Umpqua River Basin Toxics Monitoring Summary

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State of Oregon
Department of Environmental Quality

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

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Executive Summary

In 2015, the Oregon Department of Environmental Quality conducted water quality, sediment, and fish tissue sampling of seven rivers and streams in the Umpqua River Basin. This sampling effort builds on previous sampling that DEQ conducted for the Toxics Monitoring Program between 2011 and 2014. The goals of this sampling – and of the Toxics Monitoring Program as a whole – are to gather information on chemicals of concern, identify potential sources, make the information available to the public, and work with internal and external partners to reduce pollutant concentrations.

DEQ staff collected water samples three times in 2015 at 10 locations across the Umpqua River Basin. Sediment sample collection, at 10 locations in 2015, and fish tissue sample collection, at one location in 2014, occurred only once in the basin. The chemicals that can sequester to sediment are more stable in these media than in water and do not require frequent sampling. DEQ analyzed samples for nearly 500 chemicals from nine chemical groups including current-use pesticides, consumer use products, combustion by-products, dioxins and furans, flame retardants, industrial chemicals, legacy pesticides, polychlorinated biphenyls (PCBs), and metals. Across all media, 161 chemicals were detected. Among the most commonly detected chemicals were the polychlorinated dibenzodioxin, OCDD, and the herbicide, sulfometuron-methyl in water samples; PCBs and arsenic in sediment samples; and PCBs and legacy pesticides in fish tissue samples.

Overall, 96% of the compounds included in the analysis of the 2015 samples were detected at levels safe for aquatic life, wildlife, and human health. At the location on Deer Creek, which flows along State Highway 138 through the eastern part of Roseburg, fourteen chemicals in one sediment sample were found at concentrations above sediment screening levels. This included concentrations of total DDT, total PCBs, PCB-118, dieldrin, and ten dioxins and furans. Dieldrin was found at concentrations above the DEQ human health criterion (DEQ 2014) for water at three locations in the basin, including the Umpqua River at Alfred Tyson Park boat ramp. Also found at this location were 12 dioxins and furans, this is 10 more than were found anywhere else in the basin. The potential source of these dioxins is unknown. Concentrations of mercury above the DEQ human health criterion occurred in each tissue sample collected for this study exceeded DEQ human health criterion. None of the detected concentrations in this or previous sampling efforts in the Umpqua River Basin pose an immediate risk to human health and the waters are safe to fish, boat, and otherwise recreate in. Likewise, detected concentrations of contaminants in water samples were less than health based levels solely developed for drinking water (U.S. Environmental Protection Agency Maximum Contaminant Levels or Health Based Screening Levels) (J. Harvey, personal communication, Feb. 2, 2021). Analysis of bacteria concentrations were not included in this study and may impact contact recreation.

Based upon the results of this study, DEQ staff selected four monitoring locations that will become a part of the Toxics Monitoring Program's trend network (Figure 1). Chemical detections, exceedances of applicable criteria, spatial coverage, classification in the 2018/2020 Integrated Report, and the need for background or reference sites were all considered when selecting which monitoring locations to include in the statewide trend network. The Toxics Monitoring Program will sample these locations annually rather than every five years as in previous efforts, which will help DEQ understand the broadest geographical area while maximizing limited lab and staff resources.

Data included in this toxics summary report will be considered in the next Integrated Report, which reports the status of Oregon's waters to EPA and informs other regulatory programs such as the total maxiumum daily load (TMDL), National Pollutant Discharge Elimination System (NPDES) and stormwater permitting programs. In addition, data may be considered as part of the toxics reduction strategy, a cross media program that supports ongoing toxics reduction efforts within DEQ, and to prioritize drinking water source areas for other partnership programs.

Introduction

In 2007, the Oregon Legislature funded the Oregon Department of Environmental Quality to begin the Statewide Water Quality Toxics Monitoring Program. The program identified four main goals:

1. Gather information to characterize the presence and concentration of chemicals of concern in Oregon's waters.
2. Use this information to identify potential sources of these chemicals.
3. Present and make available information gathered for public benefit.
4. Work with DEQ internal groups, community groups, and Oregon citizens to identify opportunities for reducing these pollutants.

To achieve these goals, the DEQ Laboratory and Environmental Assessment Division (LEAD), with input from the Water Quality Program, developed a five-year monitoring plan. The initial phase of this plan followed a rotating basin approach to conduct reconnaissance sampling of the state's waters and was completed in 2013. DEQ LEAD published the water and fish tissue sampling results from this initial phase of sampling available in two separate statewide reports (2015 Statewide Water Quality Toxics Assessment, 2017 Statewide Aquatic Tissue Toxics Assessment). The purpose of this summary is to combine the sampling results from all media types collected in the Umpqua River Basin during the initial phase of Toxics Monitoring Program sampling with the most recent phase, completed in 2015.

Throughout this summary, chemical concentrations are compared to media specific criteria, benchmarks or screening levels. DEQ's water quality standards for human health (Oregon Administrative Rules 340 Division 41) are designed to protect people who use the water as a primary drinking water source and consume fish or shellfish collected from waterbodies. These criteria assume a consumption rate of 175 grams daily or twenty-three 8-ounce meals per month. Additionally, these criteria are intended to ensure that waterbodies support the beneficial use of "fishing" and that fish are safe to consume, rather than how much fish is safe to eat (DEQ 2017). Consequently, DEQ's criteria are more stringent than most other state fish tissue standards and are protective of subsistence consumers. DEQ human health criteria used in this assessment are generally lower than health standards set solely for drinking water consumption by EPA and others (i.e. Maximum Contaminant Levels or Health Based Screening Levels). DEQ's aquatic life criteria apply to waterbodies where the protection of fish and aquatic life is a beneficial use as outlined by the Oregon Administrative Rules (https://go.usa.gov/xyxSj). EPA's aquatic life benchmarks were developed for 635 current use pesticides based on toxicity values supported by scientific studies. Concentrations below EPA's aquatic life benchmarks are not expected to harm aquatic life (EPA 2020), these benchmarks were only used when DEQ does not have established criteria for a particular chemical.

Screening levels for chemicals in sediment estimate the likelihood that a chemical poses a threat to humans or wildlife as a result of eating fish, shellfish, or other aquatic organisms from a particular location (DEQ 2007). Oregon Health Authority (OHA) fish advisory program's screening levels identify concentrations of contaminants in fish that are not expected to harm human health assuming a consumption rate of four 8-ounce meals per month (OHA 2013). Acceptable screening levels for humans and wildlife are concentrations of bioaccumulative chemicals in fish tissue that are too low to cause adverse effects on the organisms that consume fish from the sampling locations (DEQ 2007). If no DEQ criterion or screening level existed, then the lowest regional or national criterion or screening level was used to ensure a conservative report of exceedances across the basin for each media type. Individual criteria, benchmarks and screening levels do not take into consideration the possible synergistic effect of multiple chemicals co-occuring.

The initial monitoring location selection process for the 2011 sampling effort focused on locations that integrate multiple watersheds within the basin. Water samples from the one estuary monitoring location were sampled in conjunction with South Coast Basin sampling in 2013 for logistical reasons. Results from this location were considered part of the 2015 sampling effort for this summary because the analyte list and analytical methods were similar. These results were compared to marine water quality criteria, where available, in Appendix A. For the 2015 sampling effort, most monitoring locations were selected based on land use, proximity to point and non-point source pollution, and input from both local stakeholders and DEQ basin coordinators. Table 1 details the monitoring locations and matrices sampled during both sampling efforts. Figure 1 indicates the location and sampling effort of each monitoring location in the basin. Water samples were collected three times (June, August, and November), sediment and fish tissue samples were collected only once. To accommodate DEQ's sampling partners, tissue sample collection occurred in 2013 and 2014. A short, basin specific summary of the tissue results from the previous sampling efforts are presented at the end of this report. Appendices A-C detail the detection results from both sampling efforts by media type.

Table 1 - Umpqua River Basin monitoring locations. Asterisks indicate locations that were included in the Toxics Monitoring Network.

Station	Site Description	Matrices Sampled in 2011	Matrices Sampled in 2013-15
10442	South Umpqua at Melrose Road	Water	
10444	South Umpqua at Myrtle Creek		Water, Sediment
10451	North Umpqua at Garden Valley Road (Roseburg)	Water	
10996*	Calapooya Creek at Umpqua		Water, Sediment
10997	Cow Creek at mouth	Water, Sediment	
11199	South Umpqua at Tiller		Water, Sediment
11484	South Umpqua at Days Creek Cutoff Road (Canyonville)	Water, Sediment	
12248	Lookingglass Creek at Hwy 42 at Winston, OR		Water, Sediment
25950*	Deer Creek at Fowler Bridge (Roseburg)		Water, Sediment
30163*	South Umpqua River above mouth		Water, Sediment
34140	North Umpqua at Pacific Hwy		Water, Sediment
36309	Cow Creek at Lawson Acres water intake		Water, Sediment
36829	North Umpqua at Hestness Boat Ramp	Sediment	
37399	Umpqua River at Discovery Center Docks		Water, Sediment

37615	Umpqua River at RM 37.7	Tissue	
37818*	Umpqua River at RM 21.4		Tissue
38135	Umpqua River at Alfred Tyson Park boat ramp (Elkton)		Water, Sediment
38137	Cow Creek downstream of Glendale		Water, Sediment

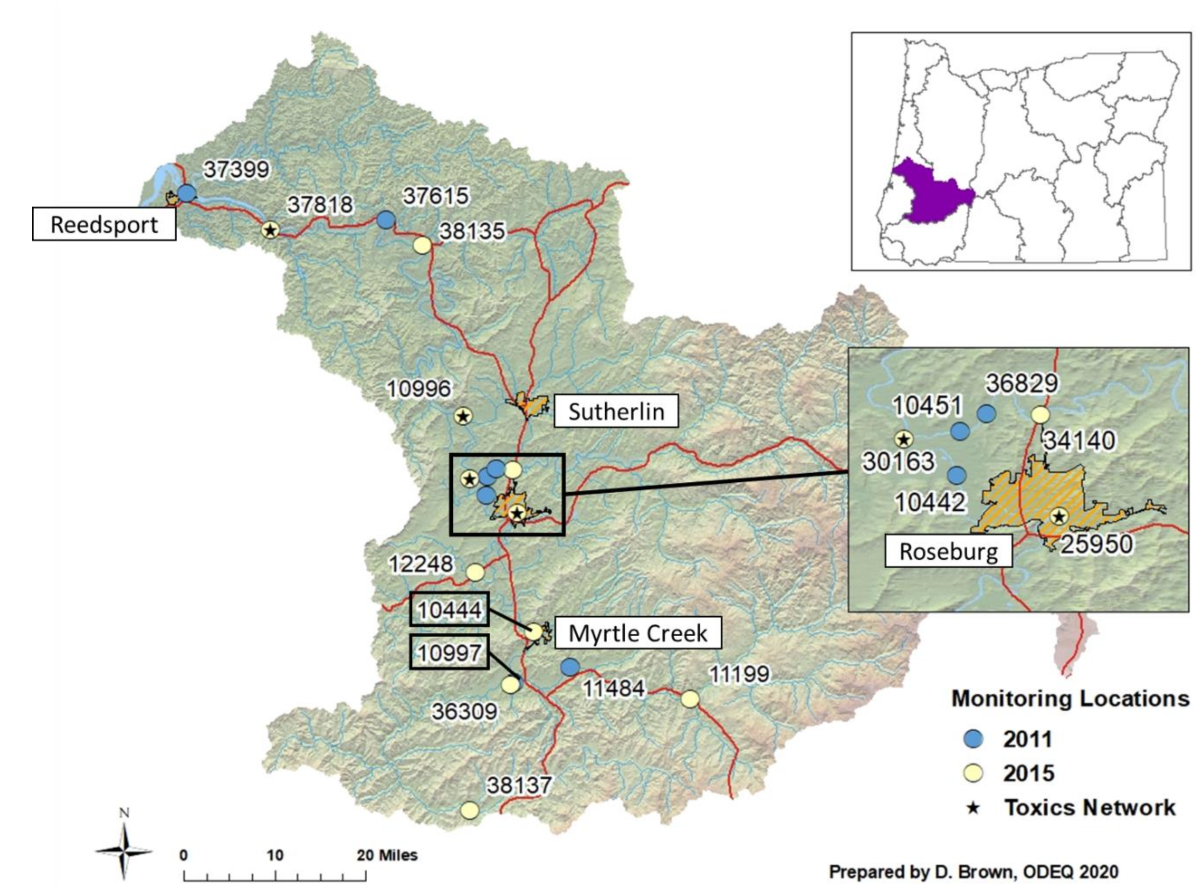

Figure 1 - Map of the study area with monitoring locations by sampling effort. Visit the Water Quality Toxics Monitoring Program webpage for a map of the whole state.

Water sample results

Seasonality

In order to capture seasonal patterns in chemical transport and hydrologic differences, collection of water samples took place three times during each sampling year. These grab samples were collected from all monitoring locations over a week long period each spring, summer and fall/winter. The sampling schedule was chosen to reflect the descending, low water, and ascending phases of the hydrograph (Figure 2).

Figure **3** shows the unique number of chemicals detected by chemical group in each of the seasonal sampling events. This figure does not include plant and animal sterols or chemicals not detected during the 2011 and 2015 sampling efforts. Detections of the four sterols, however, occurred during each season.

Current use pesticides were detected more frequently during the fall sampling effort, which may indicate that these samples were collected during a period of pesticide application or a period of "first flush" that occurs at the beginning of the rainy season. Detections of metals also showed some seasonality. More metals were detected during the summer and fall sampling effort, however, it is difficult to identify the potential reason for this increase.

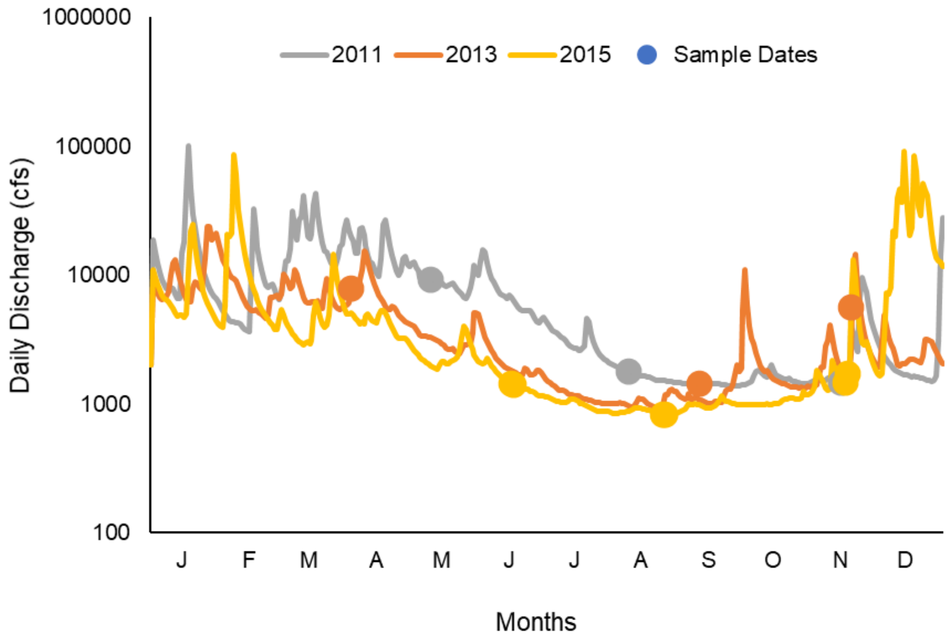

Figure 2 - Annual hydrographs of the three years during which water samples were collected in the Umpqua River Basin. The discharge data is from the most downstream USGS monitoring location in the basin. Circles indicate the sampling dates for each year.

