Willamette River Basin Toxics Summary

August 2020

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.

DEQ20-LAB-0030-TR
Version 1.0
Last Updated: 8/6/2020

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Executive summary

In 2016, the Oregon Department of Environmental Quality conducted water quality, sediment, and tissue sampling of 16 rivers and creeks in the Willamette River Basin. This sampling builds on previous water quality and tissue sampling DEQ conducted between 2008 and 2010 in the basin. DEQ's toxics monitoring efforts are resource dependent and the original sampling approach was to visit each basin every five years. Since 2016, DEQ staff have been updating analytical methods, analyzing the data, and revamping the sampling approach of the Toxics Monitoring Program. Sampling will occur yearly at selected locations moving forward. The goals of this sampling and of the Toxics Monitoring Program as a whole are to gather information on chemicals of concern, to identify sources, to make the information available to the public, and to work with internal and external partners to reduce pollutant concentrations.

DEQ staff collected water samples three times a year from 20 locations across the Willamette Basin. Sampling was scheduled during the spring, summer and late fall to capture both the wet and dry periods of the year. Sediment (22 locations) and tissue (8 locations) sample collection occurred only once per year because chemical concentrations are more stable in these media. DEQ analyzed samples for over 460 chemicals and detected 318 chemicals across all media. The analysis included chemicals from nine chemical groups including current-use pesticides, consumer use products, combustion by-products, dioxins and furans, flame-retardants, industrial chemicals, legacy pesticides, PCBs, and metals.

In the upper Willamette sub-basin, the concentrations of the herbicide, diuron, detected in water samples from Lake Creek were among the highest in the state. These detections, however, do not pose a risk to human health. DEQ detected 152 chemicals in sediment collected downstream of a stormwater outfall near Maurie Jacobs Park. Across the river at Maurie Jacobs Park, DEQ detected only 18 chemicals. Levels of chemicals measured in crayfish and mussel samples were too low to harm the health of people who eat them. In the mid-Willamette sub-basin, concentrations of DDT in sediment exceeded its benchmark at every sampling location. The benchmark indicates a concentration below which adverse effects to human health are not expected. Mercury found in crayfish at the Willamette River at Marion St. location in Salem exceeded DEQ's human health criterion. This criterion was set to protect all users including high-end consumers. Thus, the criterion assumes a consumption rate of 175 grams per day and regular consumption of up to two liters of untreated water from the waterbodies. This criterion was also exceeded in crayfish collected in the lower Willamette sub-basin at the Willamette River at St. John's Bridge location. A basin-wide Total Daily Maximum Load project to reduce mercury concentrations is currently in place for the Willamette River. Also, in the lower Willamette sub-basin, legacy pesticide concentrations in water samples remained high from the 2008-2010 sampling. Legacy pesticides are banned from use, so these results potentially indicate residual sources in the basin.

Based upon the results of this study, DEQ staff selected eleven 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, 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. The results from this study will also be used to inform permitting and regulatory programs such as total maximum daily load (TMDL), national pollutant discharge elimination system, and stormwater programs. The results may also be used in the Integrated Report, which reports the status of Oregon's waters to EPA, or as a part of the toxics reduction strategy, a cross media program that supports ongoing toxics reduction efforts within DEQ.

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 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 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 published the water and tissue sampling results from this initial phase as two separate statewide reports. The purpose of this summary is to combine the sampling results from all media types collected in the Willamette River Basin during the initial phase of Toxics Monitoring Program sampling with the most recent phase, completed in 2016. Each of the sub-basins are separated into individual chapters to replicate the reporting done in 2015. The sub-basins are separated as follows: Upper sub-basin (the Coast Fork Willamette, McKenzie, Middle Fork Willamette, South Santiam and Upper Willamette watersheds), Mid sub-basin (the North Santiam, Mid-Willamette, Mollala/Pudding and Yamhill watersheds), and Lower sub-basin (the Clackamas, Tualatin and Lower Willamette watersheds).

Throughout this summary, chemical concentrations are compared to media specific criteria, benchmarks or screening levels. Human health criteria for water quality are designed to protect people who use the water as a primary drinking water source and who 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 in addition to regular consumption of up to two liters of untreated water from the waterbodies. These criteria are intended to protect the beneficial use of "fishing" (to safely eat fish) is supported, rather than how much fish is safe to eat (DEQ 2017a). Consequently, DEQ's standard is more inclusive, protecting all consumers including those on the high-end of the range, than most other state fish tissue standards. 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). Chemical concentrations below EPA's aquatic life benchmarks are not expected to harm aquatic life. These benchmarks are 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 tissue 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 criteria or screening level existed, then the lowest regional or national screening level or criterion was used to ensure a conservative report of exceedances across the basin for each media type.

The selection process for monitoring locations included in the 2008-2010 sampling effort focused on integrator locations that receive water from the larger watersheds within a sub-basin. This process resulted in 20 monitoring locations for water samples and 16 monitoring locations for tissue samples. Sediment samples were not included in the 2008-2010 sampling effort. For the 2016 sampling effort,

additional monitoring locations were added based on the findings from the 2008-2010 sampling, land use, point and non-point source pollution, and input from local stakeholders and basin coordinators to address risks posed to smaller watersheds from chemicals of concern. A small number of reference locations also were included in 2016. These locations were assumed to contain few contaminants based on their location in the watershed, the surrounding land use type, previous sampling results, and stakeholder input. The additional selection criteria resulted in water sample collection from 20 locations, sediment sample collection from 22 locations, and tissue collection from eight locations in 2016 (Table 1). Figure 1 indicates the location of these monitoring locations in the basin. Maps with more detail are included in each sub-basin section. Results in each section of this summary are presented by media type. Comparisons of results from repeated sites, where applicable, are also included. Appendices A-C detail the detection results from both sampling efforts by sub-basin and media type.

Table 1 – Number of locations sampled in each sub-basin of the Willamette River by media type in 2016.

Sub-basin	No. Water Sampling Locations	No. Sediment Sampling Locations	No. Tissue Sampling Locations
Upper Willamette	9	10	2
Mid-Willamette	7	6	2
Lower Willamette	4	6	4
Total	20	22	8

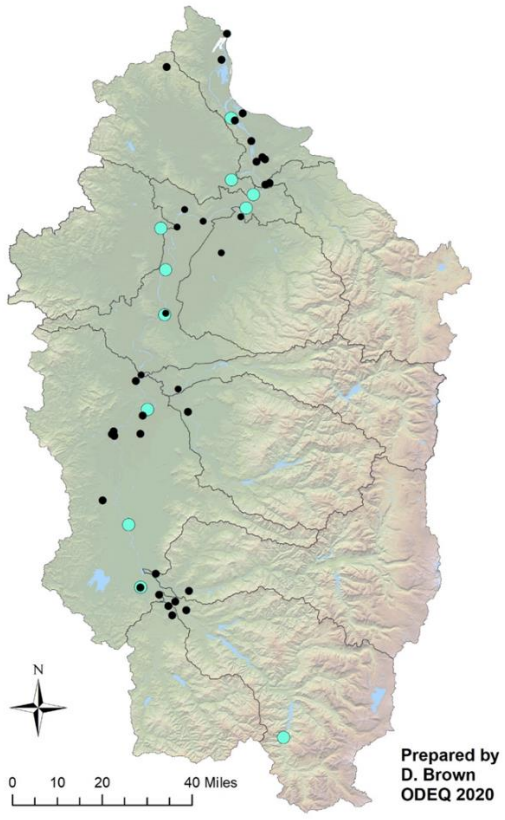

Figure 1 – Map of the study area with monitoring locations. Blue circles indicate monitoring locations carried over from this study to the Toxics Monitoring Network started in 2019. Visit the Water Quality Toxics Monitoring Program webpage for an interactive map of the whole state (https://www.oregon.gov/deq/wq/Pages/WQ-Monitoring-Statewide.aspx).

Upper Willamette Sub-basin

Introduction

This summary combines the sampling results from all media types collected in the Upper Willamette sub-basin (the Coast Fork Willamette, McKenzie, Middle Fork Willamette, South Santiam and Upper Willamette watersheds, collectively) during the initial phase of Toxics Monitoring Program sampling with the most recent phase, completed in 2016. Sampling from 2008-2010 included sample collections from 10 locations and tissue sample collections from seven locations (Table 2). Sediment sampling was not conducted in 2008-2010. In 2016, sampling occurred at nine locations for water, 10 locations for sediment and two locations for tissue (Table 2). Figure 2 indicates the location and matrices collected at each of the monitoring locations in the basin. The sampling location downstream of the stormwater outfall near Maurie Jacobs Park was included in the 2016 analysis on the recommendation of DEQ's Cleanup Program. Due to its proximity to a stormwater outfall (<10 meters), higher concentrations of certain persistent chemicals were expected.

Table 2 – Upper Willamette sub-basin sampling locations

Station	Location Description	Matrices Sampled from 2008-2010	Matrices Sampled in 2016
10350	Willamette River at Albany (eastbound Hwy 20 bridge)	Water	Water and Sediment
10352	Willamette River at Old Hwy 34 Bridge (Corvallis)	Water	
10355	Willamette River at Hwy 99E (Harrisburg)	Water and Tissue	
10359	Willamette River at Hwy 126 (Springfield)	Tissue	
10366	South Santiam River Hwy 226 (Crabtree)	Water	
10373	Mary's River at 99W (Corvallis)	Water	
10376	McKenzie River at Coburg Road	Water and Tissue	Water and Sediment
10379	Coast Fork Willamette River at Hwy 58	Tissue	
10386	Middle Fork Willamette River at Jasper Bridge	Water	
11990	Middle Fork Willamette River at Clearwater Boat Ramp	Tissue	
11140	Long Tom River at Stow Pit Road (Monroe)	Water	Water and Sediment
11180	Calapooia River at Queen Road	Water	Water and Sediment
11275	Coast Fork Willamette at Mt. Pisgah Park	Water	Water and Sediment

27986	Willamette R MF above Hills CR at USGS Gage 14144800		Water, Tissue and Sediment
29043	Willamette River at Willamette Park boat ramp, Corvallis	Tissue	
29044	Willamette River at Greenway bike bridge, Eugene	Water and Tissue	Sediment and Tissue
36875	Luckiamute River at Buena Vista Road		Water and Sediment
37248	Lake Cr at Hwy 34 near Tangent		Water and Sediment
38586	Willamette R at west bank stormwater outfall Maurie Jacobs Park, Eugene		Sediment

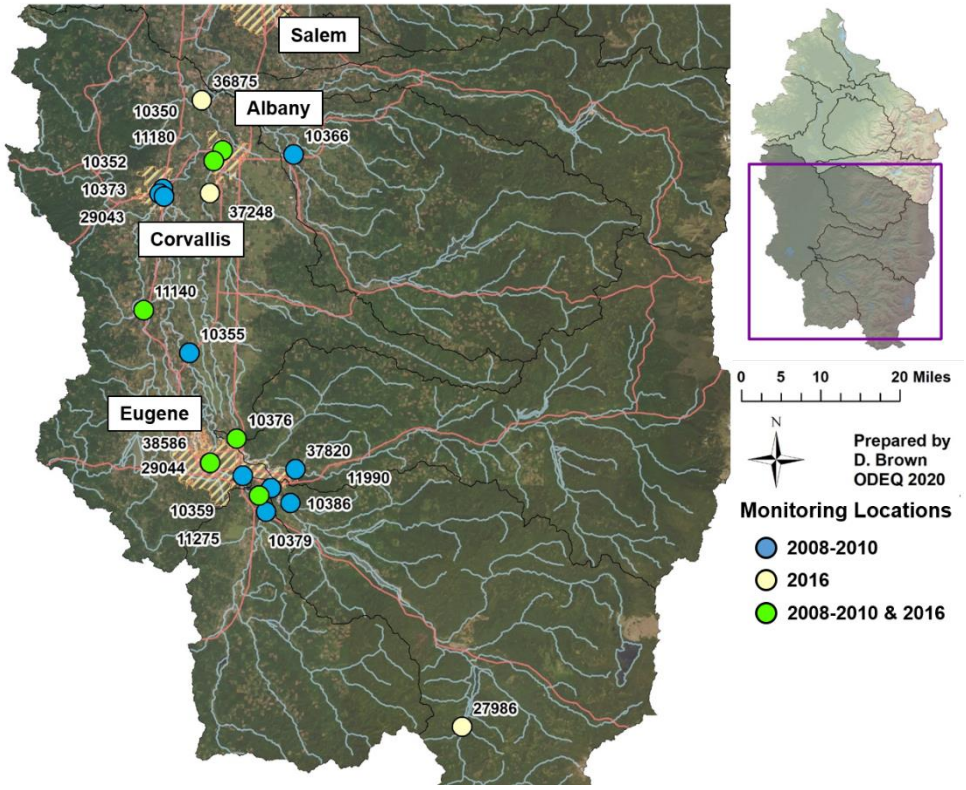

Figure 2 – Map of the study area with monitoring locations by sampling effort. Visit the Water Quality Toxics Monitoring Program webpage for a map of the whole state https://www.oregon.gov/deq/wq/Pages/WQ-Monitoring-Statewide.aspx

Water sample results

Seasonality

To characterize seasonal patterns in hydrology and human uses, collection of water samples took place three times during 2016 and six times during the period between 2008 and 2010. These grab samples were collected from all monitoring locations over a weeklong period each spring, summer and fall/winter. Sampling times were chosen to represent the declining, low water, and increasing arms of the hydrograph.

Figure 3 shows the unique number of chemicals detected by chemical group in each of the seasonal events. This figure does not include plant and animal sterols because detections occurred during each season and sampling effort.

Seasonal samples contained an average of 37 unique chemicals in 2016 compared to an average of 20 unique chemicals from 2008-2010. Metals or current use pesticides accounted for the highest amount of unique detections in all seasons during both sampling efforts (Figure 3). Detections of metals in every season and current use pesticides during the spring sampling effort increased sharply. The increase in pesticide detections was likely due, in part, to new analytical methods with lower minimum reporting limits used during the analysis of 2016 samples. Other potential factors influencing the increase in unique detections could be changes in the number of monitoring locations, sampling events and the inclusion of new parameters, so caution should be used when making comparisons between the datasets. For a full report on the water samples collected during the 2008-2010 sampling effort, see the Statewide Water Quality Toxics Assessment (DEQ, 2015).

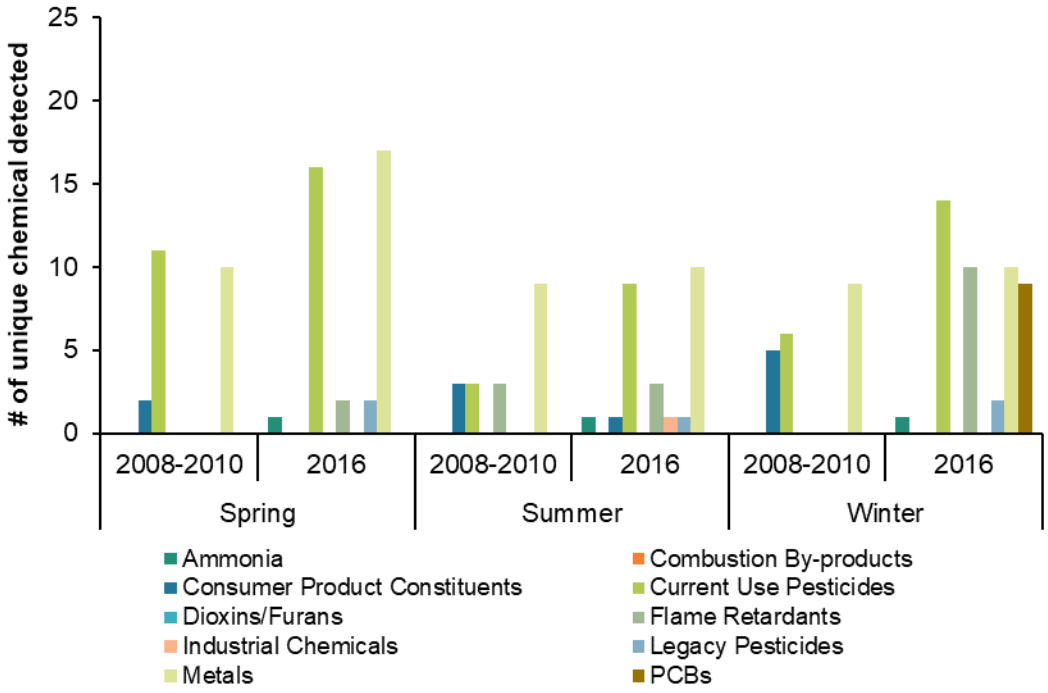

Figure 3 – Seasonality of detection by chemical group in the Upper Willamette sub-basin. Plant and animal sterols were not included in figure due to ubiquitous detection. Improved analytical methods used during the 2016 sampling effort allowed for detections at lower concentrations, which may account for the intra-annual detection disparity.

Metals

This chemical group includes all metals for which Oregon has existing water quality criteria. These metals occur naturally in the environment and can be enriched by human activities. Because of this, detections of these metals in water are common. At least 11 of the 17 metals included in the 2016 analysis were detected at each monitoring location. The highest number of unique metals detected was fourteen found at the Long Tom River (#11140), Willamette River at Hills Creek (#27986), and Lake Creek (#37248) locations. Samples collected in 2008-2010 exceeded the DEQ chronic freshwater aquatic life

criterion for iron at seven of ten monitoring locations. The only other exceedance in the 2008-2010 sampling effort was for chromium at the Mary's River (#10373) location. Dissolved metals were added to the analysis of 2016 samples. This may have contributed to the higher number of detections across the basin; however, the number of exceedances did not increase. Four samples exceeded the iron criterion while the silver criterion was exceeded at the Middle Fork Willamette River location above Hills Creek (#27986). At locations visited during both sampling efforts, iron concentrations were generally lower in 2016 with the exception of the McKenzie River (#10376) location that did not exceed the criteria in either effort.

Legacy Pesticides

Pesticides are a broad class of chemicals that include insecticides, herbicides and fungicides. Legacy pesticides refer to chlorinated insecticides, such as DDT, banned in the United States. Improved analytical methods used in the 2016 sampling effort lowered minimum reporting limits of previously analyzed chemicals and increased the number of detectable chemicals by nearly 25% from the 2008-2010 sampling effort.

Three legacy pesticides were detected in the Upper Willamette sub-basin during the 2016 sampling effort (dieldrin, 4,4'-DDE and endosulfan sulfate). Previously, during the 2008-2010 sampling effort, none of the legacy pesticides included in the analysis were detected. Concentrations of dieldrin and 4,4'-DDE at the Lake Creek (#37248) location exceeded DEQ human health criterion. 4,4'-DDE also exceeded the DEQ human health criterion at the Luckiamute River (# 36875) and Long Tom River (#11140) locations. Despite the exceedances, these human health criteria assume not only a consumption rate of 175 grams of fish or shellfish, but also regular consumption of up to two liters of untreated water from the waterbodies, which are intended to protect all consumers, including those on the high-end of the consumptive range. Although endosulfan sulfate, an insecticide formerly used on a variety of crops, has an established human health criterion, concentrations at the Luckiamute and Lake Creek locations were well below the criterion.

Current Use Pesticides

Current use pesticides are used on agricultural lands, public right-of-ways, managed forest areas, and residential properties. The Lake Creek (#37248) monitoring location contained the most unique current use pesticides during the 2016 sampling effort with 17. Diuron, an herbicide sold as Di-on or Karmex, was the most commonly detected contaminant during both sampling efforts. The only exceedance of the aquatic life benchmark for diuron occurred at the Lake Creek location (Figure 4), despite concentrations just below the benchmark at the Long Tom River (#11140) and Calapooia River (#11180) locations. This benchmark was established to protect aquatic plants and does not pose a risk to human health. None of the other contaminants detected in 2016 approached the applicable benchmarks, however more than one contaminant was found at nearly all of the locations sampled in 2016. Little is known about how persistent low-level detections or detections of multiple chemicals at one sampling location might act in the environment or impact the aquatic community.

Consumer product constituents including pharmaceuticals

The analyte list for consumer products remained the same between the 2008-2010 and 2016 sampling efforts. Two unique compounds, diphenhydramine, commonly sold as Benadryl, and sulfamethoxazole, a commonly used antibiotic, were detected in 2016 compared to six compounds during the 2008-2010 sampling effort. Both compounds in 2016 were detected only once at individual sampling locations and neither has an established human health or aquatic life criteria. Sulfamethoxazole was the most commonly detected compound in the 2008-2010 sampling effort. Two detections of bis(2-ethylhexyl)phthalate, a

plasticizer commonly used in PVC, exceeded DEQ's human health criterion in 2008-2010. This compound was not detected in 2016.

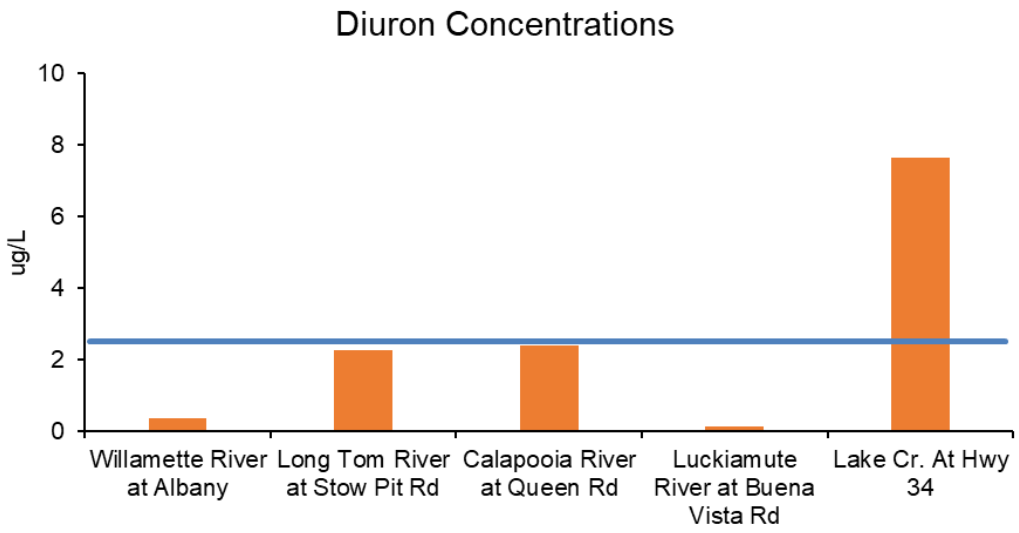

Figure 4 – Diuron concentrations from 2016 in the Upper Willamette sub-basin. The blue line indicates the EPA aquatic life benchmark of 2.4 µg/L for diuron.

Flame retardants

Polybrominated diphenyl ethers (PBDEs) are a group of flame retardants that were 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. Only a small number of PBDEs were included in the analysis of the 2008-2010 samples. Of the 11 included, three were detected. All detections occurred at the South Santiam River location (#10366), and all in the summer sample. This location was not sampled in 2016. In 2016, DEQ implemented a high-resolution analytical method in the sample analysis. Twelve of the 40 different PBDE congeners included in the 2016 analysis were detected, including the three detected during the previous sampling effort. The McKenzie River location (#10376) had the highest number of unique congeners with 10. Five other locations had at least one detection. None of the PBDEs currently have human health or aquatic life criteria.

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. Isophorone, a solvent and polymer precursor, was the only compound detected in the sub-basin during 2016. DEQ has an established human health criterion for isophorone, but the detected concentration was well below the criterion. No industrial chemical detections occurred during the 2008-2010 sampling effort.

Ammonia is a naturally occurring compound commonly found in waste products and may be extremely toxic to aquatic organisms. It is included as an industrial compound because of its use in fertilizers and dyes. Ammonia's toxicity is dependent on pH and temperature and increases as pH and temperature increase. Ammonia detections occurred at four of the nine locations sampled in 2016, none of which exceeded the DEQ freshwater aquatic life criterion. Ammonia was not included in the 2008-2010 analysis.

Polychlorinated biphenyls (PCBs)

PCBs are a class of industrial chemicals historically used as electrical insulating fluid in transformers and capacitors. The manufacture and use of PCBs was banned or limited 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. Nine different PCB congeners were detected in samples collected from the Middle Fork Willamette River location (#27986) during the winter of 2016. While none of the detected congeners has an established individual human health or aquatic life criteria, the overall PCB concentration exceeded the total PCB human health criterion. Again, this criterion assumes both consumption of resident fish at a rate of 175 grams per day and regular consumption of up to two liters of untreated water from the waterbody. The consumption rates assumed in these criteria are intended to protect all consumers, including those on the high-end of the consumptive range. None of the PCBs included in the 2008-2010 sampling effort were detected.

Plant and animal sterols

The laboratory measured four plant and animal sterols in the Upper Willamette sub-basin. These sterols occur naturally in the environment but may also be enriched by humans and human activities. None of the sterols detected currently have a screening value. Additional work is required to evaluate these data and their implications and relationship to other contaminants fully.

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 across the basin with the lowest levels detected at the Middle Fork Willamette River (#27986) and Willamette River near the greenway bike bridge (#29044) sampling locations. The highest levels were detected at the Lake Creek location (#37248).

Measured levels of the animal sterols, cholesterol and coprostanol, varied across the basin with the lowest level of cholesterol detected at the Middle Fork Willamette River location (#27986) and the lowest level of coprostanol found at the McKenzie River location (#10376). The highest level of cholesterol was found at the Lake Creek location (#37248) and the highest level of coprostanol was found at the Willamette River at Albany location (#10350). 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 locations in this study were less than one, indicating that the source of coprostanol is likely biogenic, i.e. higher mammals.

Sediment sample results

Sediment samples were not collected during 2008-2010 in the Upper Willamette sub-basin. DEQ staff collected a single sediment sample from ten locations during August of the 2016 sampling effort.

Metals

Due to the difficulty in associating concentrations of metals in animals and fish with concentrations in sediment, background levels are used in place of screening levels (DEQ 2007). These background levels are intended for comparison use only as they are values representing the 90^{th} or 95^{th} percentile of regional soil samples. Priority metals were present in each sample collected in 2016. Fourteen of the 15 metals

included in the analysis were detected at the location downstream of the stormwater outfall near Maurie Jacobs Park in Eugene (#38586). Two metals, lead and mercury, exceeded background levels at this location. The only other exceedance, arsenic, occurred at the Coast Fork Willamette River location (#11275). These background levels, however, are not to be considered a standard or criteria and exceedance does not indicate a potential health risk to humans or aquatic life.

Legacy Pesticides

Legacy pesticides accumulate and persist in sediment. The analysis in 2016 consisted of 27 chemicals, all of which were also included in the analysis of water samples. Samples collected near the stormwater outfall by Maurie Jacobs Park in Eugene (#38586) had the highest number of unique detections, with 15. Two compounds, dieldrin and total DDT, exceeded sediment bioaccumulation screening levels. These benchmarks 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 from these waterways per day (DEQ 2007). Concentrations of dieldrin, an insecticide created as an alternative to DDT, exceeded the screening level at the Luckiamute River location (#36875) and the stormwater outfall near Maurie Jacobs Park mentioned above. The concentration detected at the location downstream of the stormwater outfall near Maurie Jacobs Park was more than 500x higher than the screening level. As in the water samples, total DDT concentration was reported as the sum of DDT and it's degradates in a single sample. The total DDT screening level was exceeded at 9 of 10 monitoring locations. The highest concentration, more than 90x higher than the screening level, was again found at the location downstream of the stormwater outfall near Maurie Jacobs Park mentioned above. This location was added to the 2016 sampling effort based on the recommendation of DEQ's Cleanup Program and higher concentrations of certain chemicals were expected.

Figure 5 shows a comparison of total DDT concentrations detected in sediment and water samples. The concentrations are normalized by dividing the concentration by the screening value to create a unitless impact ratio. Values greater than one indicate an exceedance of the screening value. Impact ratios were much higher in sediment samples than in water samples at monitoring locations where total DDT was detected in both water and sediment samples.

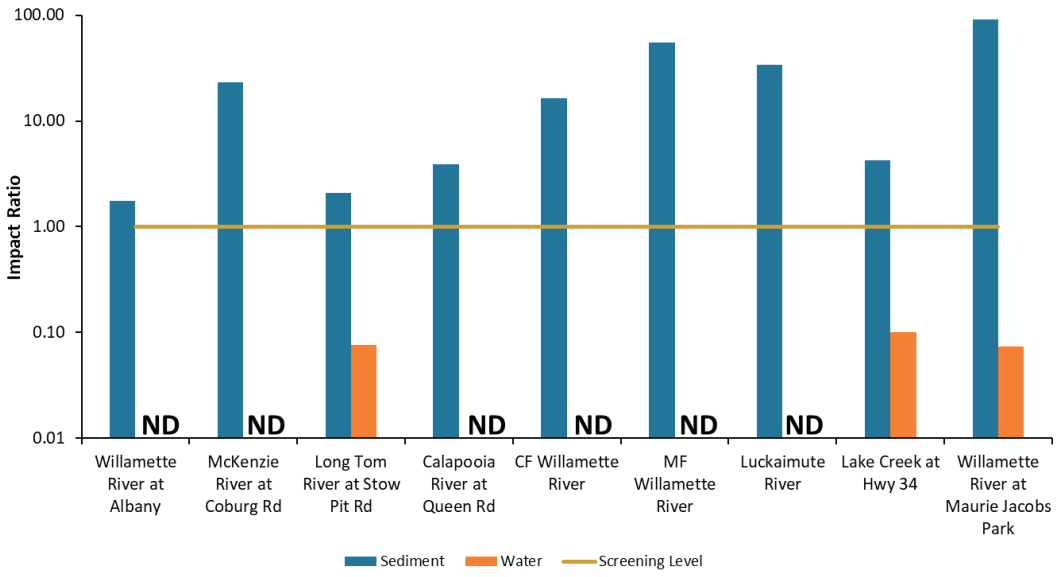

Figure 5 – Comparison of total DDT impact ratios in sediment and water samples from 2016. Values greater than one indicate an exceedance of the criterion or benchmark.

Current Use Pesticides

In 2016, DEQ monitored sediment samples for 11 current use pesticides, a majority of which are pyrethroid insecticides. The others, including trifluralin, chlorpyrifos, and oxyfluorfen, have a similar affinity to partition to sediments as pyrethroids. These pesticides are sold as wettable powders or granules under names like Talstar, Baygon or Temprid. Bifenthrin, an insecticide found in products like Ortho Max Pro, was the only detected pesticide. The detection occurred in Lake Creek (#37248), which flows through a largely agricultural area of the basin just outside the town of Tangent. Bifenthrin does not have an established screening value in sediment.

Dioxins and Furans

This chemical group is made up of two families of chemicals that share a chemical structure. While dioxins and furans can be naturally produced during forest fires, both are primarily produced as by-products during the manufacture pesticides (EPA 2015). Two dioxins and two furans were detected during the 2016 sediment sample analysis. Two locations, Coast Fork Willamette (#11275) and near the stormwater outfall near Maurie Jacobs Park in Eugene (#38586), contained all four contaminants. The dioxin 1,2,3,4,6,7,8-HpCDD exceeded its sediment bioaccumulation screening level near Maurie Jacobs Park in Eugene.

Flame retardants

Nearly all of the 20 PBDEs detected in the Upper Willamette sub-basin were exclusively found at the location downstream of the stormwater outfall near Maurie Jacobs Park in Eugene (#38586). Three other locations also had PBDE detections. The sample collected from the Coast Fork Willamette (#11275) location contained four PBDEs, while the samples collected at the McKenzie River (#10376) and Willamette River at Greenway Bridge (#29044) locations each contained one PBDE. None of the detected flame retardants have established bioaccumulation screening levels.

PCBs

Similar to the PBDEs, nearly all of the 99 PCBs detected in the Upper Willamette sub-basin were detected only at the location downstream of the stormwater outfall near Maurie Jacobs Park in Eugene (#38586). Five other locations contained PCBs, but the highest number of unique detections found at any of those locations was five. Total PCB concentrations exceeded the bioaccumulation screening level at three locations, Coast Fork Willamette (#11275), Willamette River at Greenway Bridge (#29044), and the downstream of the stormwater outfall near Maurie Jacobs Park in Eugene. Unsurprisingly, the location downstream of the stormwater outfall near Maurie Jacobs Park location had the highest concentration of total PCBs and was more than 456 times higher than the screening level. Eight individual PCB congeners also exceeded bioaccumulation screening levels at this location.

Tissue sample results

While the 2008-2010 tissue samples consisted of a variety of finfish species, including largemouth bass, smallmouth bass, northern pikeminnow, largescale sucker, and rainbow trout, the 2016 tissue samples consisted entirely of shellfish. DEQ staff chose to sample shellfish rather than finfish to capture a more accurate picture of the environment at the monitoring location given that shellfish occupy a lower trophic level than finfish. Signal crayfish were collected at two monitoring locations and Western pearlshell mussels were collected at one location in 2016. DEQ staff attempted to collect mussels from a second site, near the stormwater outfall by Maurie Jacobs Park in Eugene, without success despite seemingly

appropriate habitat. This sampling design allowed for inter- and intraspecies matrix comparisons. Finfish samples were analyzed as skinless fillets to match the OHA fish cleaning guidelines. Shellfish samples for each matrix type were homogenized to meet volume requirements prior to analysis.

Contaminant concentrations in this section were compared to OHA's fish advisory program screening levels, DEQ's human health criteria, and DEQ's acceptable tissue levels. OHA's screening levels are based on a consumption rate of four 8-ounce meals per month by a 70 kg adult (OHA 2013). DEQ's human health criteria are based on a consumption rate of twenty-three 8-ounce meals per month (DEQ 2014). The acceptable tissue levels apply to humans and wildlife consuming fish from a sampling location. Concentrations of bioaccumulative chemicals below the acceptable tissue levels are not expected to cause adverse effects on the organisms consuming the fish (DEQ 2007). If a contaminant had more than one criteria or screening level, the lowest option was used to ensure a conservative report of exceedances across the basin.

2008-2010 Sampling effort

Samples collected in the Upper Willamette sub-basin contained 18 flame-retardants, 22 legacy pesticides, and 194 PCBs (DEQ 2017b). The only priority metal included in the first sampling effort was mercury and concentrations exceeded the DEQ human health criterion for fish consumption of 0.04 mg/kg (DEQ 2014) at each location sampled. Specifically, the sample collected at the Willamette River at Highway 99E location (#10355) had the highest mercury detection in the basin. None of the other detected chemicals exceeded the applicable human health or aquatic life criteria. For a full report on the tissue samples collected during the 2008-2010 sampling effort, see the Statewide Aquatic Tissue Toxics Report released in 2017 (https://go.usa.gov/xyxSW).

2016 Sampling effort

Metals

As noted in the 2008-2010 summary, mercury was detected at concentrations over the DEQ human health criterion at every location in finfish. This was not the case in 2016 in the collected crayfish and mussels. None of the samples collected in 2016 contained mercury over the criterion. This may be attributable to the different species and lower trophic level of the invertebrates compared to fish. Arsenic and cadmium also have established acceptable tissue levels; however, neither was exceeded. Other detected metals included chromium, cobalt, nickel, titanium and zinc. None of these metals have established acceptable tissue levels. Concentrations of these metals and those with established acceptable tissue levels were relatively consistent between locations and species.

Legacy Pesticides

Legacy pesticides were found at one of the two monitoring locations sampled in 2016. The total number of unique compounds detected (five) was much fewer than detected between 2008 and 2010 (19); however, site selection and species (trophic level) sampled likely influenced this difference. The five compounds detected in 2016 were alpha-chlordane, gamma-chlordane+trans-nonachlor, dieldrin, 4,4'-DDD, and 4,4'-DDE. Samples collected at the Greenway bike bridge in Eugene (#29044) contained all five compounds. DEQ staff collected both crayfish and mussel samples at this location. The crayfish sample contained fewer compounds (4,4'-DDE) than the mussel sample (all five compounds) although the concentration of 4,4'-DDE was higher in the crayfish sample. None of the detected compounds exceeded DEQ's established acceptable tissue levels for wildlife consumption (DEQ 2007).

Current Use Pesticides

Current use pesticides are not known to sequester in tissue like legacy pesticides and thus were not included in either the 2008-2010 or 2016 sampling effort.

Flame retardants

Four PBDE congeners were detected in the mussel sample collected at the Greenway bike bridge in Eugene (#29044). Detected concentrations were well below applicable acceptable tissue levels. No PBDEs were detected in either of the crayfish samples collected.

PCBs

Thirty-eight PCB congeners were detected in shellfish samples in 2016. Only one congener was detected in crayfish samples from the Middle Fork Willamette location (#27986). Whereas, the crayfish sample collected at the Greenway bike bridge location in Eugene (#29044) contained 20 PCB congeners. The highest number of unique congeners, however, was detected in the mussel sample collected at the Greenway bike bridge. The mussel sample contained 28 PCB congeners. Regardless of the number of congeners detected, none of the concentrations exceeded the applicable acceptable tissue levels for PCBs. In 2010, a fish tissue sampled collected at the Greenway bike bridge location contained a total PCB concentration more than double the OHA fish advisory program's screening level.

Summary and Recommendations

A number of improvements were made to the Toxics Monitoring Program between the first and second sampling efforts in the Upper Willamette sub-basin. This included the addition of new analytes (i.e., glyphosate and AMPA) and new analytical methods that allowed for lower detection limits. Sediment samples were collected for the first time and the tissue sampling was expanded to include new, less mobile species for a clearer idea of how toxic chemicals work their way into the environment and the food chain.

Water samples were collected from four locations during both sampling efforts; Willamette River at Albany (#10350), McKenzie River at Coburg Road (#10376), Long Tom River at Stow Pit Road (#11140) and Calapooia River at Queen Road (#11180). During the 2008-2010 sampling effort, the number of metals and current use pesticides detected in water samples at the Long Tom and the Calapooia rivers locations raised concern for the aquatic life. In general, metals detected during both sampling efforts at these locations decreased in concentration. Overall, though, the number of metals detected at each location increased. The same analytical method was used during both sampling efforts. In 2008-2010, the only metal that exceeded its criterion at these locations was iron with the exception of the McKenzie River location. In 2016, iron concentrations only exceeded the criterion at the Long Tom River location. Current use pesticide detections increased at the Willamette and Calapooia river locations, but remained the same or decreased at the other two locations. None of the detected current use pesticides exceeded the applicable criteria during either sampling effort. The most new compounds detected in the 2016 analysis were flame retardants. An improved analytical method was used for the 2016 analysis, and the number of flame retardants included in the 2016 analysis was four times larger than those included in the 2008-2010 analysis (11 in 2008-2010 and 44 in 2016). The only flame retardant detected at the repeated locations in 2008-2010 samples occurred at the Willamette River location. This compound was again detected in 2016. Additionally, ten compounds were detected in the McKenzie River and four compounds in the Long Tom River. A breakdown product of DDT was the lone legacy pesticide detection

that occurred at these repeated locations across the two sampling efforts. The detection occurred in 2016 at the Long Tom River location and did not exceed its criterion.

Two locations added for the 2016 sampling effort, Lake Creek at Tangent (#37248) and near the stormwater outfall near Maurie Jacobs Park (#35856), stood apart from the other new monitoring locations. Water and sediment samples from the Lake Creek monitoring location contained high numbers of unique pesticides, mostly current use, and metals. These detections included the highest concentration of diuron in the entire Willamette River Basin at nearly three times the EPA aquatic life benchmark (EPA 2014) and the only exceedance of dieldrin in the Upper Willamette sub-basin. Lake Creek flows through a large agricultural area, which may explain the high concentrations of these pesticides. The sediment sample collected at the location downstream of the stormwater outfall near Maurie Jacobs Park contained four dioxins and furans, 14 metals, 17 legacy pesticides, 20 PBDEs, and 99 PCBs. Fourteen of those detected contaminants exceeded the applicable screening level. This location receives stormwater drainage. Elevated concentrations, especially those of persistent contaminants such as PCBs, may be related to long-term stormwater influences to the area. None of the other sediment samples collected in the Upper Willamette sub-basin contained anywhere close to that many contaminants, including the Greenway bike bridge monitoring location (#29044) is directly across the river. Future sampling should continue to monitor these locations.

The Greenway bike bridge in Eugene (#29044) and Willamette River above Hills Creek (#27986) monitoring locations were the only locations where water, sediment and tissue were all collected in 2016. These locations along with the Willamette River at Albany and the Willamette River at Hwy 99E locations were selected as a part of the new toxics monitoring network. Water sampling will occur at these location three times a year from 2019 moving forward. Plans to conduct sediment and tissue sampling is currently being planned. This continued sampling should help create a clear picture of the influence of toxic chemicals at each monitoring location. Additional sampling may also help identify any potential trends emerging within the basin. As a result of this study, waterbodies may also be listed as a part of the integrated report, a statewide reporting of the status of water in Oregon required every two years by the EPA.

Mid-Willamette Sub-basin

Introduction

This summary combines the sampling results from all media types collected in the Mid-Willamette sub-basin (the North Santiam, Middle Willamette, Mollala/Pudding and Yamhill watersheds, collectively) during the initial phase of Toxics Monitoring Program sampling with the most recent phase, completed in 2016. Sampling from 2008-2010 occurred at seven locations for water and three locations for tissue (Table 3). Sediment sampling was not included in this phase of sampling. In 2016, sampling occurred at seven locations for water, two locations for tissue and six locations for sediment (Table 3). Figure 6 indicates the location and matrices collected at each of the monitoring locations in the basin.

Table 3 – Mid-Willamette sub-basin sampling locations

Station	Location Description	Matrices Sampled from 2008-2010	Matrices Sampled in 2016
10339	Willamette River at Canby Ferry	Water	

10344	Willamette River at Wheatland Ferry	Water and Tissue	Water and Sediment
10363	Yamhill River at Dayton	Water	Water and Sediment
10555	Willamette River at Marion Street (Salem)	Water	Water, Tissue, and Sediment
10637	Molalla River at Knights Bridge Road (Canby)	Water	
10640	Pudding River at Hwy 211 (Woodburn)	Water	Water
10648	Yamhill River at mouth	Tissue	
10774	Santiam River at mouth	Tissue	
10792	North Santiam River at Greens Bridge	Water	
26339	Willamette River upstream of Newberg Bridge at Rogers Landing	Tissue	
28961	Mill Creek at Front Street NE, Salem (tributary to Willamette River at River Mile 84)		Water and Sediment
31545	Willamette River at Hebb Park Boat Ramp		Water, Tissue, and Sediment
33638	Champoeg Creek near mouth at Champoeg State Park (Willamette)		Water, Sediment

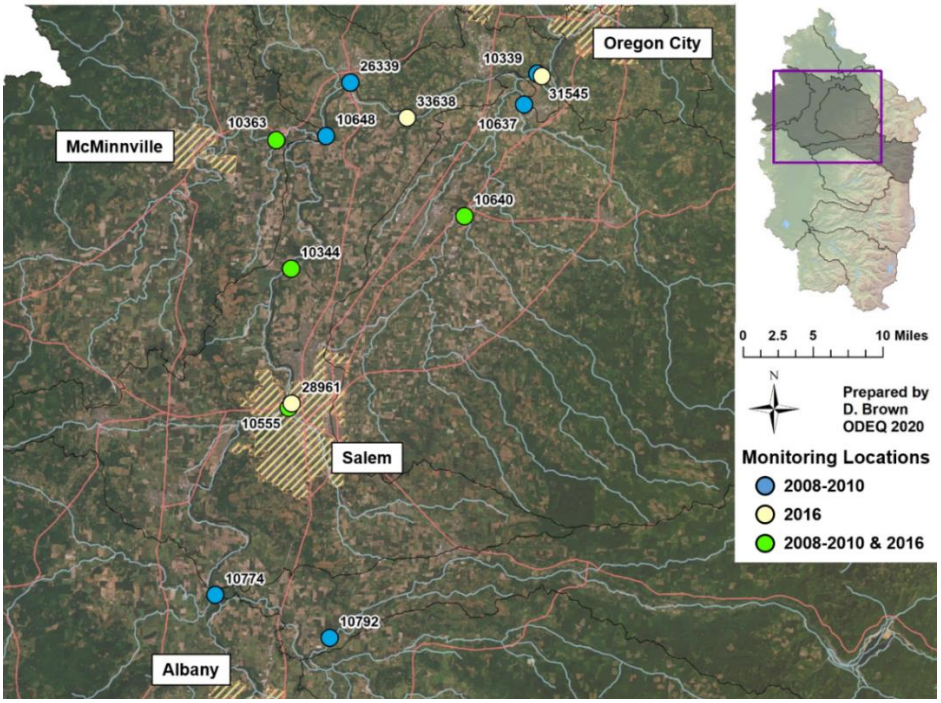

Figure 6 – Map of the study area with monitoring locations by matrix. Visit the Water Quality Toxics Monitoring Program webpage for a map of the whole state (https://www.oregon.gov/deq/wq/Pages/WQ-Monitoring-Statewide.aspx)

Water sample results

Seasonality

As in the Upper Willamette sub-basin water samples were collected three times during 2016 and six times during the period between 2008 and 2010. These grab samples were collected from all monitoring locations over a weeklong period each spring, summer and fall/winter. Sampling times were chosen to represent the declining, low water, and increasing arms of the hydrograph. Figure 7 shows the unique number of chemicals detected by chemical group in each of the seasonal events. This figure does not include plant and animal sterols because detections occurred during each season and sampling effort.

