below confluence with Fish Creek, RM 17	44° 8.7646' N, 123° 34.9032'W
MU-15	Middle/Upper Siuslaw Mainstem above Whitaker	43.98494 N, 123.65930 W
Continuous Temperature Sites		
SIT	Lake Creek above Indian Creek	44.08369, -123.784
SBT	Siuslaw River above Barber Creek	44.0539, -123.7218
SDT	Siuslaw Falls above Doe Creek	43.83173, -123.3716
LFT	Lake Creek above Fish Creek	44.14717, -123.5822
LAL	Lake Creek below Hult Pond	44.237, -123.499

Results and Analysis

Data are collected and processed under Oregon DEQ Volunteer Monitoring Quality Assurance Project Plan. Outliers have not been removed from these data. In addition to the monthly postings on the website, the VWQMP data is presented annually to the SWC Tech Team and the communities with sites exhibiting frequent exceedances or not meeting the standards. This 2014 data will be presented to the SWC Tech Team in 2015. Further monitoring and restoration efforts have been implemented as a result of the long-term SWC VWQMP, those include a DEQ 319 grant which funded multi-parameter continuous data loggers and riparian restoration work with landowners in Lorane, North Fork Siuslaw, and the Lower Siuslaw (includes South Slough), the targeting of the ongoing Siuslaw Riparian Restoration Project towards areas with consistent WQ issues, the newly completed Hawley Creek Restoration project in Lorane, and presentations at outreach meetings in Lorane.

Dissolved Oxygen (DO)

For salmonids, 11mg/L has been identified by DEQ as a minimum standard for healthy spawning and rearing (October-June) and 8mg/L is the minimum standard for any water body water bodies providing cold-water aquatic life. These standards will be used as the basis of this analysis.

Generally the 2014 DO data followed past years' data patterns, with various weather events providing a few exceptions on some sites (dry early spring, wet early summer, first flush). As might be expected, tributary and upperwatershed sites generally had higher DO levels than lower in the system.

Estuary Sites:

FB-2: DO levels fell below the coldwater habitat standard during June-October.

SS-3: Between June and October, DO levels fell below the 8 mg/L minimum requirement for coldwater habitat. DO results at SS-3 have been consistently low in this estuarine site on the lower Siuslaw River.

MD-6: This site fell below the DEQ cold water habitat minimum between August and September, which is consistent with past year's data.

KC-7: This site was below the 8 mg/L cold water habitat standard from July through October. DO at this site is consistently low during summer months over the past several years of sampling.

Generally, the 2014 data from the estuarine sites followed previous years' patterns. Further examination of the interaction of salinity, tides, temperature, and DO is needed in the estuarine sites. Up to fifteen river miles separates the estuarine sites as do their salinity levels. It is known that as the salinity of water increases, its ability to dissolve oxygen decreases. In 2014, the two lowest tidal sites at SS-3 and FB-2 had higher salinity levels than KC-7 and MD-6 and

typically had lower DO levels in summer, although warmer temperatures could have also played a factor. There is still a need to understand the management of the tidegate at the SS-3 site as associated with DO and other parameters. Due to issues of private land and disputes around the management of the tidegate, it may be awhile before we are able to fully understand the management and impacts on WQ. The KC-7 site may continue to be affected by channel migration from the over decade old restoration project and upstream beaver activity. Sites should be continued to be sampled for trending.

Freshwater Sites:

NF-M: This site fell below the spawning and rearing habitat standards for all months, but never dropped below DEQ standards for coldwater aquatic life. There was minimal seasonal fluctuation.

LO-10: This site did not meet the minimum 11mg/L spawning and rearing standard in March and fell below the 8 mg/L standard from July to September, as was typical in past year's data. There were gaps in sampling from April to May.

CH-11: Spawning months at Chickahominy Creek saw DO levels above DEQ minimum requirements for salmon spawning and rearing habitat. All summer months met the DEQ cold water minimum.

TL-12: From July to October, the site did not meet the DEQ cold water minimum. All months sampled were below the spawning and rearing requirement.

BT- 14: During spawning months, DO was below the DEQ minimum in November, December, March, April and May and did not meet the cold water standard in July.

DW-13: This site consistently exhibits relatively high levels of DO compared to other VWQMP sites in the basin. Standards were met for both the cold water and spawning and rearing habitat minimums.

MU-15: DO was measured below salmonid spawning and rearing standards in October, early in the Chinook and coho spawning seasons. The site was below coldwater habitat standards in July and August.

In the freshwater sites as well, the 2014 data followed the previous years' patterns. NF-M and MU-15 are newer sites that fell below the spawning and cold water standards. TL-12 is a relatively new site and has had some missed sampling dates due to volunteer issues. Additional years of data will be necessary to characterize the sites. CH-11 and DW-13 appear to continue to respond well to multiple restoration efforts upstream of the site. Although CH-11 will need further monitoring to determine if the mid-summer drops continue. LO-10 and BT-14 continue to demonstrate low DO. Further sampling and analysis to determine the role of Triangle Lake on BT-14 is needed. LO-10 is a site targeted for more in-depth monitoring through the DEQ 319

grant that the SWC has secured. In January 2015, LO-10 was discontinued and a SWC volunteer will sample a new site (named LO-16) downstream of the confluence of the South Fork and North Fork Siuslaw where SWC deployed a temperature and conductivity logger in summer 2014. Grab and continuous sampling efforts will complement each other and allow for both broad and fine scale comparisons throughout the year.