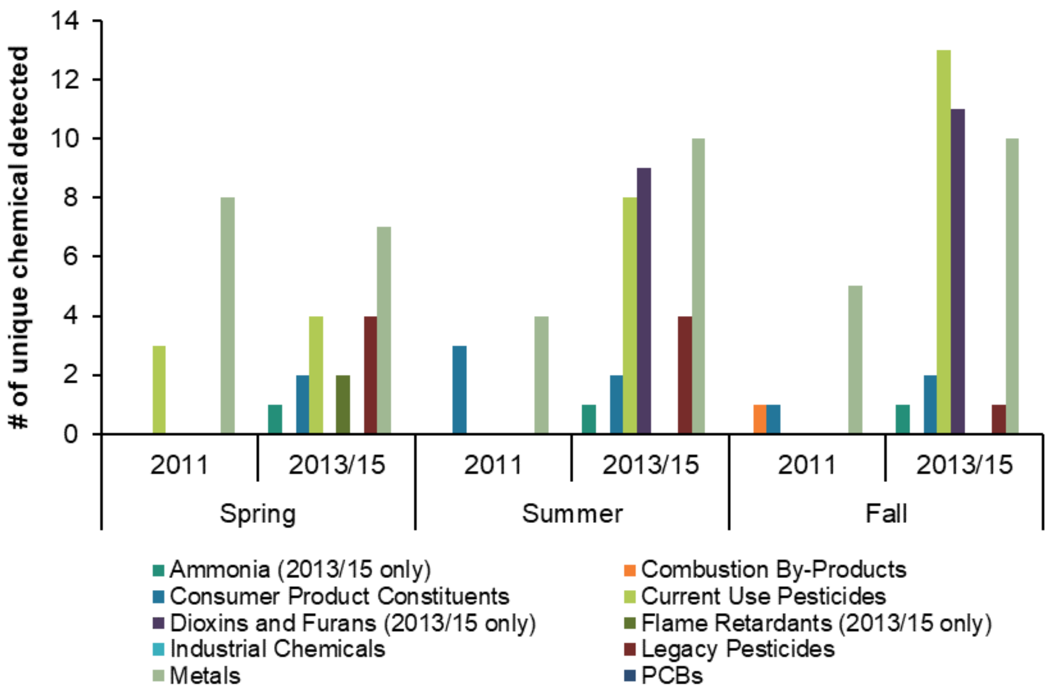

Figure 3 - Seasonality of detections in the Umpqua River Basin by chemical group.

Seasonal samples collected during the 2015 effort contained an average of 30 unique chemicals compared to an average of eight unique chemicals in 2011. The difference in the averages was in part due to the use of analytical methods with lower minimum reporting limits for both current use and legacy pesticides in the analysis of 2015 samples. The dioxin and furan chemical group was not included in the analysis of the spring 2015 samples, but accounted for nearly 25% of the detections in the analysis of both the summer and fall 2015 samples. The polybrominated diphenyl ether (flame retardant) and dioxin and furan chemical groups were not included in the analysis during the summer or fall 2011 sampling efforts due to lab capacity (Table 2).

Table 2 - Analytical methods added for the analysis of samples collected in 2013 and 2015.

Analytical Method	Chemical or Chemical Group
ASTM D6919-09	Ammonium
EPA 1699	Current use and Legacy Pesticides
EPA 1613	Dioxins and Furans
EPA 1614	Flame retardants
EPA 1668C	Polychlorinated Biphenyls (PCBs)
EPA 1632A	Inorganic Arsenic

Metals

This group includes all metals for which Oregon has existing water quality criteria. These metals occur naturally but may also be enriched or introduced by human activities. Because of this, detections of these metals are common in water. Water samples contained seven different metals in 2011 compared with 10 metals detected in 2015. Copper and lead were included in the analysis of the 2011 samples, but not detected. Aluminum was added for the analysis of the 2015 samples. Two monitoring locations, Lookingglass Creek and Deer Creek (#12248 and #25950), had the highest number of unique detections in the basin (nine). Neither of these locations were sampled during the 2011 sampling effort. In 2013, the Umpqua River at Discovery Center Docks (#37399) location had the highest number of unique detections with six. Due to lab capacity, inorganic arsenic analysis was performed only at sites where total arsenic was at least half the inorganic arsenic criterion.

None of the detected metals concentrations exceeded DEQ human health or aquatic life criteria during the 2011 or 2015 sampling efforts.

Legacy Pesticides

Pesticides are a broad class of chemicals that includes insecticides, herbicides and fungicides. Legacy pesticides refer to chlorinated insecticides, such as DDT, banned in the United States. Despite the ban, legacy pesticides and associated derivatives are frequently detected in water bodies across the state. Legacy pesticides are known to sequester in sediment where physical processes (e.g., photo-degradation by sunlight) or biological processes (e.g., bacterial metabolism) break parent pesticides down into different chemicals that may be more water soluble than the parent pesticide.

No legacy pesticides were detected during the 2011 sampling effort and a different analytical method was implemented prior to the 2015 sampling effort. The analytical method used in 2015 had a lower minimum reporting limit, and allowed for reliable detection of concentrations below that of the analytical method used in 2011. With the use of the different analytical method, five legacy pesticides were detected in 2015. Detections occurred at four monitoring locations with the highest number of unique detections (four) being found at the Deer Creek (#25950) location. Dieldrin, a legacy pesticide originally developed as an alternative to DDT, was the most commonly detected chemical in 2015 and exceeded DEQ's human health criterion at three locations, Deer Creek, South Umpqua River above mouth (#30163), and Umpqua River at Alfred Tyson Park boat dock (#38135). Heptachlor epoxide also exceeded the DEQ human health criteria at the Deer Creek location.

Two chlordane related pesticides, alpha-chlordane and gamma-chlordane+trans-nonachlor, were detected at the Deer Creek location. These two pesticides do not have established criteria, but total chlordane, measured as the sum of chlordane related pesticides, does. These detections exceeded the human health criterion for total chlordane. This was the only monitoring location with detections of these types of pesticides in the entire basin. Chlordane related chemicals were not included in the analysis of the 2011 samples.

Concentrations for all five legacy pesticides detected did not exceed standards set specifically for drinking water by EPA and others (i.e. Maximum Contaminant Levels or Health Based Screening Levels).

Current Use Pesticides

Pesticides can enter surface waters in runoff from agricultural fields, forests, urban lawns, and roadside spraying. Different analytical methods likely influenced the number of current use pesticide detections, as the number of unique chemicals detected rose from two in 2011 to 16 in 2015. In addition, the use of a different analytical method included 13 chemicals not included in the 2011 sampling analysis. Three of the newly added chemicals were detected in 2015, metsulfuron methyl, glyphosate, and a breakdown product of glyphosate, aminomethylphosphonic acid (AMPA). The herbicides, atrazine and sulfometuron-methyl were detected chemicals at five monitoring locations each and were the most commonly detected current-use pesticides in 2015. The highest number of pesticides (nine) were detected at the Calapooya Creek monitoring location (#10996). None of the pesticides detected in either sampling effort exceeded applicable criteria or benchmarks.

In addition, three of the monitoring locations from the 2015 sampling effort and one from the 2011 sampling effort were also sampled as a part of the Pesticide Stewardship Partnership's (PSP) South Umpqua Pilot Study from 2014-2019. PSP is a collaborative program between state agencies, local organizations, growers, and others. This pilot study was one of four implemented after the Pesticide Stewardship Partnership Program received funding from the Oregon Legislature in 2013 (ODA 2019). The pilot study focused on the pesticides registered for use for major land uses in the South Umpqua Subbasin, all of which were captured in the analysis reported in this summary. Overall, 10 of the 15 pesticides detected in the pilot study were also detected in the DEQ's 2015 sampling effort. A majority of these pesticides were at lower detection frequency and concentration than were found in the PSP pilot study. The exceptions being glyphosate, propiconazole, simazine, and sulfometuron methyl. All four were found more often and had higher maximum concentrations than reported in the PSP pilot study (Figure 4). The maximum concentration for each of these four pesticides was detected during the fall 2015 sampling effort. This sampling effort occurred after a period of low discharge (Figure 2) and may have represented a "first flush", which could help explain the high concentrations. None of the pesticide concentrations detected in either the PSP pilot study or as a part of DEQ's toxics monitoring approached the applicable EPA aquatic life benchmarks. The Water Quality Pesticide Management Team's Report is accessed here: https://www.oregon.gov/oda/shared/Documents/Publications/PesticidesPARC/PSPSouthUmpquaStudy.pdf.

Additionally, several current use pesticides were previously detected during drinking water source monitoring work upstream of the Cow Creek at Lawson Acres intake location (#36309). The detected pesticides included atrazine, DEET, diuron, and fluometuron (DEQ 2012).

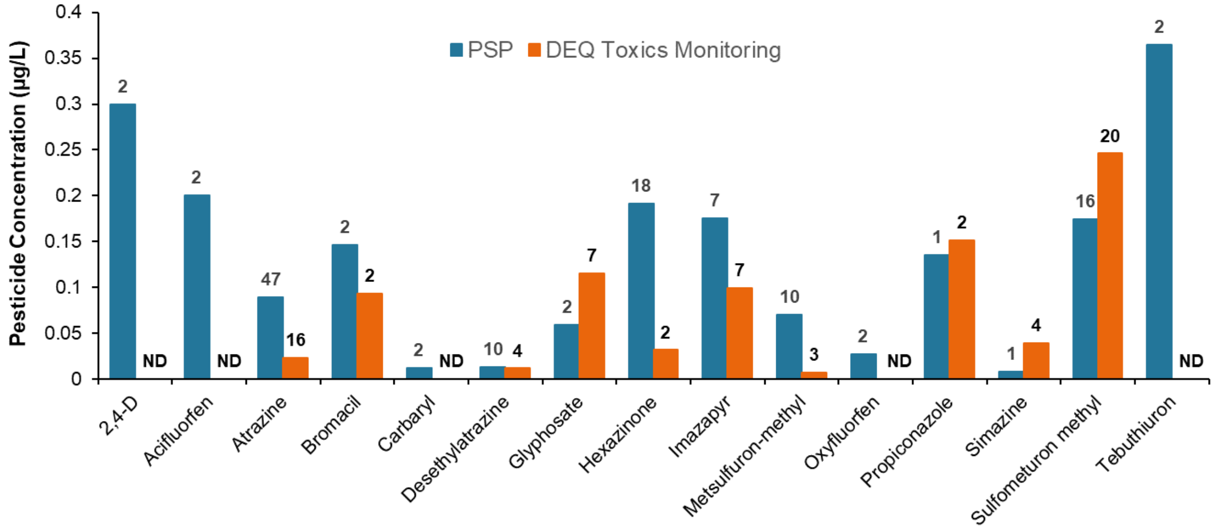

Figure 4 - A comparison between pesticide concentrations detected in the PSP pilot study and DEQ Toxics Monitoring sampling. The bold face numbers indicate the detection percentage in each study.

Combustion by-products

Combustion by-products include polycyclic aromatic hydrocarbons (PAHs) and are associated with the incomplete combustion of organic matter from automobiles, fossil fuel burning, woodstoves and cigarette smoke. They may enter the waterways as a result of air deposition or stormwater run-off from impervious surfaces, such as roads and parking lots. The only combustion by-product detected was fluoranthene in the sample collected at the Umpqua River at Discovery Center Docks (#37399) location in 2013. This sample was collected in conjuction with the South Coast sampling for logistical reasons and is generally lumped into the 2015 sampling effort in this report.

Consumer product constituents including pharmaceuticals

The laboratory analyzed water samples for 28 consumer product constituents including pharmaceuticals in 2015. The analysis of the 2011 water samples included 22 compounds from this chemical group. Sulfamethoxazole, a common antibiotic, was the most commonly detected consumer product across the basin and was found in every sample collected at the Calapooya Creek (#10996) and South Umpqua River at mouth (#30163) locations in 2015 and the South Umpqua at Melrose Road (#10442) location in 2011. All three of these locations are located downstream of municipal wastewater treatment plants. Sulfamethoxazole was also detected during the drinking water source monitoring conducted between 2008 and 2010 (DEQ 2012).

Cotinine and venlafaxine were detected once in 2015 and DEET was detected once in 2011. Bis(2-ethylhexyl)phthalate, which is commonly used in manufacturing PVC, was detected at two locations across the two studies and is the only consumer product with a DEQ human health or aquatic life criteria in this chemical group. The detected concentration of bis(2-ethylhexyl)phthalate at the South Umpqua River at Myrtle Creek (#10444) location in 2015 exceeded the DEQ human health criterion but is less than the EPA Maximum Contaminant Level for drinking water.

Dioxins and Furans

Dioxins and furans share a similar chemical structure, persist in the environment, bioaccumulate in organisms, and can cause harm to humans and wildlife. Visit the Environmental Protection Agency's Dioxin webpage for more information. Chemicals in this group can be produced as by-products during the manufacture of pesticides, bleached paper manufacturing, and as well as municipal and medical waste incineration and fossil fuel combustion. Wood stoves and forest fires are also potential sources of dioxins and furans in the environment (EPA 2015). The analysis in 2013 and 2015 included 17 chemicals. Overall, dioxins or furans were detected at six locations. The location with the highest number of detections was the Umpqua River at Alfred Tyson Park boat ramp (#38135) with 12 chemicals detected. The other five locations (Calapooya Creek at Umpqua (#10996), Lookingglass Creek at Hwy 42 (#12248), Deer Creek at Fowler Bridge (#25950), South Umpqua above mouth (#30163), and Cow Creek downstream of Glendale (#38137)) had only one or two detections. The most commonly detected dioxin was octachlorodibenzo-p-dioxin or OCDD and was detected at all six locations with a dioxin or furan detection. OCDD is considered one of the least toxic dioxins, about 3000 times less toxic than the most toxic dioxin, 2,3,7,8-TCDD (Van den Berg 2006). OCDD is prevalent in the environment and was found in all 22 sediment samples collected by USGS in the Willamette River during a study conducted between 1991-1995 (Wentz 1998). OCDD has also been found in sediment from every basin sampled by the DEQ Toxics Monitoring Program since 2015. The analytical method for this chemical group was not included in the analysis of 2011 samples, so no comparison can be made between sampling efforts. None of the dioxins or furans detected have established human health or aquatic life criteria.