Seasonal samples contained an average of 47 unique chemicals in 2016 compared to an average of 24 unique chemicals from 2008-2010. Metals accounted for the highest number of unique detections followed by current use and legacy pesticides in all seasons during both sampling efforts (Figure 7). The increase in current use pesticide detections between the two sampling efforts was likely due, in part, to new analytical methods with lower minimum reporting limits used during the analysis of 2016 samples. Other factors potentially influencing the increase could be changes in the number of monitoring locations, sampling events and the inclusion of new parameters, so caution should be used when making comparisons between the datasets. For a full report on the water samples collected during the 2008-2010 sampling effort, see the Statewide Water Quality Toxics Assessment (DEQ, 2015).

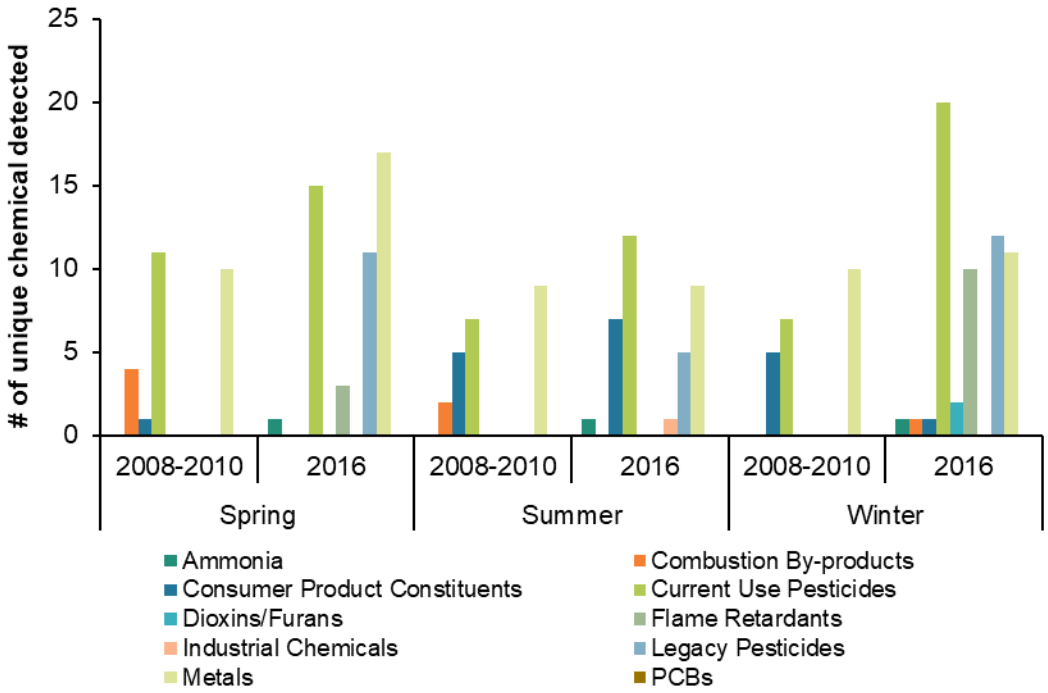

Figure 7 – Seasonality of detection by chemical group in the Mid-Willamette sub-basin. Plant and animal sterols were not included in figure due to ubiquitous detection. Improved analytical methods used during the 2016 sampling effort allowed for detections at lower concentrations, which along with an increase in the number of locations sampled may account for the seasonal detection disparity.

Metals

At least 11 of the 17 metals included in the 2016 analysis were detected at each monitoring location. The Pudding River location (#10640) contained the largest number of unique metals (15). Each site sampled during the 2008-2010 sampling effort exceeded at least one DEQ freshwater chronic aquatic life criteria. Iron concentrations exceeded the criterion at five locations, copper exceeded at four and chromium and zinc concentrations exceeded their criteria at one location each. Exceedances occurred at four locations in 2016. Iron concentrations, again, exceeded at the most locations in the basin with three. Other exceedances occurred for thallium and inorganic arsenic at one location each. Inorganic arsenic was detected at the Champoeg Creek location (#33638) in all three samples in 2016. The criterion for iron was established to protect aquatic life and exceedances do not pose a risk to human health. The criteria for thallium and inorganic arsenic assume not only a consumption rate of 175 grams of fish or shellfish, but also regular consumption of up to two liters of untreated water from these waterbodies. The consumption rates assumed in these criteria are intended to protect all consumers, including those on the high-end of the consumptive range.

Legacy Pesticides

DEQ staff analyzed samples for 33 legacy pesticides and detected 13 in 2016. Of these 13 detected chemicals, eight were included in the 2008-2010 analysis without detection. A comparison of the minimum reporting limit for these chemicals between the two sampling efforts show that reporting limits dropped 2-3 orders of magnitude with the implementation of the new analytical method. For example, the reporting limit for dieldrin dropped from 0.02 µg/L to 0.00064 µg/L.

The Champoeg Creek (#33638) and Pudding River (#10640) locations had the highest number of detections (10) and exceedances (7) across the basin. Dieldrin, total chlordane, 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT all exceeded DEQ human health criteria, while total DDT exceeded DEQ's freshwater chronic aquatic life criterion at both locations. Aldrin also exceeded at the Champoeg Creek location and heptachlor epoxide exceeded at the Pudding River location. The "total" compounds were reported as the sum of the concentrations of the parent compound, degradates, and compounds in the same family detected in a single sample. Dieldrin was the most commonly detected pesticide in the sub-basin. It was detected in each of the tributaries in 2016, but not in the mainstem Willamette River. The only location without a legacy pesticide detection was the Wheatland Ferry (#10344) location on the Willamette River.

Current Use Pesticides

Current use pesticides were the most commonly detected chemical group in both sampling efforts. During the 2008-2010 effort, 14 unique compounds were detected, while during the 2016 effort 24 unique compounds were detected. The highest number of unique detections, in 2016, was at the Champoeg Creek location (#33638) with 20. The site with the highest number of detections in 2008-2010 was the Pudding River location (#10640), which had the second most in 2016 with 14. Only one compound exceeded an established benchmark in 2016. Imidicloprid, an insecticide created to mimic nicotine, which is toxic to insects, exceeded the EPA freshwater chronic aquatic life benchmark for invertebrates at the Champoeg Creek location. Glyphosate, added to the analysis in 2016, was detected at two locations, Mill Creek (#28961) and Champoeg Creek, neither detection exceeded its benchmark. Aminomethylphosphonic acid (AMPA), a breakdown product of glyphosate, was also included in the 2016 analysis. AMPA was detected at four locations, Yamhill River (#10363), Pudding River, Mill Creek, and Champoeg Creek, again, none of the detections exceeded the benchmark.

Combustion by-products

Combustion by-products include polycyclic aromatic hydrocarbons (PAHs) and are associated with the incomplete combustion of organic matter from automobiles, fossil fuels 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. Only one combustion by-product detection, dibenzofuran, occurred in the Mid-Willamette sub-basin. This detection occurred at the Champoeg Creek location (#33638). No human health or aquatic life criterion exists for this compound. During the 2008-2010 sampling effort, three combustion by-products were detected at concentrations above the applicable DEQ human health criteria (benzo(b)fluranthene, benzo(g,h,i)perylene, and indeno(1,2,3-cd)pyrene). The exceedances occurred at the Canby (#10339) and Wheatland (#10344) ferry locations in the Willamette River and may be related to the car ferries at these sites.

Consumer product constituents including pharmaceuticals

The analyte list for consumer products remained the same between the two sampling efforts. The number of unique detections remained nearly the same as well with seven unique compounds detected in 2016 compared to six during the 2008-2010 sampling effort. The location with the highest number of unique detections in 2016 was the Yamhill River at Dayton (#10363) and the Pudding River at Highway 211 location (#10640) in 2008-2010. Sulfamethoxazole was the most commonly detected compound in 2016. Only two of the compounds detected in 2016 have established human health or aquatic life criteria (acetaminophen and diethylphthalate) and in both cases, the detected concentration was well below the applicable criterion.

Dioxins and furans

Analysis for this chemical group was not included in the 2008-2010 sampling effort. The implementation of a high-resolution analytical method in 2016 allowed DEQ to include 17 dioxins and furans in the analysis. Two dioxins, OCDD and 1,2,3,4,6,7,8-HpCDD, were detected at the Yamhill River location. No other detections occurred in water samples across the basin. Neither detected dioxin currently has a human health or aquatic life criteria.

Flame retardants

For the 2008-2010 sampling effort, samples were analyzed for a small number of PBDEs by gas chromatography/mass spectrometry without detection. The high-resolution method employed for the 2016 samples had a lower minimum reporting limit and could detect a wider variety of PBDEs. Using this high-resolution method, three of the 40 PBDE congeners included in the 2016 analysis were detected. The detections occurred at the Yamhill River (#10363) and Willamette River at Hebb Park (#31545) locations. None of the PBDEs included in the 2016 analysis have aquatic life or human health criteria.

Industrial chemicals and ammonia

This group of analytes includes a selection of 21 chemical intermediates used in the production of pesticides, pharmaceuticals, rubber, consumer products, etc. Isophorone, a solvent and polymer precursor, was the only compound detected in the sub-basin in 2016. No industrial chemical detections occurred during the 2008-2010 sampling effort. DEQ has an established human health criterion for isophorone, but the detected concentration was well below the concentration.

Plant and animal sterols

Both plant sterols, beta-sitosterol and stigmastanol were detected at all locations. Levels varied across the basin with the lowest levels detected at the Yamhill River location (#10363). The highest levels were detected at the Champoeg Creek location (#33638).

Similarly, the animal sterols, cholesterol and coprostanol, also varied across the basin. The lowest levels of both detected at the Willamette River location at Marion Street in Salem (#10555). The highest level of cholesterol was found at the Mill Creek location (#28961) and the highest level of coprostanol was found at the Wheatland Ferry location (#10344) on the Willamette River. The ratios of coprostanol to cholesterol measured at all sites in this study were less than one, indicating that the source of coprostanol is likely biogenic (i.e. livestock, humans).

Sediment sample results

Sediment samples were not collected during 2008-2010 in the Mid-Willamette sub-basin. DEQ staff collected a single sediment sample from six locations during July 2016.

Metals

Metals were present in each sample collected in 2016. Each of the metals included in the analysis were detected at the Yamhill River at Dayton (#10363) and Champoeg Creek (#33638) monitoring locations. Due to the difficulty in associating concentrations of metals in animals and fish with concentrations in sediment, background levels are used in place of screening levels (DEQ 2007). These background concentrations are intended for comparison use only as they are values representing the 90^{th} or 95^{th} percentile of regional soil samples. Three metals included in the analysis have established background levels (arsenic, cadmium, and lead). The arsenic concentration detected in the sample collected at the Champoeg Creek location (9.49 mg/kg) exceeded the arsenic background level of 7 mg/kg. The only other exceedance occurred at the Mill Creek location (#28961), where the lead concentration (37.4 mg/kg) exceeded the background level of 17 mg/kg. These background levels, however, are not to be considered a standard or criteria and exceedance does not indicate a potential health risk to humans or aquatic life.

Legacy Pesticides

The analysis in 2016 consisted of 29 compounds, all of which were also included in the analysis of water samples. The Mill Creek location (#28961) had the highest number of unique detections with 14. Two compounds, dieldrin and total DDT, exceeded sediment bioaccumulation screening levels. Concentrations of dieldrin, an insecticide created as an alternative to DDT, exceeded the screening level at three locations. The highest concentration occurred at the Champoeg Creek location (#33638). As in the water samples, total DDT concentrations were reported as the sum of DDT and its degradates in a single sample. The total DDT screening level was exceeded at each monitoring location. The highest concentration, found at the Mill Creek location where the concentration of 5006 ng/kg was well over DEQ's bioaccumulation screening level of 40 ng/kg. These screening levels represent the concentration at or below which chemicals would not be expected to affect the human population consuming more than 17g of fish or shellfish from these waterways per day (DEQ 2007).

Figure 8 shows a comparison of total DDT concentrations detected in sediment and water samples. The concentrations are normalized by dividing the concentration by the screening value to create a unitless impact ratio. Values greater than one indicate an exceedance of the screening value. At monitoring

locations at which DDT was detected in both water and sediment samples, the impact ratios were much higher in the sediment samples than in water samples.

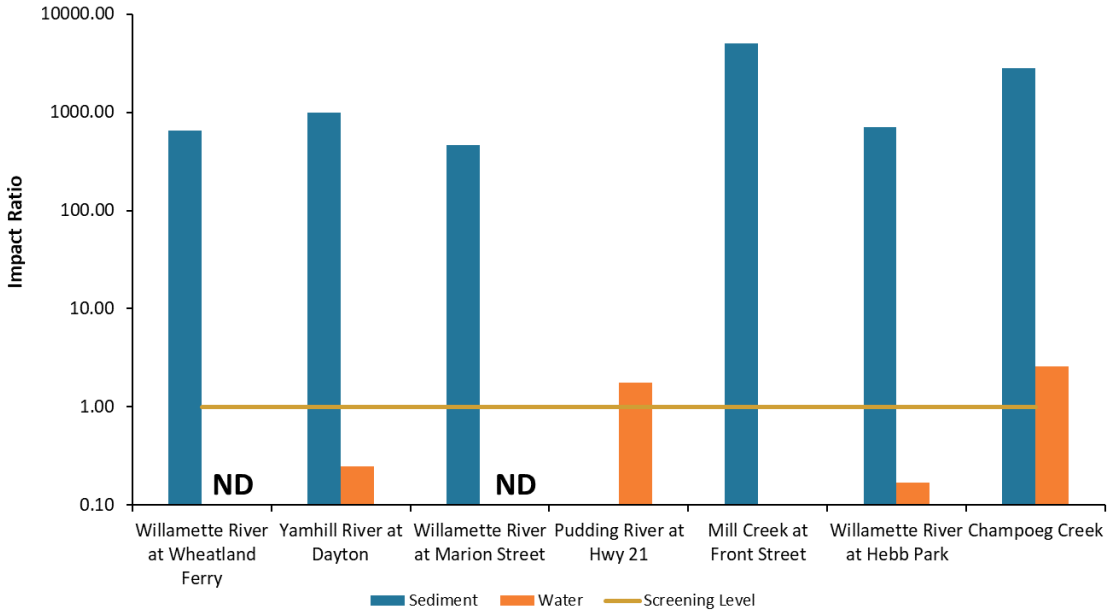

Figure 8 – Comparison of total DDT impact ratios in sediment and water samples. Sediment sample not collected at the Pudding River location. Values greater than one indicate an exceedance of the screening criterion or benchmark.

Current Use Pesticides

Despite analyzing samples for the same 11 current use pesticides as the Upper Willamette sub-basin, none were detected across all monitoring locations in the basin.

Dioxins and furans

Two dioxins and one furan were detected in the sub-basin. The Mill Creek location (#28961) contained all three compounds at levels below the sediment bioaccumulation screening level. The dioxin OCDD was detected at four locations, with the highest concentration detected at the Mill Creek location. All detected OCDD concentrations were below the sediment bioaccumulation screening level.

Polychlorinated biphenyls (PCBs)

PCBs were detected at each location across the sub-basin. The Mill Creek location (#28961) had the highest number of unique detections with 61. No other location had more than 19 unique detections. Total PCB concentrations, reported as the sum concentration of all PCB congeners detected in an individual sample, exceeded the sediment bioaccumulation screening level at every location in the basin. In addition, four individual PCB congeners have screening levels (PCB-105, PCB-118, PCB-156, and PCB-167). With the exception of PCB-167, each of these individual screening levels were exceeded at the Mill Creek location. PCB concentrations of these individual congeners did not exceed screening levels at any of the other monitoring locations. These screening levels represent the concentration at or below which chemicals would not be expected to affect the human population consuming more than 17g of fish or shellfish from these waterways per day (DEQ 2007).

Tissue sample results

Tissue sampling in 2008-2010 included northern pikeminnow and smallmouth bass. The 2016 tissue samples focused specifically on crayfish, and were collected at two monitoring locations in the Mid-Willamette sub-basin. DEQ staff attempted to collect crayfish from a third site, Champoeg Creek, without success despite seemingly appropriate habitat. Interspecies and within species matrix comparisons were conducted in the Upper and Lower Willamette sub-basins. Finfish samples were analyzed as skinless fillets to match the OHA fish cleaning guidelines. Shellfish samples for each matrix type were homogenized to meet volume requirements prior to analysis.

Again, in the tissue sample results section contaminant concentrations are compared to OHA's fish advisory program screening levels, DEQ's human health criteria, and DEQ's acceptable tissue levels. OHA's screening levels are based on a consumption rate of four 8-ounce meals per month (OHA 2013). DEQ's human health criteria are based on a consumption rate of twenty-three 8-ounce meals per month (DEQ 2014). The acceptable tissue levels apply to humans and wildlife consuming fish from a sampling location. Concentrations of bioaccumulative chemicals below the acceptable tissue levels are not expected to cause adverse effects on the organisms consuming the fish (DEQ 2007). If a contaminant had more than one criteria or screening level, the lowest option was used to ensure a conservative report of exceedances across the basin.

2008-2010 Sampling effort

Samples collected in the Mid-Willamette sub-basin contained 11 flame-retardants, 16 legacy pesticides, and 107 PCBs (DEQ 2017b). The only metal included in the first sampling effort was mercury and concentrations exceeded the DEQ Human Health criterion for fish consumption for mercury of 0.04 mg/kg at every site sampled (DEQ 2014). The sample collected in the Santiam River had the highest mercury concentration in basin. None of the other chemical detections exceeded the applicable human health or aquatic life criteria. For a full report on the tissue samples collected during the 2008-2010 sampling effort, see the Statewide Aquatic Tissue Toxics Report released in 2017 (https://go.usa.gov/xyxSW).

2016 Sampling effort

Metals

As noted in the 2008-2010 summary, mercury was detected at concentrations over the DEQ human health criterion at every location. Mercury was detected at both locations sampled in 2016, however only the concentration at the Willamette River at Marion Street (#10555) location exceeded the criterion. Similar to the Upper Willamette, influences from species and trophic level likely affect the levels of mercury in the samples. The only other metal detected in these tissue samples with an established acceptable tissue level was arsenic. Concentrations of arsenic were below the acceptable tissue level at both locations sampled in 2016. Other detected metals included cobalt, titanium and zinc. With the exception of mercury, metals concentrations tended to be slightly higher at the Willamette River at Hebb Park location (#31545) than the Marion Street location.

Legacy Pesticides

Five legacy pesticides were found in the 2016 samples compared to 16 compounds in the samples collected between 2008 and 2010 despite nearly identical analyte lists. This could be due to the difference in species collected and associated trophic level or the number of sites sampled. The compounds detected in 2016 include cis-nonachlor, gamma-chlordane+trans-nonachlor, dieldrin, 4,4'-DDD, and 4,4'-DDE.

The number of compounds detected and the concentrations detected were higher at the Willamette River at Hebb Park location (#31545) than the Willamette River at Marion Street location (#10555). Regardless, none of the detected compounds exceeded DEQ's established acceptable tissue levels for wildlife consumption (DEQ 2007).

Current Use Pesticides

Current use pesticides are not known to sequester in tissue like legacy pesticides and thus were not included in either the 2008-2010 or 2016 sampling effort.

Flame retardants

Analysis of flame retardants in shellfish included 29 congeners. Similar to the number (30) included in the analysis of samples in 2008-2010. However, only one PBDE was detected in 2016 compared to 11 during the 2008-2010 sampling effort. The lone detection (PBDE-209) in 2016 occurred at the Willamette River at Hebb Park location (#31545). None of the detected concentrations in either sampling effort exceeded existing screening levels. Differences in detections could be due to the species sampled or the locations sampled. No changes in analytical method occurred between sampling efforts for this chemical group.

Polychlorinated biphenyls (PCBs)

PCBs were highly prevalent in samples collected during the 2008-2010 sampling effort. Between the four sites sampled 107 of the 189 congeners included in the analysis were detected. In 2016, only 13 of the 172 congeners included in the analysis were detected. As with the flame retardants the difference in detection rate could be due to locations or species (trophic level) sampled. Both locations sampled in 2016 had 12 unique PCB congener detections. Neither the detected congeners nor the total concentration of PCBs at any location exceeded the applicable DEQ acceptable tissue level for wildlife consumption (DEQ 2007).

Summary and Recommendations

A number of changes were made to the Toxics Monitoring Program between the first and second sampling efforts in the Mid-Willamette sub-basin. This included the addition of new analytes (i.e., glyphosate and AMPA), new analytical methods and the collection of sediment samples. The new analytical methods had lower minimum reporting limits and added or expanded chemicals to the chemical groups included in the analysis. A change in the tissue sampling effort included a species from a lower trophic level for a clearer idea of how toxic chemicals work their way into the environment and the food chain. Results from the two tissue sampling efforts should not be compared.

During the 2008-2010 sampling effort, metals, current use pesticides and consumer product constituents in water samples and PCBs and mercury in tissue samples were identified as concerns to human health and aquatic life based on the number of detections. After completing the 2016 analysis, legacy pesticides in water and sediment samples should be added to that list. Additionally, the number of dioxins and furans, PCBs, and flame retardants detected across all media indicate that these chemical groups warrant further sampling and investigation. Compounds in these chemical groups generally lack benchmarks at this point, but other states in the region have benchmarks or bans in place that indicate the potential for human health or aquatic life risks.

Water samples were collected from four common locations during both sampling efforts; Willamette River at Wheatland Ferry (#10344), Yamhill River (#10363), Willamette River at Marion St. (#10555), and Pudding River (#10640). In addition, the Willamette River at Canby Ferry (#10339) and Willamette River at Hebb Park (#31545) locations are approximately half a mile apart; close enough to consider them the same for a general comparison. For both combustion by-products and consumer use products the number of detections and exceedances across the sub-basin decreased from 2008-2010 to 2016, with the exception of consumer use products in the Yamhill River. The number of detections and exceedances in current use pesticides and total metals remained relatively the same. However, exceedances of diuron and pentachlorophenol at the Yamhill River location in 2008-2010 were not replicated in 2016. Due to the use of improved analytical methods which lowered the minimum reporting limits for a majority of the legacy pesticides included in the 2016 sampling effort, the number of detections and exceedances in 2016 greatly increased from 2008-2010. Overall, many of the locations sampled during both sampling efforts improved somewhat. This comparison reiterates that legacy pesticides should be included in the next sampling effort in the basin.

In each sampling effort, two monitoring locations stood out based on the number of compounds detected and concentrations above applicable benchmarks in water samples. In the 2008-2010 sampling effort these locations were in the Pudding (#10640) and Yamhill (#10363) rivers. Both of which are located in mostly agricultural land use basins. These sites were sampled again in the 2016 and, in general, chemicals detected in 2008-2010 were found at lower concentrations in 2016. More compounds and exceedances were found at the Mill Creek (#28961) and Champoeg Creek (#33638) locations in 2016 than in the Pudding and Yamhill locations in 2016. These locations were not sampled in 2008-2010. Mill Creek starts in the western Cascades foothills, flows through agricultural lands, meanders through the city of Salem, the Willamette University campus, and along two state highways, which could all contribute to the compounds detected in the 2016 sampling. The Champoeg Creek location is fed by a creek that runs through agricultural fields for less than 10 miles before emptying into the Willamette River. Future toxics monitoring in the basin should consider continued monitoring at these locations across all media.

The Willamette River at Hebb Park location (#31545) was the only site where water, sediment and tissue samples were all collected in 2016. This location along with the Willamette River at Wheatland Ferry (#10344), the Yamhill River at Dayton (#10363), and the Willamette River at Marion Street (#10555) locations were selected as a part of the new toxics monitoring network. Water sampling will occur at these location three times a year from 2019 moving forward. Plans to conduct sediment and tissue sampling is currently being planned. This continued sampling should help create a clear picture of the influence of toxic chemicals at each monitoring location. Additional sampling may also help identify any potential trends emerging within the basin. As a result of this study, waterbodies may also be listed as a part of the integrated report, a statewide reporting of the status of water in Oregon required every two years by the EPA.

Lower Willamette Sub-basin

Introduction

This summary combines the sampling results from all media types collected in the Lower Willamette sub-basin (the Clackamas, Tualatin, and Lower Willamette watersheds, collectively) during the initial phase of Toxics Monitoring Program sampling with the most recent phase, completed in 2016. Sampling from 2008-2010 included water sample collections from three locations and tissue sample collections from five locations (Table 4). Sediment sampling was not conducted in 2008-2010. In 2016, sampling occurred at four locations for water, six locations for sediment and four locations for tissue (Table 4). Figure 9 indicates the location and matrices collected at each of the monitoring locations in the basin. Five locations within this sub-basin were added in 2016 based on recommendations by DEQ's Cleanup

Program. The two locations in the Willamette River near the St. John's Bridge are situated within the Portland Harbor superfund site and the three locations in Johnson Creek, which flows through a highly urbanized section of Portland that includes a number of manufacturing companies. The likelihood of contamination at these locations is generally higher than at other locations included in this analysis.

Table 4 – Lower Willamette sub-basin sampling locations.

Station	Location Description	Matrices Sampled from 2008-2010	Matrices Sampled in 2016
10332	Willamette River at SP&S RR Bridge (Portland)	Tissue	
10360	Clackamas River at Hwy 99E (Gladstone)	Water	
10456	Tualatin River at Boones Ferry Road	Water and Tissue	
10549	Multnomah Channel at St. Helens	Tissue	
10550	Multnomah Channel at Coon Island	Tissue	
10611	Willamette River at Hawthorne Bridge	Water	
10821	Willamette River at St. John's Bridge		Water, Tissue and Sediment
10916	Tualatin River at Bridge upstream of mouth		Water and Sediment
11233	Clackamas River at High Rocks (Old Hwy 213)	Tissue	
11321	Johnson Creek at SE 17th Avenue (Portland)		Water and Sediment
11324	Johnson Creek at Stanley Avenue (Milwaukie)		Tissue and Sediment
22459	East Fork Dairy Creek at Fern Flat Road, River Mile 17.6 (Tualatin)		Water and Sediment
38584	Johnson Creek at SE Harney Drive downstream of Precision Cast Corp outfall river mile 2.8		Tissue and Sediment
38813	Willamette River west bank at St. John's Bridge		Tissue

Water sample results

Seasonality

As in the other sub-basins, DEQ staff collected grab samples three times in 2016 and six times during the 2008-2010 sampling effort to capture any seasonal differences. These grab samples were collected from all monitoring locations over a weeklong period each spring, summer and fall/winter. Sampling times were chosen to represent the declining, low water, and increasing arms of the hydrograph.

An average of 43 unique chemicals were detected in each season of 2016 compared to an average of 24 unique chemical detections in 2008-2010. Metals and current use pesticides consistently had the highest number of unique detections in every season during both sampling efforts (Figure 10). Any increases in pesticide detections are likely due to new analytical methods used in 2016. These analytical methods had lower minimum reporting limits. Other potential factors include the number of monitoring locations and the inclusion of new parameters. For a full report on the water samples collected during the 2008-2010 sampling effort see the Statewide Water Quality Toxics Assessment (DEQ, 2015).

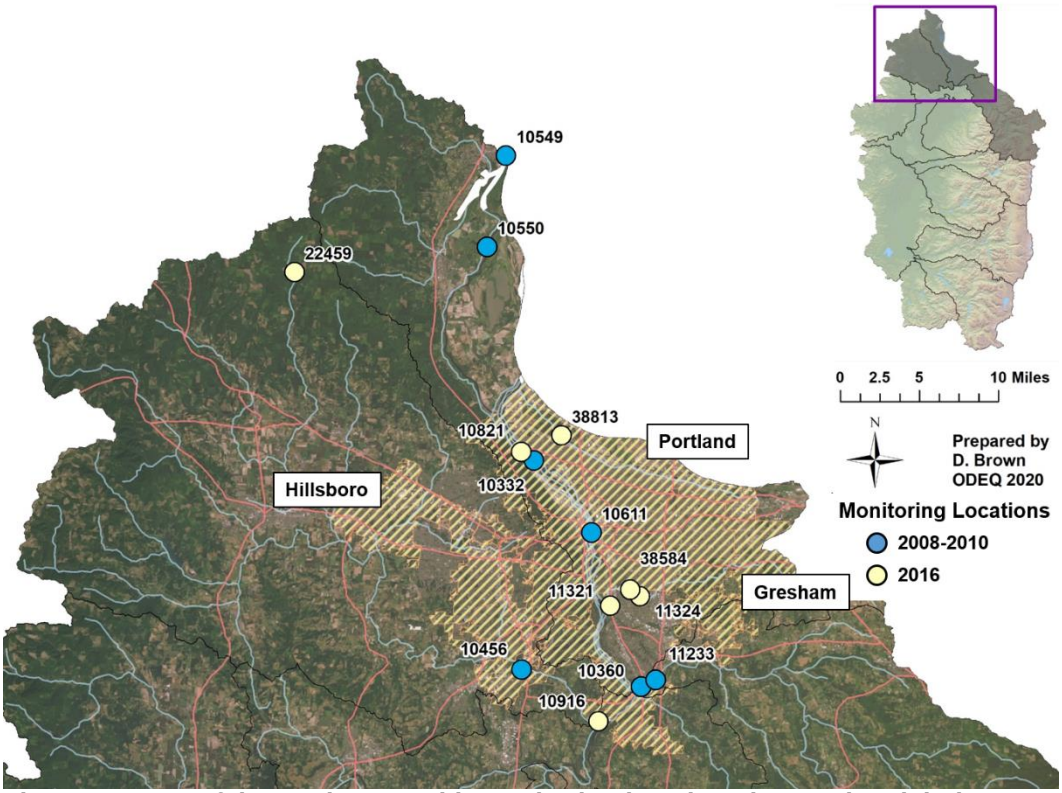

Figure 9 – Map of the study area with monitoring locations by matrix. Visit the Water Quality Toxics Monitoring Program webpage for an interactive map of the monitoring locations across the state (https://www.oregon.gov/deq/wq/Pages/WQ-Monitoring-Statewide.aspx)

Metals

In the 2016 sampling, 11 of the 17 metals included in the analysis were detected at all monitoring locations. The Tualatin River location (#10916) had the most metals detections (14). Unlike the previous sampling effort, none of the metals detected exceeded the applicable water quality criteria. In the 2008-2010 results, two metals, copper and iron, exceeded their water quality criteria at two locations, Clackamas River (#10360) and Willamette River at Hawthorne Bridge (#10611). In both sampling efforts, detections of metals occurred across all seasons.

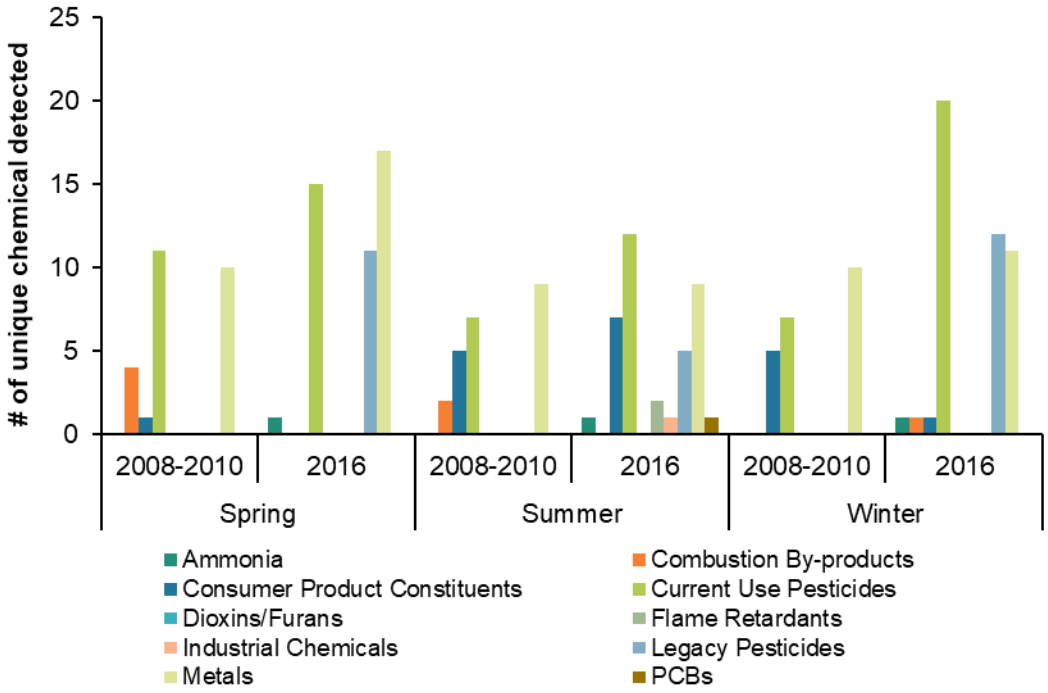

Figure 10 – Seasonality of detection by chemical group in the Lower Willamette sub-basin. Plant and animal sterols were not included in figure due to ubiquitous detection. Improved analytical methods used during the 2016 sampling effort allowed for accurate reporting at lower concentrations, which along with an increase in the number of locations sampled may account for the seasonal detection disparity.

Legacy Pesticides

Seven of the 12 unique legacy pesticides detected in 2016 were included in the 2008-2010 analysis; however, no detections occurred. A comparison of the minimum reporting limit for these chemicals between the two sampling efforts show that reporting limits dropped 2-3 orders of magnitude with the implementation of the new analytical method. For example, the reporting limit for dieldrin dropped from 0.02 µg/L to 0.00064 µg/L.

The Johnson Creek monitoring location (#11321) had the highest number of unique chemical detections with 12. Four individual compounds (aldrin, 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT) exceeded DEQ human health criteria at this location. These human health criteria assume not only a consumption rate of 175 grams of fish or shellfish, but also regular consumption of up to two liters of untreated water from the waterbodies. The consumption rates assumed in these criteria are intended to protect all consumers, including those on the high-end of the consumptive range. In addition, two "total" compounds measured as the sum of all compounds in the same family also exceeded DEQ criteria at the Johnson Creek location. Total DDT exceeded its chronic criterion for freshwater, intended to protect aquatic life, while total chlordane exceeded its human health criterion. There is currently a TMDL project aimed at reducing concentrations of DDT and dieldrin in the Johnson Creek watershed. Degradates of DDT were detected at concentrations above DEQ human health criteria at the Hawthorne Bridge location in the Willamette River (#10611; 4,4'-DDE, 4,4'-DDT) and Tualatin River (#10916; 4,4'-DDD, 4,4'-DDE, 4,4'-DDT) locations as well. The East Fork Dairy Creek location (#22459) had one detection, cis-nonachlor; however, no criterion or benchmark exists for this compound.

Current Use Pesticides

Sixteen current use pesticides were detected in both 2008-2010 and 2016. In both sampling efforts, samples collected from the Tualatin River (#10916) had the highest number of unique detections with 16 in 2008-2010 and 13 in 2016. In the 2016 analysis, this included parent pesticides as well as degradates, like glyphosate and aminomethylphosphonic acid (AMPA). These two compounds were added during the 2016 analysis and while glyphosate was only detected at the Johnson Creek location (#11321), it's degradate, AMPA, was detected at three of the four locations sampled in 2016. It is common to detect the degradate of a pesticide without detecting the parent pesticide, but less information is known about the potential impacts to human health or aquatic life of degradates. None of the current use pesticide detections exceeded EPA aquatic life benchmarks in 2016. Currently, state water quality criteria do not exist for most current use pesticides or degradates.

Combustion by-products

A total of eight combustion by-products were detected in the 2016 sampling. Detections of benzo(a)pyrene, benzo(b)fluoranthene and benzo(k)fluranthene exceeded DEQ human health criteria at the Willamette River at St. John's Bridge (#10821) and Johnson Creek (#11321) locations. Both of these sampling locations run parallel to heavily trafficked highways, which may contribute to the number of detections and exceedances observed. No compounds in this chemical group were found in samples collected in 2008-2010.

Consumer product constituents including pharmaceuticals

The analyte list for consumer products remained the same between 2010 and 2016. Detections in the group declined from seven compounds in 2008-2010 samples to four compounds in 2016 samples. Despite sampling a different location in 2016, the Tualatin River had the highest number of compounds detected during both sampling efforts (8 in 2008-2010 and 4 in 2016). Sulfamethoxazole, a commonly used antibiotic, was the most commonly detected compound during both sampling efforts. No benchmarks or criteria exist for the compounds detected.

Industrial chemicals and ammonia

The only industrial chemical detected in 2016 was 1,4-dichlorobenzene, most commonly found in mothballs; however, this detection did not exceed the DEQ human health criterion. Both of the industrial chemicals detected in 2008-2010 samples, chloroform and bromodichloromethane, are volatile organic compounds. Neither detection exceeded current aquatic life or human health water quality criteria. This family of compounds was not included in the 2016 sample analysis.

Ammonia detections occurred at three of the four locations sampled in 2016, none of which exceeded the DEQ freshwater criterion. Detections occurred in all seasonal samples collected at the Willamette (#10821) and Tualatin (#10916) river locations. Ammonia was not included in the 2008-2010 samples.

Flame retardants

Two PBDEs (PBDE-206 and PBDE-209) were detected during the 2016 sampling effort. Both chemicals were detected at the Johnson Creek (#11321) and East Fork Dairy Creek (#22459) locations, while only one was detected at the other two locations. All PBDE detections occurred during the summer sampling effort in 2016. No PBDEs were detected during the 2008-2010 sampling effort. The implementation of a different analytical method in 2016 lowered the minimum reporting limit and increased the number of

PBDEs included in the analysis from 11 to 40. PBDEs do not currently have aquatic life or human health criteria.

Polychlorinated biphenyls (PCBs)

The only PCB detection in the Lower Willamette sub-basin occurred at the East Fork Dairy Creek location (#22459) in 2016. Although PCB-118 does not have a specific aquatic life or human health criterion, the detected concentration exceeded the total PCBs human health criterion for the consumption of water and aquatic organisms. No PCB detections occurred in the 2008-2010 sampling effort.

Plant and animal sterols

Beta-sitosterol and stigmastanol were detected at all locations. Levels varied across the basin with the lowest levels detected at the East Fork Dairy Creek sampling location (#22459). The highest level of beta-sitosterol was detected at the Tualatin River location (#10916) and the highest level of stigmastanol was detected at the Johnson Creek location (#11321).

Measured levels of the animal sterols, cholesterol and coprostanol, varied across the basin with the lowest level of cholesterol at the East Fork Dairy Creek location (#22459) and lowest level of coprostanol at the Willamette River location (#10821). The highest level of cholesterol was found at the Johnson Creek location (#11321) and the highest level of coprostanol was found at the Tualatin River location (#10916). The ratios of coprostanol to cholesterol measured at all locations in this study were less than one, indicating that the source of coprostanol is likely biogenic (i.e. livestock, humans).

Sediment sample results

Sediment samples were not collected during 2008-2010 in the Lower Willamette sub-basin. DEQ staff collected sediment samples from six locations during the summer of 2016. Sediment samples were collected once per site between July and August.

Metals

Metals were present in each sample collected in 2016. The Willamette River at St. John's Bridge location (#10821) had the highest number of unique detections with 13. The remaining locations had at least 10 metal detections. For inorganic chemicals, such as arsenic, there are difficulties in associating concentrations in animals and fish with sediment concentrations, so background levels are used instead of screening levels (DEQ 2007). These background concentrations are intended for comparison use only as they are values representing the 90^{th} or 95^{th} percentile of regional soil samples. The sample collected at the Willamette River location exceeded the background concentration for arsenic. Samples from four locations (Willamette River and all three Johnson Creek locations) exceeded the lead background concentration. These background levels, however, are not to be considered a standard or criteria and exceedance does not indicate a potential health risk to humans or aquatic life.

Legacy Pesticides

Legacy pesticides accumulate and persist in sediment. Thus, analysis of sediment samples included 29 of the 33 legacy pesticides included in the analysis of water samples. The highest number of unique detections occurred at the Willamette River at St. John's Bridge location (#10821) with 19. Only one legacy pesticide (4,4'-DDT) was detected at the East Fork Dairy Creek location (#22459), while the remaining monitoring locations had at least 11 unique pesticide detections.

Two legacy pesticides (dieldrin and total DDT) exceeded sediment bioaccumulation screening levels. These screening levels represent the concentration at or below which chemicals would not be expected to affect the human population consuming more than 17g of fish or shellfish from these waterways per day (DEQ 2007). Dieldrin exceedances occurred at five of six locations. DDT, or one of its degradates, was detected at each monitoring location and exceeded the total DDT screening level at five of six locations (Figure 11). The total DDT screening level is compared to the sum of the concentrations of DDT and its degradates in a single sample. The only location that did not exceed these screening levels was the East Fork Dairy Creek location (#22459).

Figure 11 shows a comparison of total DDT concentrations detected in sediment and water samples. The results are normalized by dividing the concentration by the screening value to create a unitless impact ratio. Values greater than one indicate an exceedance of the screening value. At monitoring locations where DDT was detected in both water and sediment samples, the impact ratios are substantially higher in the sediment samples.

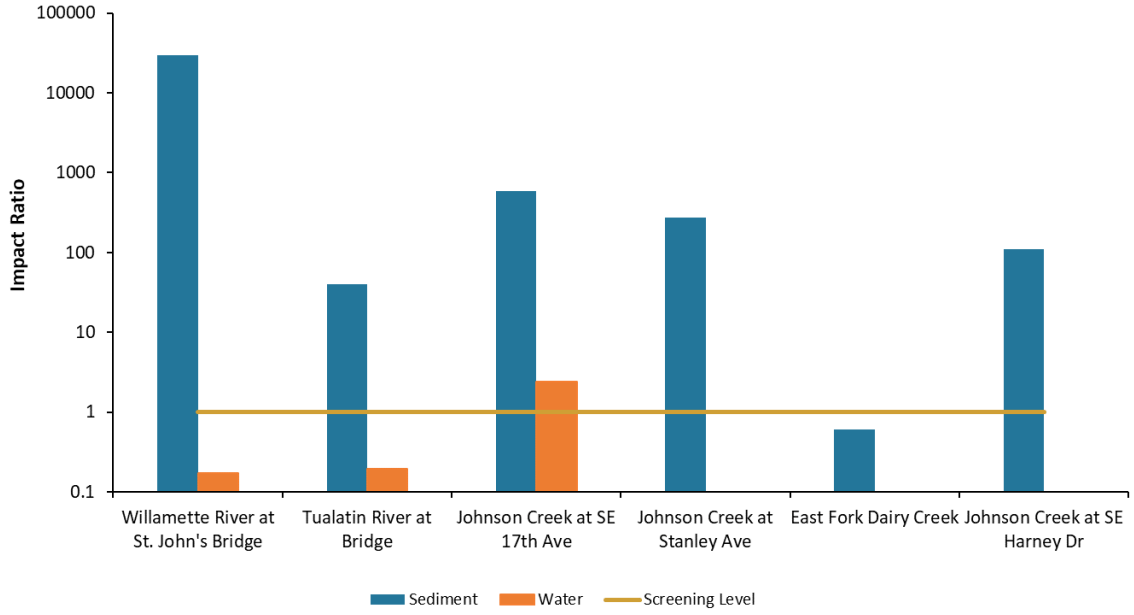

Figure 11 - Comparison of total DDT impact ratios in sediment and water samples. Water samples not collected at Johnson Creek at Stanley Ave. (#11321), East Fork Dairy Creek (#22459), or Johnson Creek at Harney Dr. (#38584). Values greater than one indicate exceedances.