Temperature (grab sample sites)

Temperature standards created by DEQ are based on a seven day average. Comparing grab sample data to seven day standards provides guidance as to where continuous monitoring is needed but is not conclusive about if significant thermal habitat degradation exists for coldwater species.

Generally the temperatures followed previous years' patterns; although, the cool and wet June may have influenced several sites in 2014. Sites BT-14, DW-13, KC-7, LO-10, MD-6, MU-15, NF-M, SS-3, TL-12 and CH-11 all had readings that exceeded the DEQ coldwater habitat maxima of 15.9 degrees Celsius. All sites listed previously except CH-11 exceeded winter spawning maxima of 12.8 degrees Celsius for one month or more from October 15th to May 15th. This is a primarily a concern at sites higher in the watershed, specifically MU-15, LO-10, and BT-14. Continuous temperature data is needed to analyze the temporal extent of these exceedances and will be addressed in the paragraphs below.

Temperature (continuous sites)

During the summer from July to October, SWC staff deployed five HOBO continuous temperature loggers throughout the watershed at three locations along upper, middle and lower Lake Creek and two sites along the upper and lower reaches of the Siuslaw River. All five loggers were audited monthly and the logger temperatures were Grade A quality within 0.5 degrees Celsius of the NIST thermometer. As expected, the uppermost site at Lake Creek (LAL) above Hult Pond/Triangle Lake recorded cooler 7-day average maximum temperatures (0.8 +/- 0.5 degrees Celsius) than the lowermost site above Indian Creek (SIT; sites were 23 river miles apart), although both sites recorded 90 days above the DEQ 7-day maximum of 15.9 degrees Celsius and 85 to 86 days above the 17.8 degrees Celsius standard for rearing habitat (please see attached graphs).

Temperatures were more variable at the SIT site with higher maximums and lower minimums (average 4.6 degree difference) compared to the LAL site (average 2.6 degree difference). The middle logger site upstream of Fish Creek (LFT; site is 10 river miles downstream of LAL and 13 river miles upstream of SIT) was deployed late, in August, and only had 40 days above the 15.9 and 17.8 degree maximums. The 7-day average maximum temperatures at LFT from late August to early October were slightly cooler than the SIT and LAL sites. When the loggers were retrieved in early October, the temperatures at all three sites were still 5 degrees Celsius above the 12.8 degree spawning maximum. The same day the loggers were retrieved, David Waltz from DEQ measured flows at the LAL and SIT sites on Lake Creek. Discharge measurements

were 4.27 cfs at the LAL site compared to 34.82 cfs at the SIT site. This difference in flow might explain the greater variability in temperature at the SIT site. Since flows were not measured at deployment, we cannot tell how discharge changed over the summer or how it correlated with changes in water temperature at each site.

As expected, 7-day average maximum temperatures at the uppermost site on the Siuslaw River (SDT) above Siuslaw Falls were cooler (4.2 +/- 0.7 degrees Celsius) than the lower site on the Siuslaw River above Barber Creek (SBT; sites were 58 river miles apart). The logger at the SDT site was deployed later in July and had 15 fewer days of data recorded. At the SBT site, the logger recorded 98 days above the DEQ 7-day average maximum temperature of 15.9 degrees Celsius and 91 days above the DEQ maximum rearing temperature of 17.8 degrees Celsius. By comparison, the SDT logger recorded 56 days above DEQ 7-day average maximum and 40 days above the DEQ maximum rearing temperature.

Maximum and minimum temperatures at the SBT site showed wider variability (average 2.7 degree difference) compared to the SDT site (average 1.5 degree difference). When the loggers were retrieved in early to mid-October, the SDT site was 0.6 degrees Celsius above the DEQ spawning temperature, while the SBT site was 3.9 degrees above. David Waltz from DEQ measured flows at the SDT site in August, September and October. Discharge declined from 11.78 cfs in August to 8.16 cfs in September and increased slightly to 8.3 cfs in early October. Water temperatures peaked in August and declined in early September and October. Shorter days, cooler nights and a rain event in September contributed to this cooling even with lower flows.

Overall, the summer of 2014 was one of the warmest on record, so this data provides a good representation of current conditions; however, temperature loggers must be deployed in 2 to 3 consecutive years to determine if there is in fact a trend.

E.coli

Sites FB-2, KC-7 and LO-10 had infrequent exceedances of the DEQ 406 MPN that were correlated with recent rain events. MU-15 did not experience any exceedances, but as a new site, further sampling is necessary to characterize the site. For the remaining sites, further sampling will enable trending. Additionally, further sampling and analysis considering precipitation, flow, and salinity (in estuarine sites) may provide a more complete understanding of bacteria in the Siuslaw.

Turbidity

Turbidity standards are currently being established by DEQ so, for the sake of this analysis results will be compared to a standard of 5 NTUs. This is the level of which most municipalities generally stop taking water.

The upper Siuslaw site in Lorane (LO-10) continues to have very high turbidity levels, between 15-40 NTU. In response to these levels, the SWC and DEQ partnered to secure funds for a continuous temperature and conductivity logger that was placed in the Upper South Fork watershed last summer. Since it was deployed late and the conductivity audits failed, SWC will deploy it again in summer 2015 to capture a full summer's worth of data. The other sites generally have relatively low turbidity readings with spikes after first flush or major rain/flow events.