Flame retardants

Polybrominated diphenyl ethers (PBDEs) are a group of flame retardants added to a variety of products such as laptops, automobiles, furniture and textiles. When these chemicals are released from products, they can enter the aquatic environment through air deposition, landfill leachate, and wastewater discharges. This chemical group does not include fire suppressing foams or chemicals used to fight wildfires. The 2015 analysis included 28 PBDEs. Detections of two PBDEs occurred in the spring sample from the Deer Creek (#25950) location. Neither detected PBDE has established human health or aquatic life criteria. The detected concentration for PBDE-99 was well below EPA's screening level for tap water (EPA 2017) No other detections occurred across the basin. PBDEs were not included in the 2011 sampling effort.

Fire suppressing foams and chemicals used to fight wild fires were not included in this study.

Industrial chemicals and ammonia

This group of analytes includes a selection of chemical intermediates used in the production of pesticides, pharmaceuticals, rubber, consumer products, etc. The analysis of the 2011 samples included just three compounds while the analysis of the 2015 samples included 20 compounds. Despite the increase none of the industrial chemicals were detected in either sampling effort.

Ammonia is a naturally occurring compound commonly found in organic waste products and is included as an industrial compound because of its use in fertilizers and dyes. While ammonia can be extremely toxic to aquatic organisms, the non-toxic form of ammonium is also naturally occurring. The toxicity is dependent on pH and temperature. As pH and temperature increase, the presence of the toxic form of ammonia also increases. DEQ measures and reports total ammonia as N, which takes into account both forms. Total ammonia detections occurred at three of the ten locations sampled in 2015. Based on a calculation utilizing pH and temperature to determine the amount of ammonia present, none of these samples exceeded the DEQ freshwater aquatic life criterion. Ammonia was not included in the 2011 sampling effort.

Plant and animal sterols

The laboratory measured four plant and animal sterols in the Umpqua River Basin. These sterols occur naturally in the environment but also may be enriched by humans and human activities, such as wastewater sources. None of the sterols detected currently have a screening level or water quality criteria. Additional work is required to fully evaluate these data and their implications and relationship to other chemicals.

The predominant source of the two plant sterols analyzed, beta-sitosterol and stigmastanol, is terrestrial plants. Other sources of these sterols may be industrial processes (wood pulping, food oils) and modern pharmaceutical supplements. Beta-sitosterol and stigmastanol were detected at all locations. Levels varied with the lowest concentrations detected at the Umpqua River at Alfred Tyson Park location (#38135) and the highest concentrations detected at the Deer Creek location (#25950).

Measured levels of the animal sterols, cholesterol and coprostanol varied across the basin with the lowest concentration of cholesterol detected at the Cow Creek location (#38137) downstream of Glendale and the lowest concentration of coprostanol at the North Umpqua at Pacific Highway (#34140) location. The highest concentration of cholesterol was detected at the Deer Creek location (#25950) and the highest concentration of coprostanol at the South Umpqua above mouth (#30163) location. While cholesterol is ubiquitous and found in a variety of different species, coprostanol is specific to fecal matter from humans and other mammals (e.g., cattle) as it is formed during digestion of cholesterol. The ratio of coprostanol to cholesterol may be used to evaluate contamination by human sewage. Ratios measured at all sites in this study were less than one, indicating that the source of coprostanol is likely biogenic (e.g., livestock) rather than an anthropogenic (e.g., human) source.

Sediment sample results

Metals

Metals were detected at each monitoring location during the 2013 and 2015 sampling efforts. All 16 metals included in the analysis of these samples were detected at the South Umpqua at Tiller (#11199) and Cow Creek at Lawson Acres water intake (#36309) locations. No fewer than 10 of the 16 metals included in the analysis were detected at any site in 2013 or 2015. The analysis of 2011 sediment samples did not include metals.

Due to the difficulty in associating concentrations of metals in animals and fish with concentrations in sediment as well as the fact that metals are naturally occurring in the environment, background concentrations are used instead of screening levels (DEQ 2007). These background concentrations are intended for comparison use only as they are values representing the 90th or 95th percentile of regional soil samples. Four of the detected metals (arsenic, cadmium, lead, and mercury) in the basin have DEQ background concentrations, rather than screening levels. Levels of arsenic at Calapooya Creek at Umpqua (#10996) and South Umpqua at Tiller were elevated over the background concentration. Similarly, mercury concentrations were elevated at the following three locations, South Umpqua at Myrtle Creek (#10444), South Umpqua at Tiller, and Cow Creek at Lawson Acres water intake. Elevation over these background concentrations does not indicate a potential health risk to humans or aquatic life, only that the concentration detected is higher than the concentration regularly found in sediment across the region. Concentrations above the background concentrations may indicate an anthropogenic input of the metal. Neither cadmium nor lead detections were elevated above regional background concentrations.

Legacy Pesticides

The analysis of the 2011 samples consisted of 24 chemicals. The analysis of 2015 samples added two chemicals (cis-chlordane and mirex) to those included in 2011. Two breakdown products of DDT, 4,4'-DDD and 4,4'-DDE, were the most commonly detected chemical in 2015. Screening levels for the individual degradates of DDT do not exist, but there is a screening level of 40 ng/kg for the total concentration of all degradates in a sample (DEQ 2007). The highest concentration of total DDT occurred at the South Umpqua above mouth (#30163) location in 2015 and was nearly ten times greater than the screening level (379.7 ng/kg). None of the detected total DDT concentrations in 2011 were over the screening level, however, the concentration found at the South Umpqua at Days Creek cutoff (#11484) location was very close (38.2 ng/kg). Four other locations had concentrations above the total DDT screening level in 2013 or 2015 (Deer Creek at Fowler Bridge (#25950), North Umpqua at Pacific Hwy. (#34140), Umpqua River at Discovery Center Docks (#37399), and Cow Creek downstream of Glendale (#38137)). Dieldrin was the only other chemical detected above its screening level (Deer Creek at Fowler Bridge). All other legacy pesticide detections in the basin were below existing screening levels. The sediment bioaccumulation screening levels represent the concentration at or below which chemicals would not be expected to affect the human population consuming more than 17 grams, about a tablespoon, of fish or shellfish per day from these waterways (DEQ 2007).

Current Use Pesticides

No current use pesticides were included in the 2011 sediment analysis. In 2015, DEQ monitored for a short list of current use pesticides, most of which are pyrethroid pesticides. The non-pyrethroid pesticides analyzed for this study, chlorpyrifos, oxyfluorfen, and trifluralin, have a similar affinity to partition to sediments as pyrethroids. These pesticides are usually sold as water soluble powders or granules under names like Lorsban ®, Goal ®, Trust ®, or Treflan ®. DEQ detected three pyrethroid insecticides (bifenthrin, cypermethrin, and permethrin) in the 2015 samples. All three insecticides were detected at only one location, Deer Creek at Fowler Bridge (#25950). None of the detected pesticides have sediment screening levels.

Amweg et al. (2006) identified toxicity units as a commonly used way to evaluate the toxicity of a compound or compounds in a sample. To calculate toxicity units, the concentration of the contaminant is first normalized to total organic carbon, then divided by the 10-day median lethal concentration (LC50) for *Hyalella azteca*, an aquatic invertebrate commonly used for survival tests. Normalization to total organic carbon is necessary in sediment samples because chemicals that partition to sediment are more likely to bind to the organic matter present. If the calculated toxicity units are greater than 1, then the concentration of the compound can be determined to be toxic. For the three pyrethroids detected in Deer Creek, the toxicity units were all well below this level and would not be considered toxic to aquatic organisms.

Dioxins and Furans

This chemical group contains 17 chemicals produced as by-products during the manufacture of pesticides and fossil fuel combustion as well as from sources such as wood stoves and forest fires (EPA 2015). No dioxins or furans were detected at the three locations sampled in 2011, while at least one dioxin or furan was detected at nearly every location during the 2013 or 2015 sampling efforts. At two locations in 2015, 15 of the 17 chemicals included in this group were detected, Deer Creek at Fowler Bridge (#25950) and Cow Creek downstream of Glendale (#38137). Concentrations above applicable screening levels occurred at six locations, with the highest number occurring at the Deer Creek location.

Flame retardants

Twenty-one PBDEs were detected in samples collected in 2013 or 2015. No PBDEs were detected in the samples collected in 2011. PBDEs were detected at six locations, Calapooya Creek at Umpqua (#10996), Deer Creek at Fowler Bridge (#25950), South Umpqua at mouth (#30163), Umpqua River at Discovery Center Docks (#37399), Umpqua River at Alfred Tyson Park (#38135), and Cow Creek downstream of Glendale (#38137). The highest number of PBDEs (18) occurred at the Deer Creek at Fowler Bridge location. Like dioxins and furans, these chemicals persist in the environment and bioaccumulate in organisms. None of the detected flame retardants have established bioaccumulation screening levels.

Polychlorinated biphenyls (PCBs)

PCBs are a class of 209 industrial chemicals historically used as electrical insulating fluid in transformers and capacitors. The manufacture and use of PCBs were banned or limited in 1979 due to their ability to persist in the environment and toxicity to humans and wildlife. However, low levels (below 50ppm) in products are not regulated and PCBs can be inadvertent by-products of some manufacturing processes, such as those associated with colorants. Three PCBs were detected at the Cow Creek at mouth (#10997) location in 2011. None were detected at the other two locations sampled that year. Potential sources of PCBs in Cow Creek are wood product manufacturing sites, mining operations, and the wastewater and stormwater outfalls for the City of Riddle (D. Waltz, personal communication, December 31, 2020). A total of 34 PCBs were detected across the locations sampled in 2013 and 2015. Twenty-three PCBs were detected at the Umpqua River at Discovery Center Docks (#37399) location in 2013 and 21 PCBs were detected at the Deer Creek at Fowler Bridge (#25950) location in 2015.

In addition to the total concentration of PCBs in a sample, two of the PCB congeners detected (PCB-105 and PCB-118) have established screening levels. Concentrations of PCB-118 above the screening level were found at seven locations in 2013 and 2015. The elevated concentrations occurred at the Calapooya Creek at Umpqua (#10996), Lookingglass Creek at Hwy 42 (#12248), Deer Creek at Fowler Bridge, North Umpqua at Pacific Hwy (#34140), Cow Creek at Lawson Acres (#36309), Umpqua River at Discovery Center Docks, and Cow Creek downstream of Glendale (#38137) locations. The concentration of total PCBs, the sum of all congener concentrations detected in one sample, at eight locations in 2013 and 2015 was above the screening level (the seven locations with elevated concentrations of PCB-118 and the South Umpqua at Tiller (#11199) location). The Umpqua River at Discovery Center Docks location had the highest concentration of PCBs in the basin (Figure 5).

PCBs are very resistant to breakdown, sequester to sediments and can bioaccumulate in organisms meaning that once these chemicals enter the environment, they are likely to remain for an extended period of time. Among other potential health risks, the EPA identifies PCBs as a potential carcinogen (EPA 2020).

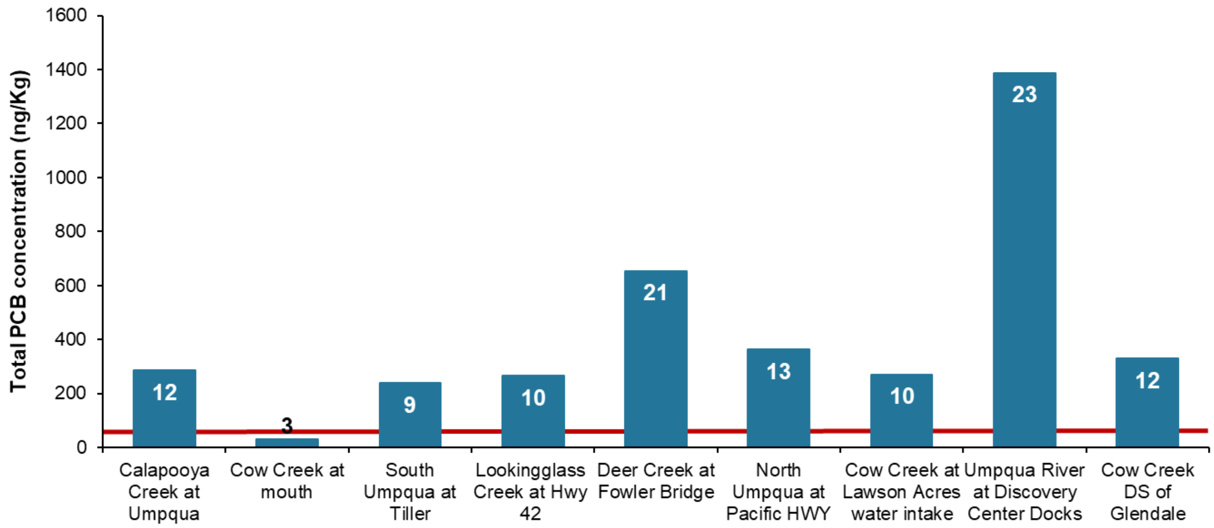

Figure 5 - Total PCB concentration in sediment samples from the Umpqua River Basin. The number in each bar indicates the total number of PCBs detected. The red line indicates the total PCB bioaccumulation screening value of 48 ng/kg.

Tissue sample results

Tissue sample collection occurred at two locations in the Umpqua River Basin and was carried out in conjunction with other DEQ programs collecting fish in the area. Four smallmouth bass, *Micropterus dolomeiu*, were collected from the Umpqua River at RM 37.7 (#37615) location in 2013 and two largemouth bass, *Micropterus salmoides*, were collected from the Umpqua River at RM 21.4 (#37818) location in 2014. Bass were selected as the target species because they are popular sportfish, long lived, resident predators that are likely to have one of the highest concentrations of contaminants of all the fish species present. All samples were processed as skinless fillets in accordance with the OHA fish consumption guidelines. The individual tissue samples were analyzed for arsenic, cadmium, selenium, and mercury. Composite samples of all the fish collected from the same sampling location were analyzed for dioxins and furans, flame retardants, legacy pesticides, and PCBs.

Total arsenic was detected in two of four fish collected in 2013 and both fish collected in 2014. The detected concentrations were below the OHA screening level for inorganic arsenic. While total arsenic levels are not directly comparable to inorganic arsenic levels, they do provide some insight into where arsenic levels are elevated. Mercury concentrations exceeded the DEQ human health criterion in all fish collected during both sampling efforts. The highest concentration was detected in a largemouth bass collected in 2014. The concentration was 0.636 mg/kg, which is nearly 16 times higher than the criterion of 0.04 mg/kg. DEQ's human health criteria were established to protect all consumers, including subsistence consumers. Thus, the mercury criterion assumes a consumption rate of 175 grams per day. Figure 6 shows the impact ratio for each mercury detection. The impact ratio is determined by dividing the concentration by the criterion. Values greater than one indicate a concentration that exceeds the criterion. Oregon Health Authority has fish consumption guidelines in place for all resident fish based on mercury concentrations in Galesville and Copper Creek reservoirs as well as a statewide advisory for mercury in small mouth bass. This indicates that mercury is a known problem in the basin and anglers should be aware of the consumption guidelines before consuming fish from the area.