Current Use Pesticides

A majority of current use pesticides included in the 2016 analysis were pyrethroid insecticides. The others, including trifluralin, chlorpyrifos, and oxyfluorfen, have a similar affinity to partition to sediments as pyrethroids. Detections of two current use pesticides (trifluralin and cypermethrin) occurred across the sub-basin. The cypermethrin detection occurred at the Tualatin River location (#10916) and the trifluralin detection occurred at the Johnson Creek at Harney Drive location (#38584). Neither pesticide has an established screening value in sediment.

Dioxins and furans

Three dioxins and three furans were detected across the sub-basin with all six found at the Johnson Creek at Harney Dr. location (#38584). The remaining locations had as few as one (East Fork Dairy Creek #22459) and as many as four (Willamette River and other Johnson Creek locations). Four detections exceeded DEQ bioaccumulation screening levels. One detection occurred at the Willamette River at St. John's Bridge location (#10821). The other three exceedances occurred at the Johnson Creek at Harney Drive location. As a reminder, these screening levels represent the concentration at or below which chemicals would not be expected to affect the human population consuming more than 17g of fish or shellfish from these waterways per day (DEQ 2007).

Flame retardants

Twenty-five PBDEs were detected between the three Johnson Creek sampling locations, but none were detected at the remaining locations in the basin. The Johnson Creek at Stanley Ave. location (#11324) had the highest number of unique detections (21), but 18 or more occurred at all three locations. PBDEs do not currently have bioaccumulation screening levels in Oregon.

Polychlorinated biphenyls (PCBs)

PCBs were found at each of the sediment monitoring locations in 2016. Of the 132 PCB congeners detected, 129 were found at the Johnson Creek at Harney Dr. (#38584) location. The East Fork Dairy Creek sample only contained two congeners; however, the presence of these chemicals indicates the pervasiveness of PCBs in the environment as this site was included in the sampling effort as a background or reference location. Nine of the detected congeners have bioaccumulation screening levels, as does total PCBs, measured as the sum of all detected concentrations in a sample. Samples from the Willamette River at St. John's Bridge (#10821) and Johnson Creek at Harney Dr. (#38584) locations contained concentrations over the bioaccumulation screening levels for eight congeners. Concentrations at all locations exceeded the total PCB bioaccumulation screening levels.

Tissue sample results

The tissue samples collected in 2008-2010 included smallmouth bass and northern pikeminnow. Tissue sampling in 2016 included signal crayfish and Siberian prawns. Siberian prawns were unintentionally collected alongside signal crayfish at the Willamette River at St. John's Bridge location (#10821), which allowed for an interspecies comparison. The crayfish samples collected along the west bank of the Willamette River at St. John's Bridge (#33813) were separated into four different matrices: whole body, shell, viscera, and abdominal muscle to identify any potential differences in sequestration of the chemicals. Fish samples (2008-2010) were analyzed as skinless fillets to match the OHA fish cleaning guidelines. Shellfish samples for each matrix type were homogenized to meet volume requirements prior to analysis.

Contaminant concentrations in this section were compared to the same screening levels and criteria as in the other sub-basins. If a contaminant had more than one criteria or screening level, the lowest option was used to ensure a conservative report of exceedances across the basin.

2008-2010 Sampling effort

The five tissue samples collected in the Lower Willamette sub-basin contained 28 flame-retardants, 20 legacy pesticides, and 168 PCBs (DEQ 2017b). The only metal included in the first sampling effort was

mercury and it was detected at every location sampled. Samples collected at the Willamette River at SP&S Bridge (#10322) and the Clackamas River (#11233) locations exceeded the DEQ human health criterion for fish consumption for mercury of 0.040 mg/kg. The sample collected in the Clackamas River was the highest mercury detection in the entire state at over 63x the human health criterion. The only other exceedance during this sampling effort occurred at the SP&S bridge location where the total concentration of PCBs surpassed the OHA fish advisory program screening level of 0.5 mg/kg (OHA 2018). For a full report on the tissue samples collected during the 2008-2010 sampling effort, see the Statewide Aquatic Tissue Toxics Report released in 2017 (https://go.usa.gov/xyxSW).

2016 Sampling effort

Metals

Concentrations of metals were relatively consistent at all four monitoring locations in whole body crayfish samples. The highest zinc detection occurred at the west bank Willamette River location (#38813, 50 mg/kg) and was nearly double the next highest detection. None of these detections exceeded DEQ acceptable tissue levels.

The interspecies comparison for metals shows more detections and higher concentrations in crayfish samples than in prawn samples. The one exception was arsenic, where prawn samples contained a slightly higher concentration. The within species matrix comparison shows some evidence of how different metals sequester in the tissue (Table 5). The highest concentration of arsenic occurred in the viscera, while the highest concentration of mercury occurred in the abdominal muscle. The abdominal muscle mercury detection exceeded the DEQ human health criterion. The selenium detection in the viscera exceeded DEQs acceptable tissue level. This acceptable tissue level is protective of mammals that consume fish or shellfish from a waterbody. The remaining metals occurred at similar concentrations across matrices. No other detections exceeded applicable screening levels.

Table 5 – Metals concentration (mg/kg) for each location and matrix sampled in 2016. If available, the applicable screening level is included below the metal name. Letters in parentheses indicate crayfish samples (C) or prawn samples (P). Red shading indicates a concentration above applicable screening level.

Monitoring Location	10821	10821	11324	35854	33813	33813	33813	33813
Matrix	Whole Body (C)	Whole Body (P)	Whole Body (C)	Whole Body (C)	Whole Body (C)	Shell (C)	Abdominal Muscle (C)	Viscera (C)
Arsenic	0.28	0.39	0.22	0.28	0.38	0.22	0.17	0.66
Cadmium (2.3 mg/kg)	ND	ND	ND	ND	ND	ND	ND	0.05
Chromium	ND	ND	ND	0.63	ND	ND	ND	ND
Cobalt	0.38	ND	0.37	0.26	0.25	0.21	ND	0.45
Mercury (0.04 mg/kg)	0.022	ND	0.03	0.19	0.022	0.03	0.102	0.014
Nickel	0.28	ND	0.64	1.08	ND	ND	ND	0.23
Selenium (0.036 mg/kg)	ND	ND	ND	ND	ND	ND	ND	0.37
Titanium	14.4	9.72	7.45	11.8	13.1	11	7.5	13.1
Zinc	19.4	17.9	26.3	24.1	50	23.1	17.5	21.9

Legacy Pesticides

More legacy pesticides occurred in whole body samples at the two locations in the Willamette River (#10821 and #33813) than at the locations in Johnson Creek (#11324 and #38584). As mentioned earlier, the Willamette River locations are located in the Portland Harbor Superfund cleanup area, which could also influence detections. Generally, detected concentrations were higher at the Willamette River locations than at the locations in Johnson Creek.

Prawn samples, generally, had more unique chemical detections and, where the detections overlapped, higher concentrations of the chemical than crayfish samples. The within species matrix comparison was limited due to insufficient sample volume to analyze the abdominal muscle tissue for legacy pesticides. In a comparison of shell and viscera samples, the viscera samples had more unique chemicals and higher concentrations of the chemicals found in both sample matrices than the shell samples. Whole body samples collected at the same location had concentrations comparable to the shell samples. Regardless of location, species, or matrix none of the detections exceeded DEQ's established acceptable tissue levels for wildlife consumption.

Current Use Pesticides

Most current use pesticides are not known to collect in tissue like legacy pesticides and thus were not included in either the 2008-2010 or 2016 sampling effort.

Flame retardants

Nine PBDEs were detected in the 2016 tissue samples. Samples collected in the Willamette River contained more PBDEs than samples collected from Johnson Creek. Two PBDEs (PBDE-47 and PBDE-99) exceeded the OHA fish advisory screening levels at both of the Willamette River locations. The only PBDE detected in both waterbodies, PBDE-209, was found at a substantially higher concentration at the Johnson Creek at Stanley Avenue location (#11324). However, this detection did not exceed the OHA Fish Advisory Program screening level. Due to a lack of detections, inter- and intra-species comparisons could not be made for these chemicals.

Polychlorinated biphenyls (PCBs)

Samples contained 100 of the 172 PCB congeners included in the analysis and congeners were found at each location and in every species and matrix sampled. The west bank location on the Willamette River at St. John's Bridge (#38813) contained the highest number of unique congeners with 90. Crayfish collected from the east bank contained 65 unique congeners. Eleven of the PCBs detected and total PCBs have acceptable tissue levels established by DEQ. None of the concentrations exceeded these acceptable levels.

The comparison of PCBs in different crayfish matrices found significantly more PCBs in the viscera, than in any other matrix. This is consistent with the chemical nature of PCBs. All 90 PCB congeners found at the location occurred in the viscera, while abdominal muscle contained 25 congeners and the shell contained 21congeners. A separate "whole body" sample collected at the same location only contained 35 PCB congeners. This is potentially due to "dilution" from the less contaminated parts of the crayfish. The interspecies comparison showed that the prawn sample contained more PCBs, at generally higher concentrations, than the crayfish sample collected at the same location. OHA issued a fish consumption advisory in 2018 based on PCB concentrations, which recommends two or fewer meals per month of resident fish and crayfish (OHA 2018).

Summary and Recommendations

A number of improvements were made to the Toxics Monitoring Program between the first and second sampling efforts in the Lower Willamette sub-basin. This included the addition of new analytes (e.g., glyphosate and AMPA) and new analytical methods with lower minimum reporting limits. Sediment samples were collected for the first time, and the tissue sampling was changed to include different species giving a different view of how toxic chemicals work their way into the environment and the food chain. This summary also included the first reporting of dioxin and furan, flame retardant, and PCB data in all three matrices for this basin. Two areas, which included five monitoring locations, were recommended by DEQ's cleanup program. These areas (the Portland Harbor superfund site and Johnson Creek, which flows through a highly urbanized section of Portland) were known to have higher concentrations of certain chemicals. This likely influenced the number of detections between the two sampling efforts.

During the 2008-2010 sampling effort, current use pesticides were identified as a chemical group that warranted further investigation due to the high number of detections. With the same number of unique chemicals and slightly more detections, current use pesticides should remain a focus of future sampling despite the lack of concentrations exceeding applicable criteria. Based upon the detections and exceedances across the basin of legacy pesticides, combustion by-products, dioxins and furans, and PCBs these chemical groups should also be the focus of future sampling or investigation and clean-up. The exceedance of mercury in crayfish tissue occurred despite a basin-wide TMDL to reduce mercury concentrations in the Willamette. The small sample size is not sufficient to determine if the actions associated with the TMDL are having the desired effect.

The Willamette River at St. John's Bridge (#10821) was the only location where water, sediment and tissue samples were all collected in 2016. This location along with the Tualatin River at Boones Ferry Road (#10456) and the Tualatin River at Bridge (#10916) locations were selected as a part of the new toxics monitoring network. Water sampling will occur at these location three times a year from 2019 moving forward. Plans to conduct sediment and tissue sampling is currently being planned. This continued sampling should help create a clear picture of the influence of toxic chemicals at each monitoring location. Additional sampling may also help identify any potential trends emerging within the basin. As a result of this study, waterbodies may also be listed as a part of the integrated report, a statewide reporting of the status of water in Oregon required every two years by the EPA.

References

Oregon Department of Environmental Quality (DEQ), Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment, 2007.

Oregon Department of Environmental Quality (DEQ), Table 40: Human Health Water Quality Criteria for Toxic Pollutants, 2014.

Oregon Department of Environmental Quality (DEQ), Statewide Water Quality Toxics Assessment, 2015.

Oregon Department of Environmental Quality (DEQ), Mercury in Oregon Waters, 2017a.

Oregon Department of Environmental Quality (DEQ), Statewide Aquatic Tissue Toxics Assessment Report, 2017b.

Oregon Health Authority (OHA), Oregon Health Authority Standard Operating Guidance Target Analytes for Oregon's Fish Advisory Program, 2013.

Oregon Health Authority (OHA), Updated Fish Advisory for Resident Fish and Shellfish: Lower Willamette River, 2018.

United States Environmental Protection Agency (EPA), Office of Pesticide Programs, Aquatic Life Benchmarks, 2014.

United States Environmental Protection Agency (EPA), Dioxins and Furans Fact Sheet, 2015.

Appendices

Screening Value Reference Key

nsv : No screening value has been assigned

1. Human Health Criteria: Water + Organism 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
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

Indicates sites at which at least one sample exceeded the screening value

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Appendix A
Water Sample Results

Samples collected during 2008-2010 or in 2016

	Percent Detection	Number of samples over screening value	UPPER WILLAMETTE BASIN Station ID and Description				Screening Value (µg/L)	S.V. Reference
			WM03 - Willamette River at Albany - 2008-2010	WM03 - Willamette River at Albany - 2016	WM04 - Willamette River at Old Hwy 34 bridge - 2008-2010	WM05 - Willamette River at Hwy 99E - 2008-2010		
			10350	10350	10352	10355		
			Maximum Values (µg/L)					
Ammonia								
Ammonia as N	26	0	—	24	—	—	‡	2
Consumer Product Constituents								
Bis(2-ethylhexyl)phthalate	7	0	0.391	—	—	—	0.2	1
Carbamazepine	1		—	—	—	—	*nsv*	
DEET	17		0.0151	—	0.0114	—	*nsv*	
Diethylphthalate	3	0	—	—	—	—	3800	1
Diphenhydramine	1		—	—	—	—	*nsv*	
Estriol	3		—	—	—	—	*nsv*	
Sulfamethoxazole	17		0.019	0.0164	0.016	0.0123	*nsv*	
Current Use Pesticides								
2,4-D	3	0	—	—	—	—	100	1
Aminomethylphosphonic acid (AMPA)	21	0	—	—	—	—	249500	5
Atrazine	20	0	0.019	—	0.0589	—	1.0	9
Bromacil	1	0	—	—	—	—	6.8	7
Carbaryl	1	0	—	—	—	—	0.5	8
Chlorpyrifos	11	0	—	0.0289	—	—	0.04	8
Deisopropylatrazine	15	0	—	—	—	—	2500	7
Desethylatrazine	15	0	—	—	—	—	1000	7
Dicamba	3	0	—	—	—	—	61	7
Dimethenamid	15	0	—	0.0462	—	—	8.9	10
Diuron	51	1	0.116	0.341	0.0454	0.14	2.4	9
Hexazinone	7	0	—	—	0.148	—	7	9
Glyphosate	1	0	—	—	—	—	11900	10
Imazapyr	2	0	—	—	—	—	24	10
Metolachlor	7	0	—	—	0.0179	—	1	6
Metribuzin	13	0	—	0.0568	0.0053	—	8.7	7
Metsulfuron methyl	7	0	—	—	—	—	0.36	10
Oxamyl	3	0	—	—	—	—	27	8
Pendimethalin	1	0	—	—	—	—	5.2	7
Pentachlorophenol	6	0	—	—	0.135	—	0.15	1
Pronamide	1		—	—	—	—	*nsv*	
Propiconazole	8	0	—	—	—	—	21	7
Simazine	10	0	0.015	—	0.047	—	6	9
Sulfometuron-methyl	7	0	—	—	—	—	0.45	8
Triclopyr	1	0	—	—	—	—	29800	7

State of Oregon Department of Environmental Quality

Appendix A
Water Sample Results

Samples collected during 2008-2010 or in 2016	Percent Detection	Number of samples over screening value	UPPER WILLAMETTE BASIN Station ID and Description: WM03 - Willamette River at Albany - 2008-2010 (10350)	WM03 - Willamette River at Albany - 2016 (10350)	WM04 - Willamette River at Old Hwy 34 bridge - 2008-2010 (10352)	WM05 - Willamette River at Hwy 99E - 2008-2010 (10355)	Screening Value (µg/L)	S.V. Reference
			Maximum Values (µg/L)					
Flame retardants								
PBDE-100	5		—	—	—	—	*nsv*	
PBDE-138	5		—	—	—	—	*nsv*	
PBDE-139	5		—	—	—	—	*nsv*	
PBDE-153	5		—	—	—	—	*nsv*	
PBDE-154	5		—	—	—	—	*nsv*	
PBDE-209	24		0.0033	0.00638	—	—	*nsv*	
PBDE-28	3		—	—	—	—	*nsv*	
PBDE-47	20		—	—	—	—	*nsv*	
PBDE-49	5		—	—	—	—	*nsv*	
PBDE-66	5		—	—	—	—	*nsv*	
PBDE-85	3		—	—	—	—	*nsv*	
PBDE-99	8		—	—	—	—	*nsv*	
Industrial Chemicals or Intermediates								
Isophorone	1	0	—	—	—	—	27	1
Legacy Pesticides								
Dieldrin	1	1	—	—	—	—	5E-06	1
Endosulfan sulfate	5	0	—	—	—	—	8.5	1
Total DDT		0	—	—	—	—	0.001	2
4,4´-DDE	3	3	—	—	—	—	2E-05	1
PCBs								
Total PCBs	5	0	—	—	—	—	0.014	2
PCB-114	4		—	—	—	—	*nsv*	
PCB-118	4		—	—	—	—	*nsv*	
PCB-156	4		—	—	—	—	*nsv*	
PCB-167	4		—	—	—	—	*nsv*	
PCB-168	4		—	—	—	—	*nsv*	
PCB-169	4		—	—	—	—	*nsv*	
PCB-189	4		—	—	—	—	*nsv*	
PCB-77	4		—	—	—	—	*nsv*	
PCB-81	4		—	—	—	—	*nsv*	
Plant or animal sterols								
beta-Sitosterol	100		—	1.61	—	—	*nsv*	
Cholesterol	100		1.256	0.667	0.749	0.745	*nsv*	
Coprostanol	91		0.112	0.13	0.072	0.067	*nsv*	
Stigmastanol	100		—	0.296	—	—	*nsv*	

Appendix A Water Sample Results			UPPER WILLAMETTE BASIN Station ID and Description					
Samples collected during 2008-2010 or in 2016	Percent Detection	Number of samples over screening value	WM03 - Willamette River at Albany - 2008-2010	WM03 - Willamette River at Albany - 2016	WM04 - Willamette River at Old Hwy 34 bridge - 2008-2010	WM05 - Willamette River at Hwy 99E - 2008-2010	Screening Value (µg/L)	S.V. Reference
			10350	10350	10352	10355		
			Maximum Values (µg/L)					
Priority Metals								
Dissolved								
Aluminum	67		—	29.9	—	—	*nsv*	
Antimony	7		—	—	—	—	*nsv*	
Arsenic	78	1	—	0.37	—	—	2.1	1
Barium	93		—	5.95	—	—	nsv	
Chromium	26	0	—	0.2	—	—	1.7	2
Copper	73	0	—	2.32	—	—	*	2
Iron	85	0	—	75.7	—	—	1000[#]	2
Lead	33	0	—	0.04	—	—	*	2
Manganese	93		—	6.45	—	—	*nsv*	
Nickel	33	0	—	0.18	—	—	*	2
Potassium	100		—	1110	—	—	*nsv*	
Selenium	4	0	—	—	—	—	4.6	2
Silver	4	1	—	—	—	—	*	2
Thallium	4		—	—	—	—	*nsv*	
Zinc	35	0	—	2.6	—	—	*	2
Total Inorganic								
Arsenic	100	0	—	—	—	—	2.1	1
Total Recoverable								
Aluminum	100		—	810	—	—	*nsv*	
Antimony	3	0	—	0.03	—	—	5.1	1
Arsenic	14	1	—	0.4	—	—	2.1	1
Barium	99	0	16.5	9.76	23.1	20.2	1000	1
Beryllium	1		—	—	—	—	*nsv*	
Cadmium	1	0	—	—	—	—	*[§]	2
Chromium	28	1	3.5	0.29	2.3	1.6	11[§]	2
Cobalt	36		0.96	—	1.37	1.12	*nsv*	
Copper	63	0	3.7	0.5	4.7	4.2	*[§]	2
Iron	92	32	2110	765	2870	2360	1000	2
Lead	72	0	0.87	0.05	1.27	0.85	*[§]	2
Manganese	96		—	23.4	—	—	*nsv*	
Nickel	29	0	1.8	0.24	2.9	2	*[§]	2
Potassium	100		—	1080	—	—	*nsv*	
Silver	1	1	—	—	—	—	*[§]	2
Thallium	1	0	—	—	—	—	0.043	1
Uranium	1		—	—	—	—	*nsv*	

State of Oregon Department of Environmental Quality

Appendix A
Water Sample Results

Samples collected during 2008-2010 or in 2016	Percent Detection	Number of samples over screening value	UPPER WILLAMETTE BASIN Station ID and Description: WM03 - Willamette River at Albany - 2008-2010	WM03 - Willamette River at Albany - 2016	WM04 - Willamette River at Old Hwy 34 bridge - 2008-2010	WM05 - Willamette River at Hwy 99E - 2008-2010	Screening Value (µg/L)	S.V. Reference
			10350	10350	10352	10355		
			Maximum Values (µg/L)					
Priority Metals, continued								
Total Recoverable								
Vanadium	38		6.4	—	8.8	7.2	*nsv*	
Zinc	76	0	11.1	1.5	13.7	11.6	*[§]	2
Standard Parameters (mg/L)			Average Values					
Dissolved Organic Carbon			2.0	1.9	2.8	1.4		
Sulfate			2.9	3.0	2.5	2.0		
Total Organic Carbon			1.4	1.7	1.9	1.3		
Total Solids			59.0	70.7	68.3	53.8		
Total Suspended Solids			4.3	5.0	7.3	3.4		
Field Parameters								
Conductivity (µmhos/cm @ 25° C)			73	73	73	56		
Dissolved Oxygen (mg/L)			9.9	10.2	10.4	10.9		
pH (SU)			7.5	7.7	7.6	7.7		
Temperature (°C)			13.5	15.0	13.4	12.1		
Turbidity (NTU)			6	6	11	7		

Appendix A Water Sample Results	UPPER WILLAMETTE BASIN Station ID and Description						
Samples collected during 2008-2010 or in 2016	WM08 - South Santiam River Hwy 226 - 2008-2010	WM09 - Mary's River at 99W (Corvallis) - 2008-2010	WM10 - McKenzie River at Coburg Road - 2008-2010	WM10 - McKenzie River at Coburg Road - 2016	WM11 - Willamette MF at Jasper Bridge - 2008-2010	Screening Value (µg/L)	S.V. Reference
	10366	10373	10376	10376	10386		
	Maximum Values (µg/L)						
Ammonia							
Ammonia as N	—	—	—	—	—	‡	2
Consumer Product Constituents							
Bis(2-ethylhexyl)phthalate	—	—	—	—	0.556	0.2	1
Carbamazepine	—	—	—	—	—	*nsv*	
DEET	—	—	—	—	0.0177	*nsv*	
Diethylphthalate	—	—	0.04998	—	0.0464	3800	1
Diphenhydramine	—	—	—	—	—		
Estriol	0.0024	—	—	—	—	*nsv*	
Sulfamethoxazole	0.0144	—	—	—	—	*nsv*	
Current Use Pesticides							
2,4-D	—	—	—	—	—	100	1
Aminomethylphosphonic acid (AMPA)	—	—	—	—	—	249500	5
Atrazine	—	0.126	—	—	—	1.0	9
Bromacil	—	—	—	—	—	6.8	7
Carbaryl	—	—	—	—	—	0.5	8
Chlorpyrifos	—	—	—	—	—	0.04	8
Deisopropylatrazine	—	—	—	—	—	2500	7
Desethylatrazine	—	—	—	—	—	1000	7
Dicamba	—	—	—	—	—	61	7
Dimethenamid	—	—	—	—	—	8.9	10
Diuron	0.007	0.058	—	—	—	2.4	9
Hexazinone	—	—	—	—	—	7	9
Glyphosate	—	—	—	—	—	11900	10
Imazapyr	—	—	—	—	—	24	10
Metolachlor	—	—	—	—	—	1	6
Metribuzin	—	0.0374	—	—	—	8.7	7
Metsulfuron methyl	—	—	—	—	—	0.36	10
Oxamyl	—	0.0113	—	—	—	27	8
Pendimethalin	—	—	—	—	—	5.2	7
Pentachlorophenol	—	—	—	—	0.115	0.15	1
Pronamide	—	—	—	—	—	*nsv*	
Propiconazole	—	—	—	—	—	21	7
Simazine	—	0.0073	—	—	—	6	9
Sulfometuron-methyl	—	—	—	—	—	0.45	8
Triclopyr	—	—	—	—	—	29800	7

Appendix A Water Sample Results	UPPER WILLAMETTE BASIN Station ID and Description						
Samples collected during 2008-2010 or in 2016	WM08 - South Santiam River Hwy 226 - 2008-2010	WM09 - Mary's River at 99W (Corvallis) - 2008-2010	WM10 - McKenzie River at Coburg Road - 2008-2010	WM10 - McKenzie River at Coburg Road - 2016	WM11 - Willamette MF at Jasper Bridge - 2008-2010	Screening Value (µg/L)	S.V. Reference
	10366	10373	10376	10376	10386		
	Maximum Values (µg/L)						
Flame retardants							
PBDE-100	—	—	—	0.00281	—	*nsv*	
PBDE-138	0.006	—	—	0.00015	—	*nsv*	
PBDE-139	—	—	—	0.00016	—	*nsv*	
PBDE-153	0.006	—	—	0.0011	—	*nsv*	
PBDE-154	0.007	—	—	0.00104	—	*nsv*	
PBDE-209	—	—	—	—	—	*nsv*	
PBDE-28	—	—	—	—	—	*nsv*	
PBDE-47	—	—	—	0.0121	—	*nsv*	
PBDE-49	—	—	—	0.00017	—	*nsv*	
PBDE-66	—	—	—	0.00017	—	*nsv*	
PBDE-85	—	—	—	0.0008	—	*nsv*	
PBDE-99	—	—	—	0.0152	—	*nsv*	
Industrial Chemicals or Intermediates							
Isophorone	—	—	—	—	—	27	1
Legacy Pesticides							
Dieldrin	—	—	—	—	—	5E-06	1
Endosulfan sulfate	—	—	—	—	—	8.5	1
Total DDT	—	—	—	—	—	0.001	2
4,4´-DDE	—	—	—	—	—	2E-05	1
PCBs							
Total PCBs	—	—	—	—	—	6E-06	1
PCB-114	—	—	—	—	—	*nsv*	
PCB-118	—	—	—	—	—	*nsv*	
PCB-156	—	—	—	—	—	*nsv*	
PCB-167	—	—	—	—	—	*nsv*	
PCB-168	—	—	—	—	—	*nsv*	
PCB-169	—	—	—	—	—	*nsv*	
PCB-189	—	—	—	—	—	*nsv*	
PCB-77	—	—	—	—	—	*nsv*	
PCB-81	—	—	—	—	—	*nsv*	
Plant or animal sterols							
beta-Sitosterol	—	—	—	0.928	—	*nsv*	
Cholesterol	1.253	0.831	0.706	0.397	724	*nsv*	
Coprostanol	0.053	0.046	0.015	0.0123	7.4	*nsv*	
Stigmastanol	—	—	—	0.116	—	*nsv*	

Appendix A Water Sample Results	UPPER WILLAMETTE BASIN Station ID and Description						
Samples collected during 2008-2010 or in 2016	WM08 - South Santiam River Hwy 226 - 2008-2010	WM09 - Mary's River at 99W (Corvallis) - 2008-2010	WM10 - McKenzie River at Coburg Road - 2008-2010	WM10 - McKenzie River at Coburg Road - 2016	WM11 - Willamette MF at Jasper Bridge - 2008-2010	Screening Value (µg/L)	S.V. Reference
	10366	10373	10376	10376	10386		
	Maximum Values (µg/L)						
Priority Metals							
Dissolved							
Aluminum	—	—	—	64.6	—	*nsv*	
Antimony	—	—	—	—	—	*nsv*	
Arsenic	—	—	—	0.37	—	2.1	1
Barium	—	—	—	2.5	—	nsv	
Chromium	—	—	—	0.21	—	1.7	2
Copper	—	—	—	1.81	—	*	2
Iron	—	—	—	71.4	—	1000[#]	2
Lead	—	—	—	0.03	—	*	2
Manganese	—	—	—	5.84	—	*nsv*	
Nickel	—	—	—	0.12	—	*	2
Potassium	—	—	—	1200	—	*nsv*	
Selenium	—	—	—	—	—	4.6	2
Silver	—	—	—	—	—	*	2
Thallium	—	—	—	—	—	*nsv*	
Zinc	—	—	—	3.2	—	*	2
Total Inorganic							
Arsenic	—	—	—	—	—	2.1	1
Total Recoverable							
Aluminum	—	—	—	578	—	*nsv*	
Antimony	—	—	—	—	—	5.1	1
Arsenic	—	—	—	0.38	—	2.1	1
Barium	5.4	39.4	4.0	5	4.8	1000	1
Beryllium	—	—	—	—	—	*nsv*	
Cadmium	—	—	—	—	—	*[§]	2
Chromium	—	13.8	1.1	0.4	1.1	11[§]	2
Cobalt	0.26	4.3	—	—	—	*nsv*	
Copper	5.1	12.5	2.1	0.74	2.7	*[§]	2
Iron	520	6460	314	451	520	1000	2
Lead	0.58	1.34	8.66	0.19	0.49	*[§]	2
Manganese	—	—	—	14.4	—	*nsv*	
Nickel	—	7.2	1.2	0.53	1.1	*[§]	2
Potassium	—	—	—	1190	—	*nsv*	
Silver	—	—	—	—	—	*[§]	2
Thallium	—	—	—	0.0008	—	0.043	1
Uranium	—	—	—	—	—	*nsv*	

Appendix A Water Sample Results	UPPER WILLAMETTE BASIN Station ID and Description						
Samples collected during 2008-2010 or in 2016	WM08 - South Santiam River Hwy 226 - 2008-2010	WM09 - Mary's River at 99W (Corvallis) - 2008-2010	WM10 - McKenzie River at Coburg Road - 2008-2010	WM10 - McKenzie River at Coburg Road - 2016	WM11 - Willamette MF at Jasper Bridge - 2008-2010	Screening Value (µg/L)	S.V. Reference
	10366	10373	10376	10376	10386		
	Maximum Values (µg/L)						
Priority Metals, continued							
Total Recoverable							
Vanadium	—	20.9	8.2	—	—	*nsv*	
Zinc	8.8	19.7	9.0	3.4	8.7	*§	2
Standard Parameters (mg/L)	Average Values						
Dissolved Organic Carbon	1.6	2.9	1.2	1.7			
Sulfate	1.2	2.5	2.7	3.3			
Total Organic Carbon	1.5	2.5	1.5	1.3			
Total Solids	40.7	81.5	57.3	58.3			
Total Suspended Solids	8.2	6.2	3.2	2.7			
Field Parameters							
Conductivity (µmhos/cm @ 25° C)	42	107	59	59			
Dissolved Oxygen (mg/L)	11.2	10.1	11.5	11.3			
pH (SU)	7.4	7.6	7.6	7.9			
Temperature (°C)	12.0	13.8	10.4	12.6			
Turbidity (NTU)	7	7	5	3			

Appendix A Water Sample Results	UPPER WILLAMETTE BASIN Station ID and Description						
Samples collected during 2008-2010 or in 2016	WM18 - Long Tom R at Stow Pit Road - 2008-2010	WM18 - Long Tom R at Stow Pit Road - 2016	WM19 - Calapooia River at Queen Road - 2008-2010	WM19 - Calapooia River at Queen Road - 2016	WM20 - Willamette CF at Mt. Pisgah Park - 2008-2010	Screening Value (µg/L)	S.V. Reference
	11140	11140	11180	11180	11275		
	Maximum Values (µg/L)						
Ammonia							
Ammonia as N	—	24	—	15	—	‡	2
Consumer Product Constituents							
Bis(2-ethylhexyl)phthalate	—	—	—	—	—	0.2	1
Carbamazepine	—	—	—	—	0.011	*nsv*	
DEET	—	—	—	—	—	*nsv*	
Diethylphthalate	—	—	—	—	—	3800	1
Diphenhydramine	—	—	—	—	—		
Estriol	—	—	—	—	—	*nsv*	
Sulfamethoxazole	—	—	—	—	0.012	*nsv*	
Current Use Pesticides							
2,4-D	0.14	—	0.63	—	—	100	1
Aminomethylphosphonic acid (AMPA)	—	0.11	—	0.0722	—	249500	5
Atrazine	0.0509	0.0187	0.0734	—	0.0157	1.0	9
Bromacil	—	—	—	—	—	6.8	7
Carbaryl	—	—	—	—	—	0.5	8
Chlorpyrifos	—	—	—	0.0218	—	0.04	8
Deisopropylatrazine	—	—	—	0.00529	—	2500	7
Desethylatrazine	—	—	—	—	—	1000	7
Dicamba	—	—	0.36	—	—	61	7
Dimethenamid	—	—	—	0.498	—	8.9	10
Diuron	0.62	2.26	2.13	2.39	0.16	2.4	9
Hexazinone	—	—	—	—	—	7	9
Glyphosate	—	—	—	0.0535	—	11900	10
Imazapyr	—	—	—	—	—	24	10
Metolachlor	0.0169	—	0.0345	0.0264	—	1	6
Metribuzin	0.013	0.345	0.0639	0.298	—	8.7	7
Metsulfuron methyl	—	—	—	—	—	0.36	10
Oxamyl	0.106	—	—	—	—	27	8
Pendimethalin	—	—	—	0.138	—	5.2	7
Pentachlorophenol	0.159	—	0.138	—	0.112	0.15	1
Pronamide	—	—	—	0.0277	—	*nsv*	
Propiconazole	0.059	0.0304	0.032	0.0562	—	21	7
Simazine	0.0132	0.00535	0.0615	0.0146	—	6	9
Sulfometuron-methyl	—	0.0173	—	—	—	0.45	8
Triclopyr	—	—	—	0.3	—	29800	7

Appendix A Water Sample Results	UPPER WILLAMETTE BASIN Station ID and Description						
Samples collected during 2008-2010 or in 2016	WM18 - Long Tom R at Stow Pit Road - 2008-2010	WM18 - Long Tom R at Stow Pit Road - 2016	WM19 - Calapooia River at Queen Road - 2008-2010	WM19 - Calapooia River at Queen Road - 2016	WM20 - Willamette CF at Mt. Pisgah Park - 2008-2010	Screening Value (µg/L)	S.V. Reference
	11140	11140	11180	11180	11275		
	Maximum Values (µg/L)						
Flame retardants							
PBDE-100	—	0.00053	—	—	—	*nsv*	
PBDE-138	—	—	—	—	—	*nsv*	
PBDE-139	—	—	—	—	—	*nsv*	
PBDE-153	—	—	—	—	—	*nsv*	
PBDE-154	—	—	—	—	—	*nsv*	
PBDE-209	—	0.00209	—	—	—	*nsv*	
PBDE-28	—	0.00011	—	—	—	*nsv*	
PBDE-47	—	0.00219	—	—	—	*nsv*	
PBDE-49	—	—	—	—	—	*nsv*	
PBDE-66	—	—	—	—	—	*nsv*	
PBDE-85	—	—	—	—	—	*nsv*	
PBDE-99	—	—	—	—	—	*nsv*	
Industrial Chemicals or Intermediates							
Isophorone	—	—	—	—	—	27	1
Legacy Pesticides							
Dieldrin	—	—	—	—	—	5E-06	1
Endosulfan sulfate	—	—	—	—	—	8.5	1
Total DDT	—	7.6E-05	—	—	—	0.001	2
4,4´-DDE	—	7.6E-05	—	—	—	2E-05	1
PCBs							
Total PCBs	—	—	—	—	—	6E-06	1
PCB-114	—	—	—	—	—	*nsv*	
PCB-118	—	—	—	—	—	*nsv*	
PCB-156	—	—	—	—	—	*nsv*	
PCB-167	—	—	—	—	—	*nsv*	
PCB-168	—	—	—	—	—	*nsv*	
PCB-169	—	—	—	—	—	*nsv*	
PCB-189	—	—	—	—	—	*nsv*	
PCB-77	—	—	—	—	—	*nsv*	
PCB-81	—	—	—	—	—	*nsv*	
Plant or animal sterols							
beta-Sitosterol	—	1.84	—	2.55	—	*nsv*	
Cholesterol	2.59	1.17	2.169	1.04	1.477	*nsv*	
Coprostanol	0.13	0.0863	0.054	0.0678	0.077	*nsv*	
Stigmastanol	—	0.0989	—	0.316	—	*nsv*	

Appendix A Water Sample Results	UPPER WILLAMETTE BASIN Station ID and Description						
Samples collected during 2008-2010 or in 2016	WM18 - Long Tom R at Stow Pit Road - 2008-2010	WM18 - Long Tom R at Stow Pit Road - 2016	WM19 - Calapooia River at Queen Road - 2008-2010	WM19 - Calapooia River at Queen Road - 2016	WM20 - Willamette CF at Mt. Pisgah Park - 2008-2010	Screening Value (µg/L)	S.V. Reference
	11140	11140	11180	11180	11275		
	Maximum Values (µg/L)						
Priority Metals							
Dissolved							
Aluminum	—	58.9	—	56.9	—	*nsv*	
Antimony	—	0.04	—	—	—	*nsv*	
Arsenic	—	0.46	—	0.87	—	2.1	1
Barium	—	18.4	—	14.2	—	nsv	
Chromium	—	0.17	—	—	—	1.7	2
Copper	—	2.51	—	2.62	—	*	2
Iron	—	209	—	154	—	1000[#]	2
Lead	—	0.1	—	0.04	—	*	2
Manganese	—	32.5	—	20.4	—	*nsv*	
Nickel	—	0.58	—	0.25	—	*	2
Potassium	—	1080	—	850	—	*nsv*	
Selenium	—	—	—	—	—	4.6	2
Silver	—	0.02	—	—	—	*	2
Thallium	—	0.01	—	—	—	*nsv*	
Zinc	—	3.3	—	2	—	*	2
Total Inorganic							
Arsenic	—	—	—	—	—	2.1	1
Total Recoverable							
Aluminum	—	1850	—	1690	—	*nsv*	
Antimony	—	0.06	—	—	—	5.1	1
Arsenic	—	0.75	—	0.88	—	2.1	1
Barium	29.6	30.3	35.1	23	15.6	1000	1
Beryllium	—	—	—	—	—	*nsv*	
Cadmium	—	—	—	—	—	*[§]	2
Chromium	2.3	1.95	3.2	1.5	2.2	11[§]	2
Cobalt	0.88	—	1.71	—	0.95	*nsv*	
Copper	4.9	2.9	6.4	2.4	5	*[§]	2
Iron	2770	2030	3370	1590	2120	1000	2
Lead	0.9	0.64	1.56	0.46	0.71	*[§]	2
Manganese	—	73	—	50.2	—	*nsv*	
Nickel	1.8	1048	5.0	1.23	1.3	*[§]	2
Potassium	—	1130.0	—	870	—	*nsv*	
Silver	—	—	—	—	—	*[§]	2
Thallium	—	—	—	—	—	0.043	1
Uranium	—	—	0.12	—	—	*nsv*	

Appendix A Water Sample Results	UPPER WILLAMETTE BASIN Station ID and Description						
Samples collected during 2008-2010 or in 2016	WM18 - Long Tom R at Stow Pit Road - 2008-2010	WM18 - Long Tom R at Stow Pit Road - 2016	WM19 - Calapooia River at Queen Road - 2008-2010	WM19 - Calapooia River at Queen Road - 2016	WM20 - Willamette CF at Mt. Pisgah Park - 2008-2010	Screening Value (µg/L)	S.V. Reference
	11140	11140	11180	11180	11275		
	Maximum Values (µg/L)						
Priority Metals, continued							
Total Recoverable							
Vanadium	6.3	—	8.3	—	5.6	*nsv*	
Zinc	11.7	3.3	17.2	1.7	11	*§	2
Standard Parameters (mg/L)	Average Values						
Dissolved Organic Carbon	4.1	3.1	2.7	2.8	2.7		
Sulfate	3.0	3.1	3.0	3.3	1.9		
Total Organic Carbon	3.9	3.7	2.3	2.5	2.7		
Total Solids	98.5	97.9	74.3	91.0	65.2		
Total Suspended Solids	16.2	10.0	15.8	7.7	4.5		
Field Parameters							
Conductivity (µmhos/cm @ 25° C)	92	93	82	94	64		
Dissolved Oxygen (mg/L)	10.1	9.9	10.3	9.9	10.2		
pH (SU)	7.5	7.2	7.6	7.8	7.5		
Temperature (°C)	15.2	15.9	13.5	15.8	12.4		
Turbidity (NTU)	33	12	14	11	9		

Appendix A Water Sample Results	UPPER WILLAMETTE BASIN Station ID and Description						
Samples collected during 2008-2010 or in 2016	WM20 - Willamette CF at Mt. Pisgah Park - 2016	WM26 - Willamette R MF above Hills CR - 2016	WM28 - Willamette R at Greenway bike bridge - 2008-2010	WM31 - Luckiamute R at Buena Vista Rd - 2008-2010	WM32 - Lake Cr at Hwy 34 nr Tangent - 2016	Screening Value (µg/L)	S.V. Reference
	11275	27986	29044	36875	37248		
	Maximum Values (µg/L)						
Ammonia							
Ammonia as N	—	—	—	—	35	‡	2
Consumer Product Constituents							
Bis(2-ethylhexyl)phthalate	—	—	—	—	—	0.2	1
Carbamazepine	—	—	—	—	—	*nsv*	
DEET	—	—	—	—	—	*nsv*	
Diethylphthalate	0.04726	—	—	—	—	3800	1
Diphenhydramine	0.0161	—	—	—	—		
Estriol	—	—	—	—	—	*nsv*	
Sulfamethoxazole	—	—	—	—	—	*nsv*	
Current Use Pesticides							
2,4-D	—	—	—	—	0.2	100	1
Aminomethylphosphonic acid (AMPA)	—	—	—	—	0.596	249500	5
Atrazine	0.0109	—	—	0.0276	0.0595	1.0	9
Bromacil	—	—	—	—	0.311	6.8	7
Carbaryl	—	—	—	0.0139	—	0.5	8
Chlorpyrifos	—	—	—	—	0.0231	0.04	8
Deisopropylatrazine	—	—	—	—	0.0333	2500	7
Desethylatrazine	—	—	—	0.00502	0.0125	1000	7
Dicamba	—	—	—	—	1	61	7
Dimethenamid	—	—	—	0.0242	2.43	8.9	10
Diuron	—	—	—	0.135	7.64	2.4	9
Hexazinone	—	—	—	—	—	7	9
Glyphosate	—	—	—	—	0.227	11900	10
Imazapyr	—	—	—	—	0.0919	24	10
Metolachlor	—	—	—	—	0.0697	1	6
Metribuzin	—	—	—	0.0573	1.76	8.7	7
Metsulfuron methyl	—	—	—	—	0.075	0.36	10
Oxamyl	—	—	—	—	—	27	8
Pendimethalin	—	—	—	—	—	5.2	7
Pentachlorophenol	—	—	—	—	—	0.15	1
Pronamide	—	—	—	—	—	*nsv*	
Propiconazole	—	—	—	—	—	21	7
Simazine	—	—	—	0.00742	0.0567	6	9
Sulfometuron-methyl	—	—	—	—	0.136	0.45	8
Triclopyr	—	—	—	—	—	29800	7