The composite samples contained nine flame retardants, 11 legacy pesticides, and 29 PCBs. The composite sample of fish collected in 2014 contained a slightly the higher number of unique detections than the composite sample of fish collected in 2013. None of these detections were found at levels above the OHA fish advisory program's screening levels.

For a full summary of the tissue sampling results view the [Statewide Aquatic Tissue Toxics Report] released in 2017.

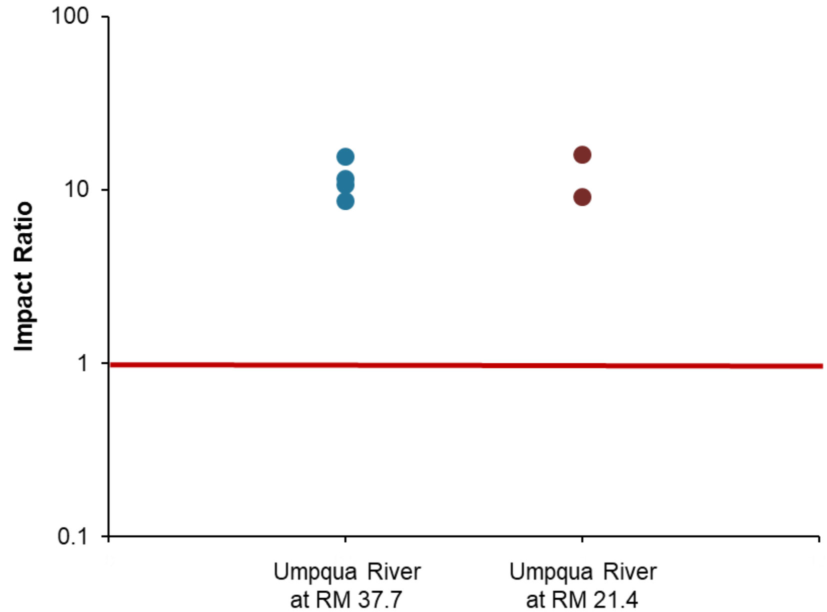

Figure 6 - Impact ratios of mercury detections in tissue samples collected in the Umpqua River Basin.

Replicate sampling

No sampling locations were carried over from the 2011 sampling effort to the 2015 sampling effort, so no replicate comparisons can be made.

Summary and Recommendations

Across all media more unique detections occurred in 2015 than in 2011. The main reasons for the increase appears to be the increase in sampling locations visited during the 2015 sampling effort, the inclusion of dioxins, furans, flame retardants and certain legacy pesticides in the analysis of 2015 water samples, and the large number of PCB congeners detected in 2015 sediment samples. The inclusion of additional chemical groups in analysis of the 2015 water samples coincided with improved analytical methods for PCBs, current use pesticides, and legacy pesticides. The improved analytical methods reduced the minimum detection limit for a number of chemicals and allowed for more potential detections.

The analysis of water samples collected from the Umpqua River Basin in 2015 found very little potential risk to human health. Four contaminants, out of the 484 included in the analysis, were found at concentrations above DEQ human health criteria, but all were detected at concentrations less than health standards set specifically for drinking water by EPA and others (i.e. Maximum Contaminant Levels or Health Based Screening Levels). Despite the high concentrations, these contaminants were rarely detected. The most commonly detected of the three, the legacy insecticide, dieldrin, had an overall percent detection of 11% across the two studies included in this summary. The results of this study agreed with the findings of PSP pilot study on the South Umpqua Subbasin in that the current use pesticides detected pose minimal threat to aquatic life (ODA 2019).

The number of dioxins and furans detected in water samples from the Umpqua River at Alfred Tyson Park (#38135) location was unexpected. The typical sources of this chemical group, pesticide manufacturing, and fossil fuel combustion, are not known to occur in the area, however, there were historic mills in the area near Elkton. Wildfires can also produce dioxins and furans, and a small fire occurred five miles upstream of this location in 2014. Whether or not this could have been the source of the dioxins and furans is unclear.

Sediment samples collected in 2015 contained 17 contaminants at concentrations above bioaccumulation screening levels or background concentrations. Despite this high number, these contaminants only account for 6% of the contaminants included in the analysis. Thus, a majority of chemicals were not detected or were found a concentrations below applicable bioaccumulation screening levels. The monitoring location with the highest number of exceedances was the Deer Creek at Fowler Bridge (#25950) location with 14. A majority of these, 10 in all, were for dioxins and furans. Although the land use in the watershed is mixed the Deer Creek location was selected as a representative "urban" site by DEQ with input from the Partners for Umpqua Rivers and Cow Creek tribes for the Umpqua toxics monitoring (D. Waltz, personal communication, Nov. 9, 2020). The Pesticide Stewardship Partnerhip's South Umpqua Pilot Study includes a detailed list of land use percentages by major land use categories (ODA 2019). In addition to these exceedances, total DDT, dieldrin, total PCBs, and PCB-118 were also found above bioaccumulation screening levels and 18 flame retardants were detected. Flame retardants do not currently have screening levels, however, the toxicity of these contaminants in mixture with other contaminants is unknown. Potential sources of these contaminants are unknown at this point, but are typically from the same sources described previously, including pesticide manufacturing, pulp and paper mill effluent, and fossil fuel combustion, along with municipal and medical waste incineration.

Tissue samples across all monitoring locations exceeded DEQ's human health criterion for mercury. Anglers in the Umpqua River Basin should be aware of any fish consumption advisories in waterbodies where they plan to catch and consume any fish. Oregon Health Authority also has a statewide fish consumption guideline in place based on mercury concentrations in bass. OHA also advises that migratory fish, like salmon, generally have lower levels of contamination that resident species and that smaller fish also generally have lower contaminant levels that larger fish of the same species. None of the other contaminants detected in the fish tissue samples exceeded human health criteria. However, in both composite samples, a substantial number of flame retardants, legacy pesticides and PCBs were detected. Appendices A-C provide the detection data from this basin.

After the 2011 sampling effort, no individual chemicals or groups of chemicals were identified as chemicals of interest in the surface water samples and none of the monitoring locations were carried over into the 2015 sampling effort. However, based on the results of the 2015 sampling effort four locations were included in the Toxics Monitoring Network. Water samples will be collected at these locations, Calapooya Creek at Umpqua (#10996), Deer Creek at Fowler Bridge (#25950), South Umpqua above mouth (#30163), and Umpqua River at RM 21.4 (#37818), will be sampled three times annually. Sediment and tissue samples, when lab resources are available, will be collected once annually. The purpose of the network is to establish a sampling routine that will accommodate trend analysis across the state, which will help DEQ identify changes in type and concentrations of chemicals of concern over time.

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List of Appendices

Appendices

Reference Key

N/A:	Analyte not included in the analysis of the sample
—:	Analyte not detected in analysis of sample
	Indicates sites at which at least one sample exceeded the screening value
nsv :	No screening value has been assigned

1. Human Health Criteria: Water + Organism (Organism only in Saltwater) 2. Freshwater Chronic Criteria (CCC) 3. Saltwater Chronic Criteria (CCC 4. Saltwater Acute Criteria (CMC)	https://www.oregon.gov/deq/Rulemaking%20Docs/tables303140.pdf
5. Freshwater Fish Acute Criteria 6. Freshwater Fish Chronic Criteria 7. Freshwater Invertebrates Acute Criteria 8. Freshwater Invertebrates Chronic Criteria 9. Freshwater Nonvascular Plants Acute Criteria 10. Freshwater Vascular Plants Acute Criteria	https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/aquatic-life-benchmarks-and-ecological-risk *Benchmarks cited in this table were up to date at date of publication
11. Sediment Bioaccumulation Screening Level Value	https://www.oregon.gov/deq/FilterDocs/GuidanceAssessingBioaccumulative.pdf
12. OHA Fish Advisory Program Screening Level	https://www.oregon.gov/oha/PH/HEALTHYENVIRONMENTS/RECREATION/FISHCONSUMPTION/Documents/fishscreeninglevels.pdf
13. Human Health Criteria: Organism Only	https://www.oregon.gov/deq/Rulemaking%20Docs/tables303140.pdf
14. Acceptable Tissue Levels for Chemicals in Fish/Shellfish Consumed by Wildlife	https://www.oregon.gov/deq/FilterDocs/GuidanceAssessingBioaccumulative.pdf

* Hardness dependent criteria

‡ pH and temperature dependent criteria

\# This criteria applies to the total recoverable metal

§ This criteria applies to the dissolved concentration, and is therefore a conservative comparison

† This criteria applies to freshwater organisms

° This criteria applies to inorganic arsenic

Benchmarks cited in the table linked above as of the date of publication of your report.

Appendix A
Water Sample Results

State of Oregon Department of Environmental Quality

UMPQUA BASIN

Station ID and Description

Samples collected in 2011, 2013, or 2015

	Percent Detection	Number of samples over screening value	South Umpqua at Melrose Road (2011) 10442	South Umpqua at Myrtle Creek (2015) 10444	North Umpqua at Garden Valley Road (2011) 10451	Calapooya Creek at Umpqua (2015) 10996	Screening Value	S.V. Reference
			Maximum Values (µg/L)					
Ammonia								
Ammonia as N	9	0	N/A	—	N/A	40	‡	2
Combustion By-Products								
Fluoranthene	2	0	—	—	—	—	14	1
Consumer Product Constituents								
bis(2-ethylhexyl)phthalate	5	1	—	1.09	—	—	0.2	1
Cotinine	2		—	—	—	—	*nsv*	
DEET	2		—	—	—	—	*nsv*	
Sulfamethoxazole	20		0.0484	0.0167	—	0.0413	*nsv*	
Venlafaxine	2		—	—	—	—	*nsv*	
Current Use Pesticides								
2,6-Dichlorobenzamide	9		—	—	—	0.276	*nsv*	
Aminomethylphosphonic acid (AMPA)	13	0	N/A	0.0514	N/A	—	249500	5
Atrazine	16	0	—	—	—	0.023	1.0	9
Bromacil	2	0	—	—	—	—	6.8	7
Deisopropylatrazine	4	0	—	—	—	0.021	2500	7
Desethylatrazine	4	0	—	—	—	0.0117	1000	7
Diuron	9	0	0.005	0.016	—	—	2.4	9
Glyphosate	7	0	N/A	—	N/A	—	11900	10
Hexazinone	2	0	—	—	—	0.0317	7	9
Imazapyr	7	0	—	—	—	—	24	10
Metsulfuron Methyl	3	0	N/A	—	N/A	—	0.36	10
Norflurazon	2	0	—	—	—	0.086	9.7	7
Propiconazole	2	0	—	0.151	—	—	21	7
Simazine	4	0	—	—	—	0.0396	6	9
Sulfometuron-methyl	20	0	0.005	0.0215	—	0.00813	0.45	10
Terbacil	2	0	—	—	—	0.0751	11	9
Dioxins and Furans								
1,2,3,4,6,7,8-HpCDD	13		N/A	—	N/A	—	*nsv*	
1,2,3,4,7,8,9-HpCDF	3		N/A	—	N/A	—	*nsv*	
1,2,3,4,7,8-HxCDD	7		N/A	—	N/A	—	*nsv*	
1,2,3,4,7,8-HxCDF	7		N/A	—	N/A	—	*nsv*	
1,2,3,6,7,8-HxCDD	7		N/A	—	N/A	—	*nsv*	
1,2,3,6,7,8-HxCDF	7		N/A	—	N/A	—	*nsv*	
1,2,3,7,8,9-HxCDF	3		N/A	—	N/A	—	*nsv*	
1,2,3,7,8-PeCDD	3		N/A	—	N/A	—	*nsv*	
1,2,3,7,8-PeCDF	7		N/A	—	N/A	—	*nsv*	

Appendix A Water Sample Results Samples collected in 2011, 2013, or 2015	Percent Detection	Number of samples over screening value	UMPQUA BASIN Station ID and Description South Umpqua at Melrose Road (2011) 10442	South Umpqua at Myrtle Creek (2015) 10444	North Umpqua at Garden Valley Road (2011) 10451	Calapooya Creek at Umpqua (2015) 10996	Screening Value	S.V. Reference
			Maximum Values (µg/L)					
Dioxins and Furans, continued								
2,3,4,6,7,8-HxCDF	7		N/A	—	N/A	—	*nsv*	
OCDD	30		N/A	—	N/A	2.9E-06	*nsv*	
OCDF	3		N/A	—	N/A	—	*nsv*	
Flame Retardants								
PBDE-66	9		N/A	—	N/A	—	*nsv*	
PBDE-99	10		N/A	—	N/A	—	*nsv*	
Legacy Pesticides								
Total Chlordane	6	1	N/A	—	N/A	—	8E-05	1
alpha-Chlordane	6		N/A	—	N/A	—	*nsv*	
gamma-Chlordane+trans-Nonachlor	3		N/A	—	N/A	—	*nsv*	
Dieldrin	11	5	—	—	—	—	5E-06	1
Endosulfan sulfate	4		—	—	—	0.00016	8.5	1
Heptachlor epoxide	4		—	—	—	—	4E-06	1
Plant or animal sterols								
beta-Sitosterol	100		0.662	0.798	0.36	0.891	*nsv*	
Cholesterol	100		1.15	1.41	0.635	1.71	*nsv*	
Coprostanol	95		0.271	0.0799	0.006	0.148	*nsv*	
Stigmastanol	100		0.0506	0.067	0.025	0.169	*nsv*	
Priority Metals								
Dissolved								
Aluminum	20		N/A	—	N/A	25.2	*nsv*	
Arsenic	84		0.53	0.81	1.03	1.08	*nsv*	
Barium	96		17.6	20.1	3.7	10.1	*nsv*	
Copper	7		—	—	—	2.42	*	2
Iron	27		—	—	—	105	1000#	2
Manganese	96		4.3	6.51	3.1	13.7	*nsv*	
Nickel	38		1.0	—	—	1.6	*	2
Thallium	2		—	—	—	—	*nsv*	
Zinc	7		—	—	6.7	—	*	2
Total Inorganic								
Arsenic	100		N/A	N/A	N/A	0.52	2.1	1
Total Recoverable								
Aluminum	83		N/A	89.7	N/A	142	*nsv*	
Arsenic	89		0.55	0.85	1.01	1.11	*nsv*	
Barium	96		18	21.3	4.0	10.9	1000	1