Appendix A Water Sample Results	UPPER WILLAMETTE BASIN Station ID and Description						
Samples collected during 2008-2010 or in 2016	WM20 - Willamette CF at Mt. Pisgah Park - 2016	WM26 - Willamette R MF above Hills CR - 2016	WM28 - Willamette R at Greenway bike bridge - 2008-2010	WM31 - Luckiamute R at Buena Vista Rd - 2008-2010	WM32 - Lake Cr at Hwy 34 nr Tangent - 2016	Screening Value (µg/L)	S.V. Reference
	11275	27986	29044	36875	37248		
	Maximum Values (µg/L)						
Flame retardants							
PBDE-100	—	—	—	—	—	*nsv*	
PBDE-138	—	—	—	—	—	*nsv*	
PBDE-139	—	—	—	—	—	*nsv*	
PBDE-153	—	—	—	—	—	*nsv*	
PBDE-154	—	—	—	—	—	*nsv*	
PBDE-209	—	—	—	0.00274	—	*nsv*	
PBDE-28	—	—	—	—	—	*nsv*	
PBDE-47	—	0.00229	—	0.00222	—	*nsv*	
PBDE-49	—	—	—	—	—	*nsv*	
PBDE-66	—	—	—	—	—	*nsv*	
PBDE-85	—	—	—	—	—	*nsv*	
PBDE-99	—	0.0019	—	—	0.0015	*nsv*	
Industrial Chemicals or Intermediates							
Isophorone	—	—	—	—	0.112	27	1
Legacy Pesticides							
Dieldrin	—	—	—	—	6.8E-05	5E-06	1
Endosulfan sulfate	—	—	—	0.00023	0.00036	8.5	1
Total DDT	—	—	—	0.0001	7.4E-05	0.001	2
4,4´-DDE	—	—	—	0.0001	7.4E-05	2E-05	1
PCBs							
Total PCBs	—	0.00276	—	—	—	6E-06	1
PCB-114	—	0.00028	—	—	—	*nsv*	
PCB-118	—	0.00044	—	—	—	*nsv*	
PCB-156	—	0.00035	—	—	—	*nsv*	
PCB-167	—	0.00043	—	—	—	*nsv*	
PCB-168	—	0.00019	—	—	—	*nsv*	
PCB-169	—	0.00037	—	—	—	*nsv*	
PCB-189	—	0.00031	—	—	—	*nsv*	
PCB-77	—	0.00016	—	—	—	*nsv*	
PCB-81	—	0.00022	—	—	—	*nsv*	
Plant or animal sterols							
beta-Sitosterol	1.44	0.661	0.728	0.9	13.2	*nsv*	
Cholesterol	0.63	0.127	0.402	0.384	3.26	*nsv*	
Coprostanol	0.0428	—	0.0139	0.028	0.126	*nsv*	
Stigmastanol	0.191	0.0443	0.0438	0.105	0.437	*nsv*	

Appendix A Water Sample Results	UPPER WILLAMETTE BASIN Station ID and Description						
Samples collected during 2008-2010 or in 2016	WM20 - Willamette CF at Mt. Pisgah Park - 2016	WM26 - Willamette R MF above Hills CR - 2016	WM28 - Willamette R at Greenway bike bridge - 2008-2010	WM31 - Luckiamute R at Buena Vista Rd - 2008-2010	WM32 - Lake Cr at Hwy 34 nr Tangent - 2016	Screening Value (µg/L)	S.V. Reference
	11275	27986	29044	36875	37248		
	Maximum Values (µg/L)						
Priority Metals							
Dissolved							
Aluminum	76.5	101	60.7	25	38.6	*nsv*	
Antimony	—	—	—	—	0.06	*nsv*	
Arsenic	1.02	0.17	0.34	0.69	2.24	2.1	1
Barium	6.34	1.3	4.02	15.5	50.8	nsv	
Chromium	0.2	0.14	—	0.15	0.17	1.7	2
Copper	1.98	—	0.5	—	1.8	*	2
Iron	231	56.1	80.6	361	82.7	1000[#]	2
Lead	0.07	0.15	0.02	0.05	0.03	*	2
Manganese	9.9	0.82	5.8	43.4	104	*nsv*	
Nickel	0.12	—	0.12	0.43	1.4	*	2
Potassium	510	910	660	970	1770	*nsv*	
Selenium	—	—	—	—	0.14	4.6	2
Silver	—	—	—	—	—	*	2
Thallium	—	—	—	—	—	*nsv*	
Zinc	2	5.1	1.3	2.5	2	*	2
Total Inorganic							
Arsenic	0.934	—	—	—	1.78	2.1	1
Total Recoverable							
Aluminum	1020	414	782	1050	1100	*nsv*	
Antimony	—	0.07	—	0.04	0.07	5.1	1
Arsenic	1.18	0.11	0.43	0.73	2.68	2.1	1
Barium	10.1	2.4	6.95	22	58.2	1000	1
Beryllium	—	0.04	—	—	—	*nsv*	
Cadmium	—	0.05	—	—	0.02	*[§]	2
Chromium	0.32	0.2	0.26	1.59	1.26	11[§]	2
Cobalt	—	—	—	—	—	*nsv*	
Copper	1.86	—	0.49	2.42	2.2	*[§]	2
Iron	905	217	662	1370	1100	1000	2
Lead	0.06	0.06	0.06	0.33	0.46	*[§]	2
Manganese	27.7	2.74	22.2	63.6	268	*nsv*	
Nickel	0.21	—	0.17	1.32	1.72	*[§]	2
Potassium	540	940	680	990	1870.0	*nsv*	
Silver	—	0.05	—	—	—	*[§]	2
Thallium	—	0.06	—	—	—	0.043	1
Uranium	—	—	—	—	—	*nsv*	

Appendix A Water Sample Results	UPPER WILLAMETTE BASIN Station ID and Description						
Samples collected during 2008-2010 or in 2016	WM20 - Willamette CF at Mt. Pisgah Park - 2016	WM26 - Willamette R MF above Hills CR - 2016	WM28 - Willamette R at Greenway bike bridge - 2008-2010	WM31 - Luckiamute R at Buena Vista Rd - 2008-2010	WM32 - Lake Cr at Hwy 34 nr Tangent - 2016	Screening Value (µg/L)	S.V. Reference
	11275	27986	29044	36875	37248		
	Maximum Values (µg/L)						
Priority Metals, continued							
Total Recoverable							
Vanadium	—	—	—	—	—	*nsv*	
Zinc	1.8	1.3	1.4	1.5	3.2	*§	2
Standard Parameters (mg/L)	Average Values						
Dissolved Organic Carbon	2.7	2.3	1.9	2.1	5.7		
Sulfate	1.4	0.3	0.8	3.7	16.2		
Total Organic Carbon	2.3	1.4	2.0	1.7	6.5		
Total Solids	62.7	59.7	57.0	82.3	222.0		
Total Suspended Solids	2.7	—	3.0	8.3	13.7		
Field Parameters							
Conductivity (µmhos/cm @ 25° C)	62	60	54	92	288		
Dissolved Oxygen (mg/L)	10.6	10.8	10.7	9.5	9.5		
pH (SU)	7.7	7.8	7.8	7.3	7.6		
Temperature (°C)	14.9	11.1	14.0	15.1	15.2		
Turbidity (NTU)	8	2	6	11	10		

State of Oregon Department of Environmental Quality

Appendix A
Sediment Sample Results

UPPER WILLAMETTE BASIN
Station ID and Description

Samples collected in August 2016	Percent Detection	Number of samples over screening value	WM03 - Willamette River at Albany	WM10 - McKenzie River at Coburg Road	WM18 - Long Tom River at Stow Pit Road (Monroe)	WM19 - Calapooia River at Queen Road	Screening Value	S.V. Reference
			10350	10376	11140	11180		
			Maximum Values (ng/kg dry)					
Current Use Pesticides								
Bifenthrin	10		—	—	—	—	*nsv*	
Dioxins and Furans								
1,2,3,4,6,7,8-HpCDD	33		—	—	—	—	85	11
1,2,3,4,6,7,8-HpCDF	11		—	—	—	—	85	11
OCDD	67		35.9	—	23.3	27.3	2800	11
OCDF	11		—	—	—	—	2800	11
Flame Retardants								
PBDE-100	22		—	—	—	—	*nsv*	
PBDE-138	11		—	—	—	—	*nsv*	
PBDE-139	11		—	—	—	—	*nsv*	
PBDE-153	11		—	—	—	—	*nsv*	
PBDE-154	11		—	—	—	—	*nsv*	
PBDE-183	11		—	—	—	—	*nsv*	
PBDE-196	11		—	—	—	—	*nsv*	
PBDE-197	11		—	—	—	—	*nsv*	
PBDE-201	11		—	—	—	—	*nsv*	
PBDE-203	11		—	—	—	—	*nsv*	
PBDE-206	11		—	—	—	—	*nsv*	
PBDE-207	11		—	—	—	—	*nsv*	
PBDE-208	11		—	—	—	—	*nsv*	
PBDE-209	44		—	517	—	—	*nsv*	
PBDE-28	11		—	—	—	—	*nsv*	
PBDE-47	22		—	—	—	—	*nsv*	
PBDE-49	11		—	—	—	—	*nsv*	
PBDE-66	11		—	—	—	—	*nsv*	
PBDE-85	11		—	—	—	—	*nsv*	
PBDE-99	22		—	—	—	—	*nsv*	
Legacy Pesticides								
Total Chlordane	17		—	—	—	—	*nsv*	
alpha-Chlordane	20		—	—	—	—	*nsv*	
cis-Nonachlor	10		—	—	—	—	*nsv*	
gamma-Chlordane+trans-Nonachlor	20		—	—	—	—	*nsv*	
Oxychlordane	10		—	—	—	—	*nsv*	
Dieldrin	20	2	—	—	—	—	1	11
Endosulfan II	10		—	—	—	—	*nsv*	
Endosulfan sulfate	20		—	—	—	—	*nsv*	
Endrin+cis-Nonachlor	10		—	—	—	—	*nsv*	

Appendix A Sediment Sample Results			UPPER WILLAMETTE BASIN Station ID and Description					
Samples collected in August 2016	Percent Detection	Number of samples over screening value	WM03 - Willamette River at Albany	WM10 - McKenzie River at Coburg Road	WM18 - Long Tom River at Stow Pit Road (Monroe)	WM19 - Calapooia River at Queen Road	Screening Value	S.V. Reference
			10350	10376	11140	11180		
			Maximum Values (ng/kg dry)					
Legacy Pesticides, continued								
Heptachlor epoxide	10		—	—	—	—	*nsv*	
Hexachlorobenzene	10	0	—	—	—	—	2300	11
Mirex	10		—	—	—	—	*nsv*	
Total DDT	59	5	70.6	922.4	83	155.5	40	11
2,4´-DDD	40		—	37.4	—	—	*nsv*	
2,4´-DDE	20		—	—	—	—	*nsv*	
2,4´-DDT	30		—	—	—	—	*nsv*	
4,4´-DDD	70		—	176	—	30.1	*nsv*	
4,4´-DDE	90		44.7	608	83	68.5	*nsv*	
4,4´-DDT	70		25.9	101	—	56.9	*nsv*	
PCBs								
Total PCBs	70	3	—	—	11.5	25.9	48	11
PCB-101+113	10		—	—	—	—	*nsv*	
PCB-102	10		—	—	—	—	*nsv*	
PCB-105	10	1	—	—	—	—	21	11
PCB-107+123	10		—	—	—	—	*nsv*	
PCB-110	50		—	—	11.5	13.7	*nsv*	
PCB-112+119	10		—	—	—	—	*nsv*	
PCB-114	10		—	—	—	—	21	11
PCB-118	30	1	—	—	—	—	26	11
PCB-122	10		—	—	—	—	*nsv*	
PCB-124	10		—	—	—	—	*nsv*	
PCB-126	10	1	—	—	—	—	0.0062	11
PCB-128	10		—	—	—	—	*nsv*	
PCB-130	10		—	—	—	—	*nsv*	
PCB-131+133	10		—	—	—	—	*nsv*	
PCB-132+153	30		—	—	—	—	*nsv*	
PCB-134	10		—	—	—	—	*nsv*	
PCB-135	10		—	—	—	—	*nsv*	
PCB-137	10		—	—	—	—	*nsv*	
PCB-138+163	20		—	—	—	—	*nsv*	
PCB-141	10		—	—	—	—	*nsv*	
PCB-142	10		—	—	—	—	*nsv*	
PCB-144	10		—	—	—	—	*nsv*	
PCB-146	10		—	—	—	—	*nsv*	
PCB-147	10		—	—	—	—	*nsv*	
PCB-148	10		—	—	—	—	*nsv*	

Appendix A Sediment Sample Results			UPPER WILLAMETTE BASIN Station ID and Description					
Samples collected in August 2016	Percent Detection	Number of samples over screening value	WM03 - Willamette River at Albany	WM10 - McKenzie River at Coburg Road	WM18 - Long Tom River at Stow Pit Road (Monroe)	WM19 - Calapooia River at Queen Road	Screening Value	S.V. Reference
			10350	10376	11140	11180		
			Maximum Values (ng/kg dry)					
PCBs, continued								
PCB-149	40		—	—	—	12.2	*nsv*	
PCB-151	10		—	—	—	—	*nsv*	
PCB-154	10		—	—	—	—	*nsv*	
PCB-156	10	1	—	—	—	—	26	11
PCB-157	10	1	—	—	—	—	26	11
PCB-158+160	10		—	—	—	—	*nsv*	
PCB-16+32	10		—	—	—	—	*nsv*	
PCB-164	10		—	—	—	—	*nsv*	
PCB-167	10	1	—	—	—	—	26	11
PCB-17	10		—	—	—	—	*nsv*	
PCB-170	10		—	—	—	—	*nsv*	
PCB-171	10		—	—	—	—	*nsv*	
PCB-172	10		—	—	—	—	*nsv*	
PCB-174	10		—	—	—	—	*nsv*	
PCB-176	10		—	—	—	—	*nsv*	
PCB-177	10		—	—	—	—	*nsv*	
PCB-178	10		—	—	—	—	*nsv*	
PCB-179	10		—	—	—	—	*nsv*	
PCB-18	10		—	—	—	—	*nsv*	
PCB-180+193	10		—	—	—	—	*nsv*	
PCB-183	10		—	—	—	—	*nsv*	
PCB-185	10		—	—	—	—	*nsv*	
PCB-187	10		—	—	—	—	*nsv*	
PCB-189	10	0	—	—	—	—	140	11
PCB-190	10		—	—	—	—	*nsv*	
PCB-194	10		—	—	—	—	*nsv*	
PCB-195	10		—	—	—	—	*nsv*	
PCB-196	10		—	—	—	—	*nsv*	
PCB-199	10		—	—	—	—	*nsv*	
PCB-20+21+33	10		—	—	—	—	*nsv*	
PCB-200	10		—	—	—	—	*nsv*	
PCB-202	10		—	—	—	—	*nsv*	
PCB-203	10		—	—	—	—	*nsv*	
PCB-204	10		—	—	—	—	*nsv*	
PCB-206	10		—	—	—	—	*nsv*	
PCB-208	10		—	—	—	—	*nsv*	
PCB-209	20		—	—	—	—	*nsv*	

Appendix A Sediment Sample Results			UPPER WILLAMETTE BASIN Station ID and Description					
Samples collected in August 2016	Percent Detection	Number of samples over screening value	WM03 - Willamette River at Albany	WM10 - McKenzie River at Coburg Road	WM18 - Long Tom River at Stow Pit Road (Monroe)	WM19 - Calapooia River at Queen Road	Screening Value	S.V. Reference
			10350	10376	11140	11180		
			Maximum Values (ng/kg dry)					
PCBs, continued								
PCB-22	10		—	—	—	—	*nsv*	
PCB-25	10		—	—	—	—	*nsv*	
PCB-26	10		—	—	—	—	*nsv*	
PCB-28	10		—	—	—	—	*nsv*	
PCB-31	10		—	—	—	—	*nsv*	
PCB-35	10		—	—	—	—	*nsv*	
PCB-37	10		—	—	—	—	*nsv*	
PCB-40	10		—	—	—	—	*nsv*	
PCB-42	10		—	—	—	—	*nsv*	
PCB-43+52	10		—	—	—	—	*nsv*	
PCB-44	10		—	—	—	—	*nsv*	
PCB-45	10		—	—	—	—	*nsv*	
PCB-46	10		—	—	—	—	*nsv*	
PCB-48	10		—	—	—	—	*nsv*	
PCB-49	10		—	—	—	—	*nsv*	
PCB-53	10		—	—	—	—	*nsv*	
PCB-56	10		—	—	—	—	*nsv*	
PCB-59	10		—	—	—	—	*nsv*	
PCB-60	10		—	—	—	—	*nsv*	
PCB-64+68	10		—	—	—	—	*nsv*	
PCB-65+75	10		—	—	—	—	*nsv*	
PCB-66	10		—	—	—	—	*nsv*	
PCB-70	10		—	—	—	—	*nsv*	
PCB-71	10		—	—	—	—	*nsv*	
PCB-74+76	10		—	—	—	—	*nsv*	
PCB-77	10	1	—	—	—	—	6.4	11
PCB-81	10	1	—	—	—	—	2.1	11
PCB-82	10		—	—	—	—	*nsv*	
PCB-83	10		—	—	—	—	*nsv*	
PCB-84	10		—	—	—	—	*nsv*	
PCB-85	10		—	—	—	—	*nsv*	
PCB-87+111+116+117	10		—	—	—	—	*nsv*	
PCB-89	10		—	—	—	—	*nsv*	
PCB-91	10		—	—	—	—	*nsv*	
PCB-95+121	10		—	—	—	—	*nsv*	
PCB-97	10		—	—	—	—	*nsv*	
PCB-99	10		—	—	—	—	*nsv*	

Appendix A Sediment Sample Results			UPPER WILLAMETTE BASIN Station ID and Description					
Samples collected in August 2016	Percent Detection	Number of samples over screening value	WM03 - Willamette River at Albany 10350	WM10 - McKenzie River at Coburg Road 10376	WM18 - Long Tom River at Stow Pit Road (Monroe) 11140	WM19 - Calapooia River at Queen Road 11180	Screening Value	S.V. Reference
			Maximum Values (mg/kg dry)					
Priority Metals								
Aluminum	100		23800	29900	18300	30400	*nsv*	
Antimony	10		—	—	—	—	*nsv*	
Arsenic	100	1	2.66	2.66	4.72	5.12	7	11
Barium	100		85.7	102	165	155	*nsv*	
Cadmium	30	0	—	—	—	—	1	11
Chromium	100		32.7	27	20.7	24.7	*nsv*	
Cobalt	100		10.9	15.6	13.5	18.7	*nsv*	
Copper	100		17.2	23.9	10.7	16.6	*nsv*	
Lead	100	1	3.69	2.8	5.19	3.98	17	11
Manganese	100		335	586	716	841	*nsv*	
Mercury	20	1	—	—	—	—	0.07	11
Nickel	100		31.9	33.3	15.4	15.7	*nsv*	
Silver	20		—	—	—	—	*nsv*	
Thallium	20		—	—	—	—	*nsv*	
Zinc	100		60.8	55.9	65	62.6	*nsv*	

Appendix A Sediment Sample Results	UPPER WILLAMETTE BASIN Station ID and Description							
Samples collected in August 2016	WM20 - Coast Fork Willamette at Mt. Pisgah Park	WM26 - Willamette R MF above Hills Cr	WM28 - Willamette R at Greenway bike bridge, Eugene	WM31 - Luckiamute R at Buena Vista Rd	WM32 - Lake Cr at Hwy 34 nr Tangent	WM34 - Willamette R at Maurie Jacobs Park	Screening Value	S.V. Reference
	11275	27986	29044	36875	37248	38586		
	Maximum Values (ng/kg dry)							
Current Use Pesticides								
Bifenthrin	—	—	—	—	307	—	*nsv*	
Dioxins and Furans								
1,2,3,4,6,7,8-HpCDD	79	—	8.97	13.6	—	124	85	11
1,2,3,4,6,7,8-HpCDF	13.2	—	—	—	—	24.6	85	11
OCDD	458	—	76.2	121	—	1620	2800	11
OCDF	179	—	—	—	—	53.6	2800	11
Flame Retardants								
PBDE-100	29.4	—	—	—	—	276	*nsv*	
PBDE-138	—	—	—	—	—	16.9	*nsv*	
PBDE-139	—	—	—	—	—	11.9	*nsv*	
PBDE-153	—	—	—	—	—	121	*nsv*	
PBDE-154	—	—	—	—	—	101	*nsv*	
PBDE-183	—	—	—	—	—	79	*nsv*	
PBDE-196	—	—	—	—	—	72.4	*nsv*	
PBDE-197	—	—	—	—	—	48.5	*nsv*	
PBDE-201	—	—	—	—	—	60.2	*nsv*	
PBDE-203	—	—	—	—	—	79.6	*nsv*	
PBDE-206	—	—	—	—	—	433	*nsv*	
PBDE-207	—	—	—	—	—	295	*nsv*	
PBDE-208	—	—	—	—	—	213	*nsv*	
PBDE-209	241	—	582	—	—	7880	*nsv*	
PBDE-28	—	—	—	—	—	16.9	*nsv*	
PBDE-47	157	—	—	—	—	1140	*nsv*	
PBDE-49	—	—	—	—	—	79.2	*nsv*	
PBDE-66	—	—	—	—	—	59	*nsv*	
PBDE-85	—	—	—	—	—	47.3	*nsv*	
PBDE-99	138	—	—	—	—	1290	*nsv*	
Legacy Pesticides								
Total Chlordane	—	—	—	—	83.4	3446.8	*nsv*	
alpha-Chlordane	—	—	—	—	30	1370	*nsv*	
cis-Nonachlor	—	—	—	—	—	289	*nsv*	
gamma-Chlordane+trans-Nonachlor	—	—	—	—	53.4	1730	*nsv*	
Oxychlordane	—	—	—	—	—	57.8	*nsv*	
Dieldrin	—	—	—	53.7	—	556	1	11
Endosulfan II	—	76.2	—	—	—	—	*nsv*	
Endosulfan sulfate	—	52.6	—	81.6	—	—	*nsv*	
Endrin+cis-Nonachlor	—	—	—	—	—	314	*nsv*	

Appendix A Sediment Sample Results	UPPER WILLAMETTE BASIN Station ID and Description							
Samples collected in August 2016	WM20 - Coast Fork Willamette at Mt. Pisgah Park	WM26 - Willamette R MF above Hills Cr	WM28 - Willamette R at Greenway bike bridge, Eugene	WM31 - Luckiamute R at Buena Vista Rd	WM32 - Lake Cr at Hwy 34 nr Tangent	WM34 - Willamette R at Maurie Jacobs Park	Screening Value	S.V. Reference
	11275	27986	29044	36875	37248	38586		
	Maximum Values (ng/kg dry)							
Legacy Pesticides, continued								
Heptachlor epoxide	—	—	—	—	—	107	*nsv*	
Hexachlorobenzene	—	—	—	—	—	672	2300	11
Mirex	—	—	—	—	—	24.2	*nsv*	
Total DDT	653.6	2188	—	1364	170.8	3627	40	11
2,4´-DDD	—	82.1	—	33.3	—	374	*nsv*	
2,4´-DDE	—	32.5	—	—	—	66.2	*nsv*	
2,4´-DDT	—	27.6	—	33.1	—	210	*nsv*	
4,4´-DDD	96.7	408	—	219	41.8	863	*nsv*	
4,4´-DDE	498	1450	—	813	129	1480	*nsv*	
4,4´-DDT	58.9	188	—	266	—	634	*nsv*	
PCBs								
Total PCBs	67.7	—	109.6	17.2	—	21889.1	48	11
PCB-101+113	—	—	—	—	—	1190	*nsv*	
PCB-102	—	—	—	—	—	38	*nsv*	
PCB-105	—	—	—	—	—	458	21	11
PCB-107+123	—	—	—	—	—	78.1	*nsv*	
PCB-110	17.4	—	21.3	—	—	1860	*nsv*	
PCB-112+119	—	—	—	—	—	70.4	*nsv*	
PCB-114	—	—	—	—	—	19.7	21	11
PCB-118	15.4	—	18.7	—	—	934	26	11
PCB-122	—	—	—	—	—	12	*nsv*	
PCB-124	—	—	—	—	—	35.1	*nsv*	
PCB-126	—	—	—	—	—	10.9	0.0062	11
PCB-128	—	—	—	—	—	324	*nsv*	
PCB-130	—	—	—	—	—	118	*nsv*	
PCB-131+133	—	—	—	—	—	39.2	*nsv*	
PCB-132+153	22.5	—	27.8	—	—	1910	*nsv*	
PCB-134	—	—	—	—	—	119	*nsv*	
PCB-135	—	—	—	—	—	243	*nsv*	
PCB-137	—	—	—	—	—	108	*nsv*	
PCB-138+163	—	—	25.1	—	—	1570	*nsv*	
PCB-141	—	—	—	—	—	281	*nsv*	
PCB-142	—	—	—	—	—	17.2	*nsv*	
PCB-144	—	—	—	—	—	77	*nsv*	
PCB-146	—	—	—	—	—	288	*nsv*	
PCB-147	—	—	—	—	—	40.3	*nsv*	
PCB-148	—	—	—	—	—	243	*nsv*	

Appendix A Sediment Sample Results	UPPER WILLAMETTE BASIN Station ID and Description							
Samples collected in August 2016	WM20 - Coast Fork Willamette at Mt. Pisgah Park	WM26 - Willamette R MF above Hills Cr	WM28 - Willamette R at Greenway bike bridge, Eugene	WM31 - Luckiamute R at Buena Vista Rd	WM32 - Lake Cr at Hwy 34 nr Tangent	WM34 - Willamette R at Maurie Jacobs Park	Screening Value	S.V. Reference
	11275	27986	29044	36875	37248	38586		
	Maximum Values (ng/kg dry)							
PCBs, continued								
PCB-149	12.4	—	16.7	—	—	1340	*nsv*	
PCB-151	—	—	—	—	—	324	*nsv*	
PCB-154	—	—	—	—	—	17.6	*nsv*	
PCB-156	—	—	—	—	—	153	26	11
PCB-157	—	—	—	—	—	48.8	26	11
PCB-158+160	—	—	—	—	—	249	*nsv*	
PCB-16+32	—	—	—	—	—	19.3	*nsv*	
PCB-164	—	—	—	—	—	124	*nsv*	
PCB-167	—	—	—	—	—	82.3	26	11
PCB-17	—	—	—	—	—	9.8	*nsv*	
PCB-170	—	—	—	—	—	207	*nsv*	
PCB-171	—	—	—	—	—	67.3	*nsv*	
PCB-172	—	—	—	—	—	43.6	*nsv*	
PCB-174	—	—	—	—	—	274	*nsv*	
PCB-176	—	—	—	—	—	39.3	*nsv*	
PCB-177	—	—	—	—	—	147	*nsv*	
PCB-178	—	—	—	—	—	59.4	*nsv*	
PCB-179	—	—	—	—	—	129	*nsv*	
PCB-18	—	—	—	—	—	26.6	*nsv*	
PCB-180+193	—	—	—	—	—	531	*nsv*	
PCB-183	—	—	—	—	—	156	*nsv*	
PCB-185	—	—	—	—	—	32.2	*nsv*	
PCB-187	—	—	—	—	—	397	*nsv*	
PCB-189	—	—	—	—	—	10.6	140	11
PCB-190	—	—	—	—	—	46	*nsv*	
PCB-194	—	—	—	—	—	176	*nsv*	
PCB-195	—	—	—	—	—	58.8	*nsv*	
PCB-196	—	—	—	—	—	84.6	*nsv*	
PCB-199	—	—	—	—	—	218	*nsv*	
PCB-20+21+33	—	—	—	—	—	26.2	*nsv*	
PCB-200	—	—	—	—	—	22.3	*nsv*	
PCB-202	—	—	—	—	—	49.2	*nsv*	
PCB-203	—	—	—	—	—	117	*nsv*	
PCB-204	—	—	—	—	—	20.5	*nsv*	
PCB-206	—	—	—	—	—	125	*nsv*	
PCB-208	—	—	—	—	—	35.2	*nsv*	
PCB-209	—	—	—	17.2	—	56.9	*nsv*	

Appendix A Sediment Sample Results	UPPER WILLAMETTE BASIN Station ID and Description							
Samples collected in August 2016	WM20 - Coast Fork Willamette at Mt. Pisgah Park	WM26 - Willamette R MF above Hills Cr	WM28 - Willamette R at Greenway bike bridge, Eugene	WM31 - Luckiamute R at Buena Vista Rd	WM32 - Lake Cr at Hwy 34 nr Tangent	WM34 - Willamette R at Maurie Jacobs Park	Screening Value	S.V. Reference
	11275	27986	29044	36875	37248	38586		
	Maximum Values (ng/kg dry)							
PCBs, continued								
PCB-22	—	—	—	—	—	17	*nsv*	
PCB-25	—	—	—	—	—	7.71	*nsv*	
PCB-26	—	—	—	—	—	14	*nsv*	
PCB-28	—	—	—	—	—	45.5	*nsv*	
PCB-31	—	—	—	—	—	36.7	*nsv*	
PCB-35	—	—	—	—	—	5.71	*nsv*	
PCB-37	—	—	—	—	—	35.3	*nsv*	
PCB-40	—	—	—	—	—	31.5	*nsv*	
PCB-42	—	—	—	—	—	49.4	*nsv*	
PCB-43+52	—	—	—	—	—	551	*nsv*	
PCB-44	—	—	—	—	—	273	*nsv*	
PCB-45	—	—	—	—	—	24.5	*nsv*	
PCB-46	—	—	—	—	—	14.7	*nsv*	
PCB-48	—	—	—	—	—	17.5	*nsv*	
PCB-49	—	—	—	—	—	137	*nsv*	
PCB-53	—	—	—	—	—	35.3	*nsv*	
PCB-56	—	—	—	—	—	85.6	*nsv*	
PCB-59	—	—	—	—	—	15.4	*nsv*	
PCB-60	—	—	—	—	—	47.4	*nsv*	
PCB-64+68	—	—	—	—	—	106	*nsv*	
PCB-65+75	—	—	—	—	—	38.2	*nsv*	
PCB-66	—	—	—	—	—	158	*nsv*	
PCB-70	—	—	—	—	—	357	*nsv*	
PCB-71	—	—	—	—	—	46.1	*nsv*	
PCB-74+76	—	—	—	—	—	122	*nsv*	
PCB-77	—	—	—	—	—	49.1	6.4	11
PCB-81	—	—	—	—	—	11.6	2.1	11
PCB-82	—	—	—	—	—	144	*nsv*	
PCB-83	—	—	—	—	—	22.5	*nsv*	
PCB-84	—	—	—	—	—	459	*nsv*	
PCB-85	—	—	—	—	—	179	*nsv*	
PCB-87+111+116+117	—	—	—	—	—	472	*nsv*	
PCB-89	—	—	—	—	—	267	*nsv*	
PCB-91	—	—	—	—	—	229	*nsv*	
PCB-95+121	—	—	—	—	—	1230	*nsv*	
PCB-97	—	—	—	—	—	446	*nsv*	
PCB-99	—	—	—	—	—	501	*nsv*	

Appendix A Sediment Sample Results	UPPER WILLAMETTE BASIN Station ID and Description							
Samples collected in August 2016	WM20 - Coast Fork Willamette at Mt. Pisgah Park	WM26 - Willamette R MF above Hills Cr	WM28 - Willamette R at Greenway bike bridge, Eugene	WM31 - Luckiamute R at Buena Vista Rd	WM32 - Lake Cr at Hwy 34 nr Tangent	WM34 - Willamette R at Maurie Jacobs Park	Screening Value	S.V. Reference
	11275	27986	29044	36875	37248	38586		
	Maximum Values (mg/kg dry)							
Priority Metals								
Aluminum	28300	27100	36800	31700	39900	26600	*nsv*	
Antimony	—	—	—	—	—	0.34	*nsv*	
Arsenic	8.18	3.54	5.09	6.51	4.88	4.21	7	11
Barium	130	92.1	159	184	244	92.4	*nsv*	
Cadmium	—	—	—	0.15	0.13	0.2	1	11
Chromium	24.2	32.6	39.1	34.4	42.9	30.8	*nsv*	
Cobalt	11.2	13	14.2	13.8	18.3	12.2	*nsv*	
Copper	24.4	20.9	23.2	22.3	24.5	38.9	*nsv*	
Lead	5.24	2.72	13.3	8.6	10.9	42.4	17	11
Manganese	453	539	652	666	860	425	*nsv*	
Mercury	0.061	—	—	—	—	0.274	0.07	11
Nickel	11.7	40	27	22.5	22.7	30	*nsv*	
Silver	—	—	—	—	0.1	0.16	*nsv*	
Thallium	—	—	—	0.2	0.25	—	*nsv*	
Zinc	77.6	70.3	91.8	80.4	79.6	260	*nsv*	

State of Oregon Department of Environmental Quality

Appendix A
Tissue Sample Results

UPPER WILLAMETTE BASIN
Station ID and Description

Samples collected in Fall 2008-2010	Percent Detection	Number of samples over Screening Value	WM05 - Willamette River at Hwy 99E (LMB, fillet) 10355	WM05 - Willamette River at Hwy 99E (NPM, fillet) 10355	WM37 - Willamette River at Hwy 126 (NPM, fillet) 10359	WM10 - McKenzie River at Coburg Road (LSS, fillet) 10376	Screening Value	S.V. Reference
			Maximum Values (mg/kg)					
Flame Retardants								
PBDE-100	92		0.00048	0.00145	7.8E-05	—	*nsv*	
PBDE-119	20		—	2.5E-06	—	—	*nsv*	
PBDE-139	13		—	—	1.7E-06	—	*nsv*	
PBDE-15	67		—	1.2E-05	1.2E-06	—	*nsv*	
PBDE-153	72	0	2.7E-05	0.00038	1.5E-05	—	0.2	12
PBDE-154	92		5.8E-05	0.00047	1.9E-05	—	*nsv*	
PBDE-17	60		5.7E-05	1.1E-05	7.6E-06	—	*nsv*	
PBDE-183	7		—	—	—	—	*nsv*	
PBDE-209	40	0	—	8.4E-05	0.00008	—	16.3	12
PBDE-28	60		—	0.00012	3.9E-05	—	*nsv*	
PBDE-47	92	0	0.00689	0.0104	0.00072	—	0.2	12
PBDE-49	80		0.00024	0.00021	2.3E-05	—	*nsv*	
PBDE-66	67		0.00015	4.3E-05	1.1E-05	—	*nsv*	
PBDE-71	7		—	—	—	—	*nsv*	
PBDE-77	7		—	—	—	—	*nsv*	
PBDE-85	60		4E-05	1E-05	4.8E-06	—	*nsv*	
PBDE-99	85	0	0.00138	0.00039	0.00012	—	0.2	12
Pentabromoethylbenzene	60		5.4E-06	4.8E-06	—	—	*nsv*	
Legacy Pesticides								
Total Chlordane		0	8.1E-05	0.00059	0.0001	—	1.2	12
alpha-Chlordane	84		1.8E-05	5.9E-05	1.4E-05	—	*nsv*	
cis-Nonachlor	79		1.2E-05	6.6E-05	1.8E-05	—	*nsv*	
gamma-Chlordane+trans-Nonachlor	25		—	—	—	—	*nsv*	
gamma-Clordane	87		—	0.0002	7.1E-05	—	*nsv*	
Oxychlordane	53		—	1.9E-05	—	—	*nsv*	
trans-Nonachlor	33		5.1E-05	0.00024	—	—	*nsv*	
Dieldrin	84	0	3.5E-05	5.7E-05	1.1E-05	—	0.1	12
Endosulfan		0	3E-05	0.0001	—	—	14	12
Endosulfan I	28		3E-05	0.0001	—	—	*nsv*	
Endrin	67	0	—	9.5E-05	3.3E-05	—	0.7	12
Heptachlor	11		—	—	—	—	*nsv*	
Heptachlor epoxide	5	0	1.8E-05	—	—	—	0.03	12
Hexachlorobenzene	59	0	—	0.00013	0.00011	—	1.9	12
Methoxychlor	71	0	—	9.4E-05	9.1E-05	—	11.7	12
Mirex	47	0	—	2.2E-05	4E-06	—	0.5	12

State of Oregon Department of Environmental Quality

Appendix A
Tissue Sample Results

Samples collected in Fall 2008-2010	Percent Detection	Number of samples over Screening Value	UPPER WILLAMETTE BASIN Station ID and Description				Screening Value	S.V. Reference
			WM05 - Willamette River at Hwy 99E (LMB, fillet)	WM05 - Willamette River at Hwy 99E (NPM, fillet)	WM37 - Willamette River at Hwy 126 (NPM, fillet)	WM10 - McKenzie River at Coburg Road (LSS, fillet)		
			10355	10355	10359	10376		
			Maximum Values (mg/kg)					
Legacy Pesticides, continued								
Total DDT		0	0.00068	0.00342	0.00045	—	1.2	12
2,4´-DDD	53		—	0.00002	3.8E-06	—	*nsv*	
2,4´-DDE	37		—	1.5E-05	6.1E-06	—	*nsv*	
2,4´-DDT	63		—	1.3E-05	5.9E-06	—	*nsv*	
4,4´-DDD	84		3.6E-05	0.00017	2.4E-05	—	*nsv*	
4,4´-DDE	95		0.00065	0.00319	0.0004	—	*nsv*	
4,4´-DDT	42		—	1.4E-05	1.3E-05	—	*nsv*	
PCBs								
Total PCBs		1	0.00161	0.00978	0.0003	0.0112	0.05	12
PCB-10+4	20		—	—	—	9.1E-06	*nsv*	
PCB-101	100		—	6.4E-05	1.5E-05	0.00023	*nsv*	
PCB-101+113	68		7.4E-05	0.00031	—	0.00036	*nsv*	
PCB-102	7		—	—	—	3.6E-06	*nsv*	
PCB-103	10		—	—	—	2.5E-06	*nsv*	
PCB-105	87	0	1.7E-05	0.00018	7.5E-06	0.00016	*nsv*	
PCB-107	69		—	1.3E-05	2.9E-06	4.1E-05	*nsv*	
PCB-107+123	29		—	—	—	—	*nsv*	
PCB-109	4		—	—	—	—	*nsv*	
PCB-109+123	100		5.7E-06	5.9E-05	—	5.5E-05	*nsv*	
PCB-11	80		4E-05	4.4E-05	—	6.1E-05	*nsv*	
PCB-110	83		5.2E-05	0.00027	1.2E-05	0.00027	*nsv*	
PCB-112	55		—	—	—	8.8E-06	*nsv*	
PCB-114	57		—	2.2E-05	—	2.2E-05	*nsv*	
PCB-115	32		—	2.2E-06	—	6.8E-06	*nsv*	
PCB-115+111	80		—	1E-05	—	9.4E-06	*nsv*	
PCB-117+87	100		2.4E-05	0.00011	—	0.00012	*nsv*	
PCB-118	93	0	5.4E-05	0.00057	2.9E-05	0.00058	*nsv*	
PCB-119+112	80		—	8E-06	—	8.1E-06	*nsv*	
PCB-120	20		—	1.6E-05	—	1.6E-05	*nsv*	
PCB-121	31		9.6E-06	2.5E-05	—	2.6E-05	*nsv*	
PCB-122	3		—	—	—	—	*nsv*	
PCB-124	53		—	1.1E-05	—	9.9E-06	*nsv*	
PCB-125	4		—	—	—	—	*nsv*	
PCB-126	23	0	—	—	—	1.3E-05	*nsv*	
PCB-127	10		—	—	—	—	*nsv*	

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Appendix A
Tissue Sample Results

UPPER WILLAMETTE BASIN
Station ID and Description

Samples collected in Fall 2008-2010	Percent Detection	Number of samples over Screening Value	WM05 - Willamette River at Hwy 99E (LMB, fillet) 10355	WM05 - Willamette River at Hwy 99E (NPM, fillet) 10355	WM37 - Willamette River at Hwy 126 (NPM, fillet) 10359	WM10 - McKenzie River at Coburg Road (LSS, fillet) 10376	Screening Value	S.V. Reference
			Maximum Values (mg/kg)					
PCBs, continued								
PCB-128	68		—	3.4E-05	4.1E-06	5.5E-05	*nsv*	
PCB-128+162	100		1.3E-05	0.00014	—	0.0001	*nsv*	
PCB-129	60		—	1.4E-05	7.4E-07	1.6E-05	*nsv*	
PCB-13	40		4E-06	—	—	6.1E-06	*nsv*	
PCB-130	63		—	3.1E-05	1.4E-06	3.2E-05	*nsv*	
PCB-131	55		—	1.2E-06	—	6.4E-06	*nsv*	
PCB-132	69		—	0.00038	4.2E-05	0.00077	*nsv*	
PCB-132+153	86		—	—	—	—	*nsv*	
PCB-133+131+142	80		—	1.6E-05	—	1.5E-05	*nsv*	
PCB-134	57		—	1.4E-05	—	1.4E-05	*nsv*	
PCB-135	73		4.7E-06	2.4E-05	1.3E-06	2.7E-05	*nsv*	
PCB-137	63		—	5.5E-05	1.9E-06	4.1E-05	*nsv*	
PCB-138	100		—	0.00024	2.9E-05	0.00055	*nsv*	
PCB-138+163	86		—	—	—	—	*nsv*	
PCB-139	13		—	6.5E-06	—	5.3E-06	*nsv*	
PCB-140	13		—	—	—	3.9E-06	*nsv*	
PCB-141	77		9.6E-06	9.6E-05	2.9E-06	0.0001	*nsv*	
PCB-142	44		—	3.8E-06	—	1.1E-05	*nsv*	
PCB-144	57		—	1.2E-05	—	1.9E-05	*nsv*	
PCB-145	3		—	—	—	—	*nsv*	
PCB-146	93		1.1E-05	0.00013	5.8E-06	0.00012	*nsv*	
PCB-147	53		—	8.2E-06	—	8E-06	*nsv*	
PCB-148	63		5.7E-06	1.2E-05	—	2E-05	*nsv*	
PCB-149	80		3.4E-05	0.00019	1.1E-05	0.00025	*nsv*	
PCB-15	20		—	—	—	—	*nsv*	
PCB-150	3		—	—	—	1.3E-06	*nsv*	
PCB-151	80		1.2E-05	5.8E-05	2.7E-06	6.3E-05	*nsv*	
PCB-153	31		9.8E-05	0.00116	—	0.001	*nsv*	
PCB-154	33		—	4.7E-06	—	4.5E-06	*nsv*	
PCB-155	3		—	—	—	1.8E-06	*nsv*	
PCB-156	83	0	6.5E-06	0.0001	4.5E-06	7.6E-05	*nsv*	
PCB-157	63	0	—	2.5E-05	1.1E-06	2E-05	*nsv*	
PCB-158	100		7.4E-06	8.2E-05	2.6E-06	7.4E-05	*nsv*	
PCB-158+160	29		—	—	—	—	*nsv*	
PCB-159	7		—	—	—	1.6E-06	*nsv*	

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Appendix A
Tissue Sample Results

UPPER WILLAMETTE BASIN
Station ID and Description

Samples collected in Fall 2008-2010	Percent Detection	Number of samples over Screening Value	WM05 - Willamette River at Hwy 99E (LMB, fillet) 10355	WM05 - Willamette River at Hwy 99E (NPM, fillet) 10355	WM37 - Willamette River at Hwy 126 (NPM, fillet) 10359	WM10 - McKenzie River at Coburg Road (LSS, fillet) 10376	Screening Value	S.V. Reference
			Maximum Values (mg/kg)					
PCBs, continued								
PCB-16	56		1.5E-05	2E-05	—	3.2E-05	*nsv*	
PCB-16+32	50		—	—	—	—	*nsv*	
PCB-162	20		—	—	—	3.8E-06	*nsv*	
PCB-163+138	100		7.6E-05	0.00081	—	0.00071	*nsv*	
PCB-164	63		—	2.9E-05	9.8E-07	3E-05	*nsv*	
PCB-165	7		—	—	—	1.9E-05	*nsv*	
PCB-166	30		—	2.6E-06	—	6.2E-06	*nsv*	
PCB-167	63	0	—	5.3E-05	1.8E-06	4.8E-05	*nsv*	
PCB-169	23	0	—	—	—	1E-05	*nsv*	
PCB-17	54		1.1E-05	1.6E-05	—	2.9E-05	*nsv*	
PCB-170	76		1.2E-05	0.00019	1.2E-06	0.00014	*nsv*	
PCB-171	66		—	3.5E-05	1E-06	4.1E-05	*nsv*	
PCB-172	59		—	4.6E-05	—	4.5E-05	*nsv*	
PCB-173	14		—	—	—	4E-06	*nsv*	
PCB-174	79		7.5E-06	6.6E-05	1.8E-06	0.00012	*nsv*	
PCB-175	69		—	5.6E-06	—	9.9E-06	*nsv*	
PCB-175+182	23		—	—	—	—	*nsv*	
PCB-176	41		—	4.3E-06	3.3E-07	1.9E-05	*nsv*	
PCB-177	69		5.8E-06	5.8E-05	1.9E-06	0.0001	*nsv*	
PCB-178	66		—	3.5E-05	9.8E-07	4.4E-05	*nsv*	
PCB-179	72		—	2E-05	9.8E-07	4.3E-05	*nsv*	
PCB-18	75		2.5E-05	2.9E-05	—	7.5E-05	*nsv*	
PCB-180	100		—	0.00017	1.2E-05	0.00044	*nsv*	
PCB-180+193	83		3.8E-05	0.00068	—	0.00051	*nsv*	
PCB-181	17		—	—	—	2.7E-06	*nsv*	
PCB-183	76		8.6E-06	0.00012	3.2E-06	0.00013	*nsv*	
PCB-184	3		—	—	—	2.4E-06	*nsv*	
PCB-185	52		—	1.4E-05	—	0.00002	*nsv*	
PCB-186	3		—	—	—	—	*nsv*	
PCB-187	83		2.7E-05	0.00032	7.5E-06	0.00028	*nsv*	
PCB-188	3		—	—	—	—	*nsv*	
PCB-189	39	0	—	8.6E-06	—	1.1E-05	*nsv*	
PCB-19	11		—	4E-06	—	4.8E-06	*nsv*	
PCB-190	68		—	5E-05	1E-06	3.6E-05	*nsv*	
PCB-191	34		—	9.2E-06	—	8.7E-06	*nsv*	

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Appendix A
Tissue Sample Results

Samples collected in Fall 2008-2010	Percent Detection	Number of samples over Screening Value	UPPER WILLAMETTE BASIN Station ID and Description				Screening Value	S.V. Reference
			WM05 - Willamette River at Hwy 99E (LMB, fillet)	WM05 - Willamette River at Hwy 99E (NPM, fillet)	WM37 - Willamette River at Hwy 126 (NPM, fillet)	WM10 - McKenzie River at Coburg Road (LSS, fillet)		
			10355	10355	10359	10376		
			Maximum Values (mg/kg)					
PCBs, continued								
PCB-194	67		6.7E-06	0.00011	2.3E-06	7.6E-05	*nsv*	
PCB-195	53		—	3.3E-05	9.4E-07	2.4E-05	*nsv*	
PCB-196	60		—	5.7E-05	1.1E-06	3.6E-05	*nsv*	
PCB-197	27		—	4.2E-06	—	3.6E-06	*nsv*	
PCB-198	7		—	4.4E-06	—	—	*nsv*	
PCB-199	73		9.8E-06	0.00013	2E-06	6.9E-05	*nsv*	
PCB-20	100		—	2.8E-06	2.6E-06	1.3E-05	*nsv*	
PCB-20+21+33	53		4.6E-05	6.2E-05	—	8.1E-05	*nsv*	
PCB-200	23		—	—	—	8.2E-06	*nsv*	
PCB-201	37		—	9.4E-06	—	9.9E-06	*nsv*	
PCB-202	60		—	1.9E-05	8.2E-07	1.6E-05	*nsv*	
PCB-203	67		7.5E-06	0.00011	2.3E-06	5.6E-05	*nsv*	
PCB-204	10		—	—	—	—	*nsv*	
PCB-205	27		—	4E-06	—	5.1E-06	*nsv*	
PCB-206	63		—	3.1E-05	1.5E-06	2.3E-05	*nsv*	
PCB-207	38		—	4.6E-06	4.5E-07	3.1E-06	*nsv*	
PCB-208	58		—	1.1E-05	7.4E-07	9.3E-06	*nsv*	
PCB-209	57		—	1.7E-05	9.8E-07	8.7E-06	*nsv*	
PCB-22	86		2.7E-05	3.7E-05	1.6E-06	4.7E-05	*nsv*	
PCB-25	43		4.5E-06	6.7E-06	—	9.2E-06	*nsv*	
PCB-26	57		9.5E-06	1.4E-05	—	2E-05	*nsv*	
PCB-27	14		—	—	—	1.3E-06	*nsv*	
PCB-28	100		7.2E-05	0.00011	4.1E-06	0.00014	*nsv*	
PCB-29	7		—	—	—	6.3E-07	*nsv*	
PCB-31	100		5.6E-05	7.9E-05	4.7E-06	0.00012	*nsv*	
PCB-32	25		7.7E-06	1.1E-05	—	1.7E-05	*nsv*	
PCB-35	7		—	—	—	1.6E-06	*nsv*	
PCB-36	4		—	—	—	—	*nsv*	
PCB-37	76		1.3E-05	1.7E-05	—	2.9E-05	*nsv*	
PCB-39	14		—	—	—	1.2E-06	*nsv*	
PCB-40	47		5.7E-06	8.2E-06	—	9.8E-06	*nsv*	
PCB-41	27		—	—	—	1.8E-06	*nsv*	
PCB-41+72	11		—	4.1E-06	—	4.9E-06	*nsv*	
PCB-42	50		1.2E-05	1.9E-05	—	2.2E-05	*nsv*	
PCB-43	100		—	1.4E-05	9.1E-06	6.9E-05	*nsv*	

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Appendix A
Tissue Sample Results

Samples collected in Fall 2008-2010	Percent Detection	Number of samples over Screening Value	UPPER WILLAMETTE BASIN Station ID and Description				Screening Value	S.V. Reference
			WM05 - Willamette River at Hwy 99E (LMB, fillet)	WM05 - Willamette River at Hwy 99E (NPM, fillet)	WM37 - Willamette River at Hwy 126 (NPM, fillet)	WM10 - McKenzie River at Coburg Road (LSS, fillet)		
			10355	10355	10359	10376		
			Maximum Values (mg/kg)					
PCBs, continued								
PCB-43+52	57		—	—	—	—	*nsv*	
PCB-44	77		5.3E-05	7.7E-05	—	0.00012	*nsv*	
PCB-45	37		—	5.6E-06	—	7.9E-06	*nsv*	
PCB-46	7		—	—	—	2.2E-06	*nsv*	
PCB-47	13		3.9E-05	4.4E-05	—	5.7E-05	*nsv*	
PCB-48	33		8.2E-06	1.4E-05	—	5.7E-06	*nsv*	
PCB-49	80		3.3E-05	5.7E-05	3.7E-06	7.8E-05	*nsv*	
PCB-51	43		4.7E-06	4.8E-06	—	7.7E-06	*nsv*	
PCB-52+43	100		0.00013	0.00021	—	0.00028	*nsv*	
PCB-53	40		4.6E-06	6.5E-06	—	9.9E-06	*nsv*	
PCB-55	7		—	—	—	1.8E-06	*nsv*	
PCB-56	73		1.2E-05	2.4E-05	1.5E-06	2.8E-05	*nsv*	
PCB-57	7		—	—	—	1.6E-06	*nsv*	
PCB-58	18		—	—	—	1.6E-06	*nsv*	
PCB-59	23		—	—	—	3E-06	*nsv*	
PCB-6	80		5.8E-06	6.9E-06	—	1.2E-05	*nsv*	
PCB-60	73		9E-06	2.5E-05	1.8E-06	3.1E-05	*nsv*	
PCB-61	3		—	—	—	—	*nsv*	
PCB-62	3		—	—	—	—	*nsv*	
PCB-63	47		—	4.7E-06	—	5.9E-06	*nsv*	
PCB-64	100		1.9E-05	3.3E-05	2.9E-06	4.1E-05	*nsv*	
PCB-64+68	43		—	—	—	—	*nsv*	
PCB-65	100		—	7.1E-06	3.7E-06	2E-05	*nsv*	
PCB-65+75	43		—	—	—	—	*nsv*	
PCB-66	87		3.7E-05	9.6E-05	5E-06	0.00011	*nsv*	
PCB-68	13		4.7E-06	—	—	5.5E-06	*nsv*	
PCB-69	7		—	—	—	1.5E-06	*nsv*	
PCB-70	87		6.3E-05	0.00013	7.1E-06	0.00015	*nsv*	
PCB-71	53		8.2E-06	1.1E-05	—	1.4E-05	*nsv*	
PCB-73	7		—	—	—	1.1E-06	*nsv*	
PCB-74	100		4.5E-05	0.00012	4E-06	0.00014	*nsv*	
PCB-74+76	43		—	—	—	—	*nsv*	
PCB-77	53	0	—	6.7E-06	6.2E-07	1.2E-05	*nsv*	
PCB-78	7		—	—	—	—	*nsv*	
PCB-79	10		—	—	—	1.1E-06	*nsv*	

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Appendix A
Tissue Sample Results

Samples collected in Fall 2008-2010	Percent Detection	Number of samples over Screening Value	UPPER WILLAMETTE BASIN Station ID and Description				Screening Value	S.V. Reference
			WM05 - Willamette River at Hwy 99E (LMB, fillet)	WM05 - Willamette River at Hwy 99E (NPM, fillet)	WM37 - Willamette River at Hwy 126 (NPM, fillet)	WM10 - McKenzie River at Coburg Road (LSS, fillet)		
			10355	10355	10359	10376		
			Maximum Values (mg/kg)					
PCBs, continued								
PCB-8	40		—	3.7E-05	—	6.4E-05	*nsv*	
PCB-80	7		—	—	—	—	*nsv*	
PCB-81	23	0	—	—	—	1.1E-05	*nsv*	
PCB-82	47		—	3.5E-06	—	1.6E-05	*nsv*	
PCB-83	27		—	4.8E-06	—	6.2E-06	*nsv*	
PCB-84	47		—	3E-06	—	1.9E-05	*nsv*	
PCB-85	73		1E-05	6.3E-05	3E-06	5.5E-05	*nsv*	
PCB-87	100		—	1.8E-05	4.3E-06	8.2E-05	*nsv*	
PCB-87+111+116+117	43		—	—	—	—	*nsv*	
PCB-89	77		1.2E-05	5E-05	2.5E-06	5.6E-05	*nsv*	
PCB-90	17		—	1.5E-05	—	5.7E-06	*nsv*	
PCB-91	60		—	3.4E-06	—	1.8E-05	*nsv*	
PCB-92	17		1.3E-05	2.6E-05	—	2.4E-05	*nsv*	
PCB-94	3		—	—	—	—	*nsv*	
PCB-95	100		6.4E-05	0.00013	6.8E-06	0.00015	*nsv*	
PCB-95+121	57		—	—	—	—	*nsv*	
PCB-96	3		—	—	—	1.3E-06	*nsv*	
PCB-97	80		1.8E-05	7.1E-05	4.1E-06	7.4E-05	*nsv*	
PCB-99	87		3.4E-05	0.00019	7.8E-06	0.00016	*nsv*	
Priority Metals (Total)								
Arsenic	100	0	—	—	—	—	*nsv*	
Cadmium	25	0	—	—	—	—	2.3	12
Chromium	75		—	—	—	—	*nsv*	
Cobalt	75		—	—	—	—	*nsv*	
Mercury	100	68	0.45	1.64	1.09	0.54	0.04	13
Nickel	25		—	—	—	—	*nsv*	
Titanium	100		—	—	—	—	*nsv*	
Zinc	100		—	—	—	—	*nsv*	

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Appendix A Tissue Sample Results	UPPER WILLAMETTE BASIN Station ID and Description						
Samples collected in Fall 2008-2010	WM10 - McKenzie River at Coburg Road (NPM, fillet)	WM38 - Coast Fork Willamette River at Hwy 58 (LSS, fillet)	WM38 - Coast Fork Willamette River at Hwy 58 (NPM, fillet)	WM38 - Coast Fork Willamette River at Hwy 58 (SMB, fillet)	WM44 - Willamette MF at Clearwater Ramp (LSS, fillet)	Screening Value	S.V. Reference
	10376	10379	10379	10379	11990		
	Maximum Values (mg/kg)						
Flame Retardants							
PBDE-100	0.00104	0.00063	0.00028	—	—	*nsv*	
PBDE-119	4.5E-06	—	—	—	—	*nsv*	
PBDE-139	—	—	—	—	—	*nsv*	
PBDE-15	3.3E-05	2.4E-06	1.7E-06	—	—	*nsv*	
PBDE-153	7.2E-05	3.7E-05	4.9E-05	—	—	0.2	12
PBDE-154	0.0002	0.00017	7.8E-05	—	—	*nsv*	
PBDE-17	—	1.6E-05	1.4E-05	—	—	*nsv*	
PBDE-183	—	—	—	—	—	*nsv*	
PBDE-209	—	—	7.2E-05	—	—	16.3	12
PBDE-28	—	0.00028	6.7E-05	—	—	*nsv*	
PBDE-47	0.00935	0.0038	0.00137	—	—	0.2	12
PBDE-49	0.0003	7E-05	6.6E-05	—	—	*nsv*	
PBDE-66	0.00012	4.2E-06	1.5E-05	—	—	*nsv*	
PBDE-71	—	—	—	—	—	*nsv*	
PBDE-77	—	—	—	—	—	*nsv*	
PBDE-85	3.4E-05	5.4E-06	5.2E-06	—	—	*nsv*	
PBDE-99	0.00117	0.0001	0.00013	—	—	0.2	12
Pentabromoethylbenzene	6.8E-06	—	—	—	—	*nsv*	
Legacy Pesticides							
Total Chlordane	0.00045	0.00019	0.0002	—	0.00021	1.2	12
alpha-Chlordane	5.7E-05	3.6E-05	2.7E-05	—	3.4E-05	*nsv*	
cis-Nonachlor	4.2E-05	2.9E-05	3.5E-05	—	3.1E-05	*nsv*	
gamma-Chlordane+trans-Nonachlor	—	—	—	—	—	*nsv*	
gamma-Clordane	0.00014	0.00011	0.00012	—	0.00013	*nsv*	
Oxychlordane	1.8E-05	1.9E-05	1.3E-05	—	1.9E-05	*nsv*	
trans-Nonachlor	0.0002	—	—	—	—	*nsv*	
Dieldrin	2E-05	2.7E-05	2.2E-05	—	2.4E-05	0.1	12
Endosulfan	0.00018	—	—	—	—	14	12
Endosulfan I	0.00018	—	—	—	—	*nsv*	
Endrin	3.5E-05	4.2E-05	4.2E-05	—	2.8E-05	0.7	12
Heptachlor	2.5E-06	—	—	—	—	*nsv*	
Heptachlor epoxide	—	—	—	—	—	0.03	12
Hexachlorobenzene	0.00024	0.00012	0.00013	—	0.00021	1.9	12
Methoxychlor	6.3E-05	4.8E-05	4.9E-05	—	6.5E-05	11.7	12
Mirex	1.5E-05	4.9E-06	7.4E-06	—	—	0.5	12

Appendix A Tissue Sample Results	UPPER WILLAMETTE BASIN Station ID and Description						
Samples collected in Fall 2008-2010	WM10 - McKenzie River at Coburg Road (NPM, fillet)	WM38 - Coast Fork Willamette River at Hwy 58 (LSS, fillet)	WM38 - Coast Fork Willamette River at Hwy 58 (NPM, fillet)	WM38 - Coast Fork Willamette River at Hwy 58 (SMB, fillet)	WM44 - Willamette MF at Clearwater Ramp (LSS, fillet)	Screening Value	S.V. Reference
	10376	10379	10379	10379	11990		
	Maximum Values (mg/kg)						
Legacy Pesticides, continued							
Total DDT	0.00388	0.00225	0.0015	—	0.00076	1.2	12
2,4´-DDD	2.2E-05	1.6E-05	9.2E-06	—	9E-06	*nsv*	
2,4´-DDE	1E-05	—	1.5E-05	—	—	*nsv*	
2,4´-DDT	1.5E-05	1.3E-05	1.2E-05	—	1.2E-05	*nsv*	
4,4´-DDD	0.00011	0.00021	7.6E-05	—	6.5E-05	*nsv*	
4,4´-DDE	0.00355	0.00175	0.00137	—	0.00057	*nsv*	
4,4´-DDT	0.00017	0.00026	1.3E-05	—	1E-04	*nsv*	
PCBs							
Total PCBs	0.01125	0.00255	0.00158	—	0.00232	0.05	12
PCB-10+4	9.1E-06	—	—	—	—	*nsv*	
PCB-101	0.00023	0.00015	7.9E-05	—	0.00012	*nsv*	
PCB-101+113	0.00036	—	—	—	—	*nsv*	
PCB-102	3.6E-06	—	—	—	1.7E-06	*nsv*	
PCB-103	2.5E-06	—	—	—	—	*nsv*	
PCB-105	0.00016	8.7E-05	5.5E-05	—	4.6E-05	*nsv*	
PCB-107	4.1E-05	1.9E-05	1.2E-05	—	1.6E-05	*nsv*	
PCB-107+123	—	—	—	—	—	*nsv*	
PCB-109	9.8E-07	—	—	—	—	*nsv*	
PCB-109+123	5.5E-05	—	—	—	—	*nsv*	
PCB-11	6.1E-05	—	—	—	—	*nsv*	
PCB-110	0.00027	0.00013	6.8E-05	—	1E-04	*nsv*	
PCB-112	8.8E-06	3.7E-06	—	—	3.8E-06	*nsv*	
PCB-114	2.2E-05	8.3E-06	5.1E-06	—	8.1E-06	*nsv*	
PCB-115	6.8E-06	5.1E-06	2.5E-06	—	2.8E-06	*nsv*	
PCB-115+111	9.4E-06	—	—	—	—	*nsv*	
PCB-117+87	0.00012	—	—	—	—	*nsv*	
PCB-118	0.00058	0.00028	0.00017	—	0.00014	*nsv*	
PCB-119+112	8.1E-06	—	—	—	—	*nsv*	
PCB-120	1.6E-05	—	—	—	—	*nsv*	
PCB-121	2.6E-05	—	—	—	—	*nsv*	
PCB-122	—	—	—	—	—	*nsv*	
PCB-124	9.9E-06	6E-06	2.9E-06	—	4.5E-06	*nsv*	
PCB-125	—	—	—	—	—	*nsv*	
PCB-126	1.3E-05	—	—	—	5.7E-06	*nsv*	
PCB-127	3.1E-06	—	—	—	1E-06	*nsv*	

Appendix A Tissue Sample Results	UPPER WILLAMETTE BASIN Station ID and Description						
Samples collected in Fall 2008-2010	WM10 - McKenzie River at Coburg Road (NPM, fillet)	WM38 - Coast Fork Willamette River at Hwy 58 (LSS, fillet)	WM38 - Coast Fork Willamette River at Hwy 58 (NPM, fillet)	WM38 - Coast Fork Willamette River at Hwy 58 (SMB, fillet)	WM44 - Willamette MF at Clearwater Ramp (LSS, fillet)	Screening Value	S.V. Reference
	10376	10379	10379	10379	11990		
	Maximum Values (mg/kg)						
PCBs, continued							
PCB-128	5.5E-05	3.6E-05	3E-05	—	2.7E-05	*nsv*	
PCB-128+162	0.0001	—	—	—	—	*nsv*	
PCB-129	1.6E-05	1.1E-05	6E-06	—	6.5E-06	*nsv*	
PCB-13	6.1E-06	—	—	—	—	*nsv*	
PCB-130	3.2E-05	1.7E-05	9.6E-06	—	1.3E-05	*nsv*	
PCB-131	6.4E-06	2.2E-06	—	—	2.8E-06	*nsv*	
PCB-132	0.00077	0.00037	0.00025	—	0.00028	*nsv*	
PCB-132+153	—	—	—	—	—	*nsv*	
PCB-133+131+142	1.5E-05	—	—	—	—	*nsv*	
PCB-134	1.4E-05	5E-06	3.2E-06	—	5.9E-06	*nsv*	
PCB-135	2.7E-05	1E-05	6E-06	—	1.1E-05	*nsv*	
PCB-137	4.1E-05	1.5E-05	1E-05	—	1.2E-05	*nsv*	
PCB-138	0.00055	0.00028	0.00018	—	0.00024	*nsv*	
PCB-138+163	—	—	—	—	—	*nsv*	
PCB-139	5.3E-06	2.8E-06	—	—	—	*nsv*	
PCB-140	3.9E-06	—	—	—	—	*nsv*	
PCB-141	0.0001	2.5E-05	1.6E-05	—	2.6E-05	*nsv*	
PCB-142	1.1E-05	3.8E-06	—	—	3.7E-06	*nsv*	
PCB-144	1.9E-05	6.3E-06	3.2E-06	—	5.8E-06	*nsv*	
PCB-145	1.1E-06	—	—	—	—	*nsv*	
PCB-146	0.00012	4.6E-05	3E-05	—	3.6E-05	*nsv*	
PCB-147	8E-06	4.1E-06	2E-06	—	3.4E-06	*nsv*	
PCB-148	2E-05	6.2E-06	2.4E-06	—	8.9E-06	*nsv*	
PCB-149	0.00025	0.00011	6.3E-05	—	9.1E-05	*nsv*	
PCB-15	4.3E-05	—	—	—	—	*nsv*	
PCB-150	1.3E-06	—	—	—	—	*nsv*	
PCB-151	6.3E-05	1.9E-05	1.3E-05	—	1.5E-05	*nsv*	
PCB-153	0.001	—	—	—	—	*nsv*	
PCB-154	4.5E-06	1.5E-06	—	—	1.8E-06	*nsv*	
PCB-155	1.8E-06	—	—	—	—	*nsv*	
PCB-156	7.6E-05	3.8E-05	2.4E-05	—	2.7E-05	*nsv*	
PCB-157	2E-05	7.5E-06	5.5E-06	—	8.6E-06	*nsv*	
PCB-158	7.4E-05	3E-05	1.8E-05	—	2.2E-05	*nsv*	
PCB-158+160	—	—	—	—	—	*nsv*	
PCB-159	1.6E-06	—	—	—	—	*nsv*	

Appendix A Tissue Sample Results	UPPER WILLAMETTE BASIN Station ID and Description						
Samples collected in Fall 2008-2010	WM10 - McKenzie River at Coburg Road (NPM, fillet)	WM38 - Coast Fork Willamette River at Hwy 58 (LSS, fillet)	WM38 - Coast Fork Willamette River at Hwy 58 (NPM, fillet)	WM38 - Coast Fork Willamette River at Hwy 58 (SMB, fillet)	WM44 - Willamette MF at Clearwater Ramp (LSS, fillet)	Screening Value	S.V. Reference
	10376	10379	10379	10379	11990		
	Maximum Values (mg/kg)						
PCBs, continued							
PCB-16	3.2E-05	—	—	—	4.7E-06	*nsv*	
PCB-16+32	—	—	—	—	—	*nsv*	
PCB-162	3.8E-06	—	—	—	1.3E-06	*nsv*	
PCB-163+138	0.00071	—	—	—	—	*nsv*	
PCB-164	3E-05	1.1E-05	6.6E-06	—	1.2E-05	*nsv*	
PCB-165	1.9E-05	—	—	—	—	*nsv*	
PCB-166	6.2E-06	2.4E-06	—	—	2.2E-06	*nsv*	
PCB-167	4.8E-05	1.7E-05	1.2E-05	—	1.7E-05	*nsv*	
PCB-169	1E-05	—	—	—	5.8E-06	*nsv*	
PCB-17	2.9E-05	1.8E-06	—	—	3.4E-06	*nsv*	
PCB-170	0.00014	2.7E-05	2E-05	—	3.1E-05	*nsv*	
PCB-171	4.1E-05	7E-06	5.6E-06	—	9.9E-06	*nsv*	
PCB-172	4.5E-05	7.1E-06	4.9E-06	—	9.3E-06	*nsv*	
PCB-173	4E-06	—	—	—	—	*nsv*	
PCB-174	0.00012	1.5E-05	1E-05	—	0.00003	*nsv*	
PCB-175	9.9E-06	1.4E-06	—	—	2.2E-06	*nsv*	
PCB-175+182	—	—	—	—	—	*nsv*	
PCB-176	1.9E-05	2.2E-06	9.4E-07	—	3.9E-06	*nsv*	
PCB-177	0.0001	1.4E-05	1E-05	—	2.5E-05	*nsv*	
PCB-178	4.4E-05	6.5E-06	1.1E-06	—	1.1E-05	*nsv*	
PCB-179	4.3E-05	5.2E-06	1.1E-06	—	1.2E-05	*nsv*	
PCB-18	7.5E-05	3.6E-06	—	—	7.3E-06	*nsv*	
PCB-180	0.00044	7.3E-05	5.8E-05	—	9.9E-05	*nsv*	
PCB-180+193	0.00051	—	—	—	—	*nsv*	
PCB-181	2.7E-06	—	—	—	—	*nsv*	
PCB-183	0.00013	1.9E-05	1.5E-05	—	2.6E-05	*nsv*	
PCB-184	2.4E-06	—	—	—	—	*nsv*	
PCB-185	0.00002	2.7E-06	1.8E-06	—	5.2E-06	*nsv*	
PCB-186	—	—	—	—	—	*nsv*	
PCB-187	0.00028	4.9E-05	3.8E-05	—	8.4E-05	*nsv*	
PCB-188	—	—	—	—	—	*nsv*	
PCB-189	1.1E-05	1.5E-06	—	—	3.5E-06	*nsv*	
PCB-19	4.8E-06	—	—	—	—	*nsv*	
PCB-190	3.6E-05	7.1E-06	5.8E-06	—	7.6E-06	*nsv*	
PCB-191	8.7E-06	1.3E-06	—	—	—	*nsv*	

Appendix A Tissue Sample Results	UPPER WILLAMETTE BASIN Station ID and Description						
Samples collected in Fall 2008-2010	WM10 - McKenzie River at Coburg Road (NPM, fillet)	WM38 - Coast Fork Willamette River at Hwy 58 (LSS, fillet)	WM38 - Coast Fork Willamette River at Hwy 58 (NPM, fillet)	WM38 - Coast Fork Willamette River at Hwy 58 (SMB, fillet)	WM44 - Willamette MF at Clearwater Ramp (LSS, fillet)	Screening Value	S.V. Reference
	10376	10379	10379	10379	11990		
	Maximum Values (mg/kg)						
PCBs, continued							
PCB-194	7.6E-05	1.3E-05	9.6E-06	—	1.5E-05	*nsv*	
PCB-195	2.4E-05	4.5E-06	3.8E-06	—	4.6E-06	*nsv*	
PCB-196	3.6E-05	4.1E-06	3.9E-06	—	7.7E-06	*nsv*	
PCB-197	3.6E-06	—	—	—	9.9E-07	*nsv*	
PCB-198	—	—	—	—	—	*nsv*	
PCB-199	6.9E-05	1.4E-05	1E-05	—	1.6E-05	*nsv*	
PCB-20	1.3E-05	3.9E-06	3E-06	—	7E-06	*nsv*	
PCB-20+21+33	8.1E-05	—	—	—	—	*nsv*	
PCB-200	8.2E-06	—	—	—	2.5E-06	*nsv*	
PCB-201	9.9E-06	1.3E-06	—	—	2.2E-06	*nsv*	
PCB-202	1.6E-05	4.2E-06	3E-06	—	5.9E-06	*nsv*	
PCB-203	5.6E-05	1.2E-05	8.8E-06	—	1.1E-05	*nsv*	
PCB-204	3.5E-07	—	—	—	4.7E-07	*nsv*	
PCB-205	5.1E-06	—	—	—	—	*nsv*	
PCB-206	2.3E-05	8.1E-06	5.8E-06	—	9.6E-06	*nsv*	
PCB-207	3.1E-06	8.5E-07	9.9E-07	—	—	*nsv*	
PCB-208	9.3E-06	3.5E-06	2.7E-06	—	4.5E-06	*nsv*	
PCB-209	8.7E-06	5E-06	3.6E-06	—	5.8E-06	*nsv*	
PCB-22	4.7E-05	2.7E-06	2.3E-06	—	4.1E-06	*nsv*	
PCB-25	9.2E-06	—	—	—	1.1E-06	*nsv*	
PCB-26	2E-05	1.9E-06	—	—	2.3E-06	*nsv*	
PCB-27	1.3E-06	—	—	—	—	*nsv*	
PCB-28	0.00014	1.1E-05	7.3E-06	—	1.6E-05	*nsv*	
PCB-29	6.3E-07	—	—	—	—	*nsv*	
PCB-31	0.00012	7.8E-06	6.9E-06	—	1.2E-05	*nsv*	
PCB-32	1.7E-05	—	—	—	—	*nsv*	
PCB-35	1.6E-06	—	—	—	—	*nsv*	
PCB-36	7.1E-07	—	—	—	—	*nsv*	
PCB-37	2.9E-05	1.9E-06	2.4E-06	—	3.2E-06	*nsv*	
PCB-39	1.2E-06	—	—	—	—	*nsv*	
PCB-40	9.8E-06	—	—	—	2.3E-06	*nsv*	
PCB-41	1.8E-06	8.5E-07	—	—	—	*nsv*	
PCB-41+72	4.9E-06	—	—	—	—	*nsv*	
PCB-42	2.2E-05	—	—	—	6.2E-06	*nsv*	
PCB-43	6.9E-05	2.9E-05	2.2E-05	—	5E-05	*nsv*	

State of Oregon Department of Environmental Quality

Appendix A Tissue Sample Results	UPPER WILLAMETTE BASIN Station ID and Description						
Samples collected in Fall 2008-2010	WM10 - McKenzie River at Coburg Road (NPM, fillet)	WM38 - Coast Fork Willamette River at Hwy 58 (LSS, fillet)	WM38 - Coast Fork Willamette River at Hwy 58 (NPM, fillet)	WM38 - Coast Fork Willamette River at Hwy 58 (SMB, fillet)	WM44 - Willamette MF at Clearwater Ramp (LSS, fillet)	Screening Value	S.V. Reference
	10376	10379	10379	10379	11990		
	Maximum Values (mg/kg)						
PCBs, continued							
PCB-43+52	—	—	—	—	—	*nsv*	
PCB-44	0.00012	1.2E-05	8E-06	—	2.1E-05	*nsv*	
PCB-45	7.9E-06	—	—	—	1.9E-06	*nsv*	
PCB-46	2.2E-06	—	—	—	—	*nsv*	
PCB-47	5.7E-05	—	—	—	—	*nsv*	
PCB-48	5.7E-06	—	—	—	3.1E-06	*nsv*	
PCB-49	7.8E-05	1.4E-05	9.3E-06	—	2.2E-05	*nsv*	
PCB-51	7.7E-06	—	—	—	2E-06	*nsv*	
PCB-52+43	0.00028	—	—	—	—	*nsv*	
PCB-53	9.9E-06	—	—	—	1.9E-06	*nsv*	
PCB-55	1.8E-06	—	—	—	—	*nsv*	
PCB-56	2.8E-05	4.6E-06	3.4E-06	—	6.3E-06	*nsv*	
PCB-57	1.6E-06	—	—	—	—	*nsv*	
PCB-58	1.6E-06	—	—	—	—	*nsv*	
PCB-59	3E-06	—	—	—	1.3E-06	*nsv*	
PCB-6	1.2E-05	—	—	—	—	*nsv*	
PCB-60	3.1E-05	9.5E-06	6.7E-06	—	8.3E-06	*nsv*	
PCB-61	—	—	—	—	—	*nsv*	
PCB-62	1.1E-06	—	—	—	—	*nsv*	
PCB-63	5.9E-06	1.5E-06	—	—	2.4E-06	*nsv*	
PCB-64	4.1E-05	7.2E-06	6.1E-06	—	1.4E-05	*nsv*	
PCB-64+68	—	—	—	—	—	*nsv*	
PCB-65	2E-05	6.3E-06	5.2E-06	—	1.4E-05	*nsv*	
PCB-65+75	—	—	—	—	—	*nsv*	
PCB-66	0.00011	2.7E-05	1.7E-05	—	2.5E-05	*nsv*	
PCB-68	5.5E-06	—	—	—	—	*nsv*	
PCB-69	1.5E-06	—	—	—	—	*nsv*	
PCB-70	0.00015	2.6E-05	2.1E-05	—	3.2E-05	*nsv*	
PCB-71	1.4E-05	1.7E-06	—	—	3.1E-06	*nsv*	
PCB-73	1.1E-06	—	—	—	—	*nsv*	
PCB-74	0.00014	2E-05	1.3E-05	—	1.9E-05	*nsv*	
PCB-74+76	—	—	—	—	—	*nsv*	
PCB-77	1.2E-05	2.1E-06	1.8E-06	—	5.5E-06	*nsv*	
PCB-78	1.5E-06	—	—	—	—	*nsv*	
PCB-79	1.1E-06	—	—	—	—	*nsv*	

Appendix A Tissue Sample Results	UPPER WILLAMETTE BASIN Station ID and Description						
Samples collected in Fall 2008-2010	WM10 - McKenzie River at Coburg Road (NPM, fillet)	WM38 - Coast Fork Willamette River at Hwy 58 (LSS, fillet)	WM38 - Coast Fork Willamette River at Hwy 58 (NPM, fillet)	WM38 - Coast Fork Willamette River at Hwy 58 (SMB, fillet)	WM44 - Willamette MF at Clearwater Ramp (LSS, fillet)	Screening Value	S.V. Reference
	10376	10379	10379	10379	11990		
	Maximum Values (mg/kg)						
PCBs, continued							
PCB-8	6.4E-05	—	—	—	—	*nsv*	
PCB-80	1.1E-06	—	—	—	—	*nsv*	
PCB-81	1.1E-05	2.1E-06	—	—	4.7E-06	*nsv*	
PCB-82	1.6E-05	9.8E-06	5.2E-06	—	7.7E-06	*nsv*	
PCB-83	6.2E-06	3.2E-06	—	—	2.8E-06	*nsv*	
PCB-84	1.9E-05	8.5E-06	3.5E-06	—	1.1E-05	*nsv*	
PCB-85	5.5E-05	2.7E-05	1.6E-05	—	2.1E-05	*nsv*	
PCB-87	8.2E-05	4.5E-05	2.2E-05	—	4E-05	*nsv*	
PCB-87+111+116+117	—	—	—	—	—	*nsv*	
PCB-89	5.6E-05	2.1E-05	1.3E-05	—	1.9E-05	*nsv*	
PCB-90	5.7E-06	—	—	—	—	*nsv*	
PCB-91	1.8E-05	9.1E-06	4E-06	—	8.6E-06	*nsv*	
PCB-92	2.4E-05	—	—	—	—	*nsv*	
PCB-94	—	—	—	—	—	*nsv*	
PCB-95	0.00015	3.4E-05	1.8E-05	—	3.8E-05	*nsv*	
PCB-95+121	—	—	—	—	—	*nsv*	
PCB-96	1.3E-06	—	—	—	—	*nsv*	
PCB-97	7.4E-05	4.1E-05	1.9E-05	—	3.3E-05	*nsv*	
PCB-99	0.00016	7.9E-05	3.8E-05	—	5.8E-05	*nsv*	
Priority Metals (Total)							
Arsenic	—	—	—	—	—	*nsv*	
Cadmium	—	—	—	—	—	2.3	12
Chromium	—	—	—	—	—	*nsv*	
Cobalt	—	—	—	—	—	*nsv*	
Mercury	1.19	0.48	1.1	0.41	0.15	0.04	13
Nickel	—	—	—	—	—	*nsv*	
Titanium	—	—	—	—	—	*nsv*	
Zinc	—	—	—	—	—	*nsv*	

Appendix A Tissue Sample Results	UPPER WILLAMETTE BASIN Station ID and Description					
Samples collected in Fall 2008-2010	WM44 - Willamette MF at Clearwater Ramp (NPM, fillet)	WM46 - Willamette R at Willamette Park Ramp (NPM, fillet)	WM28 - Willamette R at Greenway bike bridge (LSS, fillet)	WM28 - Willamette R at Greenway bike bridge (NPM, fillet)	Screening Value	S.V. Reference
	11990	29043	29044	29044		
	Maximum Values (mg/kg)					
Flame Retardants						
PBDE-100	—	0.00039	—	0.00057	*nsv*	
PBDE-119	—	—	—	2.9E-06	*nsv*	
PBDE-139	—	—	—	1.7E-06	*nsv*	
PBDE-15	—	—	—	9E-06	*nsv*	
PBDE-153	—	5.2E-05	—	8.2E-05	0.2	12
PBDE-154	—	0.0001	—	0.00012	*nsv*	
PBDE-17	—	—	—	9.1E-05	*nsv*	
PBDE-183	—	—	—	5.6E-07	*nsv*	
PBDE-209	—	—	—	0.00014	16.3	12
PBDE-28	—	—	—	0.00024	*nsv*	
PBDE-47	—	0.00229	—	0.00547	0.2	12
PBDE-49	—	4.2E-05	—	0.00015	*nsv*	
PBDE-66	—	—	—	8.9E-05	*nsv*	
PBDE-71	—	—	—	7.2E-06	*nsv*	
PBDE-77	—	—	—	4E-07	*nsv*	
PBDE-85	—	—	—	2.6E-05	*nsv*	
PBDE-99	—	5.7E-05	—	0.00097	0.2	12
Pentabromoethylbenzene	—	—	—	—	*nsv*	
Legacy Pesticides						
Total Chlordane	0.00032	0.00022	0.00018	0.00022	1.2	12
alpha-Chlordane	3.5E-05	3.4E-05	4.6E-05	2.8E-05	*nsv*	
cis-Nonachlor	6.1E-05	3.2E-05	3.2E-05	3.9E-05	*nsv*	
gamma-Chlordane+trans-Nonachlor	—	—	—	—	*nsv*	
gamma-Clordane	0.00023	1.6E-05	0.0001	—	*nsv*	
Oxychlordane	—	1.2E-05	—	9E-06	*nsv*	
trans-Nonachlor	—	0.00012	—	0.00015	*nsv*	
Dieldrin	1.8E-05	2E-05	2.1E-05	1.7E-05	0.1	12
Endosulfan	—	2.5E-05	—	—	14	12
Endosulfan I	—	2.5E-05	—	—	*nsv*	
Endrin	5.7E-05	—	2.7E-05	6.1E-05	0.7	12
Heptachlor	—	—	2.7E-06	—	*nsv*	
Heptachlor epoxide	—	—	—	—	0.03	12
Hexachlorobenzene	0.00016	—	0.00015	—	1.9	12
Methoxychlor	7.3E-05	—	5.3E-05	—	11.7	12
Mirex	1.1E-05	—	—	1.2E-05	0.5	12

Appendix A Tissue Sample Results	UPPER WILLAMETTE BASIN Station ID and Description					
Samples collected in Fall 2008-2010	WM44 - Willamette MF at Clearwater Ramp (NPM, fillet)	WM46 - Willamette R at Willamette Park Ramp (NPM, fillet)	WM28 - Willamette R at Greenway bike bridge (LSS, fillet)	WM28 - Willamette R at Greenway bike bridge (NPM, fillet)	Screening Value	S.V. Reference
	11990	29043	29044	29044		
	Maximum Values (mg/kg)					
Legacy Pesticides, continued						
Total DDT	0.00167	0.00101	0.0008	0.00105	1.2	12
2,4´-DDD	6.9E-06	—	1.6E-05	—	*nsv*	
2,4´-DDE	1.1E-05	—	—	—	*nsv*	
2,4´-DDT	1E-05	—	9.8E-06	—	*nsv*	
4,4´-DDD	7.8E-05	6E-05	7.7E-05	2.7E-05	*nsv*	
4,4´-DDE	0.00156	0.00095	0.00062	0.00102	*nsv*	
4,4´-DDT	—	—	8.7E-05	—	*nsv*	
PCBs						
Total PCBs	0.00368	0.00328	0.00882	0.12105	0.05	12
PCB-10+4	—	—	—	—	*nsv*	
PCB-101	0.00014	—	0.00046	0.00185	*nsv*	
PCB-101+113	—	0.00015	—	0.00268	*nsv*	
PCB-102	—	—	—	—	*nsv*	
PCB-103	—	—	—	5.8E-06	*nsv*	
PCB-105	9.3E-05	1E-04	0.00022	0.0047	*nsv*	
PCB-107	2.6E-05	—	0.00037	0.00094	*nsv*	
PCB-107+123	—	—	—	4E-05	*nsv*	
PCB-109	—	—	—	—	*nsv*	
PCB-109+123	—	2.7E-05	—	0.0014	*nsv*	
PCB-11	—	—	—	2.4E-05	*nsv*	
PCB-110	0.00011	0.00015	0.00013	0.00203	*nsv*	
PCB-112	4.4E-06	—	6.1E-06	7.1E-05	*nsv*	
PCB-114	9.2E-06	1.1E-05	0.00034	0.00062	*nsv*	
PCB-115	5.2E-06	—	3.9E-06	6.6E-05	*nsv*	
PCB-115+111	—	4.8E-06	—	0.0001	*nsv*	
PCB-117+87	—	5.4E-05	—	0.0013	*nsv*	
PCB-118	0.00027	0.00032	0.00038	0.0157	*nsv*	
PCB-119+112	—	4.1E-06	—	0.00012	*nsv*	
PCB-120	1.2E-06	8.9E-06	1.1E-06	0.00015	*nsv*	
PCB-121	—	1E-05	—	0.00015	*nsv*	
PCB-122	1.1E-05	—	—	—	*nsv*	
PCB-124	6.3E-06	5E-06	7.2E-06	0.00018	*nsv*	
PCB-125	—	—	—	3.2E-06	*nsv*	
PCB-126	3.4E-06	—	0.00048	7.2E-06	*nsv*	
PCB-127	—	—	4.3E-06	—	*nsv*	

Appendix A Tissue Sample Results	UPPER WILLAMETTE BASIN Station ID and Description					
Samples collected in Fall 2008-2010	WM44 - Willamette MF at Clearwater Ramp (NPM, fillet)	WM46 - Willamette R at Willamette Park Ramp (NPM, fillet)	WM28 - Willamette R at Greenway bike bridge (LSS, fillet)	WM28 - Willamette R at Greenway bike bridge (NPM, fillet)	Screening Value	S.V. Reference
	11990	29043	29044	29044		
	Maximum Values (mg/kg)					
PCBs, continued						
PCB-128	6.8E-05	—	3.6E-05	0.00087	*nsv*	
PCB-128+162	—	5.6E-05	—	0.00151	*nsv*	
PCB-129	1.4E-05	7.3E-06	9.3E-06	0.00039	*nsv*	
PCB-13	—	—	—	—	*nsv*	
PCB-130	2.3E-05	1.5E-05	1.4E-05	0.00055	*nsv*	
PCB-131	2.6E-06	—	3.7E-06	—	*nsv*	
PCB-132	0.00067	—	0.00059	0.0104	*nsv*	
PCB-132+153	—	—	—	0.00085	*nsv*	
PCB-133+131+142	—	5.8E-06	—	0.00019	*nsv*	
PCB-134	7.8E-06	6.9E-06	7.4E-06	0.0002	*nsv*	
PCB-135	1.3E-05	1.1E-05	1.2E-05	0.00016	*nsv*	
PCB-137	2.8E-05	2.5E-05	1.3E-05	0.00181	*nsv*	
PCB-138	0.0005	—	0.00039	0.00712	*nsv*	
PCB-138+163	—	—	—	0.0006	*nsv*	
PCB-139	—	—	—	0.00011	*nsv*	
PCB-140	2E-06	—	—	6.3E-06	*nsv*	
PCB-141	5.8E-05	3.3E-05	2.6E-05	0.00058	*nsv*	
PCB-142	9.7E-06	—	5E-06	0.00014	*nsv*	
PCB-144	8.3E-06	4.9E-06	6.3E-06	0.00012	*nsv*	
PCB-145	—	—	—	—	*nsv*	
PCB-146	0.00008	4.7E-05	3.5E-05	0.00169	*nsv*	
PCB-147	4.8E-06	4.1E-06	2.4E-06	0.00022	*nsv*	
PCB-148	5.2E-06	—	1E-05	6.1E-05	*nsv*	
PCB-149	0.0001	0.0001	9.2E-05	0.00166	*nsv*	
PCB-15	—	—	—	—	*nsv*	
PCB-150	—	—	—	—	*nsv*	
PCB-151	2.5E-05	2.2E-05	0.00002	0.00031	*nsv*	
PCB-153	—	0.00046	—	0.0148	*nsv*	
PCB-154	3.8E-06	—	2.4E-06	2.3E-05	*nsv*	
PCB-155	—	—	—	—	*nsv*	
PCB-156	0.00005	4.3E-05	0.00078	0.00293	*nsv*	
PCB-157	1.2E-05	9E-06	0.00037	0.00056	*nsv*	
PCB-158	4.6E-05	3.5E-05	2.5E-05	0.00104	*nsv*	
PCB-158+160	—	—	—	6.7E-05	*nsv*	
PCB-159	—	—	1.3E-06	—	*nsv*	