DEQ State of Oregon Department of Environmental Quality	Appendix A Water Sample Results Samples collected in 2011, 2013, or 2015	Percent Detection	Number of samples over screening value	South Umpqua at Melrose Road (2011) 10442	South Umpqua at Myrtle Creek (2015) 10444	North Umpqua at Garden Valley Road (2011) 10451	Calapooya Creek at Umpqua (2015) 10996	Screening Value	S.V. Reference
				UMPQUA BASIN Station ID and Description					
				Maximum Values (µg/L)					
Priority Metals, continued									
Total Recoverable									
Chromium		7		—	—	—	—	11§	
Copper		7		—	—	—	2.39	*§	2
Iron		67		240	151	160	292	1000	2
Lead		2		—	—	—	—	*§	2
Manganese		100		16	21.8	7.7	42.2	*nsv*	
Nickel		47		1.0	1.16	—	1.77	*§	2
Zinc		5		—	—	—	—	*§	2
Standard Parameters (mg/L)				Average Values					
Dissolved Organic Carbon		97		3.4	2.8	2.4	3.3		
Hardness as CaCO3 (Dissolved)		100		55.7	59.9	21.6	46.5		
Sulfate		100		5.9	8.0	1.5	6.2		
Total Organic Carbon		100		2.6	2.8	1.6	3.2		
Total Solids		100		98.3	95.3	61.0	90.7		
Total Suspended Solids		69		2.0	1.5	2.0	2.0		
Field Parameters									
Conductivity (µmhos/cm @ 25° C)		100		153	154	64	156		
Dissolved Oxygen (mg/L)		100		11.0	10.2	11.1	10.2		
pH (SU)		100		8.2	8.5	7.8	8.0		
Temperature (°C)		100		14.9	18.9	11.9	17.5		
Turbidity (NTU)		89		3	2	2	3		

State of Oregon Department of Environmental Quality	Appendix A Water Sample Results Samples collected in 2011, 2013, or 2015	UMPQUA BASIN Station ID and Description Cow Creek at mouth (2011) 10997	South Umpqua at Tiller (2015) 11199	South Umpqua at Days Creek Cutoff Road (2011) 11484	Lookingglass Creek at Hwy 42 at Winston (2015) 12248	Screening Value	S.V. Reference
		Maximum Values (µg/L)					
Ammonia							
	Ammonia as N	N/A	—	N/A	—	‡	2
Combustion By-Products							
	Fluoranthene	—	—	—	—	14	1
Consumer Product Constituents							
	bis(2-ethylhexyl)phthalate	—	—	—	—	0.2	1
	Cotinine	—	—	—	—	*nsv*	
	DEET	—	—	0.0307	—	*nsv*	
	Sulfamethoxazole	—	—	—	—	*nsv*	
	Venlafaxine	—	—	—	—	*nsv*	
Current Use Pesticides							
	2,6-Dichlorobenzamide	—	—	—	—	*nsv*	
	Aminomethylphosphonic acid (AMPA)	N/A	—	N/A	—	249500	5
	Atrazine	—	—	—	0.00483	1.0	9
	Bromacil	—	—	—	—	6.8	7
	Deisopropylatrazine	—	—	—	—	2500	7
	Desethylatrazine	—	—	—	—	1000	7
	Diuron	0.006	—	—	—	2.4	9
	Glyphosate	N/A	—	N/A	—	11900	10
	Hexazinone	—	—	—	—	7	9
	Imazapyr	—	—	—	0.0992	24	10
	Metsulfuron Methyl	N/A	—	N/A	—	0.36	10
	Norflurazon	—	—	—	—	9.7	7
	Propiconazole	—	—	—	—	21	7
	Simazine	—	—	—	—	6	9
	Sulfometuron-methyl	—	—	—	—	0.45	10
	Terbacil	—	—	—	—	11	9
Dioxins and Furans							
	1,2,3,4,6,7,8-HpCDD	N/A	—	N/A	—	*nsv*	
	1,2,3,4,7,8,9-HpCDF	N/A	—	N/A	—	*nsv*	
	1,2,3,4,7,8-HxCDD	N/A	—	N/A	—	*nsv*	
	1,2,3,4,7,8-HxCDF	N/A	—	N/A	—	*nsv*	
	1,2,3,6,7,8-HxCDD	N/A	—	N/A	—	*nsv*	
	1,2,3,6,7,8-HxCDF	N/A	—	N/A	—	*nsv*	
	1,2,3,7,8,9-HxCDF	N/A	—	N/A	—	*nsv*	
	1,2,3,7,8-PeCDD	N/A	—	N/A	—	*nsv*	
	1,2,3,7,8-PeCDF	N/A	—	N/A	—	*nsv*	

State of Oregon Department of Environmental Quality	Appendix A Water Sample Results Samples collected in 2011, 2013, or 2015	UMPQUA BASIN Station ID and Description Cow Creek at mouth (2011) 10997	South Umpqua at Tiller (2015) 11199	South Umpqua at Days Creek Cutoff Road (2011) 11484	Lookingglass Creek at Hwy 42 at Winston (2015) 12248	Screening Value	S.V. Reference
		Maximum Values (µg/L)					
Dioxins and Furans, continued							
2,3,4,6,7,8-HxCDF		N/A	—	N/A	—	*nsv*	
OCDD		N/A	—	N/A	2.2E-06	*nsv*	
OCDF		N/A	—	N/A	—	*nsv*	
Flame Retardants							
PBDE-66		N/A	—	N/A	—	*nsv*	
PBDE-99		N/A	—	N/A	—	*nsv*	
Legacy Pesticides							
Total Chlordane		N/A	—	N/A	—	8E-05	1
alpha-Chlordane		N/A	—	N/A	—	*nsv*	
gamma-Chlordane+trans-Nonachlor		N/A	—	N/A	—	*nsv*	
Dieldrin		—	—	—	—	5E-06	1
Endosulfan sulfate		—	—	—	—	8.5	1
Heptachlor epoxide		—	—	—	—	4E-06	1
Plant or animal sterols							
beta-Sitosterol		0.458	0.955	0.504	1.54	*nsv*	
Cholesterol		0.909	0.925	0.892	1.52	*nsv*	
Coprostanol		0.0741	0.0093	0.00859	0.132	*nsv*	
Stigmastanol		0.0562	0.0545	0.04	0.141	*nsv*	
Priority Metals							
Dissolved							
Aluminum		N/A	—	N/A	112	*nsv*	
Arsenic		—	0.88	0.56	0.56	*nsv*	
Barium		19.7	14.8	13.7	15.6	*nsv*	
Copper		—	—	—	1.73	*	2
Iron		—	—	—	278	1000#	2
Manganese		5.6	8.15	3.0	18.6	*nsv*	
Nickel		1.7	—	—	1.83	*	2
Thallium		—	—	—	—	*nsv*	
Zinc		—	—	—	—	*	2
Total Inorganic							
Arsenic		N/A	N/A	N/A	N/A	2.1	1
Total Recoverable							
Aluminum		N/A	39.6	N/A	482	*nsv*	
Arsenic		0.26	0.9	0.61	0.71	*nsv*	
Barium		20.1	15.3	13.7	17.7	1000	1

State of Oregon Department of Environmental Quality	Appendix A Water Sample Results — Samples collected in 2011, 2013, or 2015	UMPQUA BASIN Station ID and Description: Cow Creek at mouth (2011)	South Umpqua at Tiller (2015)	South Umpqua at Days Creek Cutoff Road (2011)	Lookingglass Creek at Hwy 42 at Winston (2015)	Screening Value	S.V. Reference
		10997	11199	11484	12248		
		Maximum Values (µg/L)					
Priority Metals, continued							
Total Recoverable							
Chromium		1.1	—	—	1.67	11§	
Copper		—	—	—	2.19	*§	2
Iron		—	71.8	310	723	1000	2
Lead		—	—	—	—	*§	2
Manganese		7.1	17.1	8.1	38.6	*nsv*	
Nickel		2.2	—	—	2.98	*§	2
Zinc		—	—	—	—	*§	2
Standard Parameters (mg/L)		Average Values					
Dissolved Organic Carbon		3.9	2.0	2.7	4.9		
Hardness as CaCO3 (Dissolved)		52.2	45.0	42.5	47.8		
Sulfate		3.7	8.8	5.4	8.2		
Total Organic Carbon		2.6	2.0	2.1	4.9		
Total Solids		90.7	81.7	82.3	88.0		
Total Suspended Solids		1.5	1.0	2.0	3.0		
Field Parameters							
Conductivity (µmhos/cm @ 25° C)		126	127	111	131		
Dissolved Oxygen (mg/L)		11.4	10.3	11.3	9.7		
pH (SU)		8.3	8.1	8.3	8.2		
Temperature (°C)		14.1	16.6	13.1	19.6		
Turbidity (NTU)		2	2	2	8		

State of Oregon Department of Environmental Quality	Appendix A Water Sample Results	UMPQUA BASIN Station ID and Description					
	Samples collected in 2011, 2013, or 2015	Deer Creek at Fowler Bridge (2015)	South Umpqua River above mouth (2015)	North Umpqua at Pacific Hwy (2015)	Cow Creek at Lawson Acres water intake (2015)	Screening Value	S.V. Reference
		25950	30163	34140	36309		
		Maximum Values (µg/L)					
Ammonia							
Ammonia as N		13	168	—	—	‡	2
Combustion By-Products							
Fluoranthene		—	—	—	—	14	1
Consumer Product Constituents							
bis(2-ethylhexyl)phthalate		—	—	—	—	0.2	1
Cotinine		0.0168	—	—	—	*nsv*	
DEET		—	—	—	—	*nsv*	
Sulfamethoxazole		—	0.0348	—	—	*nsv*	
Venlafaxine		—	0.0155	—	—	*nsv*	
Current Use Pesticides							
2,6-Dichlorobenzamide		0.0707	0.0229	—	—	*nsv*	
Aminomethylphosphonic acid (AMPA)		0.0997	0.0939	—	—	249500	5
Atrazine		0.00436	0.00739	—	—	1.0	9
Bromacil		0.0932	—	—	—	6.8	7
Deisopropylatrazine		—	—	—	—	2500	7
Desethylatrazine		—	—	—	—	1000	7
Diuron		—	0.00811	—	—	2.4	9
Glyphosate		0.115	0.0838	—	—	11900	10
Hexazinone		—	—	—	—	7	9
Imazapyr		0.0527	—	—	—	24	10
Metsulfuron Methyl		0.00705	—	—	—	0.36	10
Norflurazon		—	—	—	—	9.7	7
Propiconazole		—	—	—	—	21	7
Simazine		—	—	—	—	6	9
Sulfometuron-methyl		0.246	0.033	—	0.00802	0.45	10
Terbacil		—	—	—	—	11	9
Dioxins and Furans							
1,2,3,4,6,7,8-HpCDD		2.5E-06	—	—	—	*nsv*	
1,2,3,4,7,8,9-HpCDF		—	—	—	—	*nsv*	
1,2,3,4,7,8-HxCDD		—	—	—	—	*nsv*	
1,2,3,4,7,8-HxCDF		—	—	—	—	*nsv*	
1,2,3,6,7,8-HxCDD		—	—	—	—	*nsv*	
1,2,3,6,7,8-HxCDF		—	—	—	—	*nsv*	
1,2,3,7,8,9-HxCDF		—	—	—	—	*nsv*	
1,2,3,7,8-PeCDD		—	—	—	—	*nsv*	
1,2,3,7,8-PeCDF		—	—	—	—	*nsv*	

Appendix A Water Sample Results	UMPQUA BASIN Station ID and Description					
Samples collected in 2011, 2013, or 2015	Deer Creek at Fowler Bridge (2015)	South Umpqua River above mouth (2015)	North Umpqua at Pacific Hwy (2015)	Cow Creek at Lawson Acres water intake (2015)	Screening Value	S.V. Reference
	25950	30163	34140	36309		
	Maximum Values (µg/L)					
Dioxins and Furans, continued						
2,3,4,6,7,8-HxCDF	—	—	—	—	*nsv*	
OCDD	1.2E-05	6.4E-06	—	—	*nsv*	
OCDF	—	—	—	—	*nsv*	
Flame Retardants						
PBDE-66	0.00012	—	—	—	*nsv*	
PBDE-99	0.00402	—	—	—	*nsv*	
Legacy Pesticides						
Total Chlordane	0.00056	—	—	—	8E-05	1
alpha-Chlordane	0.00037	—	—	—	*nsv*	
gamma-Chlordane+trans-Nonachlor	0.00019	—	—	—	*nsv*	
Dieldrin	0.00064	9.8E-05	—	—	5E-06	1
Endosulfan sulfate	—	0.00016	—	—	8.5	1
Heptachlor epoxide	0.00323	—	—	—	4E-06	1
Plant or animal sterols						
beta-Sitosterol	1.73	1.41	0.472	0.961	*nsv*	
Cholesterol	2.6	2.38	0.981	1.11	*nsv*	
Coprostanol	0.135	0.721	0.0142	0.0671	*nsv*	
Stigmastanol	0.263	0.109	0.0316	0.0899	*nsv*	
Priority Metals						
Dissolved						
Aluminum	—	—	—	—	*nsv*	
Arsenic	0.62	1.49	1.56	0.5	*nsv*	
Barium	34.8	18.6	3.62	25	*nsv*	
Copper	1.66	—	—	—	*	2
Iron	83.6	—	—	52.4	1000#	2
Manganese	108.0	8.9	9.6	6.5	*nsv*	
Nickel	2.93	—	—	1.34	*	2
Thallium	—	—	—	—	*nsv*	
Zinc	—	—	—	—	*	2
Total Inorganic						
Arsenic	N/A	0.832	1.24	N/A	2.1	1
Total Recoverable						
Aluminum	166	58.9	144	71.8	*nsv*	
Arsenic	0.62	1.36	1.51	0.48	*nsv*	
Barium	34	19.1	3.88	26.2	1000	1

Appendix A Water Sample Results	UMPQUA BASIN Station ID and Description					
Samples collected in 2011, 2013, or 2015	Deer Creek at Fowler Bridge (2015)	South Umpqua River above mouth (2015)	North Umpqua at Pacific Hwy (2015)	Cow Creek at Lawson Acres water intake (2015)	Screening Value	S.V. Reference
	25950	30163	34140	36309		
	Maximum Values (µg/L)					
Priority Metals, continued						
Total Recoverable						
Chromium	—	—	—	—	11§	
Copper	1.62	—	—	—	*§	2
Iron	332	134	93.7	149	1000	2
Lead	0.28	—	—	—	*§	2
Manganese	121	18.9	15.5	11.5	*nsv*	
Nickel	3.2	1.14	—	1.71	*§	2
Zinc	—	—	—	—	*§	2
Standard Parameters (mg/L)	Average Values					
Dissolved Organic Carbon	4.3	2.9	1.6	2.4		
Hardness as CaCO3 (Dissolved)	186.7	61.8	24.5	60.4		
Sulfate	14.9	8.5	2.2	5.6		
Total Organic Carbon	4.9	2.9	1.3	2.3		
Total Solids	371.0	105.0	63.0	94.7		
Total Suspended Solids	5.3	2.0	2.0	3.0		
Field Parameters						
Conductivity (µmhos/cm @ 25° C)	478	162	90	161		
Dissolved Oxygen (mg/L)	9.4	9.6	9.9	11.0		
pH (SU)	8.0	8.5	7.8	8.7		
Temperature (°C)	17.0	19.8	16.7	19.0		
Turbidity (NTU)	4	2	1	2		