Appendix A Tissue Sample Results	UPPER WILLAMETTE BASIN Station ID and Description					
Samples collected in Fall 2008-2010	WM44 - Willamette MF at Clearwater Ramp (NPM, fillet)	WM46 - Willamette R at Willamette Park Ramp (NPM, fillet)	WM28 - Willamette R at Greenway bike bridge (LSS, fillet)	WM28 - Willamette R at Greenway bike bridge (NPM, fillet)	Screening Value	S.V. Reference
	11990	29043	29044	29044		
	Maximum Values (mg/kg)					
PCBs, continued						
PCB-16	2.6E-06	—	5.7E-06	1.1E-05	*nsv*	
PCB-16+32	—	—	—	4.3E-05	*nsv*	
PCB-162	3.6E-06	—	2E-06	—	*nsv*	
PCB-163+138	—	0.00033	—	0.0112	*nsv*	
PCB-164	1.9E-05	1.4E-05	1.2E-05	0.00036	*nsv*	
PCB-165	—	—	2.7E-05	—	*nsv*	
PCB-166	4.3E-06	—	2.6E-06	0.00015	*nsv*	
PCB-167	2.6E-05	2.1E-05	0.00058	0.00113	*nsv*	
PCB-169	2.9E-06	—	0.00037	6.7E-06	*nsv*	
PCB-17	—	—	3.4E-06	2.7E-05	*nsv*	
PCB-170	6.4E-05	5.2E-05	2.9E-05	0.00137	*nsv*	
PCB-171	1.8E-05	1.1E-05	1.1E-05	0.00016	*nsv*	
PCB-172	2.2E-05	1.1E-05	8.1E-06	0.00016	*nsv*	
PCB-173	—	—	1.8E-06	1.1E-05	*nsv*	
PCB-174	3.8E-05	2.7E-05	2.6E-05	0.0003	*nsv*	
PCB-175	4E-06	—	3.4E-06	2.9E-05	*nsv*	
PCB-175+182	—	—	—	—	*nsv*	
PCB-176	3.2E-06	—	4.8E-06	1.9E-05	*nsv*	
PCB-177	3.3E-05	2.3E-05	2.2E-05	0.00031	*nsv*	
PCB-178	2.3E-05	9.7E-06	9.5E-06	7.8E-05	*nsv*	
PCB-179	1.4E-05	7.4E-06	1.1E-05	3.5E-05	*nsv*	
PCB-18	3.9E-06	—	7.1E-06	6.6E-05	*nsv*	
PCB-180	0.00016	—	0.00043	0.0022	*nsv*	
PCB-180+193	—	0.00018	—	0.00316	*nsv*	
PCB-181	1.7E-06	—	1.7E-06	6.5E-05	*nsv*	
PCB-183	5.3E-05	3.5E-05	2.3E-05	0.00054	*nsv*	
PCB-184	—	—	—	—	*nsv*	
PCB-185	6.7E-06	4.7E-06	4.4E-06	3.4E-05	*nsv*	
PCB-186	—	—	1.1E-06	—	*nsv*	
PCB-187	0.00013	0.00011	5.5E-05	0.00115	*nsv*	
PCB-188	—	—	—	9.6E-07	*nsv*	
PCB-189	4.3E-06	—	0.0002	8.9E-05	*nsv*	
PCB-19	—	—	—	4.4E-06	*nsv*	
PCB-190	1.6E-05	1.5E-05	7.6E-06	0.0003	*nsv*	
PCB-191	3.8E-06	—	2E-06	6.9E-05	*nsv*	

Appendix A Tissue Sample Results	UPPER WILLAMETTE BASIN Station ID and Description					
Samples collected in Fall 2008-2010	WM44 - Willamette MF at Clearwater Ramp (NPM, fillet)	WM46 - Willamette R at Willamette Park Ramp (NPM, fillet)	WM28 - Willamette R at Greenway bike bridge (LSS, fillet)	WM28 - Willamette R at Greenway bike bridge (NPM, fillet)	Screening Value	S.V. Reference
	11990	29043	29044	29044		
	Maximum Values (mg/kg)					
PCBs, continued						
PCB-194	2.7E-05	3E-05	1.3E-05	0.00025	*nsv*	
PCB-195	8.2E-06	9.6E-06	5.1E-06	8.5E-05	*nsv*	
PCB-196	1.1E-05	1.3E-05	8.4E-06	0.00013	*nsv*	
PCB-197	1.6E-06	—	1.5E-06	7E-06	*nsv*	
PCB-198	—	—	—	6.1E-06	*nsv*	
PCB-199	2.9E-05	3E-05	1.4E-05	0.00028	*nsv*	
PCB-20	4.1E-06	—	9.5E-06	8.8E-06	*nsv*	
PCB-20+21+33	—	—	—	3.6E-05	*nsv*	
PCB-200	2.4E-06	—	2.5E-06	7E-06	*nsv*	
PCB-201	3.2E-06	—	3.1E-06	2.6E-05	*nsv*	
PCB-202	3.8E-06	6.4E-06	3.5E-06	3.6E-05	*nsv*	
PCB-203	1.9E-05	2.6E-05	9.4E-06	0.00019	*nsv*	
PCB-204	6.1E-07	—	—	—	*nsv*	
PCB-205	2.5E-06	—	2.2E-06	6.2E-06	*nsv*	
PCB-206	1.8E-05	1.1E-05	8.7E-06	9.4E-05	*nsv*	
PCB-207	2.4E-06	—	2.4E-06	2.3E-05	*nsv*	
PCB-208	8.2E-06	4.4E-06	4.9E-06	3.1E-05	*nsv*	
PCB-209	0.00001	1.1E-05	4.6E-06	1.6E-05	*nsv*	
PCB-22	2E-06	—	5E-06	2.8E-05	*nsv*	
PCB-25	—	—	1.8E-06	2E-05	*nsv*	
PCB-26	1.3E-06	—	5.9E-06	5.9E-05	*nsv*	
PCB-27	—	—	—	4.7E-06	*nsv*	
PCB-28	9.4E-06	2.4E-05	0.00034	0.00013	*nsv*	
PCB-29	—	—	8.1E-07	—	*nsv*	
PCB-31	7.9E-06	1.5E-05	1.3E-05	0.00011	*nsv*	
PCB-32	—	—	—	5E-06	*nsv*	
PCB-35	—	—	1.5E-06	—	*nsv*	
PCB-36	—	—	—	—		
PCB-37	2.7E-06	—	4.7E-06	1.1E-05	*nsv*	
PCB-39	—	—	1.3E-06	6.4E-06	*nsv*	
PCB-40	—	—	3.2E-06	3.8E-05	*nsv*	
PCB-41	—	—	—	1.4E-06	*nsv*	
PCB-41+72	—	—	—	—	*nsv*	
PCB-42	—	6.5E-06	6.1E-06	8.1E-05	*nsv*	
PCB-43	3E-05	—	0.00041	0.00031	*nsv*	

Appendix A Tissue Sample Results	UPPER WILLAMETTE BASIN Station ID and Description					
Samples collected in Fall 2008-2010	WM44 - Willamette MF at Clearwater Ramp (NPM, fillet)	WM46 - Willamette R at Willamette Park Ramp (NPM, fillet)	WM28 - Willamette R at Greenway bike bridge (LSS, fillet)	WM28 - Willamette R at Greenway bike bridge (NPM, fillet)	Screening Value	S.V. Reference
	11990	29043	29044	29044		
	Maximum Values (mg/kg)					
PCBs, continued						
PCB-43+52	—	—	—	0.00044	*nsv*	
PCB-44	1.1E-05	1.9E-05	2E-05	0.00026	*nsv*	
PCB-45	—	—	2.2E-06	1.8E-05	*nsv*	
PCB-46	—	—	1.4E-06	—	*nsv*	
PCB-47	—	—	—	0.00005	*nsv*	
PCB-48	—	—	3E-06	1.7E-05	*nsv*	
PCB-49	1.1E-05	1.8E-05	2E-05	0.0003	*nsv*	
PCB-51	—	—	2.3E-06	5.1E-05	*nsv*	
PCB-52+43	—	4E-05	—	0.00061	*nsv*	
PCB-53	—	—	2.5E-06	2E-05	*nsv*	
PCB-55	—	—	1.4E-06	—	*nsv*	
PCB-56	4.9E-06	1.2E-05	8.5E-06	4.9E-05	*nsv*	
PCB-57	—	—	1.3E-06	—	*nsv*	
PCB-58	—	—	1.2E-06	—	*nsv*	
PCB-59	—	—	1.8E-06	1.2E-05	*nsv*	
PCB-6	—	—	—	4.1E-06	*nsv*	
PCB-60	9.8E-06	1.3E-05	1.9E-05	0.00015	*nsv*	
PCB-61	—	—	1E-06	—	*nsv*	
PCB-62	—	—	—	—	*nsv*	
PCB-63	1.3E-06	—	2.6E-06	4.7E-05	*nsv*	
PCB-64	9.1E-06	1.2E-05	1.4E-05	4.5E-05	*nsv*	
PCB-64+68	—	—	—	0.0002	*nsv*	
PCB-65	6.9E-06	—	1.2E-05	3E-05	*nsv*	
PCB-65+75	—	—	—	0.00025	*nsv*	
PCB-66	2.2E-05	5.6E-05	0.00003	0.001	*nsv*	
PCB-68	—	—	—	—	*nsv*	
PCB-69	—	—	1.2E-06	—	*nsv*	
PCB-70	3.1E-05	5.1E-05	4.1E-05	0.00096	*nsv*	
PCB-71	7.8E-07	—	3.3E-06	6.3E-05	*nsv*	
PCB-73	—	—	8.1E-07	—	*nsv*	
PCB-74	1.9E-05	6.2E-05	2.2E-05	0.00137	*nsv*	
PCB-74+76	—	—	—	0.00015	*nsv*	
PCB-77	4.6E-06	5.2E-06	0.00033	2.7E-05	*nsv*	
PCB-78	—	—	1.3E-06	—	*nsv*	
PCB-79	—	—	1.9E-06	4.2E-06	*nsv*	

Appendix A Tissue Sample Results	UPPER WILLAMETTE BASIN Station ID and Description					
Samples collected in Fall 2008-2010	WM44 - Willamette MF at Clearwater Ramp (NPM, fillet)	WM46 - Willamette R at Willamette Park Ramp (NPM, fillet)	WM28 - Willamette R at Greenway bike bridge (LSS, fillet)	WM28 - Willamette R at Greenway bike bridge (NPM, fillet)	Screening Value	S.V. Reference
	11990	29043	29044	29044		
	Maximum Values (mg/kg)					
PCBs, continued						
PCB-8	—	—	—	—	*nsv*	
PCB-80	—	—	1.1E-06	—	*nsv*	
PCB-81	3.6E-06	—	0.00042	1.5E-05	*nsv*	
PCB-82	7.2E-06	—	1E-05	9.5E-05	*nsv*	
PCB-83	1.9E-06	—	3.5E-06	3.1E-05	*nsv*	
PCB-84	6.4E-06	—	1.4E-05	8.1E-05	*nsv*	
PCB-85	3.4E-05	3E-05	2.2E-05	0.00086	*nsv*	
PCB-87	4.7E-05	—	4.7E-05	0.00065	*nsv*	
PCB-87+111+116+117	—	—	—	0.00013	*nsv*	
PCB-89	2.4E-05	1.9E-05	2E-05	0.00037	*nsv*	
PCB-90	6.1E-06	—	—	0.00039	*nsv*	
PCB-91	6.9E-06	—	1E-05	7.4E-05	*nsv*	
PCB-92	—	7.9E-06	—	0.00012	*nsv*	
PCB-94	—	—	—	1.2E-06	*nsv*	
PCB-95	2.9E-05	3.6E-05	4.5E-05	0.00081	*nsv*	
PCB-95+121	—	—	—	0.0002	*nsv*	
PCB-96	—	—	—	—	*nsv*	
PCB-97	3.2E-05	0.00004	3.9E-05	0.00148	*nsv*	
PCB-99	6.7E-05	9.6E-05	6.1E-05	0.00344	*nsv*	
Priority Metals (Total)						
Arsenic	—	—	—	—	*nsv*	
Cadmium	—	—	—	—	2.3	12
Chromium	—	—	—	—	*nsv*	
Cobalt	—	—	—	—	*nsv*	
Mercury	0.76	1.03	0.23	0.56	0.04	13
Nickel	—	—	—	—	*nsv*	
Titanium	—	—	—	—	*nsv*	
Zinc	—	—	—	—	*nsv*	

Appendix A Tissue Sample Results	UPPER WILLAMETTE BASIN Station ID and Description				
Samples collected in Fall 2016	WM26 - Willamette R MF at USGS Gage 14144800 (Crayfish)	WM28 - Willamette R at Greenway bike bridge (Crayfish)	WM28 - Willamette R at Greenway bike bridge (Mussel)	Screening Value	S.V. Reference
2016 Samples	27986	29044	29044		
	Maximum Values (mg/kg)				
Flame Retardants					
PBDE-100	—	—	0.0000251	*nsv*	
PBDE-119	—	—	—	*nsv*	
PBDE-139	—	—	—	*nsv*	
PBDE-15	—	—	—	*nsv*	
PBDE-153	—	—	—	0.2	12
PBDE-154	—	—	0.0000107	*nsv*	
PBDE-17	—	—	—	*nsv*	
PBDE-183	—	—	—	*nsv*	
PBDE-209	—	—	—	16.3	12
PBDE-28	—	—	—	*nsv*	
PBDE-47	—	—	0.000126	0.2	12
PBDE-49	—	—	0.000019	*nsv*	
PBDE-66	—	—	—	*nsv*	
PBDE-71	—	—	—	*nsv*	
PBDE-77	—	—	—	*nsv*	
PBDE-85	—	—	—	*nsv*	
PBDE-99	—	—	—	0.2	12
Pentabromoethylbenzene	—	—	—	*nsv*	
Legacy Pesticides					
Total Chlordane	—	—	0.0000453	1.2	14
alpha-Chlordane	—	—	0.0000142	*nsv*	
cis-Nonachlor	—	—	—	*nsv*	
gamma-Chlordane+trans-Nonachlor	—	—	0.0000311	*nsv*	
gamma-Clordane	—	—	—	*nsv*	
Oxychlordane	—	—	—	*nsv*	
trans-Nonachlor	—	—	—	*nsv*	
Dieldrin	—	—	0.0000108	0.044	14
Endosulfan	—	—	—	*nsv*	
Endosulfan I	—	—	—	*nsv*	
Endrin	—	—	—	*nsv*	
Heptachlor	—	—	—	*nsv*	
Heptachlor epoxide	—	—	—	*nsv*	
Hexachlorobenzene	—	—	—	*nsv*	
Methoxychlor	—	—	—	*nsv*	
Mirex	—	—	—	*nsv*	

Appendix A Tissue Sample Results	UPPER WILLAMETTE BASIN Station ID and Description				
Samples collected in Fall 2016	WM26 - Willamette R MF at USGS Gage 14144800 (Crayfish)	WM28 - Willamette R at Greenway bike bridge (Crayfish)	WM28 - Willamette R at Greenway bike bridge (Mussel)	Screening Value	S.V. Reference
2016 Samples	27986	29044	29044		
	Maximum Values (mg/kg)				
Legacy Pesticides, continued					
Total DDT	—	0.000138	0.0001285	0.051	14
2,4´-DDD	—	—	—	*nsv*	
2,4´-DDE	—	—	—	*nsv*	
2,4´-DDT	—	—	—	*nsv*	
4,4´-DDD	—	—	0.0000195	*nsv*	
4,4´-DDE	—	0.000138	0.000109	*nsv*	
4,4´-DDT	—	—	—	*nsv*	
PCBs					
Total PCBs	0.000026	0.00065007	0.00049518	0.88	14
PCB-10+4	—	—	—	*nsv*	
PCB-101	—	—	—	*nsv*	
PCB-101+113	—	—	0.0000342	*nsv*	
PCB-102	—	—	—	*nsv*	
PCB-103	—	—	—	*nsv*	
PCB-105	—	0.0000118	0.0000114	0.02	14
PCB-107	—	—	—	*nsv*	
PCB-107+123	—	—	—	*nsv*	
PCB-109	—	—	—	*nsv*	
PCB-109+123	—	—	—	*nsv*	
PCB-11	—	—	—	*nsv*	
PCB-110	—	0.0000134	0.0000408	*nsv*	
PCB-112	—	—	—	*nsv*	
PCB-114	—	—	—	0.02	14
PCB-115	—	—	—	*nsv*	
PCB-115+111	—	—	—	*nsv*	
PCB-117+87	—	—	—	*nsv*	
PCB-118	—	0.0000646	0.0000335	0.02	14
PCB-119+112	—	—	—	*nsv*	
PCB-120	—	—	—	*nsv*	
PCB-121	—	—	—	*nsv*	
PCB-122	—	—	—	*nsv*	
PCB-124	—	—	—	*nsv*	
PCB-125	—	—	—	*nsv*	
PCB-126	—	—	—	1.6E-04	14
PCB-127	—	—	—	*nsv*	

Appendix A Tissue Sample Results	UPPER WILLAMETTE BASIN Station ID and Description				
Samples collected in Fall 2016	WM26 - Willamette R MF at USGS Gage 14144800 (Crayfish)	WM28 - Willamette R at Greenway bike bridge (Crayfish)	WM28 - Willamette R at Greenway bike bridge (Mussel)	Screening Value	S.V. Reference
2016 Samples	27986	29044	29044		
	Maximum Values (mg/kg)				
PCBs, continued					
PCB-128	—	—	—	*nsv*	
PCB-128+162	—	—	—	*nsv*	
PCB-129	—	—	—	*nsv*	
PCB-13	—	—	—	*nsv*	
PCB-130	—	—	—	*nsv*	
PCB-131	—	—	—	*nsv*	
PCB-132	—	—	—	*nsv*	
PCB-132+153	—	0.000117	0.0000579	*nsv*	
PCB-133+131+142	—	—	—	*nsv*	
PCB-134	—	—	—	*nsv*	
PCB-135	—	—	0.00000728	*nsv*	
PCB-137	—	—	—	*nsv*	
PCB-138	—	—	—	*nsv*	
PCB-138+163	—	0.000049	0.0000449	*nsv*	
PCB-139	—	—	—	*nsv*	
PCB-140	—	—	—	*nsv*	
PCB-141	—	—	0.00000763	*nsv*	
PCB-142	—	—	—	*nsv*	
PCB-144	—	—	—	*nsv*	
PCB-145	—	—	—	*nsv*	
PCB-146	—	0.00002	0.00000863	*nsv*	
PCB-147	—	—	—	*nsv*	
PCB-148	—	—	—	*nsv*	
PCB-149	—	—	0.0000397	*nsv*	
PCB-15	—	—	—	*nsv*	
PCB-150	—	—	—	*nsv*	
PCB-151	—	—	0.0000105	*nsv*	
PCB-153	—	—	—	*nsv*	
PCB-154	—	—	—	*nsv*	
PCB-155	—	—	—	*nsv*	
PCB-156	—	0.0000154	—	0.02	14
PCB-157	—	—	—	0.02	14
PCB-158	—	—	—	*nsv*	
PCB-158+160	—	—	—	*nsv*	
PCB-159	—	—	—	*nsv*	

Appendix A Tissue Sample Results	UPPER WILLAMETTE BASIN Station ID and Description				
Samples collected in Fall 2016	WM26 - Willamette R MF at USGS Gage 14144800 (Crayfish)	WM28 - Willamette R at Greenway bike bridge (Crayfish)	WM28 - Willamette R at Greenway bike bridge (Mussel)	Screening Value	S.V. Reference
2016 Samples	27986	29044	29044		
	Maximum Values (mg/kg)				
PCBs, continued					
PCB-16	—	—	—	*nsv*	
PCB-16+32	—	—	—	*nsv*	
PCB-162	—	—	—	*nsv*	
PCB-163+138	—	—	—	*nsv*	
PCB-164	—	—	—	*nsv*	
PCB-165	—	—	—	*nsv*	
PCB-166	—	—	—	*nsv*	
PCB-167	—	—	—	0.02	14
PCB-169	—	—	—	2.0E-05	14
PCB-17	—	—	—	*nsv*	
PCB-170	—	0.0000143	—	*nsv*	
PCB-171	—	—	—	*nsv*	
PCB-172	—	—	—	*nsv*	
PCB-173	—	—	—	*nsv*	
PCB-174	—	—	0.0000185	*nsv*	
PCB-175	—	—	—	*nsv*	
PCB-175+182	—	0.0000814	0.0000214	*nsv*	
PCB-176	—	—	—	*nsv*	
PCB-177	—	—	—	*nsv*	
PCB-178	—	—	—	*nsv*	
PCB-179	—	—	0.00000897	*nsv*	
PCB-18	—	0.00000666	0.00000352	*nsv*	
PCB-180	—	—	—	*nsv*	
PCB-180+193	0.000026	0.000108	—	*nsv*	
PCB-181	—	—	—	*nsv*	
PCB-183	—	0.0000144	—	*nsv*	
PCB-184	—	—	—	*nsv*	
PCB-185	—	—	—	*nsv*	
PCB-186	—	—	—	*nsv*	
PCB-187	—	0.0000409	—	*nsv*	
PCB-188	—	—	—	*nsv*	
PCB-189	—	—	—	0.02	14
PCB-19	—	—	—	*nsv*	
PCB-190	—	—	—	*nsv*	
PCB-191	—	—	—	*nsv*	

Appendix A Tissue Sample Results	UPPER WILLAMETTE BASIN Station ID and Description				
Samples collected in Fall 2016	WM26 - Willamette R MF at USGS Gage 14144800 (Crayfish)	WM28 - Willamette R at Greenway bike bridge (Crayfish)	WM28 - Willamette R at Greenway bike bridge (Mussel)	Screening Value	S.V. Reference
2016 Samples	27986	29044	29044		
	Maximum Values (mg/kg)				
PCBs, continued					
PCB-194	—	—	—	*nsv*	
PCB-195	—	—	—	*nsv*	
PCB-196	—	—	—	*nsv*	
PCB-197	—	—	—	*nsv*	
PCB-198	—	—	—	*nsv*	
PCB-199	—	—	0.0000123	*nsv*	
PCB-20	—	—	—	*nsv*	
PCB-20+21+33	—	—	—	*nsv*	
PCB-200	—	—	—	*nsv*	
PCB-201	—	—	—	*nsv*	
PCB-202	—	—	—	*nsv*	
PCB-203	—	—	—	*nsv*	
PCB-204	—	—	—	*nsv*	
PCB-205	—	—	—	*nsv*	
PCB-206	—	—	—	*nsv*	
PCB-207	—	—	—	*nsv*	
PCB-208	—	—	—	*nsv*	
PCB-209	—	—	—	*nsv*	
PCB-22	—	0.00000558	0.00000325	*nsv*	
PCB-25	—	—	—	*nsv*	
PCB-26	—	—	—	*nsv*	
PCB-27	—	—	—	*nsv*	
PCB-28	—	0.0000215	0.00000953	*nsv*	
PCB-29	—	—	—	*nsv*	
PCB-31	—	0.0000134	0.0000071	*nsv*	
PCB-32	—	—	—	*nsv*	
PCB-35	—	—	—	*nsv*	
PCB-36	—	—	—	*nsv*	
PCB-37	—	0.00000853	—	*nsv*	
PCB-39	—	—	—	*nsv*	
PCB-40	—	—	—	*nsv*	
PCB-41	—	—	—	*nsv*	
PCB-41+72	—	—	—	*nsv*	
PCB-42	—	—	—	*nsv*	
PCB-43	—	—	—	*nsv*	

Appendix A Tissue Sample Results	UPPER WILLAMETTE BASIN Station ID and Description				
Samples collected in Fall 2016	WM26 - Willamette R MF at USGS Gage 14144800 (Crayfish)	WM28 - Willamette R at Greenway bike bridge (Crayfish)	WM28 - Willamette R at Greenway bike bridge (Mussel)	Screening Value	S.V. Reference
2016 Samples	27986	29044	29044		
	Maximum Values (mg/kg)				
PCBs, continued					
PCB-43+52	—	—	0.0000174	*nsv*	
PCB-44	—	—	0.0000109	*nsv*	
PCB-45	—	—	—	*nsv*	
PCB-46	—	—	—	*nsv*	
PCB-47	—	—	—	*nsv*	
PCB-48	—	—	—	*nsv*	
PCB-49	—	—	0.00000743	*nsv*	
PCB-51	—	—	—	*nsv*	
PCB-52+43	—	—	—	*nsv*	
PCB-53	—	—	—	*nsv*	
PCB-55	—	—	—	*nsv*	
PCB-56	—	—	—	*nsv*	
PCB-57	—	—	—	*nsv*	
PCB-58	—	—	—	*nsv*	
PCB-59	—	—	—	*nsv*	
PCB-6	—	—	—	*nsv*	
PCB-60	—	—	—	*nsv*	
PCB-61	—	—	—	*nsv*	
PCB-62	—	—	—	*nsv*	
PCB-63	—	—	—	*nsv*	
PCB-64	—	—	—	*nsv*	
PCB-64+68	—	—	—	*nsv*	
PCB-65	—	—	—	*nsv*	
PCB-65+75	—	—	—	*nsv*	
PCB-66	—	0.0000142	0.0000129	*nsv*	
PCB-68	—	—	—	*nsv*	
PCB-69	—	—	—	*nsv*	
PCB-70	—	0.0000117	0.000014	*nsv*	
PCB-71	—	—	—	*nsv*	
PCB-73	—	—	—	*nsv*	
PCB-74	—	—	—	*nsv*	
PCB-74+76	—	—	—	*nsv*	
PCB-77	—	—	—	1.6E-04	14
PCB-78	—	—	—	*nsv*	
PCB-79	—	—	—	*nsv*	

Appendix A Tissue Sample Results	UPPER WILLAMETTE BASIN Station ID and Description				
Samples collected in Fall 2016	WM26 - Willamette R MF at USGS Gage 14144800 (Crayfish)	WM28 - Willamette R at Greenway bike bridge (Crayfish)	WM28 - Willamette R at Greenway bike bridge (Mussel)	Screening Value	S.V. Reference
2016 Samples	27986	29044	29044		
	Maximum Values (mg/kg)				
PCBs, continued					
PCB-8	—	—	—	*nsv*	
PCB-80	—	—	—	*nsv*	
PCB-81	—	—	—	8.0E-05	14
PCB-82	—	—	—	*nsv*	
PCB-83	—	—	—	*nsv*	
PCB-84	—	—	—	*nsv*	
PCB-85	—	—	—	*nsv*	
PCB-87	—	—	—	*nsv*	
PCB-87+111+116+117	—	—	—	*nsv*	
PCB-89	—	—	0.00000664	*nsv*	
PCB-90	—	—	—	*nsv*	
PCB-91	—	—	—	*nsv*	
PCB-92	—	—	—	*nsv*	
PCB-94	—	—	—	*nsv*	
PCB-95	—	—	—	*nsv*	
PCB-95+121	—	—	0.000016	*nsv*	
PCB-96	—	—	—	*nsv*	
PCB-97	—	—	0.0000115	*nsv*	
PCB-99	—	0.0000183	0.0000174	*nsv*	
Priority Metals (Total)					
Arsenic	0.47	0.27	0.77	7.6	14
Cadmium	—	—	0.09	5.6	14
Chromium	—	0.82	0.7	*nsv*	
Cobalt	—	0.27	0.11	*nsv*	
Mercury	0.028	0.03	0.028	0.04	13
Nickel	0.56	—	—	*nsv*	
Titanium	3.19	9.6	4.02	*nsv*	
Zinc	20.1	23.5	15.9	*nsv*	

Appendices

Screening Value Reference Key

nsv : No screening value has been assigned

1. Human Health Criteria: Water + Organism 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
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

Indicates sites at which at least one sample exceeded the screening value

State of Oregon Department of Environmental Quality

Appendix B
Water Sample Results

MID WILLAMETTE BASIN
Station ID and Description

Samples collected during 2008-2010 or in 2016	Percent Detection	Number of samples over Screening Value	WM01 - Willamette River at Canby Ferry - 2008-2010	WM02 - Willamette River at Wheatland Ferry - 2008-2010	WM02 - Willamette River at Wheatland Ferry - 2016	WM07 - Yamhill River at Dayton - 2008-2010	Screening Value	S.V. Reference
			10339	10344	10344	10363		
			Maximum Values (µg/L)					
Ammonia								
Ammonia as N	90	0	—	—	63	—	‡	2
Combustion By-Products								
Benzo(b)fluoranthene	5	1	0.033	—	—	—	0.0013	1
Benzo(g,h,i)perylene	5		—	0.021	—	—	*nsv*	
Chrysene	2	1	0.026	—	—	—	0.0013	1
Dibenzofuran	5		—	—	—	—	*nsv*	
Fluoranthene	2	0	0.034	—	—	—	14	1
Indeno(1,2,3-cd)pyrene	2	1	—	0.02	—	—	0.0013	1
Pyrene	2	0	0.028	—	—	—	290	1
Consumer Product Constituents								
Acetaminophen	2	0	—	—	—	—	14750	7
Bis(2-ethylhexyl)phthalate	10		—	0.879	—	0.413	0.2	1
Caffeine	2		—	—	—	—	*nsv*	
Carbamazepine	14		0.01	—	—	0.045	*nsv*	
Cotinine	5		—	—	—	—	*nsv*	
DEET	19		0.0239	0.0158	—	0.015	*nsv*	
Diethylphthalate	7	0	0.042	—	—	—	3800	1
Diphenhydramine	2		—	—	—	—	*nsv*	
Sulfamethoxazole	41		0.0285	0.028	0.016	0.337	*nsv*	
Venlafaxine	8		—	—	—	0.042	*nsv*	
Current Use Pesticides								
2,4-D	2	0	—	—	—	—	100	1
2,6-Dichlorobenzamide	38		—	—	—	—	*nsv*	
Aminomethylphosphonic acid (AMPA)	56	0	—	—	—	—	249500	5
Atrazine	27	0	0.0279	0.0076	0.00664	0.0211	1.0	9
Carbaryl	10	0	—	—	0.00816	0.0204	0.5	8
Chloroneb	5		—	0.068	—	0.028	*nsv*	
Deisopropylatrazine	29	0	—	—	—	—	2500	7
Desethylatrazine	24	0	—	—	—	—	1000	7
Dichlobenil	10	0	—	—	—	—	30	10
Dimethenamid	29	0	—	—	0.059	—	8.9	10
Diuron	75	1	0.329	0.221	0.314	3.06	2.4	9
Glyphosate	10	0	—	—	—	—	11900	10
Hexazinone	2	0	—	—	—	—	7	9
Imidacloprid	2	0	—	—	—	—	0.01	8
Methomyl	2	0	—	—	—	—	0.6	8

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Appendix B
Water Sample Results

MID WILLAMETTE BASIN
Station ID and Description

Samples collected during 2008-2010 or in 2016	Percent Detection	Number of samples over Screening Value	WM01 - Willamette River at Canby Ferry - 2008-2010	WM02 - Willamette River at Wheatland Ferry - 2008-2010	WM02 - Willamette River at Wheatland Ferry - 2016	WM07 - Yamhill River at Dayton - 2008-2010	Screening Value	S.V. Reference
			10339	10344	10344	10363		
			Maximum Values (µg/L)					
Current Use Pesticides, continued								
Metolachlor	19	0	0.0241	—	—	—	1	6
Metribuzin	16	0	0.0059	0.0043	0.0601	0.0431	8.7	7
Metsulfuron Methyl	10	0	—	—	—	—	0.36	10
Napropamide	2	0	—	—	—	—	1100	4
Norflurazon	5	0	—	—	—	—	9.7	7
Oxamyl	5	0	—	—	—	—	27	8
Oxyfluorfen	10	0	—	—	—	—	0.29	9
Pentachlorophenol	6	1	0.145	—	—	0.15	0.15	1
Pronamide	2		—	—	—	—	*nsv*	
Propiconazole	7	0	—	—	—	0.026	21	7
Simazine	33	0	0.102	0.03	0.0215	0.124	6	9
Sulfometuron-methyl	10	0	—	—	—	—	0.45	8
Terbacil	3	0	—	—	—	—	11	9
Terbutylazine	2	0	—	—	—	0.0035	1700	5
Triclopyr	2	0	—	—	—	—	29800	7
Trifluralin	3	0	—	—	—	—	1.14	4
Dioxins and Furans								
1,2,3,4,6,7,8-HpCDD	2		—	—	—	—	*nsv*	
OCDD	2		—	—	—	—	*nsv*	
Flame Retardants								
PBDE-209	3		—	—	—	—	*nsv*	
PBDE-47	3		—	—	—	—	*nsv*	
PBDE-99	2		—	—	—	—	*nsv*	
Industrial Chemicals or Intermediates								
Isophorone	2	0	—	—	—	—	27	1
Legacy Pesticides								
Aldrin	2	1	—	—	—	—	5E-06	1
Total Chlordane		2	—	—	—	—	8E-05	1
alpha-Chlordane	14		—	—	—	—	*nsv*	
cis-Nonachlor	5		—	—	—	—	*nsv*	
gamma-Chlordane+trans-Nonachlor	14		—	—	—	—	*nsv*	
Dieldrin	17	10	—	—	—	—	5E-06	1
Endosulfan sulfate	10	0	—	—	—	—	8.5	1
Heptachlor	2	1	—	—	—	—	8E-06	1
Heptachlor epoxide	4	2	—	—	—	—	4E-06	1

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Appendix B
Water Sample Results

Samples collected during 2008-2010 or in 2016	Percent Detection	Number of samples over Screening Value	MID WILLAMETTE BASIN Station ID and Description: WM01 - Willamette River at Canby Ferry - 2008-2010 (10339)	WM02 - Willamette River at Wheatland Ferry - 2008-2010 (10344)	WM02 - Willamette River at Wheatland Ferry - 2016 (10344)	WM07 - Yamhill River at Dayton - 2008-2010 (10363)	Screening Value	S.V. Reference
			Maximum Values (µg/L)					
Legacy Pesticides, continued								
Total DDT		2	—	—	—	—	0.001	2
2,4´-DDD	14		—	—	—	—	*nsv*	
2,4´-DDT	14		—	—	—	—	*nsv*	
4,4´-DDD	8	5	—	—	—	—	3E-05	1
4,4´-DDE	14	8	—	—	—	—	2E-05	1
4,4´-DDT	10	6	—	—	—	—	2E-05	1
Plant or animal sterols								
beta-Sitosterol	100		—	—	1.8	—	*nsv*	
Cholesterol	100		0.885	1.155	0.77	1.09	*nsv*	
Coprostanol	100		0.154	0.241	0.236	0.231	*nsv*	
Stigmastanol	100		—	—	0.247	—	*nsv*	
Priority Metals								
Dissolved								
Aluminum	71		—	—	43.4	—	*nsv*	
Antimony	10		—	—	—	—	*nsv*	
Arsenic	71	0	—	—	0.37	—	2.1	1
Barium	100		—	—	6.2	—	nsv	
Chromium	29	0	—	—	0.18	—	1.7	2
Copper	43	0	—	—	0.7	—	*	2
Iron	86	0	—	—	69.1	—	1000[#]	2
Lead	38	0	—	—	0.04	—	*	2
Manganese	100		—	—	7.12	—	*nsv*	
Nickel	33	0	—	—	0.19	—	*	2
Potassium	100		—	—	940	—	*nsv*	
Selenium	10	0	—	—	—	—	4.6	2
Silver	5	0	—	—	—	—	*	2
Zinc	33	0	—	—	2.6	—	*	2
Total Inorganic								
Arsenic	19	2	—	—	—	—	2.1	1
Total Recoverable								
Aluminum	100		—	—	663	—	*nsv*	
Antimony	2	0	—	—	0.04	—	5.1	1
Arsenic	19	0	0.35	—	0.38	0.36	2.1	1
Barium	99	0	25.4	8.1	9.37	61	1000	1
Beryllium	1		—	—	—	—	*nsv*	

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Appendix B
Water Sample Results

MID WILLAMETTE BASIN

Samples collected during 2008-2010 or in 2016	Percent Detection	Number of samples over Screening Value	Station ID and Description: WM01 - Willamette River at Canby Ferry - 2008-2010 (10339)	WM02 - Willamette River at Wheatland Ferry - 2008-2010 (10344)	WM02 - Willamette River at Wheatland Ferry - 2016 (10344)	WM07 - Yamhill River at Dayton - 2008-2010 (10363)	Screening Value	S.V. Reference
			Maximum Values (µg/L)					
Priority Metals								
Total Recoverable								
Cadmium	3	0	—	—	—	—	*[§]	2
Chromium	24	1	3.8	4.2	0.35	12.1	11[§]	2
Cobalt	42		1.55	0.25	—	5.55	*nsv*	
Copper	55	4	5.9	3.5	0.7	18.3	*[§]	2
Iron	93	16	3420	507	661	13300	1000	2
Lead	56	0	0.9	0.39	0.06	2.65	*[§]	2
Manganese	100		—	—	18.9	—	*nsv*	
Nickel	28	0	2.7	3.3	0.26	8.4	*[§]	2
Potassium	100		—	—	960	—	*nsv*	
Thallium	2	1	—	—	—	—	0.043	1
Uranium	1		—	—	—	0.17	*nsv*	
Vanadium	21		10.6	4.4	—	34	*nsv*	
Zinc	72	1	9.1	6.9	2.2	28.6	*[§]	2
			Average Values					
Standard Parameters (mg/L)								
Dissolved Organic Carbon	100		2.0	1.8	1.8	2.8		
Sulfate	100		2.9	2.7	2.8	6.1		
Total Organic Carbon	100		1.4	2.0	1.6	2.4		
Total Solids	100		59.0	56.8	66.0	113.0		
Total Suspended Solids	90		4.3	3.0	6.5	21.2		
Field Parameters								
Conductivity (µmhos/cm @ 25° C)	100		73	69	70	145		
Dissolved Oxygen (mg/L)	100		9.9	12.0	11.2	9.3		
pH (SU)	100		7.5	7.9	7.8	7.6		
Temperature (°C)	100		13.5	14.9	14.4	13.9		
Turbidity (NTU)	100		6	4	6	13		

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Appendix B
Water Sample Results

MID WILLAMETTE BASIN
Station ID and Description

Samples collected during 2008-2010 or in 2016	WM07 - Yamhill River at Dayton - 2016	WM13 - Willamette River at Marion Street - 2008-2010	WM13 - Willamette River at Marion Street - 2016	WM15 - Molalla R at Knights Bridge Rd - 2008-2010	WM16 - Pudding R at Hwy 211 - 2008-2010	Screening Value	S.V. Reference
	10363	10555	10555	10637	10640		
	Maximum Values (µg/L)						
Ammonia							
Ammonia as N	184	—	17	—	—	‡	2
Combustion By-Products							
Benzo(b)fluoranthene	—	—	—	—	—	0.0013	1
Benzo(g,h,i)perylene	—	—	—	—	—	*nsv*	
Chrysene	—	—	—	—	—	0.0013	1
Dibenzofuran	—	—	—	—	—	*nsv*	
Fluoranthene	—	—	—	—	—	14	1
Indeno(1,2,3-cd)pyrene	—	—	—	—	—	0.0013	1
Pyrene	—	—	—	—	—	290	1
Consumer Product Constituents							
Acetaminophen	0.467	—	—	—	—	14750	7
Bis(2-ethylhexyl)phthalate	—	0.719	—	—	2.61	0.2	1
Caffeine	0.43	—	—	—	—	*nsv*	
Carbamazepine	0.0289	—	—	—	0.066	*nsv*	
Cotinine	0.041	—	—	—	—	*nsv*	
DEET	0.0584	0.0133	—	0.0202	0.0893	*nsv*	
Diethylphthalate	—	—	—	0.049	0.04	3800	1
Diphenhydramine	—	—	—	—	—	*nsv*	
Sulfamethoxazole	0.0945	0.019	—	—	0.308	*nsv*	
Venlafaxine	0.0326	—	—	—	0.048	*nsv*	
Current Use Pesticides							
2,4-D	—	—	—	—	0.25	100	1
2,6-Dichlorobenzamide	—	—	—	—	—	*nsv*	
Aminomethylphosphonic acid (AMPA)	0.0668	—	—	—	—	249500	5
Atrazine	0.0141	0.0086	0.0045	0.0158	0.0865	1.0	9
Carbaryl	0.018	—	—	—	0.0126	0.5	8
Chloroneb	—	0.56	—	—	—	*nsv*	
Deisopropylatrazine	—	—	—	—	—	2500	7
Desethylatrazine	—	—	—	—	—	1000	7
Dichlobenil	—	—	—	—	—	30	10
Dimethenamid	0.0552	—	—	—	—	8.9	10
Diuron	0.272	0.272	0.265	0.0335	1.41	2.4	9
Glyphosate	—	—	—	—	—	11900	10
Hexazinone	—	—	—	—	0.058	7	9
Imidacloprid	—	—	—	—	—	0.01	8
Methomyl	—	—	—	—	—	0.6	8

Appendix B Water Sample Results	MID WILLAMETTE BASIN Station ID and Description						
Samples collected during 2008-2010 or in 2016	WM07 - Yamhill River at Dayton - 2016	WM13 - Willamette River at Marion Street - 2008-2010	WM13 - Willamette River at Marion Street - 2016	WM15 - Molalla R at Knights Bridge Rd - 2008-2010	WM16 - Pudding R at Hwy 211 - 2008-2010	Screening Value	S.V. Reference
	10363	10555	10555	10637	10640		
	Maximum Values (µg/L)						
Current Use Pesticides, continued							
Metolachlor	0.0182	—	—	—	0.0427	1	6
Metribuzin	0.081	—	0.0465	—	0.0141	8.7	7
Metsulfuron Methyl	0.00926	—	—	—	—	0.36	10
Napropamide	—	—	—	—	—	1100	4
Norflurazon	—	—	—	—	0.0377	9.7	7
Oxamyl	—	0.0519	—	—	0.0157	27	8
Oxyfluorfen	—	—	—	—	—	0.29	9
Pentachlorophenol	—	—	—	0.128	0.13	0.15	1
Pronamide	0.0306	—	—	—	—	*nsv*	
Propiconazole	—	—	—	—	—	21	7
Simazine	0.0619	0.0254	0.00551	0.0346	0.159	6	9
Sulfometuron-methyl	—	—	—	—	—	0.45	8
Terbacil	—	—	—	—	—	11	9
Terbutylazine	—	—	—	—	—	1700	5
Triclopyr	—	—	—	—	—	29800	7
Trifluralin	—	—	—	—	—	1.14	4
Dioxins and Furans							
1,2,3,4,6,7,8-HpCDD	0.00047	—	—	—	—	*nsv*	
OCDD	0.00298	—	—	—	—	*nsv*	
Flame Retardants							
PBDE-209	—	—	—	—	—	*nsv*	
PBDE-47	0.00299	—	—	—	—	*nsv*	
PBDE-99	0.0011	—	—	—	—	*nsv*	
Industrial Chemicals or Intermediates							
Isophorone	—	—	—	—	—	27	1
Legacy Pesticides							
Aldrin	—	—	—	—	—	5E-06	1
Total Chlordane	—	—	—	—	—	8E-05	1
alpha-Chlordane	—	—	—	—	—	*nsv*	
cis-Nonachlor	—	—	—	—	—	*nsv*	
gamma-Chlordane+trans-Nonachlor	—	—	—	—	—	*nsv*	
Dieldrin	0.00011	—	—	—	—	5E-06	1
Endosulfan sulfate	0.00017	—	—	—	—	8.5	1
Heptachlor	7E-05	—	—	—	—	8E-06	1
Heptachlor epoxide	—	—	0.00015	—	—	4E-06	1

Appendix B Water Sample Results	MID WILLAMETTE BASIN Station ID and Description						
Samples collected during 2008-2010 or in 2016	WM07 - Yamhill River at Dayton - 2016	WM13 - Willamette River at Marion Street - 2008-2010	WM13 - Willamette River at Marion Street - 2016	WM15 - Molalla R at Knights Bridge Rd - 2008-2010	WM16 - Pudding R at Hwy 211 - 2008-2010	Screening Value	S.V. Reference
	10363	10555	10555	10637	10640		
	Maximum Values (µg/L)						
Legacy Pesticides, continued							
Total DDT	0.00025	—	—	—	—	0.001	2
2,4´-DDD	—	—	—	—	—	*nsv*	
2,4´-DDT	—	—	—	—	—	*nsv*	
4,4´-DDD	—	—	—	—	—	3E-05	1
4,4´-DDE	0.00018	—	—	—	—	2E-05	1
4,4´-DDT	7.3E-05	—	—	—	—	2E-05	1
Plant or animal sterols							
beta-Sitosterol	1.31	—	1.33	—	—	*nsv*	
Cholesterol	0.633	0.835	0.533	0.568	1.06	*nsv*	
Coprostanol	0.207	0.086	0.108	0.026	0.141	*nsv*	
Stigmastanol	0.173	—	0.205	—	—	*nsv*	
Priority Metals							
Dissolved							
Aluminum	23.7	—	60	—	—	*nsv*	
Antimony	—	—	—	—	—	*nsv*	
Arsenic	0.65	—	0.32	—	—	2.1	1
Barium	15.9	—	5.88	—	—	nsv	
Chromium	0.27	—	0.24	—	—	1.7	2
Copper	1.87	—	0.79	—	—	*	2
Iron	70.7	—	83.9	—	—	1000[#]	2
Lead	0.05	—	0.03	—	—	*	2
Manganese	28.1	—	5.53	—	—	*nsv*	
Nickel	0.4	—	0.19	—	—	*	2
Potassium	1770	—	910	—	—	*nsv*	
Selenium	0.15	—	—	—	—	4.6	2
Silver	—	—	—	—	—	*	2
Zinc	2	—	4.9	—	—	*	2
Total Inorganic							
Arsenic	—	—	—	—	—	2.1	1
Total Recoverable							
Aluminum	1730	—	967	—	—	*nsv*	
Antimony	—	—	—	—	—	5.1	1
Arsenic	0.66	—	0.39	—	0.54	2.1	1
Barium	23	19.6	11	13.9	33.6	1000	1
Beryllium	—	—	—	—	—	*nsv*	

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Appendix B
Water Sample Results

MID WILLAMETTE BASIN
Station ID and Description

Samples collected during 2008-2010 or in 2016	WM07 - Yamhill River at Dayton - 2016	WM13 - Willamette River at Marion Street - 2008-2010	WM13 - Willamette River at Marion Street - 2016	WM15 - Molalla R at Knights Bridge Rd - 2008-2010	WM16 - Pudding R at Hwy 211 - 2008-2010	Screening Value	S.V. Reference
	10363	10555	10555	10637	10640		
	Maximum Values (µg/L)						
Priority Metals							
Total Recoverable							
Cadmium	0.01	—	—	—	—	*[§]	2
Chromium	2.54	2.9	0.37	2.5	1.5	11[§]	2
Cobalt	—	1.1	—	0.73	1.05	*nsv*	
Copper	3.92	4.2	0.74	26.8	3.2	*[§]	2
Iron	2150	2580	940	990	2350	1000	2
Lead	0.51	1	0.25	1.4	0.96	*[§]	2
Manganese	41.5	—	30.1	—	—	*nsv*	
Nickel	1.92	2.3	0.26	2.5	1.2	*[§]	2
Potassium	1780	—	960	—	—	*nsv*	
Thallium	—	—	—	—	—	0.043	1
Uranium	—	—	—	—	—	*nsv*	
Vanadium	—	7.7	—	—	7.5	*nsv*	
Zinc	2.2	14.8	4.1	19.7	131	*[§]	2
	Average Values						
Standard Parameters (mg/L)							
Dissolved Organic Carbon	2.0	1.4	1.7	1.6	3.0		
Sulfate	5.9	2.7	2.6	1.4	6.7		
Total Organic Carbon	2.1	1.2	1.6	1.8	2.8		
Total Solids	113.7	56.8	64.7	49.7	109.8		
Total Suspended Solids	16.0	5.4	5.7	6.0	10.0		
Field Parameters							
Conductivity (µmhos/cm @ 25° C)	108	62	66	57	142		
Dissolved Oxygen (mg/L)	9.5	10.2	10.2	11.2	9.3		
pH (SU)	7.4	7.6	7.4	7.7	7.4		
Temperature (°C)	14.1	13.5	13.1	12.5	14.3		
Turbidity (NTU)	15	5	6	3	7		

Appendix B Water Sample Results	MID WILLAMETTE BASIN Station ID and Description						
Samples collected during 2008-2010 or in 2016	WM16 - Pudding R at Hwy 211 - 2016	WM17 - N Santiam R at Greens Bridge - 2008-2010	WM27 - Mill Creek at Front Street NE - 2016	WM29 - Willamette River at Hebb Park Boat Ramp - 2016	WM30 - Champoeg Creek at Champoeg State Park - 2016	Screening Value	S.V. Reference
	10640	10792	28961	31545	33638		
	Maximum Values (µg/L)						
Ammonia							
Ammonia as N	37	—	29	34	46	‡	2
Combustion By-Products							
Benzo(b)fluoranthene	—	—	—	—	—	0.0013	1
Benzo(g,h,i)perylene	—	—	—	—	—	*nsv*	
Chrysene	—	—	—	—	—	0.0013	1
Dibenzofuran	—	—	—	—	0.00744	*nsv*	
Fluoranthene	—	—	—	—	—	14	1
Indeno(1,2,3-cd)pyrene	—	—	—	—	—	0.0013	1
Pyrene	—	—	—	—	—	290	1
Consumer Product Constituents							
Acetaminophen	—	—	—	—	—	14750	7
Bis(2-ethylhexyl)phthalate	—	0.428	—	—	—	0.2	1
Caffeine	—	—	—	—	—	*nsv*	
Carbamazepine	—	—	—	—	—	*nsv*	
Cotinine	—	—	—	—	—	*nsv*	
DEET	—	0.0112	—	—	—	*nsv*	
Diethylphthalate		0.04026	—	—	—	3800	1
Diphenhydramine	—	—	—	—	0.0209	*nsv*	
Sulfamethoxazole	0.0365	—	—	0.0192	—	*nsv*	
Venlafaxine	—	—	—	—	—	*nsv*	
Current Use Pesticides							
2,4-D	—	—	—	—	—	100	1
2,6-Dichlorobenzamide	0.127	—	0.0708	—	0.243	*nsv*	
Aminomethylphosphonic acid (AMPA)	0.314	—	0.0698	—	1.03	249500	5
Atrazine	0.0213	—	0.00836	0.00598	0.0138	1.0	9
Carbaryl	0.0101	—	—	0.00794	—	0.5	8
Chloroneb	—	—	—	—	—	*nsv*	
Deisopropylatrazine	0.00122	—	—	—	0.026	2500	7
Desethylatrazine	0.00768	—	0.00451	—	0.00695	1000	7
Dichlobenil	—	—	—	—	0.0683	30	10
Dimethenamid	0.093	—	—	—	0.424	8.9	10
Diuron	0.457	0.0772	0.197	0.136	0.654	2.4	9
Glyphosate	—	—	0.124	—	0.059	11900	10
Hexazinone	—	—	—	—	—	7	9
Imidacloprid	—	—	—	—	0.0278	0.01	8
Methomyl	0.0272	—	—	—	—	0.6	8

Appendix B Water Sample Results	MID WILLAMETTE BASIN Station ID and Description						
Samples collected during 2008-2010 or in 2016	WM16 - Pudding R at Hwy 211 - 2016	WM17 - N Santiam R at Greens Bridge - 2008-2010	WM27 - Mill Creek at Front Street NE - 2016	WM29 - Willamette River at Hebb Park Boat Ramp - 2016	WM30 - Champoeg Creek at Champoeg State Park - 2016	Screening Value	S.V. Reference
	10640	10792	28961	31545	33638		
	Maximum Values (µg/L)						
Current Use Pesticides, continued							
Metolachlor	0.119	—	0.0193	0.0122	0.244	1	6
Metribuzin	0.0749	—	0.0593	0.0285	0.0638	8.7	7
Metsulfuron Methyl	—	—	0.00991	—	—	0.36	10
Napropamide	—	—	—	—	0.0693	1100	4
Norflurazon	—	—	—	—	0.112	9.7	7
Oxamyl	—	0.0316	—	—	—	27	8
Oxyfluorfen	—	—	—	—	0.0314	0.29	9
Pentachlorophenol	—	—	—	—	—	0.15	1
Pronamide	—	—	—	—	—	*nsv*	
Propiconazole	—	—	—	—	0.0414	21	7
Simazine	0.0904	—	0.00708	0.0162	0.145	6	9
Sulfometuron-methyl	0.0102	—	0.0302	—	—	0.45	8
Terbacil	—	—	0.0242	—	0.335	11	9
Terbutylazine	—	—	—	—	—	1700	5
Triclopyr	—	—	—	—	1.2	29800	7
Trifluralin	0.00057	—	—	—	0.00069	1.14	4
Dioxins and Furans							
1,2,3,4,6,7,8-HpCDD	—	—	—	—	—	*nsv*	
OCDD	—	—	—	—	—	*nsv*	
Flame Retardants							
PBDE-209	—	—	—	0.00632	—	*nsv*	
PBDE-47	—	—	—	—	—	*nsv*	
PBDE-99	—	—	—	—	—	*nsv*	
Industrial Chemicals or Intermediates							
Isophorone	0.0653	—	—	—	—	27	1
Legacy Pesticides		—					
Aldrin	—	—	—	—	0.00012	5E-06	1
Total Chlordane	0.00042	—	—	—	0.00031	8E-05	1
alpha-Chlordane	0.00017	—	—	—	8.1E-05	*nsv*	
cis-Nonachlor	—	—	—	—	0.0001	*nsv*	
gamma-Chlordane+trans-Nonachlor	0.00025	—	—	—	0.00013	*nsv*	
Dieldrin	0.00047	—	0.00013	—	0.00252	5E-06	1
Endosulfan sulfate	0.0004	—	—	—	0.00099	8.5	1
Heptachlor	—	—	—	—	—	8E-06	1
Heptachlor epoxide	0.00015	—	—	—	—	4E-06	1

Appendix B Water Sample Results	MID WILLAMETTE BASIN Station ID and Description						
Samples collected during 2008-2010 or in 2016	WM16 - Pudding R at Hwy 211 - 2016	WM17 - N Santiam R at Greens Bridge - 2008-2010	WM27 - Mill Creek at Front Street NE - 2016	WM29 - Willamette River at Hebb Park Boat Ramp - 2016	WM30 - Champoeg Creek at Champoeg State Park - 2016	Screening Value	S.V. Reference
	10640	10792	28961	31545	33638		
	Maximum Values (µg/L)						
Legacy Pesticides, continued		—					
Total DDT	0.00394	—	6.4E-05	0.00017	0.00261	0.001	2
2,4´-DDD	0.00019	—	—	—	—	*nsv*	
2,4´-DDT	0.00043	—	—	—	9.5E-05	*nsv*	
4,4´-DDD	0.00035	—	—	—	0.00017	3E-05	1
4,4´-DDE	0.00134	—	6.4E-05	9E-05	0.00161	2E-05	1
4,4´-DDT	0.00175	—	—	7.7E-05	0.00074	2E-05	1
Plant or animal sterols			0.0641				
beta-Sitosterol	2.58	—	1.42	1.39	3.96	*nsv*	
Cholesterol	0.9	1.124	2.16	0.634	1.79	*nsv*	
Coprostanol	0.13	0.33	0.152	0.139	0.179	*nsv*	
Stigmastanol	0.327	—	0.544	0.208	0.557	*nsv*	
Priority Metals							
Dissolved							
Aluminum	33.5	—	62.1	41.4	32.4	*nsv*	
Antimony	—	—	0.04	—	0.06	*nsv*	
Arsenic	1.19	—	0.19	0.4	5.57	2.1	1
Barium	23.6	—	22	7.73	32.7	nsv	
Chromium	—	—	0.18	0.15	0.37	1.7	2
Copper	0.7	—	1.94	2.94	2.02	*	2
Iron	199	—	117	76.7	72.8	1000[#]	2
Lead	0.23	—	0.04	0.03	0.03	*	2
Manganese	42.5	—	9.1	9.7	148	*nsv*	
Nickel	0.29	—	0.18	0.21	0.62	*	2
Potassium	2120	—	1240	1090	3840	*nsv*	
Selenium	—	—	—	—	0.13	4.6	2
Silver	0.01	—	—	—	—	*	2
Zinc	3.4	—	3	1.6	2.2	*	2
Total Inorganic							
Arsenic	0.886	—	—	—	5.26	2.1	1
Total Recoverable							
Aluminum	1140	—	496	932	3420	*nsv*	
Antimony	0.04	—	0.04	—	—	5.1	1
Arsenic	1.25	—	0.25	0.43	5.7	2.1	1
Barium	30.7	19	25.2	13.7	58.8	1000	1
Beryllium	0.03	—	—	—	—	*nsv*	

Appendix B Water Sample Results	MID WILLAMETTE BASIN Station ID and Description						
Samples collected during 2008-2010 or in 2016	WM16 - Pudding R at Hwy 211 - 2016	WM17 - N Santiam R at Greens Bridge - 2008-2010	WM27 - Mill Creek at Front Street NE - 2016	WM29 - Willamette River at Hebb Park Boat Ramp - 2016	WM30 - Champoeg Creek at Champoeg State Park - 2016	Screening Value	S.V. Reference
	10640	10792	28961	31545	33638		
	Maximum Values (µg/L)						
Priority Metals							
Total Recoverable							
Cadmium	0.02	—	—	0.13	—	*[§]	2
Chromium	1.05	2.1	—	1	3.16	11[§]	2
Cobalt	—	1.16	—	—	—	*nsv*	
Copper	1.51	3.5	1.1	1.84	4.14	*[§]	2
Iron	1240	2160	542	972	3360	1000	2
Lead	0.46	0.94	0.25	0.28	1.2	*[§]	2
Manganese	44.7	—	18.8	29.6	218	*nsv*	
Nickel	0.37	2.4	0.18	0.44	2.56	*[§]	2
Potassium	2160	—	1300	1070	4180	*nsv*	
Thallium	—	—	—	0.05	0.02	0.043	1
Uranium	—	—	—	—	—	*nsv*	
Vanadium	—	5.1	—	—	—	*nsv*	
Zinc	3	9.5	2.5	1.3	11	*[§]	2
	Average Values						
Standard Parameters (mg/L)							
Dissolved Organic Carbon	2.4	1.2	1.7	1.7	4.0		
Sulfate	5.0	1.1	2.7	2.9	13.9		
Total Organic Carbon	2.5	1.0	1.6	1.6	4.4		
Total Solids	116.0	42.0	67.0	71.3	237.7		
Total Suspended Solids	8.0	8.6	3.0	5.7	13.3		
Field Parameters							
Conductivity (µmhos/cm @ 25° C)	137	42	79	75	300		
Dissolved Oxygen (mg/L)	9.6	11.2	10.5	9.9	9.3		
pH (SU)	7.4	7.5	7.4	7.4	7.5		
Temperature (°C)	13.7	11.7	13.1	14.9	14.4		
Turbidity (NTU)	11	5	6	7	28		

Appendix B Sediment Sample Results			MID WILLAMETTE BASIN Station ID and Description				
Samples collected in July 2016	Percent Detection	Number of samples over Screening Value	WM02 - Willamette River at Wheatland Ferry	WM07 - Yamhill River at Dayton	WM13 - Willamette River at Marion Street (Salem)	Screening Value	S.V. Reference
			10344	10363	10555		
			Maximum Values (ng/kg)				
Dioxins and Furans							
1,2,3,4,6,7,8-HpCDD	17	0	—	—	—	85	11
1,2,3,4,6,7,8-HpCDF	17	0	—	—	—	85	11
OCDD	67	0	—	47.6	15.2	2800	11
Legacy Pesticides							
Aldrin	29		—	36.3	—	*nsv*	
Total Chlordane	21		—	87.1	133.4	*nsv*	
alpha-Chlordane	71		—	25.3	49.5	*nsv*	
cis-Nonachlor	29		—	—	—	*nsv*	
gamma-Chlordane+trans-Nonachlor	71		—	61.8	83.9	*nsv*	
Oxychlordane	14		—	—	—	*nsv*	
Dieldrin	57	4	—	213	—	1	11
Endosulfan II	29		—	—	128	*nsv*	
Endosulfan sulfate	14		—	58.9	—	*nsv*	
Endrin+cis-Nonachlor	43		—	—	—	*nsv*	
Heptachlor	14		—	—	—	*nsv*	
Total DDT	75	7	644.6	999.9	464	40	11
2,4´-DDD	43		—	42.9	—	*nsv*	
2,4´-DDE	14		—	—	—	*nsv*	
2,4´-DDT	100		82.8	34	65.1	*nsv*	
4,4´-DDD	100		41.5	181	36.3	*nsv*	
4,4´-DDE	100		81.3	502	78.6	*nsv*	
4,4´-DDT	100		439	240	284	*nsv*	
PCBs							
Total PCBs	100	6	65.6	485.99	70.8	48	11
PCB-101+113	100		24.3	35.9	26.4	*nsv*	
PCB-105	33	1	—	—	—	21	11
PCB-110	100		30.5	47.6	32.5	*nsv*	
PCB-118	100	1	—	—	—	26	11
PCB-128	17		—	—	—	*nsv*	
PCB-129	17		—	—	—	*nsv*	
PCB-130	17		—	—	—	*nsv*	
PCB-132+153	100		—	76.2	—	*nsv*	
PCB-134	17		—	—	—	*nsv*	
PCB-135	17		—	—	—	*nsv*	
PCB-137	17		—	—	—	*nsv*	
PCB-138+163	100		—	56	—	*nsv*	

Appendix B Sediment Sample Results			MID WILLAMETTE BASIN Station ID and Description				
Samples collected in July 2016	Percent Detection	Number of samples over Screening Value	WM02 - Willamette River at Wheatland Ferry	WM07 - Yamhill River at Dayton	WM13 - Willamette River at Marion Street (Salem)	Screening Value	S.V. Reference
			10344	10363	10555		
			Maximum Values (ng/kg)				
PCBs, continued							
PCB-141	33		—	11.8	—	*nsv*	
PCB-144	17		—	—	—	*nsv*	
PCB-146	17		—	—	—	*nsv*	
PCB-148	17		—	—	—	*nsv*	
PCB-149	100		—	47.3	—	*nsv*	
PCB-151	50		—	17.7	—	*nsv*	
PCB-156	17	1	—	—	—	26	11
PCB-158+160	17		—	—	—	*nsv*	
PCB-164	17		—	—	—	*nsv*	
PCB-167	17	0	—	—	—	26	11
PCB-170	33		—	12.1	—	*nsv*	
PCB-171	17		—	—	—	*nsv*	
PCB-174	33		—	21.1	—	*nsv*	
PCB-177	17		—	—	—	*nsv*	
PCB-178	17		—	—	—	*nsv*	
PCB-179	33		—	10.8	—	*nsv*	
PCB-18	17		—	—	—	*nsv*	
PCB-180+193	33		—	35.2	—	*nsv*	
PCB-183	33		—	11.3	—	*nsv*	
PCB-187	100		—	29.6	—	*nsv*	
PCB-194	17		—	—	—	*nsv*	
PCB-199	33		—	—	—	*nsv*	
PCB-202	17		—	—	—	*nsv*	
PCB-203	17		—	—	—	*nsv*	
PCB-206	17		—	—	—	*nsv*	
PCB-207	17		—	—	—	*nsv*	
PCB-208	17		—	—	—	*nsv*	
PCB-209	17		—	—	—	*nsv*	
PCB-22	17		—	—	—	*nsv*	
PCB-28	33		—	6.52	—	*nsv*	
PCB-31	33		—	5.97	—	*nsv*	
PCB-37	17		—	—	—	*nsv*	
PCB-43+52	33		—	—	—	*nsv*	
PCB-44	33		—	—	—	*nsv*	
PCB-49	33		—	—	—	*nsv*	
PCB-56	33		—	—	—	*nsv*	

Appendix B Sediment Sample Results			MID WILLAMETTE BASIN Station ID and Description				
Samples collected in July 2016	Percent Detection	Number of samples over Screening Value	WM02 - Willamette River at Wheatland Ferry	WM07 - Yamhill River at Dayton	WM13 - Willamette River at Marion Street (Salem)	Screening Value	S.V. Reference
			10344	10363	10555		
			Maximum Values (ng/kg)				
PCBs, continued							
PCB-60	17		—	—	—	*nsv*	
PCB-66	50		—	13.6	—	*nsv*	
PCB-70	100		10.8	23	11.9	*nsv*	
PCB-74+76	17		—	—	—	*nsv*	
PCB-82	17		—	—	—	*nsv*	
PCB-84	33		—	—	—	*nsv*	
PCB-85	33		—	—	—	*nsv*	
PCB-87+111+116+117	17		—	—	—	*nsv*	
PCB-89	33		—	—	—	*nsv*	
PCB-91	17		—	—	—	*nsv*	
PCB-95+121	33		—	—	—	*nsv*	
PCB-97	50		—	11.3	—	*nsv*	
PCB-99	50		—	13	—	*nsv*	
Priority Metals (Total)			Maximum Values (mg/kg)				
Aluminum	100		26000	34200	27700	*nsv*	
Arsenic	100	1	2.88	5.52	3.23	7	11
Barium	100		119	217	96.9	*nsv*	
Cadmium	100	0	—	0.25	—	1	11
Chromium	100		27.2	42.2	28.5	*nsv*	
Cobalt	100		14	26	12.8	*nsv*	
Copper	100		19.1	30.8	21.6	*nsv*	
Lead	100	1	3.64	9.05	5.28	17	11
Manganese	100		516	877	401	*nsv*	
Nickel	100		32.8	31.8	25.3	*nsv*	
Thallium	29		—	0.1	—	*nsv*	
Zinc	100		61.6	102	66.5	*nsv*	

Appendix B Sediment Sample Results	MID WILLAMETTE BASIN Station ID and Description				
Samples collected in July 2016	WM27 - Mill Creek at Front Street NE, Salem	WM29 - Willamette River at Hebb Park Boat Ramp	WM30 - Champoeg Creek at Champoeg State Park	Screening Value	S.V. Reference
	28961	31545	33638		
	Maximum Values (ng/kg)				
Dioxins and Furans					
1,2,3,4,6,7,8-HpCDD	20.3	—	—	85	11
1,2,3,4,6,7,8-HpCDF	7.15	—	—	85	11
OCDD	204	21.3	—	2800	11
Legacy Pesticides					
Aldrin	—	—	—	*nsv*	
Total Chlordane	2066	—	122.6	*nsv*	
alpha-Chlordane	521	—	41.1	*nsv*	
cis-Nonachlor	266	—	—	*nsv*	
gamma-Chlordane+trans-Nonachlor	1250	—	81.5	*nsv*	
Oxychlordane	29.1	—	—	*nsv*	
Dieldrin	170	—	304	1	11
Endosulfan II	470	—	—	*nsv*	
Endosulfan sulfate	—	—	—	*nsv*	
Endrin+cis-Nonachlor	308	—	75.3	*nsv*	
Heptachlor	30	—	—	*nsv*	
Total DDT	5006	705.4	2810	40	11
2,4´-DDD	252	—	—	*nsv*	
2,4´-DDE	55.8	—	—	*nsv*	
2,4´-DDT	928	70.7	172	*nsv*	
4,4´-DDD	760	83.7	238	*nsv*	
4,4´-DDE	1110	162	1150	*nsv*	
4,4´-DDT	1900	389	1250	*nsv*	
PCBs					
Total PCBs	4336.25	80	55.8	48	11
PCB-101+113	212	26	25	*nsv*	
PCB-105	78.8	—	—	21	11
PCB-110	326	32	30.8	*nsv*	
PCB-118	181	—	—	26	11
PCB-128	67	—	—	*nsv*	
PCB-129	15.2	—	—	*nsv*	
PCB-130	21	—	—	*nsv*	
PCB-132+153	371	—	—	*nsv*	
PCB-134	19.6	—	—	*nsv*	
PCB-135	42.2	—	—	*nsv*	
PCB-137	19.9	—	—	*nsv*	
PCB-138+163	316	—	—	*nsv*	

Appendix B Sediment Sample Results	MID WILLAMETTE BASIN Station ID and Description				
Samples collected in July 2016	WM27 - Mill Creek at Front Street NE, Salem	WM29 - Willamette River at Hebb Park Boat Ramp	WM30 - Champoeg Creek at Champoeg State Park	Screening Value	S.V. Reference
	28961	31545	33638		
	Maximum Values (ng/kg)				
PCBs, continued					
PCB-141	53.3	—	—	*nsv*	
PCB-144	13.5	—	—	*nsv*	
PCB-146	50.3	—	—	*nsv*	
PCB-148	36.7	—	—	*nsv*	
PCB-149	223	—	—	*nsv*	
PCB-151	60.9	10.6	—	*nsv*	
PCB-156	34.3	—	—	26	11
PCB-158+160	37.5	—	—	*nsv*	
PCB-164	23.7	—	—	*nsv*	
PCB-167	15.9	—	—	26	11
PCB-170	44.7	—	—	*nsv*	
PCB-171	13.6	—	—	*nsv*	
PCB-174	66.7	—	—	*nsv*	
PCB-177	30	—	—	*nsv*	
PCB-178	12.3	—	—	*nsv*	
PCB-179	26.7	—	—	*nsv*	
PCB-18	11.9	—	—	*nsv*	
PCB-180+193	123	—	—	*nsv*	
PCB-183	35.5	—	—	*nsv*	
PCB-187	92.6	—	—	*nsv*	
PCB-194	55.9	—	—	*nsv*	
PCB-199	136	—	—	*nsv*	
PCB-202	28.7	—	—	*nsv*	
PCB-203	65.4	—	—	*nsv*	
PCB-206	222	—	—	*nsv*	
PCB-207	17.9	—	—	*nsv*	
PCB-208	61.6	—	—	*nsv*	
PCB-209	61.6	—	—	*nsv*	
PCB-22	8.05	—	—	*nsv*	
PCB-28	26.2	—	—	*nsv*	
PCB-31	19.5	—	—	*nsv*	
PCB-37	13.8	—	—	*nsv*	
PCB-43+52	105	—	—	*nsv*	
PCB-44	47.9	—	—	*nsv*	
PCB-49	26.5	—	—	*nsv*	
PCB-56	15	—	—	*nsv*	

State of Oregon Department of Environmental Quality	Appendix B Sediment Sample Results	MID WILLAMETTE BASIN Station ID and Description				
	Samples collected in July 2016	WM27 - Mill Creek at Front Street NE, Salem	WM29 - Willamette River at Hebb Park Boat Ramp	WM30 - Champoeg Creek at Champoeg State Park	Screening Value	S.V. Reference
		28961	31545	33638		
		Maximum Values (ng/kg)				
PCBs, continued						
PCB-60		10.9	—	—	*nsv*	
PCB-66		30.1	—	—	*nsv*	
PCB-70		60.2	11.4	—	*nsv*	
PCB-74+76		23.8	—	—	*nsv*	
PCB-82		27.3	—	—	*nsv*	
PCB-84		57.7	—	—	*nsv*	
PCB-85		35.5	—	—	*nsv*	
PCB-87+111+116+117		84.5	—	—	*nsv*	
PCB-89		41.5	—	—	*nsv*	
PCB-91		32.7	—	—	*nsv*	
PCB-95+121		181	—	—	*nsv*	
PCB-97		77.7	—	—	*nsv*	
PCB-99		86.5	—	—	*nsv*	
Priority Metals (Total)		Maximum Values (mg/kg)				
Aluminum		24000	30900	28000	*nsv*	
Arsenic		3.16	3.22	9.49	7	11
Barium		109	141	316	*nsv*	
Cadmium		0.15	—	0.12	1	11
Chromium		24.8	33.7	34	*nsv*	
Cobalt		13.4	15.4	18	*nsv*	
Copper		29.8	20.8	14.7	*nsv*	
Lead		37.4	4.44	5.37	17	11
Manganese		668	393	3280	*nsv*	
Nickel		28	27.3	28.8	*nsv*	
Thallium		—	—	0.1	*nsv*	
Zinc		133	72	76	*nsv*	

State of Oregon Department of Environmental Quality

Appendix B
Tissue Sample Results

Samples collected in Fall 2008	Percent Detection	Number of samples over screening value	MID WILLAMETTE BASIN Station ID and Description: WM02 - Willamette R at Wheatland Ferry (NPM, fillet) 10344	WM02 - Willamette R at Wheatland Ferry (SMB, fillet) 10344	WM41 - Yamhill River at mouth (SMB, fillet) 10648	WM42 - Santiam River at mouth (NPM, fillet) 10774	Screening Value	S.V. Reference
			Maximum Value (mg/kg)					
Flame Retardants								
PBDE-100	100		0.00066	0.00074	0.00023	0.00033	*nsv*	
PBDE-15	29		2.5E-05	3.7E-06	—	—	*nsv*	
PBDE-153	70	0	9.5E-05	4.7E-05	3.8E-05	3.9E-05	0.2	12
PBDE-154	100		8.3E-05	0.00017	4.6E-05	8.4E-05	*nsv*	
PBDE-183	14		—	—	—	3.2E-06	*nsv*	
PBDE-209	50	0	—	—	—	—	16.3	12
PBDE-47	100	0	0.00859	0.00374	0.00138	0.00266	0.2	12
PBDE-49	71		0.00029	0.00014	3.5E-05	6.9E-05	*nsv*	
PBDE-66	57		0.00014	—	1.2E-05	3.1E-06	*nsv*	
PBDE-85	29		2.7E-05	—	—	3.1E-06	*nsv*	
PBDE-99	80	0	0.00139	—	0.00021	6.4E-05	0.2	12
Pentabromoethylbenzene	20		7.1E-06	—	—	—	*nsv*	
Legacy Pesticides								
Total Chlordane	100	0	0.00019	0.0005	—	0.00017	1.2	12
alpha-Chlordane	100		3.4E-05	7.7E-05	—	2.4E-05	*nsv*	
cis-Nonachlor	100		2.3E-05	7.8E-05	—	2.9E-05	*nsv*	
gamma-Chlordane+trans-Nonachlor	100		—	—	—	—	*nsv*	
gamma-Clordane	60		2.3E-05	2.5E-05	—	—	*nsv*	
Oxychlordane	71		1.1E-05	3E-05	—	8.4E-06	*nsv*	
trans-Nonachlor	100		9.4E-05	0.00029	—	0.00011	*nsv*	
Dieldrin	86	0	3.8E-05	8.7E-05	—	4.7E-05	0.1	12
Endosulfan	33	0	—	0.00003	—	0.00011	14	12
Endosulfan I	43		—	0.00003	—	0.00011	*nsv*	
Endosulfan sulfate	14		—	—	—	—	*nsv*	
Hexachlorobenzene	17	0	—	0.00045	—	—	1.9	12
Mirex	29	0	—	1.6E-05	—	—	0.5	12
Total DDT	100	0	0.00094	0.00302	—	0.00199	1.2	12
2,4´-DDD	57		8.9E-06	3.9E-05	—	—	*nsv*	
2,4´-DDE	57		—	2.5E-05	—	8.5E-06	*nsv*	
2,4´-DDT	57		—	2.1E-05	—	1E-05	*nsv*	
4,4´-DDD	100		7E-05	0.00036	—	0.00013	*nsv*	
4,4´-DDE	100		0.00076	0.00257	—	0.00185	*nsv*	
4,4´-DDT	43		0.0001	—	—	—	*nsv*	
PCBs								
Total PCBs	100	0	31032	31032	31944	0.00241	0.05	12
PCB-101+113	56		0.00014	0.00018	7.1E-05	0.00011	*nsv*	

State of Oregon Department of Environmental Quality

Appendix B
Tissue Sample Results

Samples collected in Fall 2008	Percent Detection	Number of samples over screening value	MID WILLAMETTE BASIN Station ID and Description				Screening Value	S.V. Reference
			WM02 - Willamette R at Wheatland Ferry (NPM, fillet)	WM02 - Willamette R at Wheatland Ferry (SMB, fillet)	WM41 - Yamhill River at mouth (SMB, fillet)	WM42 - Santiam River at mouth (NPM, fillet)		
			10344	10344	10648	10774		
			Maximum Value (mg/kg)					
PCBs, continued								
PCB-105	100	0	4.6E-05	0.00013	2.6E-05	5.7E-05	*nsv*	
PCB-109+123	100		1.5E-05	4.9E-05	9.6E-06	2E-05	*nsv*	
PCB-11	80		4.5E-05	2.2E-05	—	3.5E-05	*nsv*	
PCB-110	56		0.00011	0.0002	6.5E-05	9.6E-05	*nsv*	
PCB-114	44	0	4.6E-06	1.6E-05	—	8.1E-06	*nsv*	
PCB-115+111	40		—	6.1E-06	—	—	*nsv*	
PCB-117+87	100		4.6E-05	6.9E-05	2.3E-05	3.6E-05	*nsv*	
PCB-118	100	0	0.00014	0.00046	8.5E-05	0.00024	*nsv*	
PCB-119+112	60		4.3E-06	5.8E-06	—	—	*nsv*	
PCB-120	56		8.2E-06	1.1E-05	4.6E-06	5.4E-06	*nsv*	
PCB-121	100		1.7E-05	1.7E-05	5.8E-06	8.1E-06	*nsv*	
PCB-124	22		—	6.9E-06	—	—	*nsv*	
PCB-128+162	100		2.6E-05	8.1E-05	2.5E-05	3.6E-05	*nsv*	
PCB-129	33		—	9.2E-06	—	3.6E-06	*nsv*	
PCB-130	56		7.1E-06	2.3E-05	9.2E-06	9.3E-06	*nsv*	
PCB-132+153	100		—	—	—	—	*nsv*	
PCB-133+131+142	80		—	1E-05	4.4E-06	4.4E-06	*nsv*	
PCB-134	56		5E-06	8.4E-06	6E-06	3.6E-06	*nsv*	
PCB-135	56		8.5E-06	1.5E-05	1.1E-05	6.4E-06	*nsv*	
PCB-137	56		7.9E-06	3.6E-05	7.4E-06	1.6E-05	*nsv*	
PCB-138+163	100		—	—	—	—	*nsv*	
PCB-139	11		—	4E-06	—	—	*nsv*	
PCB-141	56		1.7E-05	4.2E-05	2.8E-05	2.2E-05	*nsv*	
PCB-144	44		3.9E-06	6.4E-06	5.4E-06	—	*nsv*	
PCB-146	100		2.3E-05	9.4E-05	3.5E-05	3.5E-05	*nsv*	
PCB-147	22		—	7.3E-06	—	—	*nsv*	
PCB-148	44		8.6E-06	5.2E-06	7.1E-06	—	*nsv*	
PCB-149	78		6E-05	0.00013	9.9E-05	6.1E-05	*nsv*	
PCB-15	20		3.2E-05	—	—	—	*nsv*	
PCB-151	56		2.1E-05	4E-05	3.5E-05	1.4E-05	*nsv*	
PCB-153	100		0.00019	0.00077	0.0003	0.00034	*nsv*	
PCB-156	100	0	1.4E-05	6.7E-05	1.5E-05	2.6E-05	*nsv*	
PCB-157	33	0	—	1.5E-05	—	5.9E-06	*nsv*	
PCB-158	100		1.5E-05	4.7E-05	2E-05	2.2E-05	*nsv*	
PCB-16	20		2.5E-05	—	—	—	*nsv*	
PCB-163+138	100		0.00015	0.00055	0.00022	0.00023	*nsv*	

State of Oregon Department of Environmental Quality

Appendix B
Tissue Sample Results

MID WILLAMETTE BASIN
Station ID and Description

Samples collected in Fall 2008	Percent Detection	Number of samples over screening value	WM02 - Willamette R at Wheatland Ferry (NPM, fillet)	WM02 - Willamette R at Wheatland Ferry (SMB, fillet)	WM41 - Yamhill River at mouth (SMB, fillet)	WM42 - Santiam River at mouth (NPM, fillet)	Screening Value	S.V. Reference
			10344	10344	10648	10774		
			Maximum Value (mg/kg)					
PCBs, continued								
PCB-164	56		6.6E-06	2E-05	9.5E-06	8.3E-06	*nsv*	
PCB-167	56	0	6.7E-06	3.6E-05	8.3E-06	1.6E-05	*nsv*	
PCB-168	11		—	—	—	—	*nsv*	
PCB-17	11		2E-05	—	—	—	*nsv*	
PCB-170	56		2.1E-05	0.0001	4.5E-05	3.5E-05	*nsv*	
PCB-171	56		5.6E-06	2E-05	1.3E-05	7.2E-06	*nsv*	
PCB-172	56		4.7E-06	2.2E-05	1E-05	8.1E-06	*nsv*	
PCB-174	56		1.2E-05	4.1E-05	3.5E-05	1.5E-05	*nsv*	
PCB-177	56		1.1E-05	4.7E-05	3.3E-05	1.5E-05	*nsv*	
PCB-178	56		5.8E-06	2.2E-05	1.4E-05	6.4E-06	*nsv*	
PCB-179	56		5.9E-06	1.3E-05	1.4E-05	4.4E-06	*nsv*	
PCB-18	22		4.4E-05	—	—	8.3E-06	*nsv*	
PCB-180+193	100		6.3E-05	0.00039	0.00015	0.00012	*nsv*	
PCB-183	56		1.4E-05	6.3E-05	3.5E-05	2.2E-05	*nsv*	
PCB-185	33		—	8.3E-06	6.9E-06	—	*nsv*	
PCB-187	100		4.6E-05	0.00029	0.00012	6.7E-05	*nsv*	
PCB-189	11	0	—	5.4E-06	—	—	*nsv*	
PCB-19	11		3.9E-06	—	—	—	*nsv*	
PCB-190	56		6.5E-06	3.3E-05	1.4E-05	9.5E-06	*nsv*	
PCB-191	11		—	5.3E-06	—	—	*nsv*	
PCB-194	56		1.1E-05	6.3E-05	2E-05	2.2E-05	*nsv*	
PCB-195	56		4.1E-06	2.1E-05	8.1E-06	6.2E-06	*nsv*	
PCB-196	56		4.8E-06	2.7E-05	0.00001	8.4E-06	*nsv*	
PCB-199	56		1.4E-05	7.7E-05	2.7E-05	2.3E-05	*nsv*	
PCB-2	20		—	—	4.9E-06	—	*nsv*	
PCB-20+21+33	44		6.2E-05	9E-06	—	1.2E-05	*nsv*	
PCB-201	11		—	5.4E-06	—	—	*nsv*	
PCB-202	44		—	1.2E-05	6.4E-06	4.9E-06	*nsv*	
PCB-203	56		1.1E-05	4.8E-05	1.7E-05	1.8E-05	*nsv*	
PCB-206	56		4.8E-06	2.1E-05	5.8E-06	1.1E-05	*nsv*	
PCB-207	11		—	4.5E-06	—	—	*nsv*	
PCB-208	33		—	9.7E-06	—	4.7E-06	*nsv*	
PCB-209	56		9E-06	4.1E-05	5.9E-06	1.5E-05	*nsv*	
PCB-22	33		3.7E-05	1.2E-05	—	9.9E-06	*nsv*	
PCB-25	11		7E-06	—	—	—	*nsv*	
PCB-26	33		1.5E-05	6.3E-06	—	3.7E-06	*nsv*	

State of Oregon Department of Environmental Quality

Appendix B
Tissue Sample Results

Samples collected in Fall 2008	Percent Detection	Number of samples over screening value	MID WILLAMETTE BASIN Station ID and Description				Screening Value	S.V. Reference
			WM02 - Willamette R at Wheatland Ferry (NPM, fillet)	WM02 - Willamette R at Wheatland Ferry (SMB, fillet)	WM41 - Yamhill River at mouth (SMB, fillet)	WM42 - Santiam River at mouth (NPM, fillet)		
			10344	10344	10648	10774		
			Maximum Value (mg/kg)					
PCBs, continued								
PCB-28	100		0.00011	5E-05	2E-05	3.3E-05	*nsv*	
PCB-31	56		8.6E-05	2.8E-05	1.3E-05	2.1E-05	*nsv*	
PCB-32	20		1.1E-05	—	—	—	*nsv*	
PCB-37	22		1.8E-05	—	—	1.1E-05	*nsv*	
PCB-40	22		9E-06	4.9E-06	—	—	*nsv*	
PCB-41+72	11		4.2E-06	—	—	—	*nsv*	
PCB-42	56		2E-05	1.6E-05	4.4E-06	7.3E-06	*nsv*	
PCB-44	56		8.9E-05	4.1E-05	1.5E-05	2.4E-05	*nsv*	
PCB-45	11		6.4E-06	—	—	—	*nsv*	
PCB-47	11		5.2E-05	—	—	—	*nsv*	
PCB-48	11		1E-05	—	—	—	*nsv*	
PCB-49	56		5.9E-05	4.3E-05	1.1E-05	2.1E-05	*nsv*	
PCB-51	11		6.5E-06	—	—	—	*nsv*	
PCB-52+43	80		0.00021	8.7E-05	2.6E-05	—	*nsv*	
PCB-53	11		8.1E-06	—	—	—	*nsv*	
PCB-56	56		2.3E-05	2.3E-05	6.8E-06	1.1E-05	*nsv*	
PCB-6	20		9.3E-06	—	—	—	*nsv*	
PCB-60	56		1.8E-05	2E-05	6.2E-06	1.1E-05	*nsv*	
PCB-63	11		—	5.2E-06	—	—	*nsv*	
PCB-64	100		3.3E-05	2.6E-05	7.1E-06	1.3E-05	*nsv*	
PCB-66	100		8.5E-05	0.00011	2.6E-05	5.3E-05	*nsv*	
PCB-68	40		5.6E-06	—	—	4.3E-06	*nsv*	
PCB-70	78		0.0001	9.8E-05	2.5E-05	5E-05	*nsv*	
PCB-71	22		1.4E-05	—	—	—	*nsv*	
PCB-74	100		8.9E-05	0.00011	2.5E-05	5.2E-05	*nsv*	
PCB-77	22	0	—	8.3E-06	—	4.4E-06	*nsv*	
PCB-8	20		4.8E-05	—	—	—	*nsv*	
PCB-83	11		—	—	—	—	*nsv*	
PCB-84	22		—	—	5.8E-06	6.3E-06	*nsv*	
PCB-85	56		2.3E-05	4.4E-05	1.2E-05	2.3E-05	*nsv*	
PCB-89	56		2.3E-05	3E-05	1.2E-05	1.5E-05	*nsv*	
PCB-90	22		—	1.5E-05	—	—	*nsv*	
PCB-92	44		2.1E-05	1.2E-05	5.8E-06	—	*nsv*	
PCB-95	100		0.0001	5.8E-05	2.9E-05	3.1E-05	*nsv*	
PCB-97	56		3.7E-05	5.6E-05	1.8E-05	2.8E-05	*nsv*	
PCB-99	100		7.6E-05	0.00014	3.9E-05	7.4E-05	*nsv*	