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Appendix A Water Sample Results Samples collected in 2011, 2013, or 2015 Estuary Site	UMPQUA BASIN Station ID and Description Umpqua R at Alfred Tyson Park boat ramp (2015) 38135	Cow Creek DS of Glendale (2015) 38137	Screening Value	S.V. Reference	Umpqua River at Discovery Center Docks (2013) 37399	Saltwater Screening Value	S.V. Reference
	Maximum Values (µg/L)						
Ammonia							
Ammonia as N	—	—	‡	2	—	‡	3
Combustion By-Products							
Fluoranthene	—	—	14	1	0.00347	14	1
Consumer Product Constituents							
bis(2-ethylhexyl)phthalate	—	—	0.2	1	—	0.2	1
Cotinine	—	—	*nsv*		—	*nsv*	
DEET	—	—	*nsv*		—	*nsv*	
Sulfamethoxazole	—	—	*nsv*		—	*nsv*	
Venlafaxine	—	—	*nsv*		—	*nsv*	
Current Use Pesticides							
2,6-Dichlorobenzamide	—	—	*nsv*		—	*nsv*	
Aminomethylphosphonic acid (AMPA)	—	—	249500	5	N/A	249500	5†
Atrazine	0.007	—	1.0	9	0.00484	1.0	9†
Bromacil	—	—	6.8	7	—	6.8	7†
Deisopropylatrazine	—	—	2500	7	—	2500	7†
Desethylatrazine	—	—	1000	7	—	1000	7†
Diuron	—	—	2.4	9	—	2.4	9†
Glyphosate	—	—	11900	10	N/A	11900	10†
Hexazinone	—	—	7	9	—	7	9†
Imazapyr	—	—	24	10	—	24	10†
Metsulfuron Methyl	—	—	0.36	10	N/A	0.36	10†
Norflurazon	—	—	9.7	7	—	9.7	7†
Propiconazole	—	—	21	7	—	21	7†
Simazine	—	—	6	9	—	6	9†
Sulfometuron-methyl	—	—	0.45	10	—	0.45	10†
Terbacil	—	—	11	9	—	11	9†
Dioxins and Furans							
1,2,3,4,6,7,8-HpCDD	3.4E-06	1.7E-06	*nsv*		—	*nsv*	
1,2,3,4,7,8,9-HpCDF	2.8E-06	—	*nsv*		—	*nsv*	
1,2,3,4,7,8-HxCDD	2.4E-06	—	*nsv*		—	*nsv*	
1,2,3,4,7,8-HxCDF	2.1E-06	—	*nsv*		—	*nsv*	
1,2,3,6,7,8-HxCDD	2.7E-06	—	*nsv*		—	*nsv*	
1,2,3,6,7,8-HxCDF	2.1E-06	—	*nsv*		—	*nsv*	
1,2,3,7,8,9-HxCDF	2.7E-06	—	*nsv*		—	*nsv*	
1,2,3,7,8-PeCDD	8.3E-07	—	*nsv*		—	*nsv*	
1,2,3,7,8-PeCDF	1.7E-06	—	*nsv*		—	*nsv*	

State of Oregon Department of Environmental Quality

Appendix A
Water Sample Results

UMPQUA BASIN
Station ID and Description

Samples collected in 2011, 2013, or 2015 Estuary Site	Umpqua R at Alfred Tyson Park boat ramp (2015) 38135	Cow Creek DS of Glendale (2015) 38137	Screening Value	S.V. Reference	Umpqua River at Discovery Center Docks (2013) 37399	Saltwater Screening Value	S.V. Reference
	Maximum Values (µg/L)						
Dioxins and Furans, continued							
2,3,4,6,7,8-HxCDF	2.5E-06	—	*nsv*		—	*nsv*	
OCDD	6.8E-06	5.5E-06	*nsv*		—	*nsv*	
OCDF	5.8E-06	—	*nsv*		—	*nsv*	
Flame Retardants							
PBDE-66	—	—	*nsv*		—	*nsv*	
PBDE-99	—	—	*nsv*		—	*nsv*	
Legacy Pesticides							
Total Chlordane	—	—	8E-05	1	—	8E-05	1
alpha-Chlordane	—	—	*nsv*		—	*nsv*	
gamma-Chlordane+trans-Nonachlor	—	—	*nsv*		—	*nsv*	
Dieldrin	0.00012	—	5E-06	1	—	5E-06	1
Endosulfan sulfate	—	—	8.5	1	—	8.5	1
Heptachlor epoxide	—	—	4E-06	1	—	4E-06	1
Plant or animal sterols					—		
beta-Sitosterol	0.455	0.698	*nsv*		0.214	*nsv*	
Cholesterol	1.05	0.719	*nsv*		0.524	*nsv*	
Coprostanol	0.0384	0.0672	*nsv*		0.0311	*nsv*	
Stigmastanol	0.0445	0.0653	*nsv*		0.0271	*nsv*	
Priority Metals							
Dissolved							
Aluminum	—	23.9	*nsv*		N/A	*nsv*	
Arsenic	1.51	—	*nsv*		1.08	*nsv*	
Barium	8.22	7.57	*nsv*		5.34	*nsv*	
Copper	—	—	*	2	—	0.004	3
Iron	64.6	117	1000$^{\#}$	2	—	*nsv*	
Manganese	4.2	7.2	*nsv*		10.5	*nsv*	
Nickel	—	3.59	*	2	—	8.2	3
Thallium	—	—	*nsv*		0.04	*nsv*	
Zinc	—	7.38	*	2	9.03	81	3
Total Inorganic							
Arsenic	1.03	N/A	2.1	1	0.475	1.0	1
Total Recoverable							
Aluminum	78.5	62.2	*nsv*		N/A	*nsv*	
Arsenic	1.54	—	*nsv*		1.14	*nsv*	
Barium	8.64	7.96	1000	1	6.7	*nsv*	

Appendix A Water Sample Results	UMPQUA BASIN Station ID and Description						
Samples collected in 2011, 2013, or 2015	Umpqua R at Alfred Tyson Park boat ramp (2015)	Cow Creek DS of Glendale (2015)	Screening Value	S.V. Reference	Umpqua River at Discovery Center Docks (2013)	Saltwater Screening Value	S.V. Reference
Estuary Site	38135	38137			37399		
	Maximum Values (µg/L)						
Priority Metals, continued							
Total Recoverable							
Chromium	—	—	11§		—	50§	3
Copper	—	—	*§	2	—	0.004§	3
Iron	138	177	1000	2	317	*nsv*	
Lead	—	—	*§	2	—	8.1§	3
Manganese	9.96	9.66	*nsv*		21.6	*nsv*	
Nickel	—	3.99	*§	2	—	8.2§	3
Zinc	—	8.32	*§	2	—	81§	2
Standard Parameters (mg/L)	Average Values						
Dissolved Organic Carbon	2.1	3.1			2.0		
Hardness as CaCO3 (Dissolved)	32.0	49.4			614.0		
Sulfate	3.6	4.2			272.6		
Total Organic Carbon	1.9	3.1			2.0		
Total Solids	69.0	89.0			3945.3		
Total Suspended Solids	2.0	12.5			5.0		
Field Parameters							
Conductivity (µmhos/cm @ 25° C)	113	119			7918		
Dissolved Oxygen (mg/L)	9.5	9.7			9.3		
pH (SU)	8.1	7.7			7.4		
Temperature (°C)	18.9	14.7			15.4		
Turbidity (NTU)	3	2			4		

Appendix B DETECTION SUMMARY			UMPQUA BASIN Station ID and Description					
Samples collected in 2011, 2013, or 2015	Percent Detection	Number of samples over screening value	South Umpqua at Myrtle Creek (2015) 10444	Calapooya Creek at Umpqua (2015) 10996	Cow Creek at mouth (2011) 10997	South Umpqua at Tiller (2015) 11199	Screening Value	S.V. Reference
			Maximum Values (ng/kg)					
Current Use Pesticides								
Bifenthrin	9		—	—	N/A	—	*nsv*	
Cypermethrin	9		—	—	N/A	—	*nsv*	
Permethrin	9		—	—	N/A	—	*nsv*	
Dioxins and Furans								
1,2,3,4,6,7,8-HpCDD	47	1	0.48	—	—	—	85	11
1,2,3,4,6,7,8-HpCDF	21	0	—	—	—	—	85	11
1,2,3,4,7,8,9-HpCDF	9	0	—	—	—	—	85	11
1,2,3,4,7,8-HxCDD	2	2	—	0.717	—	—	0.34	11
1,2,3,4,7,8-HxCDF	16	1	—	—	—	—	0.34	11
1,2,3,6,7,8-HxCDD	16	3	—	—	—	—	0.34	11
1,2,3,6,7,8-HxCDF	8	1	—	—	—	—	0.34	11
1,2,3,7,8,9-HxCDD	16	1	—	—	—	—	0.34	11
1,2,3,7,8,9-HxCDF	12	0	—	—	—	—	0.34	11
1,2,3,7,8-PeCDD	12	3	—	—	—	—	0.034	11
1,2,3,7,8-PeCDF	7	1	—	0.22	—	—	0.31	11
2,3,4,6,7,8-HxCDF	13	2	—	—	—	—	0.34	11
2,3,4,7,8-PeCDF	8	2	—	—	—	—	0.0037	11
2,3,7,8-TCDD	4	1	—	—	—	—	0.0011	11
2,3,7,8-TCDF	15	0	—	—	—	—	0.094	11
OCDD	4	0	2.69	—	—	—	2800	11
OCDF	2	0	—	—	N/A	—	2800	11
Flame retardants								
PBDE-17	25		—	—	—	—	*nsv*	
PBDE-28	8		—	—	—	—	*nsv*	
PBDE-47	37		—	317	—	—	*nsv*	
PBDE-49	11		—	—	—	—	*nsv*	
PBDE-66	11		—	—	—	—	*nsv*	
PBDE-85	21		—	—	—	—	*nsv*	
PBDE-99	29		—	230	—	—	*nsv*	
PBDE-100	29		—	56.3	—	—	*nsv*	
PBDE-138	8		—	—	—	—	*nsv*	
PBDE-139	8		—	—	—	—	*nsv*	
PBDE-153	19		—	—	—	—	*nsv*	
PBDE-154	19		—	—	—	—	*nsv*	
PBDE-183	11		—	—	—	—	*nsv*	
PBDE-196	7		—	—	—	—	*nsv*	
PBDE-197	7		—	—	—	—	*nsv*	
PBDE-201	7		—	—	—	—	*nsv*	
PBDE-203	7		—	—	—	—	*nsv*	
PBDE-206	6		—	—	—	—	*nsv*	

Appendix B DETECTION SUMMARY Samples collected in 2011, 2013, or 2015	Percent Detection	Number of samples over screening value	South Umpqua at Myrtle Creek (2015) 10444	Calapooya Creek at Umpqua (2015) 10996	Cow Creek at mouth (2011) 10997	South Umpqua at Tiller (2015) 11199	Screening Value	S.V. Reference
			UMPQUA BASIN Station ID and Description — Maximum Values (ng/kg)					
Flame retardants, continued								
PBDE-207	7		—	—	—	—	*nsv*	
PBDE-208	7		—	—	—	—	*nsv*	
PBDE-209	44		—	—	—	—	*nsv*	
Legacy Pesticides								
Total DDT	50	5	—	—	14.2	—	40	11
2,4'-DDD	13		—	—	—	—	*nsv*	
2,4'-DDT	6		—	—	—	—	*nsv*	
4,4'-DDD	31		—	—	—	—	*nsv*	
4,4'-DDE	62		—	—	14.2	—	*nsv*	
4,4'-DDT	31		—	—	—	—	*nsv*	
Total Chlordane	27		—	—	—	—	*nsv*	
alpha-Chlordane	19		—	—	—	—	*nsv*	
cis-Chlordane	9		—	—	N/A	—	*nsv*	
cis-Nonachlor	6		—	—	—	—	*nsv*	
gamma-Chlordane+trans-Nonachlor	13		—	—	—	—	*nsv*	
Dieldrin	6	1	—	—	—	—	1	11
Endosulfan II	13		—	—	—	—	*nsv*	
Endrin+cis-Nonachlor	6		—	—	—	—	*nsv*	
Heptachlor epoxide	6		—	—	—	—	*nsv*	
PCBs								
Total PCBs	64	8	—	284.7	30.57	237.6	48	11
PCB-16+32	7		—	—	—	—	*nsv*	
PCB-17	7		—	—	—	—	*nsv*	
PCB-18	7		—	—	—	—	*nsv*	
PCB-19	7		—	—	—	—	*nsv*	
PCB-20+21+33	7		—	—	—	—	*nsv*	
PCB-22	7		—	—	—	—	*nsv*	
PCB-26	7		—	—	—	—	*nsv*	
PCB-28	7		—	—	—	—	*nsv*	
PCB-31	21		—	—	6.37	—	*nsv*	
PCB-37	7		—	—	—	—	*nsv*	
PCB-42	7		—	—	—	—	*nsv*	
PCB-43+52	7		—	—	—	—	*nsv*	
PCB-44	7		—	—	—	—	*nsv*	
PCB-49	7		—	—	—	—	*nsv*	
PCB-66	21		—	—	13.3	—	*nsv*	
PCB-70	64		—	15.9	10.9	12.2	*nsv*	
PCB-84	7		—	—	—	—	*nsv*	
PCB-95+121	21		—	—	—	—	*nsv*	
PCB-97	21		—	—	—	—	*nsv*	

Appendix B DETECTION SUMMARY Samples collected in 2011, 2013, or 2015	Percent Detection	Number of samples over screening value	UMPQUA BASIN Station ID and Description South Umpqua at Myrtle Creek (2015) 10444	Calapooya Creek at Umpqua (2015) 10996	Cow Creek at mouth (2011) 10997	South Umpqua at Tiller (2015) 11199	Screening Value	S.V. Reference
			Maximum Values (ng/kg)					
PCBs, continued								
PCB-99	36		—	—	—	—	*nsv*	
PCB-101+113	57		—	35.8	—	32.1	*nsv*	
PCB-105	7	0	—	—	—	—	21	11
PCB-110	57		—	36.3	—	31.5	*nsv*	
PCB-118	57	7	—	27.9	—	23.9	26	11
PCB-132+153	57		—	52.3	—	46.7	*nsv*	
PCB-138+163	57		—	29.6	—	24.7	*nsv*	
PCB-141	7		—	—	—	—	*nsv*	
PCB-148	7		—	—	—	—	*nsv*	
PCB-149	57		—	40.5	—	37.3	*nsv*	
PCB-151	43		—	14.2	—	14.2	*nsv*	
PCB-174	14		—	—	—	—	*nsv*	
PCB-180+193	7		—	—	—	—	*nsv*	
PCB-187	50		—	16.3	—	15	*nsv*	
PCB-199	43		—	15.9	—	—	*nsv*	
Priority Metals (Total)			Maximum Value (mg/kg)					
Aluminum	100		19200	24200	N/A	32500	*nsv*	
Arsenic	100	2	3.9	8.37	N/A	9.87	7	11
Barium	100		119	122	N/A	250	*nsv*	
Cadmium	75	0	0.11	0.12	N/A	0.12	1	11
Chromium	100		60.9	50.8	N/A	19.2	*nsv*	
Cobalt	100		10.4	19.5	N/A	15.9	*nsv*	
Copper	100		20	32.6	N/A	20.4	*nsv*	
Lead	100	0	4.84	4.81	N/A	5.79	17	11
Manganese	100		506	818	N/A	932	*nsv*	
Mercury	58	3	0.078	—	N/A	0.071	0.07	11
Nickel	100		59.8	42.8	N/A	12.8	*nsv*	
Thallium	17		—	—	N/A	0.14	*nsv*	
Zinc	100		56.5	54.8	N/A	71.6	*nsv*	

Appendix B DETECTION SUMMARY	UMPQUA BASIN Station ID and Description							
Samples collected in 2011, 2013, or 2015	South Umpqua at Days Creek Cutoff Road (2011)	Lookingglass Creek at Hwy 42 (2015)	Deer Creek at Fowler Bridge, Roseburg (2015)	South Umpqua River above mouth (2015)	North Umpqua at Pacific HWY (2015)	Cow Creek at Lawson Acres water intake (2015)	Screening Value	S.V. Reference
	11484	12248	25950	30163	34140	36309		
	Maximum Values (ng/kg)							
Current Use Pesticides								
Bifenthrin	N/A	—	4930	—	—	—	*nsv*	
Cypermethrin	N/A	—	8490	—	—	—	*nsv*	
Permethrin	N/A	—	5040	—	—	—	*nsv*	
Dioxins and Furans								
1,2,3,4,6,7,8-HpCDD	—	0.421	64.2	—	—	1.19	85	11
1,2,3,4,6,7,8-HpCDF	—	0.244	16.9	—	—	—	85	11
1,2,3,4,7,8,9-HpCDF	—	—	1.23	—	—	—	85	11
1,2,3,4,7,8-HxCDD	—	—	0.803	0.211	—	0.0452	0.34	11
1,2,3,4,7,8-HxCDF	—	—	0.94	0.288	—	0.043	0.34	11
1,2,3,6,7,8-HxCDD	—	—	2.51	0.654	—	0.0744	0.34	11
1,2,3,6,7,8-HxCDF	—	—	0.659	0.279	—	—	0.34	11
1,2,3,7,8,9-HxCDD	—	—	1.71	—	0.138	0.0749	0.34	11
1,2,3,7,8,9-HxCDF	—	—	0.296	—	—	—	0.34	11
1,2,3,7,8-PeCDD	—	—	0.499	—	—	0.0352	0.034	11
1,2,3,7,8-PeCDF	—	—	0.189	—	—	—	0.31	11
2,3,4,6,7,8-HxCDF	—	—	1.23	0.376	—	—	0.34	11
2,3,4,7,8-PeCDF	—	—	0.166	—	—	—	0.0037	11
2,3,7,8-TCDD	—	—	0.097	—	—	—	0.0011	11
2,3,7,8-TCDF	—	—	0.051	—	—	0.0251	0.094	11
OCDD	—	2.97	—	—	—	9.71	2800	11
OCDF	N/A	—	—	—	—	—	2800	11
Flame retardants								
PBDE-17	—	—	—	—	—	—	*nsv*	
PBDE-28	—	—	14.9	—	—	—	*nsv*	
PBDE-47	—	—	597	165	—	—	*nsv*	
PBDE-49	—	—	29	—	—	—	*nsv*	
PBDE-66	—	—	23.3	—	—	—	*nsv*	
PBDE-85	—	—	28.5	—	—	—	*nsv*	
PBDE-99	—	—	631	—	—	—	*nsv*	
PBDE-100	—	—	140	—	—	—	*nsv*	
PBDE-138	—	—	—	—	—	—	*nsv*	
PBDE-139	—	—	—	—	—	—	*nsv*	
PBDE-153	—	—	65.7	—	—	—	*nsv*	
PBDE-154	—	—	56.8	—	—	—	*nsv*	
PBDE-183	—	—	28.9	—	—	—	*nsv*	
PBDE-196	—	—	39.5	—	—	—	*nsv*	
PBDE-197	—	—	21.8	—	—	—	*nsv*	
PBDE-201	—	—	29.5	—	—	—	*nsv*	
PBDE-203	—	—	50.3	—	—	—	*nsv*	
PBDE-206	—	—	173	—	—	—	*nsv*	

State of Oregon Department of Environmental Quality

State of Oregon Department of Environmental Quality (DEQ)	Appendix B DETECTION SUMMARY Samples collected in 2011, 2013, or 2015	UMPQUA BASIN Station ID and Description: South Umpqua at Days Creek Cutoff Road (2011)	Lookingglass Creek at Hwy 42 (2015)	Deer Creek at Fowler Bridge, Roseburg (2015)	South Umpqua River above mouth (2015)	North Umpqua at Pacific HWY (2015)	Cow Creek at Lawson Acres water intake (2015)	Screening Value	S.V. Reference
		11484	12248	25950	30163	34140	36309		
		Maximum Values (ng/kg)							
Flame retardants, continued									
PBDE-207		—	—	121	—	—	—	*nsv*	
PBDE-208		—	—	93.2	—	—	—	*nsv*	
PBDE-209		—	—	2770	368	—	—	*nsv*	
Legacy Pesticides									
Total DDT		38.2	—	329.9	379.7	302.3	—	40	11
2,4'-DDD		—	—	27.5	—	—	—	*nsv*	
2,4'-DDT		—	—	—	—	31.2	—	*nsv*	
4,4'-DDD		—	—	87.4	41.7	24.4	—	*nsv*	
4,4'-DDE		20.5	—	104	234	77.7	—	*nsv*	
4,4'-DDT		17.7	—	111	104	169	—	*nsv*	
Total Chlordane		—	—	704.3	—	25.3	—	*nsv*	
alpha-Chlordane		—	—	169	—	25.3	—	*nsv*	
cis-Chlordane		N/A	—	279	—	—	—	*nsv*	
cis-Nonachlor		—	—	41.3	—	—	—	*nsv*	
gamma-Chlordane+trans-Nonachlor		—	—	215	—	—	—	*nsv*	
Dieldrin		—	—	114	—	—	—	1	11
Endosulfan II		—	—	317	—	379	—	*nsv*	
Endrin+cis-Nonachlor		—	—	90.9	—	—	—	*nsv*	
Heptachlor epoxide		—	—	76.2	—	—	—	*nsv*	
PCBs									
Total PCBs		—	265	653.45	—	362.8	269.4	48	11
PCB-16+32		—	—	—	—	—	—	*nsv*	
PCB-17		—	—	—	—	—	—	*nsv*	
PCB-18		—	—	—	—	—	—	*nsv*	
PCB-19		—	—	—	—	—	—	*nsv*	
PCB-20+21+33		—	—	—	—	—	—	*nsv*	
PCB-22		—	—	—	—	—	—	*nsv*	
PCB-26		—	—	—	—	—	—	*nsv*	
PCB-28		—	—	7.15	—	—	—	*nsv*	
PCB-31		—	—	5.6	—	—	—	*nsv*	
PCB-37		—	—	—	—	—	—	*nsv*	
PCB-42		—	—	—	—	—	—	*nsv*	
PCB-43+52		—	—	—	—	—	—	*nsv*	
PCB-44		—	—	—	—	—	—	*nsv*	
PCB-49		—	—	—	—	—	—	*nsv*	
PCB-66		—	—	11	—	—	—	*nsv*	
PCB-70		—	12.8	22.3	—	13.6	15.6	*nsv*	
PCB-84		—	—	11.7	—	—	—	*nsv*	
PCB-95+121		—	—	33.2	—	22.7	—	*nsv*	
PCB-97		—	—	16.9	—	11.7	—	*nsv*	

Appendix B DETECTION SUMMARY	UMPQUA BASIN Station ID and Description							
Samples collected in 2011, 2013, or 2015	South Umpqua at Days Creek Cutoff Road (2011)	Lookingglass Creek at Hwy 42 (2015)	Deer Creek at Fowler Bridge, Roseburg (2015)	South Umpqua River above mouth (2015)	North Umpqua at Pacific HWY (2015)	Cow Creek at Lawson Acres water intake (2015)	Screening Value	S.V. Reference
	11484	12248	25950	30163	34140	36309		
	Maximum Values (ng/kg)							
PCBs, continued								
PCB-99	—	—	17.5	—	11	—	*nsv*	
PCB-101+113	—	33.7	51.5	—	37.4	34.3	*nsv*	
PCB-105	—	—	19.1	—	—	—	21	11
PCB-110	—	34.6	63	—	43.5	34.9	*nsv*	
PCB-118	—	26.1	50.1	—	28.5	28.2	26	11
PCB-132+153	—	48.7	87.5	—	60.7	47.5	*nsv*	
PCB-138+163	—	26	65.1	—	38.9	26.2	*nsv*	
PCB-141	—	—	14.2	—	—	—	*nsv*	
PCB-148	—	—	11	—	—	—	*nsv*	
PCB-149	—	37.2	63.1	—	46.4	37.1	*nsv*	
PCB-151	—	13.9	—	—	15.1	13.4	*nsv*	
PCB-174	—	—	15	—	—	—	*nsv*	
PCB-180+193	—	—	29.1	—	—	—	*nsv*	
PCB-187	—	15.8	28.1	—	16.3	15.7	*nsv*	
PCB-199	—	16.2	31.3	—	17	16.5	*nsv*	
Priority Metals (Total)	Maximum Values (mg/kg)							
Aluminum	N/A	17300	22900	22300	21800	30700	*nsv*	
Arsenic	N/A	4.06	3.02	3.24	4.07	3.41	7	11
Barium	N/A	99.9	150	134	99.9	305	*nsv*	
Cadmium	N/A	—	0.12	0.13	0.16	0.11	1	11
Chromium	N/A	56.7	160	88.2	99.6	143	*nsv*	
Cobalt	N/A	23	34.6	13.5	21.1	16.5	*nsv*	
Copper	N/A	21.8	34.2	—	27.8	29.9	*nsv*	
Lead	N/A	4.72	13.1	5.54	5.02	6.31	17	11
Manganese	N/A	552	1010	372	824	453	*nsv*	
Mercury	N/A	—	0.046	—	—	0.075	0.07	11
Nickel	N/A	58.7	114	51.9	40.8	108	*nsv*	
Thallium	N/A	—	—	—	—	0.16	*nsv*	
Zinc	N/A	47.1	79.6	63.4	128	68.4	*nsv*	

Appendix B DETECTION SUMMARY	UMPQUA BASIN Station ID and Description					
Samples collected in 2011, 2013, or 2015	N Umpqua at Hestness Boat Ramp (2011)	Umpqua River at Discovery Center Docks (2013)	Umpqua R at Alfred Tyson Park boat ramp (2015)	Cow Creek DS of Glendale (2015)	Screening Value	S.V. Reference
Estuary Site	36829	37399	38135	38137		
	Maximum Values (ng/kg)					
Current Use Pesticides						
Bifenthrin	N/A	N/A	—	—	*nsv*	
Cypermethrin	N/A	N/A	—	—	*nsv*	
Permethrin	N/A	N/A	—	—	*nsv*	
Dioxins and Furans						
1,2,3,4,6,7,8-HpCDD	—	89.1	0.555	41	85	11
1,2,3,4,6,7,8-HpCDF	—	—	—	6.02	85	11
1,2,3,4,7,8,9-HpCDF	—	—	—	0.718	85	11
1,2,3,4,7,8-HxCDD	—	—	—	0.152	0.34	11
1,2,3,4,7,8-HxCDF	—	—	—	0.166	0.34	11
1,2,3,6,7,8-HxCDD	—	—	—	0.691	0.34	11
1,2,3,6,7,8-HxCDF	—	—	—	0.0935	0.34	11
1,2,3,7,8,9-HxCDD	—	—	—	0.31	0.34	11
1,2,3,7,8,9-HxCDF	—	—	—	0.122	0.34	11
1,2,3,7,8-PeCDD	—	—	—	0.0499	0.034	11
1,2,3,7,8-PeCDF	—	—	—	—	0.31	11
2,3,4,6,7,8-HxCDF	—	—	—	0.159	0.34	11
2,3,4,7,8-PeCDF	—	—	—	0.0466	0.0037	11
2,3,7,8-TCDD	—	—	—	—	0.0011	11
2,3,7,8-TCDF	—	—	0.0508	0.0246	0.094	11
OCDD	—	893	—	659	2800	11
OCDF	N/A	N/A	—	106	2800	11
Flame retardants						
PBDE-17	—	28.4	—	—	*nsv*	
PBDE-28	—	—	—	—	*nsv*	
PBDE-47	—	1040	—	197	*nsv*	
PBDE-49	—	115	—	—	*nsv*	
PBDE-66	—	70.5	—	—	*nsv*	
PBDE-85	—	43.6	—	74.5	*nsv*	
PBDE-99	—	1080	—	758	*nsv*	
PBDE-100	—	281	—	134	*nsv*	
PBDE-138	—	—	—	43.4	*nsv*	
PBDE-139	—	—	—	29.7	*nsv*	
PBDE-153	—	103	—	208	*nsv*	
PBDE-154	—	99.2	—	157	*nsv*	
PBDE-183	—	46.8	—	—	*nsv*	
PBDE-196	—	—	—	—	*nsv*	
PBDE-197	—	—	—	—	*nsv*	
PBDE-201	—	—	—	—	*nsv*	
PBDE-203	—	—	—	—	*nsv*	
PBDE-206	—	—	—	—	*nsv*	

Appendix B DETECTION SUMMARY	UMPQUA BASIN Station ID and Description					
Samples collected in 2011, 2013, or 2015	N Umpqua at Hestness Boat Ramp (2011)	Umpqua River at Discovery Center Docks (2013)	Umpqua R at Alfred Tyson Park boat ramp (2015)	Cow Creek DS of Glendale (2015)	Screening Value	S.V. Reference
Estuary Site	36829	37399	38135	38137		
	Maximum Values (ng/kg)					
Flame retardants, continued						
PBDE-207	—	—	—	—	*nsv*	
PBDE-208	—	—	—	—	*nsv*	
PBDE-209	—	1990	663	N/A	*nsv*	
Legacy Pesticides						
Total DDT	12.4	346.9	—	63.7	40	11
2,4'-DDD	—	25.5	—	—	*nsv*	
2,4'-DDT	—	—	—	—	*nsv*	
4,4'-DDD	—	129	—	36.1	*nsv*	
4,4'-DDE	12.4	170	—	27.6	*nsv*	
4,4'-DDT	—	22.4	—	—	*nsv*	
Total Chlordane	—	58.7	—	—	*nsv*	
alpha-Chlordane	—	19.9	—	—	*nsv*	
cis-Chlordane	N/A	N/A	—	—	*nsv*	
cis-Nonachlor	—	—	—	—	*nsv*	
gamma-Chlordane+trans-Nonachlor	—	38.8	—	—	*nsv*	
Dieldrin	—	—	—	—	1	11
Endosulfan II	—	—	—	—	*nsv*	
Endrin+cis-Nonachlor	—	—	—	—	*nsv*	
Heptachlor epoxide	—	—	—	—	*nsv*	
PCBs						
Total PCBs	—	38786.4	—	38465.4	48	11
PCB-16+32	—	57.5	—	—	*nsv*	
PCB-17	—	39.5	—	—	*nsv*	
PCB-18	—	83.7	—	—	*nsv*	
PCB-19	—	12.3	—	—	*nsv*	
PCB-20+21+33	—	83.4	—	—	*nsv*	
PCB-22	—	38.6	—	—	*nsv*	
PCB-26	—	24.9	—	—	*nsv*	
PCB-28	—	—	—	—	*nsv*	
PCB-31	—	117	—	—	*nsv*	
PCB-37	—	32.8	—	—	*nsv*	
PCB-42	—	29.1	—	—	*nsv*	
PCB-43+52	—	123	—	—	*nsv*	
PCB-44	—	79.2	—	—	*nsv*	
PCB-49	—	83	—	—	*nsv*	
PCB-66	—	60.3	—	—	*nsv*	
PCB-70	—	62.9	—	14.7	*nsv*	
PCB-84	—	—	—	—	*nsv*	
PCB-95+121	—	46.6	—	—	*nsv*	
PCB-97	—	—	—	—	*nsv*	

State of Oregon Department of Environmental Quality DEQ	Appendix B DETECTION SUMMARY Samples collected in 2011, 2013, or 2015 Estuary Site	UMPQUA BASIN Station ID and Description N Umpqua at Hestness Boat Ramp (2011) 36829	Umpqua River at Discovery Center Docks (2013) 37399	Umpqua R at Alfred Tyson Park boat ramp (2015) 38135	Cow Creek DS of Glendale (2015) 38137	Screening Value	S.V. Reference
		Maximum Values (ng/kg)					
PCBs, continued							
PCB-99		—	32.2	—	11.5	*nsv*	
PCB-101+113		—	64.8	—	34.2	*nsv*	
PCB-105		—	—	—	—	21	11
PCB-110		—	72.7	—	37.2	*nsv*	
PCB-118		—	71.1	—	29.3	26	11
PCB-132+153		—	75.2	—	56.7	*nsv*	
PCB-138+163		—	58.5	—	35.2	*nsv*	
PCB-141		—	—	—	—	*nsv*	
PCB-148		—	—	—	—	*nsv*	
PCB-149		—	39.1	—	43.8	*nsv*	
PCB-151		—	—	—	14.5	*nsv*	
PCB-174		—	—	—	11.7	*nsv*	
PCB-180+193		—	—	—	—	*nsv*	
PCB-187		—	—	—	21.6	*nsv*	
PCB-199		—	—	—	18	*nsv*	
Priority Metals (Total)		Maximum Values (mg/kg)					
Aluminum		N/A	29500	21800	20600	*nsv*	
Arsenic		N/A	5.73	4.64	1.49	7	11
Barium		N/A	60.5	120	63.6	*nsv*	
Cadmium		N/A	—	0.16	—	1	11
Chromium		N/A	68.3	46.5	83.1	*nsv*	
Cobalt		N/A	14.2	12.4	10.4	*nsv*	
Copper		N/A	28.5	—	21.4	*nsv*	
Lead		N/A	6.45	5.6	3.95	17	11
Manganese		N/A	316	742	505	*nsv*	
Mercury		N/A	0.054	0.057	0.045	0.07	11
Nickel		N/A	44.7	35.6	70.3	*nsv*	
Thallium		N/A	0.054	—	—	*nsv*	
Zinc		N/A	76	56.4	44.5	*nsv*	

State of Oregon Department of Environmental Quality

Appendix C
DETECTION SUMMARY

Samples collected in 2013 or 2014

Samples collected in 2013 or 2014	Percent Detection	Number of samples over screening value	UMPQUA BASIN Station ID and Description: Umpqua River at RM 37.7 (SMB, 2013) 37615	Umpqua River at RM 37.7 (SMB, 2013) 37615	Umpqua River at RM 37.7 (SMB, 2013) 37615	Umpqua River at RM 37.7 (SMB, 2013) 37615	Screening Value	S.V. Reference
			Maximum Values (mg/kg)					
Flame Retardants								
PBDE-17	50		N/A	N/A	N/A	N/A	*nsv*	
PBDE-28	100		N/A	N/A	N/A	N/A	*nsv*	
PBDE-47	100	0	N/A	N/A	N/A	N/A	0.2	12
PBDE-49	100		N/A	N/A	N/A	N/A	0.2	12
PBDE-66	100		N/A	N/A	N/A	N/A	*nsv*	
PBDE-99	100	0	N/A	N/A	N/A	N/A	0.2	12
PBDE-100	100		N/A	N/A	N/A	N/A	*nsv*	
PBDE-153	100	0	N/A	N/A	N/A	N/A	0.2	12
PBDE-154	100		N/A	N/A	N/A	N/A	*nsv*	
Legacy Pesticides								
Total Chlordane	100	0	N/A	N/A	N/A	N/A	1.2	12
alpha-Chlordane	100		N/A	N/A	N/A	N/A	*nsv*	
cis-Nonachlor	100		N/A	N/A	N/A	N/A	*nsv*	
gamma-Chlordane+trans-Nonachlor	100		N/A	N/A	N/A	N/A	*nsv*	
Oxychlordane	50		N/A	N/A	N/A	N/A	*nsv*	
Dieldrin	100	0	N/A	N/A	N/A	N/A	0.1	12
Endrin+cis-Nonachlor	100		N/A	N/A	N/A	N/A	*nsv*	
Mirex	50	0	N/A	N/A	N/A	N/A	0.5	12
Total DDT	100	0	N/A	N/A	N/A	N/A	1.2	12
2,4´-DDT	50		N/A	N/A	N/A	N/A	*nsv*	
4,4´-DDD	100		N/A	N/A	N/A	N/A	*nsv*	
4,4´-DDE	100		N/A	N/A	N/A	N/A	*nsv*	
4,4´-DDT	100		N/A	N/A	N/A	N/A	*nsv*	
PCBs								
Total PCB	100	0	N/A	N/A	N/A	N/A	0.05	12
PCB-28	100		N/A	N/A	N/A	N/A	*nsv*	
PCB-31	100		N/A	N/A	N/A	N/A	*nsv*	
PCB-43+52	100		N/A	N/A	N/A	N/A	*nsv*	
PCB-44	50		N/A	N/A	N/A	N/A	*nsv*	
PCB-49	100		N/A	N/A	N/A	N/A	*nsv*	
PCB-66	100		N/A	N/A	N/A	N/A	*nsv*	
PCB-70	100		N/A	N/A	N/A	N/A	*nsv*	
PCB-74+76	50		N/A	N/A	N/A	N/A	*nsv*	
PCB-85	100		N/A	N/A	N/A	N/A	*nsv*	
PCB-89	100		N/A	N/A	N/A	N/A	*nsv*	
PCB-97	50		N/A	N/A	N/A	N/A	*nsv*	
PCB-99	50		N/A	N/A	N/A	N/A	*nsv*	
PCB-101+113	100		N/A	N/A	N/A	N/A	*nsv*	
PCB-105	100		N/A	N/A	N/A	N/A	*nsv*	
PCB-110	100		N/A	N/A	N/A	N/A	*nsv*	
PCB-110	100		N/A	N/A	N/A	N/A	*nsv*	
PCB-118	100		N/A	N/A	N/A	N/A	*nsv*	

Appendix C DETECTION SUMMARY Samples collected in 2013 or 2014	Percent Detection	Number of samples over screening value	UMPQUA BASIN Station ID and Description Umpqua River at RM 37.7 (SMB, 2013) 37615	Umpqua River at RM 37.7 (SMB, 2013) 37615	Umpqua River at RM 37.7 (SMB, 2013) 37615	Umpqua River at RM 37.7 (SMB, 2013) 37615	Screening Value	S.V. Reference
			Maximum Values (mg/kg)					
PCBs, continued								
PCB-128	100		N/A	N/A	N/A	N/A	*nsv*	
PCB-132+153	100		N/A	N/A	N/A	N/A	*nsv*	
PCB-138+163	100		N/A	N/A	N/A	N/A	*nsv*	
PCB-146	100		N/A	N/A	N/A	N/A	*nsv*	
PCB-149	100		N/A	N/A	N/A	N/A	*nsv*	
PCB-151	50		N/A	N/A	N/A	N/A	*nsv*	
PCB-156	50		N/A	N/A	N/A	N/A	*nsv*	
PCB-170	100		N/A	N/A	N/A	N/A	*nsv*	
PCB-180+193	100		N/A	N/A	N/A	N/A	*nsv*	
PCB-183	100		N/A	N/A	N/A	N/A	*nsv*	
PCB-187	100		N/A	N/A	N/A	N/A	*nsv*	
PCB-203	50		N/A	N/A	N/A	N/A	*nsv*	
Metals (Total)								
Arsenic	66	0	—	—	0.12	0.07	0.7°	12
Mercury	100	6	0.345	0.427	0.618	0.465	0.04	13

State of Oregon Department of Environmental Quality	Appendix C DETECTION SUMMARY	UMPQUA BASIN Station ID and Description					
	Samples collected in 2013 or 2014	Umpqua River at RM 37.7 (Composite) 37615	Umpqua River at RM 21.4 (LMB, 2014) 37818	Umpqua River at RM 21.4 (LMB, 2014) 37818	Umpqua River at RM 21.4 (Composite) 37818	Screening Value	S.V. Reference
		Maximum Values (mg/kg)					
Flame Retardants							
PBDE-17		4.3E-05	N/A	N/A	—	*nsv*	
PBDE-28		3.8E-05	N/A	N/A	4.3E-05	*nsv*	
PBDE-47		0.00134	N/A	N/A	0.00219	0.2	12
PBDE-49		2.3E-05	N/A	N/A	5.7E-05	0.2	12
PBDE-66		2.1E-05	N/A	N/A	2.7E-05	*nsv*	
PBDE-99		0.00043	N/A	N/A	0.00037	0.2	12
PBDE-100		0.00018	N/A	N/A	0.00029	*nsv*	
PBDE-153		6.4E-05	N/A	N/A	8.3E-05	0.2	12
PBDE-154		5E-05	N/A	N/A	6.6E-05	*nsv*	
Legacy Pesticides							
Total Chlordane		0.00016	N/A	N/A	0.00035	1.2	12
alpha-Chlordane		3E-05	N/A	N/A	5.9E-05	*nsv*	
cis-Nonachlor		3.2E-05	N/A	N/A	5.9E-05	*nsv*	
gamma-Chlordane+trans-Nonachlor		9.4E-05	N/A	N/A	0.0002	*nsv*	
Oxychlordane		—	N/A	N/A	3.6E-05	*nsv*	
Dieldrin		1.8E-05	N/A	N/A	4.3E-05	0.1	12
Endrin+cis-Nonachlor		2.7E-05	N/A	N/A	6.8E-05	*nsv*	
Mirex		—	N/A	N/A	1.1E-05	0.5	12
Total DDT		0.00044	N/A	N/A	0.0008	1.2	12
2,4´-DDT		—	N/A	N/A	1.1E-05	*nsv*	
4,4´-DDD		4.1E-05	N/A	N/A	7.1E-05	*nsv*	
4,4´-DDE		0.00036	N/A	N/A	0.00065	*nsv*	
4,4´-DDT		4.8E-05	N/A	N/A	6.8E-05	*nsv*	
PCBs							
Total PCB		0.00048	N/A	N/A	0.00099	0.05	12
PCB-28		8.1E-06	N/A	N/A	1.1E-05	*nsv*	
PCB-31		4.3E-06	N/A	N/A	6.5E-06	*nsv*	
PCB-43+52		1.9E-05	N/A	N/A	2.9E-05	*nsv*	
PCB-44		—	N/A	N/A	1.1E-05	*nsv*	
PCB-49		1E-05	N/A	N/A	1.3E-05	*nsv*	
PCB-66		1.4E-05	N/A	N/A	2.4E-05	*nsv*	
PCB-70		8.7E-06	N/A	N/A	2E-05	*nsv*	
PCB-74+76		—	N/A	N/A	1.8E-05	*nsv*	
PCB-85		8.7E-06	N/A	N/A	1.7E-05	*nsv*	
PCB-89		2.4E-05	N/A	N/A	1E-05	*nsv*	
PCB-97		—	N/A	N/A	9.9E-06	*nsv*	
PCB-99		—	N/A	N/A	5.4E-05	*nsv*	
PCB-101+113		2.6E-05	N/A	N/A	5E-05	*nsv*	
PCB-105		1.8E-05	N/A	N/A	3.7E-05	*nsv*	
PCB-110		1.9E-05	N/A	N/A	3.8E-05	*nsv*	
PCB-110		1.9E-05	N/A	N/A	3.8E-05	*nsv*	
PCB-118		4.7E-05	N/A	N/A	0.0001	*nsv*	

Appendix C DETECTION SUMMARY Samples collected in 2013 or 2014	Umpqua River at RM 37.7 (Composite) 37615	Umpqua River at RM 21.4 (LMB, 2014) 37818	Umpqua River at RM 21.4 (LMB, 2014) 37818	Umpqua River at RM 21.4 (Composite) 37818	Screening Value	S.V. Reference
	UMPQUA BASIN Station ID and Description — Maximum Values (mg/kg)					
PCBs, continued						
PCB-128	1.2E-05	N/A	N/A	2E-05	*nsv*	
PCB-132+153	0.0001	N/A	N/A	0.00018	*nsv*	
PCB-138+163	5.6E-05	N/A	N/A	0.00013	*nsv*	
PCB-146	1.4E-05	N/A	N/A	2.2E-05	*nsv*	
PCB-149	1.5E-05	N/A	N/A	2.3E-05	*nsv*	
PCB-151	—	N/A	N/A	1.4E-05	*nsv*	
PCB-156	—	N/A	N/A	1.2E-05	*nsv*	
PCB-170	1E-05	N/A	N/A	1.6E-05	*nsv*	
PCB-180+193	3.1E-05	N/A	N/A	5.4E-05	*nsv*	
PCB-183	8.9E-06	N/A	N/A	1.3E-05	*nsv*	
PCB-187	2.1E-05	N/A	N/A	4.1E-05	*nsv*	
PCB-203	—	N/A	N/A	1.4E-05	*nsv*	
Metals (Total)						
Arsenic	N/A	0.13	0.1	N/A	0.7°	12
Mercury	N/A	0.636	0.366	N/A	0.04	13