State of Oregon Department of Environmental Quality

Appendix B
Tissue Sample Results

Samples collected in Fall 2008	Percent Detection	Number of samples over screening value	MID WILLAMETTE BASIN Station ID and Description: WM02 - Willamette R at Wheatland Ferry (NPM, fillet) 10344	WM02 - Willamette R at Wheatland Ferry (SMB, fillet) 10344	WM41 - Yamhill River at mouth (SMB, fillet) 10648	WM42 - Santiam River at mouth (NPM, fillet) 10774	Screening Value	S.V. Reference
			Maximum Value (mg/kg)					
Priority Metals (Total)								
Arsenic	100	0	—	—	—	—	*nsv*	
Cobalt	100		—	—	—	—	*nsv*	
Mercury	100	25	0.8	0.26	0.43	1.37	0.04	13
Titanium	100		—	—	—	—	*nsv*	
Zinc	100		—	—	—	—	*nsv*	

Appendix B Tissue Sample Results	MID WILLAMETTE BASIN Station ID and Description						
Samples collected in Fall 2008 or 2016	WM45 - Willamette R US of Newberg Bridge (SMB, fillet)	Screening Value	S.V. Reference	WM13 - Willamette River at Marion Street (2016, Crayfish)	WM29 - Willamette River at Hebb Park Boat Ramp (2016, Crayfish)	Screening Value	S.V. Reference
2016 Samples	26339			10555	31545		
	Maximum Value (mg/kg)						
Flame Retardants							
PBDE-100	0.00105	*nsv*		—	—	*nsv*	
PBDE-15	—	*nsv*		—	—	*nsv*	
PBDE-153	0.000205	0.2	12	—	—	0.2	12
PBDE-154	0.000198	*nsv*		—	—	*nsv*	
PBDE-183	—	*nsv*		—	—	*nsv*	
PBDE-209	—	16.3	12	—	0.000196	16.3	12
PBDE-47	0.00572	0.2	12	—	—	0.2	12
PBDE-49	0.000129	*nsv*		—	—	*nsv*	
PBDE-66	0.0000557	*nsv*		—	—	*nsv*	
PBDE-85	—	*nsv*		—	—	*nsv*	
PBDE-99	0.000992	0.2	12	—	—	0.2	12
Pentabromoethylbenzene	—	*nsv*		—	—	*nsv*	
Legacy Pesticides							
Total Chlordane	0.0003346	1.2	12	0.0000488	0.000073	1.2	14
alpha-Chlordane	0.0000358	*nsv*		—	—	*nsv*	
cis-Nonachlor	0.0000595	*nsv*		0.0000141	0.0000184	*nsv*	
gamma-Chlordane+trans-Nonachlor	—	*nsv*		0.0000347	0.0000546	*nsv*	
gamma-Clordane	—	*nsv*		—	—	*nsv*	
Oxychlordane	0.0000213	*nsv*		—	—	*nsv*	
trans-Nonachlor	0.000218	*nsv*		—	—	*nsv*	
Dieldrin	0.0000598	0.1	12	—	0.000015	0.044	14
Endosulfan	—	14	12	—	—	*nsv*	
Endosulfan I	—	*nsv*		—	—	*nsv*	
Endosulfan sulfate	—	*nsv*		—	—	*nsv*	
Hexachlorobenzene	—	1.9	12	—	—	*nsv*	
Mirex	0.0000228	0.5	12	—	—	*nsv*	
Total DDT	0.0022992	1.2	12	0.0005215	0.0012437	0.051	14
2,4´-DDD	0.0000208	*nsv*		—	—	*nsv*	
2,4´-DDE	0.00001	*nsv*		—	—	*nsv*	
2,4´-DDT	0.0000174	*nsv*		—	—	*nsv*	
4,4´-DDD	0.000179	*nsv*		0.0000155	0.0000237	*nsv*	
4,4´-DDE	0.00189	*nsv*		0.000506	0.00122	*nsv*	
4,4´-DDT	0.000182	*nsv*		—	—	*nsv*	
PCBs							
Total PCBs	0.0034179	0.05	12	31665.0005	0.00052454	0.88	14
PCB-101+113	0.000131	*nsv*		—	—	*nsv*	

Appendix B Tissue Sample Results	MID WILLAMETTE BASIN Station ID and Description							
Samples collected in Fall 2008 or 2016	WM45 - Willamette R US of Newberg Bridge (SMB, fillet)	Screening Value	S.V. Reference	WM13 - Willamette River at Marion Street (2016, Crayfish)	WM29 - Willamette River at Hebb Park Boat Ramp (2016, Crayfish)	Screening Value	S.V. Reference
2016 Samples	26339			10555	31545		
	Maximum Value (mg/kg)						
PCBs, continued							
PCB-105	0.0000791	*nsv*		0.0000101	0.0000114	0.02	14
PCB-109+123	0.0000265	*nsv*		—	—	*nsv*	
PCB-11	0.0000186	*nsv*		—	—	*nsv*	
PCB-110	0.000156	*nsv*		—	—	*nsv*	
PCB-114	0.0000081	*nsv*		—	—	0.02	14
PCB-115+111	0.0000046	*nsv*		—	—	*nsv*	
PCB-117+87	0.0000555	*nsv*		—	—	*nsv*	
PCB-118	0.00023	*nsv*		0.0000866	0.0000692	0.02	14
PCB-119+112	0.0000052	*nsv*		—	—	*nsv*	
PCB-120	0.0000115	*nsv*		—	—	*nsv*	
PCB-121	0.0000123	*nsv*		—	—	*nsv*	
PCB-124	0.0000052	*nsv*		—	—	*nsv*	
PCB-128+162	0.0000604	*nsv*		—	—	*nsv*	
PCB-129	0.0000068	*nsv*		—	—	*nsv*	
PCB-130	0.0000179	*nsv*		—	—	*nsv*	
PCB-132+153	—	*nsv*		0.000113	0.00013	*nsv*	
PCB-133+131+142	0.0000078	*nsv*		—	—	*nsv*	
PCB-134	0.0000104	*nsv*		—	—	*nsv*	
PCB-135	0.0000177	*nsv*		—	—	*nsv*	
PCB-137	0.000017	*nsv*		—	—	*nsv*	
PCB-138+163	—	*nsv*		0.0000539	0.0000645	*nsv*	
PCB-139	—	*nsv*		—	—	*nsv*	
PCB-141	0.0000329	*nsv*		—	—	*nsv*	
PCB-144	0.0000071	*nsv*		—	—	*nsv*	
PCB-146	0.0000515	*nsv*		0.0000297	0.0000302	*nsv*	
PCB-147	0.0000047	*nsv*		—	—	*nsv*	
PCB-148	0.0000087	*nsv*		—	—	*nsv*	
PCB-149	0.000133	*nsv*		—	0.0000115	*nsv*	
PCB-15	—	*nsv*		—	—	*nsv*	
PCB-151	0.000037	*nsv*		—	—	*nsv*	
PCB-153	0.00038	*nsv*		—	—	*nsv*	
PCB-156	0.000031	*nsv*		0.0000129	0.0000107	0.02	14
PCB-157	0.0000077	*nsv*		—	—	0.02	14
PCB-158	0.0000361	*nsv*		—	—	*nsv*	
PCB-16	—	*nsv*		—	—	*nsv*	
PCB-163+138	0.000355	*nsv*		—	—	*nsv*	

Appendix B Tissue Sample Results	MID WILLAMETTE BASIN Station ID and Description							
Samples collected in Fall 2008 or 2016	WM45 - Willamette R US of Newberg Bridge (SMB, fillet)	Screening Value	S.V. Reference	WM13 - Willamette River at Marion Street (2016, Crayfish)	WM29 - Willamette River at Hebb Park Boat Ramp (2016, Crayfish)	Screening Value	S.V. Reference
2016 Samples	26339			10555	31545		
	Maximum Value (mg/kg)						
PCBs, continued							
PCB-164	0.0000161	*nsv*		—	—	*nsv*	
PCB-167	0.0000167	*nsv*		—	—	0.02	14
PCB-168	0.0000637	*nsv*		—	—	*nsv*	
PCB-17	—	*nsv*		—	—	*nsv*	
PCB-170	0.0000574	*nsv*		—	—	*nsv*	
PCB-171	0.0000155	*nsv*		—	—	*nsv*	
PCB-172	0.0000127	*nsv*		—	—	*nsv*	
PCB-174	0.0000379	*nsv*		—	—	*nsv*	
PCB-177	0.0000386	*nsv*		—	—	*nsv*	
PCB-178	0.0000175	*nsv*		—	—	*nsv*	
PCB-179	0.0000155	*nsv*		—	—	*nsv*	
PCB-18	—	*nsv*		—	—	*nsv*	
PCB-180+193	0.000176	*nsv*		0.0000714	0.0000726	*nsv*	
PCB-183	0.0000421	*nsv*		—	—	*nsv*	
PCB-185	0.0000079	*nsv*		—	—	*nsv*	
PCB-187	0.000139	*nsv*		0.0000696	0.0000833	*nsv*	
PCB-189	—	*nsv*		—	—	0.02	14
PCB-19	—	*nsv*		—	—	*nsv*	
PCB-190	0.0000194	*nsv*		—	—	*nsv*	
PCB-191	—	*nsv*		—	—	*nsv*	
PCB-194	0.0000297	*nsv*		—	—	*nsv*	
PCB-195	0.0000115	*nsv*		—	—	*nsv*	
PCB-196	0.0000142	*nsv*		—	—	*nsv*	
PCB-199	0.0000402	*nsv*		—	—	*nsv*	
PCB-2	—	*nsv*		—	—	*nsv*	
PCB-20+21+33	0.0000089	*nsv*		—	—	*nsv*	
PCB-201	—	*nsv*		—	—	*nsv*	
PCB-202	0.0000096	*nsv*		—	—	*nsv*	
PCB-203	0.0000306	*nsv*		—	—	*nsv*	
PCB-206	0.0000109	*nsv*		—	—	*nsv*	
PCB-207	—	*nsv*		—	—	*nsv*	
PCB-208	0.0000055	*nsv*		—	—	*nsv*	
PCB-209	0.000016	*nsv*		—	—	*nsv*	
PCB-22	—	*nsv*		—	—	*nsv*	
PCB-25	—	*nsv*		—	—	*nsv*	
PCB-26	—	*nsv*		—	—	*nsv*	

Appendix B Tissue Sample Results	MID WILLAMETTE BASIN Station ID and Description							
Samples collected in Fall 2008 or 2016	WM45 - Willamette R US of Newberg Bridge (SMB, fillet)	Screening Value	S.V. Reference	WM13 - Willamette River at Marion Street (2016, Crayfish)	WM29 - Willamette River at Hebb Park Boat Ramp (2016, Crayfish)	Screening Value	S.V. Reference
2016 Samples	26339			10555	31545		
	Maximum Value (mg/kg)						
PCBs, continued							
PCB-28	0.0000195	*nsv*		0.00000678	0.00000664	*nsv*	
PCB-31	0.0000131	*nsv*		—	—	*nsv*	
PCB-32	—	*nsv*		—	—	*nsv*	
PCB-37	—	*nsv*		—	—	*nsv*	
PCB-40	—	*nsv*		—	—	*nsv*	
PCB-41+72	—	*nsv*		—	—	*nsv*	
PCB-42	0.0000083	*nsv*		—	—	*nsv*	
PCB-44	0.0000189	*nsv*		—	—	*nsv*	
PCB-45	—	*nsv*		—	—	*nsv*	
PCB-47	—	*nsv*		—	—	*nsv*	
PCB-48	—	*nsv*		—	—	*nsv*	
PCB-49	0.0000207	*nsv*		—	—	*nsv*	
PCB-51	—	*nsv*		—	—	*nsv*	
PCB-52+43	0.0000415	*nsv*		—	—	*nsv*	
PCB-53	—	*nsv*		—	—	*nsv*	
PCB-56	0.0000121	*nsv*		—	—	*nsv*	
PCB-6	—	*nsv*		—	—	*nsv*	
PCB-60	0.0000128	*nsv*		—	—	*nsv*	
PCB-63	—	*nsv*		—	—	*nsv*	
PCB-64	0.0000139	*nsv*		—	—	*nsv*	
PCB-66	0.0000622	*nsv*		0.0000214	0.0000171	*nsv*	
PCB-68	—	*nsv*		—	—	*nsv*	
PCB-70	0.0000484	*nsv*		0.0000101	—	*nsv*	
PCB-71	0.0000054	*nsv*		—	—	*nsv*	
PCB-74	0.0000559	*nsv*		—	—	*nsv*	
PCB-77	—	*nsv*		—	—	1.6E-04	14
PCB-8	—	*nsv*		—	—	*nsv*	
PCB-83	0.0000041	*nsv*		—	—	*nsv*	
PCB-84	—	*nsv*		—	—	*nsv*	
PCB-85	0.0000323	*nsv*		—	—	*nsv*	
PCB-89	0.0000221	*nsv*		—	—	*nsv*	
PCB-90	0.0000091	*nsv*		—	—	*nsv*	
PCB-92	0.0000121	*nsv*		—	—	*nsv*	
PCB-95	0.0000431	*nsv*		—	—	*nsv*	
PCB-97	0.0000442	*nsv*		—	—	*nsv*	
PCB-99	0.0000988	*nsv*		0.0000152	0.0000174	*nsv*	

Appendix B Tissue Sample Results	MID WILLAMETTE BASIN Station ID and Description							
Samples collected in Fall 2008 or 2016	WM45 - Willamette R US of Newberg Bridge (SMB, fillet)	Screening Value	S.V. Reference	WM13 - Willamette River at Marion Street (2016, Crayfish)	WM29 - Willamette River at Hebb Park Boat Ramp (2016, Crayfish)	Screening Value	S.V. Reference
2016 Samples	26339			10555	31545		
	Maximum Value (mg/kg)						
Priority Metals (Total)							
Arsenic	—	*nsv*		0.19	0.28	7.6	14
Cobalt	—	*nsv*		0.23	0.27	*nsv*	
Mercury	0.48	0.04	13	0.049	0.031	0.04	13
Titanium	—	*nsv*		8.9	9.7	*nsv*	
Zinc	—	*nsv*		20	21.3	*nsv*	

Appendices

Screening Value Reference Key

nsv : No screening value has been assigned

1. Human Health Criteria: Water + Organism 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
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

Indicates sites at which at least one sample exceeded the screening value

State of Oregon Department of Environmental Quality

Appendix C
Water Sample Results

LOWER WILLAMETTE BASIN
Station ID and Description

Samples collected during 2008-2010 or in 2016	Percent Detection	Number of samples over screening value	WM06 - Clackamas River at Hwy 99E - 2008-2010	WM12 - Tualatin R at Boones Ferry Rd - 2008-2010	WM14 - Willamette River at Hawthorne Bridge - 2008-2010	Screening Value	S.V. Reference
			10360	10456	10611		
			Maximum Values (µg/L)				
Ammonia							
Ammonia as N	58	0	—	—	—	‡	2
Combustion By-Products							
Benzo(a)pyrene	3	1	—	—	—	0.0013	1
Benzo(b)fluoranthene	17	2	—	—	—	0.0013	1
Benzo(g,h,i)perylene	8		—	—	—	*nsv*	
Benzo(k)fluoranthene	8	1	—	—	—	0.0013	1
Chrysene	7		—	—	—	*nsv*	
Fluoranthene	10	0	—	—	—	14	1
Phenanthrene	7		—	—	—	*nsv*	
Pyrene	10	0	—	—	—	290	1
Consumer Product Constituents							
Bis(2-ethylhexyl)phthalate	14	4	—	0.585	0.918	0.2	1
Caffeine	3		—	0.26	—	*nsv*	
Carbamazepine	21		—	0.15	0.016	*nsv*	
Cotinine	8		—	—	—	*nsv*	
DEET	31		—	0.0313	—	*nsv*	
Diethylphthalate	7	0	—	0.049	0.05	3800	1
Diphenhydramine	7		—	0.034	—	*nsv*	
Sulfamethoxazole	41		—	0.28	0.0382	*nsv*	
Venlafaxine	17		—	0.091	—	*nsv*	
Current Use Pesticides							
2,4-D	3	0	—	0.22	—	100	1
2,6-Dichlorobenzamide	21		—	—	—	*nsv*	
Aminomethylphosphonic acid (AMPA)	50	0	—	—	—	249500	5
Atrazine	27	0	—	0.0196	0.0104	1.0	9
Baygon (Propoxur)	7	0	—	0.0027	—	5.5	7
Carbaryl	14	0	—	0.0577	—	0.5	8
Carbofuran	7	0	—	0.0041	0.0026	0.75	8
Deisopropylatrazine	17	0	—	—	—	2500	7
Desethylatrazine	8	0	—	—	—	1000	7
Dichlobenil	17	0	—	—	—	30	10
Diuron	76	0	0.046	0.406	0.173	2.4	9
EPTC	3	0	—	—	—	800	8
Glyphosate	8	0	—	—	—	11900	10
Imidacloprid	7	0	—	0.03	—	1.05	8
Metolachlor	18	0	—	0.141	—	1	8

Appendix C Water Sample Results			LOWER WILLAMETTE BASIN Station ID and Description				
Samples collected during 2008-2010 or in 2016	Percent Detection	Number of samples over screening value	WM06 - Clackamas River at Hwy 99E - 2008-2010	WM12 - Tualatin R at Boones Ferry Rd - 2008-2010	WM14 - Willamette River at Hawthorne Bridge - 2008-2010	Screening Value	S.V. Reference
			10360	10456	10611		
			Maximum Values (µg/L)				
Current Use Pesticides, continued							
Metribuzin	10	0	—	0.0125	0.0062	8.7	9
Napropamide	3	0	—	—	—	1100	4
Oxamyl	7	0	—	0.0045	—	27	8
Pentachlorophenol	10	3	0.197	0.166	0.33	0.15	1
Prometon	6	0	—	0.0046	—	98	9
Pronamide	3		—	—	—	*nsv*	
Propiconazole	3	0	—	0.014	—	21	9
Pyraclostrobin	3	0	—	0.0141	—	1.5	9
Simazine	32	0	—	0.0469	0.0266	6	9
Triclopyr	3	0	—	0.34	—	29800	9
Trifluralin	4	0	—	—	—	1.9	2
Flame Retardants							
PBDE-206	50		—	—	—	*nsv*	
PBDE-209	100		—	—	—	*nsv*	
Industrial Chemicals or Intermediates							
1,4-Dichlorobenzene	6	0	—	—	—	16	1
Chloroform	17	0	—	1.5	—	260	1
Industrial Chemicals or Intermediates, cont'd							
Dichlorobromomethane	17	0	—	0.5	—	310000	1
Legacy Pesticides							
Aldrin	4	1	—	—	—	5E-06	1
Total Chlordane	7	1	—	—	—	8E-05	1
alpha-Chlordane	9		—	—	—	*nsv*	
cis-Nonachlor	9		—	—	—	*nsv*	
gamma-Chlordane+trans-Nonachlor	9		—	—	—	*nsv*	
Dieldrin	25	0	—	—	—	5E-06	1
Endosulfan sulfate	11	0	—	—	—	8.5	1
Heptachlor epoxide	9		—	—	—	*nsv*	
Total DDT	21	1	—	—	—	0.001	2
2,4´-DDD	9		—	—	—	*nsv*	
2,4´-DDT	9		—	—	—	*nsv*	
4,4´-DDD	18	2	—	—	—	3E-05	1
4,4´-DDE	29	5	—	—	—	2E-05	1
4,4´-DDT	24	4	—	—	—	2E-05	1

Appendix C Water Sample Results			LOWER WILLAMETTE BASIN Station ID and Description				
Samples collected during 2008-2010 or in 2016	Percent Detection	Number of samples over screening value	WM06 - Clackamas River at Hwy 99E - 2008-2010	WM12 - Tualatin R at Boones Ferry Rd - 2008-2010	WM14 - Willamette River at Hawthorne Bridge - 2008-2010	Screening Value	S.V. Reference
			10360	10456	10611		
			Maximum Values (µg/L)				
PCBs							
Total PCBs	3	1	—	—	—	6E-06	1
PCB-118	8		—	—	—	*nsv*	
Plant or animal sterols							
beta-Sitosterol	100		—	—	—	*nsv*	
Cholesterol	100		0.769	4.03	1.18	*nsv*	
Coprostanol	92		0.026	1.06	0.357	*nsv*	
Stigmastanol	100		—	—	—	*nsv*	
Priority Metals							
Dissolved							
Aluminum	75		—	—	—	*nsv*	
Antimony	25		—	—	—	*nsv*	
Arsenic	83	0	—	—	—	2.1	1
Barium	100		—	—	—	*nsv*	
Cadmium	8	0	—	—	—	*	2
Chromium	25	0	—	—	—	11	2
Copper	56	0	—	—	—	*	2
Iron	75	0	—	—	—	1000[#]	2
Lead	33	0	—	—	—	*	2
Manganese	83		—	—	—	*nsv*	
Nickel	33	0	—	—	—	*	2
Potassium	100		—	—	—	*nsv*	
Zinc	45	0	—	—	—	*	2
Total Recoverable							
Aluminum	100		—	—	—	*nsv*	
Antimony	7	0	—	—	—	5.1	1
Arsenic	28	0	0.59	0.71	0.38	2.1	1
Barium	100	0	32.6	39.3	31.5	1000	1
Cadmium	2	0	—	—	—	*[§]	2
Chromium	28	0	3.6	3.7	3.5	11[§]	2
Cobalt	56		2.73	1.58	1.8	*nsv*	
Copper	73	2	6	5.8	64.3	*[§]	2
Iron	100	9	3560	4020	4470	1000	2
Lead	69	0	2.94	2.65	1.62	*[§]	2
Manganese	100		—	—	—	*nsv*	
Molybdenum	3		—	4.2	—	*nsv*	
Nickel	50	0	3.4	2.5	3.5	*[§]	2

Appendix C Water Sample Results			LOWER WILLAMETTE BASIN Station ID and Description				
Samples collected during 2008-2010 or in 2016	Percent Detection	Number of samples over screening value	WM06 - Clackamas River at Hwy 99E - 2008-2010	WM12 - Tualatin R at Boones Ferry Rd - 2008-2010	WM14 - Willamette River at Hawthorne Bridge - 2008-2010	Screening Value	S.V. Reference
			10360	10456	10611		
			Maximum Values (µg/L)				
Priority Metals, cont'd							
Total Recoverable							
Potassium	100		—	—	—	*nsv*	
Silver	2	0	—	0.16	—	*§	2
Thallium	2	0	—	—	—	0.043	1
Uranium	3		0.16	—	—	*nsv*	
Vanadium	32		8.9	10.4	12.1	*nsv*	
Zinc	85	0	14.8	25.1	37.6	*§	2
			Average Values				
Standard Parameters (mg/L)							
Dissolved Organic Carbon	92		1.3	4.6	1.9		
Sulfate	100		0.9	19.9	3.2		
Total Organic Carbon	90		1.3	4.2	2.6		
Total Solids	100		54.2	162.0	62.2		
Total Suspended Solids	97		9.6	11.4	4.7		
Field Parameters							
Conductivity (µmhos/cm @ 25° C)	100		56	222	78		
Dissolved Oxygen (mg/L)	100		11.2	7.3	10.5		
pH (SU)	100		7.7	7.3	7.5		
Temperature (°C)	100		10.9	13.6	13.0		
Turbidity (NTU)	100		5	10	5		

Appendix C Water Sample Results	LOWER WILLAMETTE BASIN Station ID and Description					
Samples collected during 2008-2010 or in 2016	WM21 - Willamette River at St. John's Bridge - 2016	WM22 - Tualatin R at Bridge US of mouth - 2016	WM23 - Johnson Cr at SE 17th Ave - 2016	WM25 - East Fork Dairy Creek at Fern Flat Road - 2016	Screening Value	S.V. Reference
	10821	10916	11321	22459		
	Maximum Values (µg/L)					
Ammonia						
Ammonia as N	76	226	13	—	‡	2
Combustion By-Products						
Benzo(a)pyrene	—	—	0.00474	—	0.0013	1
Benzo(b)fluoranthene	0.0151	—	0.00789	—	0.0013	1
Benzo(g,h,i)perylene	—	—	0.00535	—	*nsv*	
Benzo(k)fluoranthene	0.00464	—	—	—	0.0013	1
Chrysene	0.00414	—	0.00513	—	*nsv*	
Fluoranthene	0.00704	—	0.00939	—	14	1
Phenanthrene	0.012	—	0.00621	—	*nsv*	
Pyrene	0.00461	—	0.0151	—	290	1
Consumer Product Constituents						
Bis(2-ethylhexyl)phthalate	—	—	—	—	0.2	1
Caffeine	—	—	—	—	*nsv*	
Carbamazepine	—	0.067	—	—	*nsv*	
Cotinine	—	0.0229	—	—	*nsv*	
DEET	—	—	—	—	*nsv*	
Diethylphthalate	—	—	—	—	3800	1
Diphenhydramine	—	—	—	—	*nsv*	
Sulfamethoxazole	0.026	0.098	—	—	*nsv*	
Venlafaxine	—	0.0435	—	—	*nsv*	
Current Use Pesticides						
2,4-D	—	—	—	—	100	1
2,6-Dichlorobenzamide	0.026	0.0895	0.23	—	*nsv*	
Aminomethylphosphonic acid (AMPA)	0.0525	0.156	0.0874	—	249500	5
Atrazine	0.00937	0.0548	0.00639	—	1.0	9
Baygon (Propoxur)	—	—	—	—	5.5	7
Carbaryl	—	0.00755	—	—	0.5	8
Carbofuran	—	—	—	—	0.75	8
Deisopropylatrazine	—	0.00883	—	—	2500	7
Desethylatrazine	—	0.00637	—	—	1000	7
Dichlobenil	—	0.341	0.0219	—	30	10
Diuron	0.132	0.142	0.11	—	2.4	9
EPTC	—	0.0343	—	—	800	8
Glyphosate	—	—	0.138	—	11900	10
Imidacloprid	—	—	—	—	1.05	8
Metolachlor	—	—	—	—	1	8

Appendix C Water Sample Results	LOWER WILLAMETTE BASIN Station ID and Description					
Samples collected during 2008-2010 or in 2016	WM21 - Willamette River at St. John's Bridge - 2016	WM22 - Tualatin R at Bridge US of mouth - 2016	WM23 - Johnson Cr at SE 17th Ave - 2016	WM25 - East Fork Dairy Creek at Fern Flat Road - 2016	Screening Value	S.V. Reference
	10821	10916	11321	22459		
	Maximum Values (µg/L)					
Current Use Pesticides, continued						
Metribuzin	0.024	0.0189	—	—	8.7	9
Napropamide	—	—	0.207	—	1100	4
Oxamyl	—	0.00602	—	—	27	8
Pentachlorophenol	—	—	—	—	0.15	1
Prometon	—	—	—	—	98	9
Pronamide	—	0.0298	—	—	*nsv*	
Propiconazole	—	—	—	—	21	9
Pyraclostrobin	—	—	—	—	1.5	9
Simazine	0.0138	0.0346	0.00702	—	6	9
Triclopyr	—	—	—	—	29800	9
Trifluralin	—	—	0.00073	—	1.9	2
Flame Retardants						
PBDE-206	—	—	0.00054	0.00044	*nsv*	
PBDE-209	0.00677	0.0046	0.0114	0.0111	*nsv*	
Industrial Chemicals or Intermediates						
1,4-Dichlorobenzene	—	—	0.0093	—	16	1
Chloroform	—	—	—	—	260	1
Industrial Chemicals or Intermediates, cont'd						
Dichlorobromomethane	—	—	—	—	310000	1
Legacy Pesticides						
Aldrin	—	—	7.1E-05	—	5E-06	1
Total Chlordane	—	—	0.00041	—	8E-05	1
alpha-Chlordane	—	—	0.00014	—	*nsv*	
cis-Nonachlor	—		—	9.5E-05	*nsv*	
gamma-Chlordane+trans-Nonachlor	—	—	0.00026	—	*nsv*	
Dieldrin	0.00011	0.00028	0.00292	—	5E-06	1
Endosulfan sulfate	—	0.00024	0.00055	—	8.5	1
Heptachlor epoxide	—	—	0.00014	—	*nsv*	
Total DDT	0.00017	0.00019	0.00243	—	0.001	2
2,4´-DDD	—	—	0.00012	—	*nsv*	
2,4´-DDT	—	—	0.00014	—	*nsv*	
4,4´-DDD	—	0.00012	0.00035	—	3E-05	1
4,4´-DDE	9.3E-05	0.00013	0.00115	—	2E-05	1
4,4´-DDT	8.1E-05	6.7E-05	0.00068	—	2E-05	1

Appendix C Water Sample Results	LOWER WILLAMETTE BASIN Station ID and Description					
Samples collected during 2008-2010 or in 2016	WM21 - Willamette River at St. John's Bridge - 2016	WM22 - Tualatin R at Bridge US of mouth - 2016	WM23 - Johnson Cr at SE 17th Ave - 2016	WM25 - East Fork Dairy Creek at Fern Flat Road - 2016	Screening Value	S.V. Reference
	10821	10916	11321	22459		
	Maximum Values (µg/L)					
PCBs						
Total PCBs	—	—	—	0.00024	6E-06	1
PCB-118	—	—	—	0.00024	*nsv*	
Plant or animal sterols						
beta-Sitosterol	1.77	3.88	2.89	0.855	*nsv*	
Cholesterol	0.975	1.25	1.5	0.253	*nsv*	
Coprostanol	0.12	0.334	0.149	—	*nsv*	
Stigmastanol	0.155	0.305	0.333	0.135	*nsv*	
Priority Metals						
Dissolved						
Aluminum	37.6	46.3	82.2	39.9	*nsv*	
Antimony	0.04	0.08	0.06	—	*nsv*	
Arsenic	0.57	0.76	0.71	0.32	2.1	1
Barium	8.12	19.2	21.5	12.1	*nsv*	
Cadmium	—	0.01	—	—	*	2
Chromium	0.15	0.24	0.33	—	11	2
Copper	0.95	1.93	2.73	—	*	2
Iron	67.6	213	160	52.5	1000[#]	2
Lead	0.04	0.05	0.05	0.07	*	2
Manganese	11.2	38.2	12.1	1.3	*nsv*	
Nickel	0.26	1.08	0.45	—	*	2
Potassium	1590	7700	3960	1800	*nsv*	
Zinc	2.2	8.57	2.7	9.63	*	2
Total Recoverable						
Aluminum	722	960	1560	261	*nsv*	
Antimony	0.06	0.06	0.04	—	5.1	1
Arsenic	0.6	0.8	0.75	0.34	2.1	1
Barium	12.1	22.4	33.1	13	1000	1
Cadmium	0.02	—	—	—	*[§]	2
Chromium	0.38	1.18	1.55	0.19	11[§]	2
Cobalt	—	—	—	—	*nsv*	
Copper	1.2	2.04	2.92	—	*[§]	2
Iron	743	1170	1340	280	1000	2
Lead	0.24	0.35	1.14	0.05	*[§]	2
Manganese	37.5	47.2	45.2	6.66	*nsv*	
Molybdenum	—	—	—	—	*nsv*	
Nickel	0.37	1.17	1.38	0.11	*[§]	2

Appendix C Water Sample Results	LOWER WILLAMETTE BASIN Station ID and Description					
Samples collected during 2008-2010 or in 2016	WM21 - Willamette River at St. John's Bridge - 2016	WM22 - Tualatin R at Bridge US of mouth - 2016	WM23 - Johnson Cr at SE 17th Ave - 2016	WM25 - East Fork Dairy Creek at Fern Flat Road - 2016	Screening Value	S.V. Reference
	10821	10916	11321	22459		
	Maximum Values (µg/L)					
Priority Metals, cont'd						
Total Recoverable						
Potassium	1600	8000	4060	1810	*nsv*	
Silver	—	—	—	—	*§	2
Thallium	—	0.02	—	—	0.043	1
Uranium	—	—	—	—	*nsv*	
Vanadium	—	—	—	—	*nsv*	
Zinc	2.4	7.26	16.6	11.3	*§	2
	Average Values					
Standard Parameters (mg/L)						
Dissolved Organic Carbon	1.8	9.9	11.0	11.1		
Sulfate	4.0	23.3	7.1	1.7		
Total Organic Carbon	1.8	2.8	2.1	1.2		
Total Solids	78.0	160.7	135.3	65.7		
Total Suspended Solids	5.0	6.7	7.0	3.7		
Field Parameters						
Conductivity (µmhos/cm @ 25° C)	94	208	147	57		
Dissolved Oxygen (mg/L)	10.9	9.9	11.0	11.1		
pH (SU)	7.7	7.5	7.7	7.8		
Temperature (°C)	15.0	14.9	13.5	10.2		
Turbidity (NTU)	7	8	11	3		

State of Oregon Department of Environmental Quality

Appendix C
Sediment Sample Results

LOWER WILLAMETTE BASIN
Station ID and Description

Samples collected in July or August 2016	Percent Detection	Number of samples over screening value	WM21 - Willamette River at St. John's Bridge 10821	WM22 - Tualatin River at Bridge upstream of mouth 10916	WM23 - Johnson Creek at SE 17th Avenue 11321	Screening Value	S.V. Reference
			Maximum Values (ng/kg)				
Current Use Pesticides							
Cypermethrin	17		—	2320	—	*nsv*	
Trifluralin	17		—	—	—	*nsv*	
Dioxins and Furans							
1,2,3,4,6,7,8-HpCDD	83	2	175	71.2	59.7	85	11
1,2,3,4,6,7,8-HpCDF	67	0	17.8	—	14.2	85	11
1,2,3,4,7,8-HxCDF	17	1	—	—	—	0.34	11
1,2,3,6,7,8-HxCDD	17	1	—	—	—	0.34	11
OCDD	100	0	2540	477	498	2800	11
OCDF	83	0	119	23.9	49.2	2800	11
Flame Retardants							
PBDE-100	33		—	—	—	*nsv*	
PBDE-138	33		86.2	—	—	*nsv*	
PBDE-139	33		43.5	—	—	*nsv*	
PBDE-140	17		22.3	—	—	*nsv*	
PBDE-153	50		314	—	—	*nsv*	
PBDE-154	50		267	—	—	*nsv*	
PBDE-17	33		—	—	—	*nsv*	
PBDE-171	17		52.6	—	—	*nsv*	
PBDE-180	17		36.1	—	—	*nsv*	
PBDE-183	50		142	—	—	*nsv*	
PBDE-191	17		39.6	—	—	*nsv*	
PBDE-196	50		210	—	—	*nsv*	
PBDE-197	50		123	—	—	*nsv*	
PBDE-201	50		195	—	—	*nsv*	
PBDE-203	50		277	—	—	*nsv*	
PBDE-206	50		748	—	—	*nsv*	
PBDE-207	50		517	—	—	*nsv*	
PBDE-208	50		381	—	—	*nsv*	
PBDE-209	33		—	—	—	*nsv*	
PBDE-28	33		—	—	—	*nsv*	
PBDE-47	33		—	—	—	*nsv*	
PBDE-49	33		—	—	—	*nsv*	
PBDE-66	33		—	—	—	*nsv*	
PBDE-85	50		146	—	—	*nsv*	
PBDE-99	50		2440	—	—	*nsv*	
Legacy Pesticides							
Aldrin	57		26.5	63.5	45.2	*nsv*	
Total Chlordane	61		482.2	379.1	2198	*nsv*	
alpha-Chlordane	83		154	98.4	428	*nsv*	

Appendix C Sediment Sample Results			LOWER WILLAMETTE BASIN Station ID and Description				
Samples collected in July or August 2016	Percent Detection	Number of samples over screening value	WM21 - Willamette River at St. John's Bridge 10821	WM22 - Tualatin River at Bridge upstream of mouth 10916	WM23 - Johnson Creek at SE 17th Avenue 11321	Screening Value	S.V. Reference
			Maximum Values (ng/kg)				
Legacy Pesticides, continued							
cis-Nonachlor	71		40.5	55.7	309	*nsv*	
gamma-Chlordane+trans-Nonachlor	83		219	225	919	*nsv*	
Oxychlordane	33		—	—	116	*nsv*	
Dieldrin	71	5	279	430	2490	1	11
Endosulfan II	29		130	—	841	*nsv*	
Endosulfan sulfate	14		—	—	—	*nsv*	
Endrin+cis-Nonachlor	83		68.7	86.8	426	*nsv*	
Heptachlor	14		—	—	—	*nsv*	
Heptachlor epoxide	43		—	—	89.5	*nsv*	
Hexachlorobenzene	100	0	812	—	—	2300	11
Methoxychlor	14		829	—	—	*nsv*	
Total DDT	83	4	1173830	1588	23634	40	11
2,4´-DDD	83		14600	70.9	246	*nsv*	
2,4´-DDE	67		1130	—	128	*nsv*	
2,4´-DDT	83		548000	132	2820	*nsv*	
4,4´-DDD	83		144000	294	2650	*nsv*	
4,4´-DDE	83		12100	592	3190	*nsv*	
4,4´-DDT	100		454000	499	14600	*nsv*	
PCBs							
Total PCBs	100	6	31311.3	1511.9	22572.7	48	11
PCB-100	17		—	—	—	*nsv*	
PCB-101+113	100		962	76.8	1340	*nsv*	
PCB-102	50		57.9	—	27.9	*nsv*	
PCB-103	33		11.8	—	—	*nsv*	
PCB-105	83	5	384	49.8	519	21	11
PCB-107+123	50		56	—	108	*nsv*	
PCB-110	100		1230	120	1940	*nsv*	
PCB-112+119	50		55	—	60.9	*nsv*	
PCB-114	50	2	24.5	—	20.2	21	11
PCB-115	17		—	—	—	*nsv*	
PCB-118	100	5	735	104	1210	26	11
PCB-122	50		10.8	—	17.1	*nsv*	
PCB-124	50		25.3	—	54.1	*nsv*	
PCB-125	17		—	—	—	*nsv*	
PCB-128	83		245	40.7	373	*nsv*	
PCB-129	50		55.3	—	88.4	*nsv*	
PCB-130	83		75.5	11.2	119	*nsv*	
PCB-131+133	33		—	—	23.7	*nsv*	
PCB-132+153	100		1230	195	1990	*nsv*	

Appendix C Sediment Sample Results			LOWER WILLAMETTE BASIN Station ID and Description				
Samples collected in July or August 2016	Percent Detection	Number of samples over screening value	WM21 - Willamette River at St. John's Bridge 10821	WM22 - Tualatin River at Bridge upstream of mouth 10916	WM23 - Johnson Creek at SE 17th Avenue 11321	Screening Value	S.V. Reference
			Maximum Values (ng/kg)				
PCBs, continued							
PCB-134	67		66.1	—	108	*nsv*	
PCB-135	83		128	16.9	232	*nsv*	
PCB-136	17		—	—	—	*nsv*	
PCB-137	67		60.7	—	107	*nsv*	
PCB-138+163	100		1160	186	1800	*nsv*	
PCB-140	17		—	—	—	*nsv*	
PCB-141	83		189	23.9	288	*nsv*	
PCB-142	33		12.9	—	29.2	*nsv*	
PCB-143	17		—	—	—	*nsv*	
PCB-144	67		45.5	—	68	*nsv*	
PCB-146	83		171	25.1	263	*nsv*	
PCB-147	50		18.5	—	40.1	*nsv*	
PCB-148	83		131	12.7	188	*nsv*	
PCB-149	100		760	96.2	1180	*nsv*	
PCB-150	17		—	—	—	*nsv*	
PCB-151	83		189	26.2	296	*nsv*	
PCB-152	17		—	—	—	*nsv*	
PCB-154	33		—	—	12.4	*nsv*	
PCB-156	83	4	113	19.8	185	26	11
PCB-157	50	3	34.1	—	49.2	26	11
PCB-158+160	67		113	—	194	*nsv*	
PCB-16+32	60		199	—	43.9	*nsv*	
PCB-164	83		87.7	11.2	126	*nsv*	
PCB-166	33		—	—	10.6	*nsv*	
PCB-167	67	3	68.1	—	85.5	26	11
PCB-17	60		117	—	26.9	*nsv*	
PCB-170	83		337	26.2	167	*nsv*	
PCB-171	67		90.7	—	55.6	*nsv*	
PCB-172	50		57.2	—	34.4	*nsv*	
PCB-173	17		—	—	—	*nsv*	
PCB-174	83		319	32.6	257	*nsv*	
PCB-175+182	17		—	—	—	*nsv*	
PCB-176	50		35.5	—	28.2	*nsv*	
PCB-177	83		184	17	118	*nsv*	
PCB-178	67		59.4	—	45.4	*nsv*	
PCB-179	67		106	—	97	*nsv*	
PCB-18	80		398	—	73.3	*nsv*	
PCB-180+193	83		733	59.8	405	*nsv*	
PCB-181	17		—	—	—	*nsv*	

State of Oregon Department of Environmental Quality

Appendix C
Sediment Sample Results

LOWER WILLAMETTE BASIN

Samples collected in July or August 2016	Percent Detection	Number of samples over screening value	Station ID and Description: WM21 - Willamette River at St. John's Bridge 10821	WM22 - Tualatin River at Bridge upstream of mouth 10916	WM23 - Johnson Creek at SE 17th Avenue 11321	Screening Value	S.V. Reference
			Maximum Values (ng/kg)				
PCBs, continued							
PCB-183	83		184	15.3	120	*nsv*	
PCB-185	50		34.6	—	24.9	*nsv*	
PCB-187	100		397	44.2	289	*nsv*	
PCB-189	33	0	15	—	—	140	11
PCB-19	60		32.8	—	10.5	*nsv*	
PCB-190	67		66.3	—	39.8	*nsv*	
PCB-191	33		13.9	—	—	*nsv*	
PCB-194	67		157	—	78.2	*nsv*	
PCB-195	50		57.1	—	32.1	*nsv*	
PCB-196	20		74.9	—	—	*nsv*	
PCB-199	83		295	31	146	*nsv*	
PCB-20+21+33	60		306	—	70.5	*nsv*	
PCB-200	33		16.5	—	—	*nsv*	
PCB-201	50		28	—	16.9	*nsv*	
PCB-202	50		65.9	—	39	*nsv*	
PCB-203	67		105	—	64.2	*nsv*	
PCB-206	83		462	16.2	65.7	*nsv*	
PCB-207	17		103	—	—	*nsv*	
PCB-208	50		277	—	28.5	*nsv*	
PCB-209	67		794	—	61.9	*nsv*	
PCB-22	80		172	—	41.3	*nsv*	
PCB-24	20		—	—	—	*nsv*	
PCB-25	60		19.6	—	12.5	*nsv*	
PCB-26	60		59.1	—	26.7	*nsv*	
PCB-27	40		15.4	—	—	*nsv*	
PCB-28	100		550	8.02	110	*nsv*	
PCB-31	100		553	5.98	103	*nsv*	
PCB-35	20		—	—	—	*nsv*	
PCB-37	67		152	—	50.8	*nsv*	
PCB-39	40		12.2	—	—	*nsv*	
PCB-40	60		252	—	32.2	*nsv*	
PCB-41+72	40		134	—	—	*nsv*	
PCB-42	80		457	—	65.9	*nsv*	
PCB-43+52	100		1900	23.1	587	*nsv*	
PCB-44	100		1500	12.5	280	*nsv*	
PCB-45	60		209	—	20.5	*nsv*	
PCB-46	40		106	—	—	*nsv*	
PCB-48	60		274	—	40.2	*nsv*	
PCB-49	80		958	—	192	*nsv*	

Appendix C Sediment Sample Results			LOWER WILLAMETTE BASIN Station ID and Description				
Samples collected in July or August 2016	Percent Detection	Number of samples over screening value	WM21 - Willamette River at St. John's Bridge 10821	WM22 - Tualatin River at Bridge upstream of mouth 10916	WM23 - Johnson Creek at SE 17th Avenue 11321	Screening Value	S.V. Reference
			Maximum Values (ng/kg)				
PCBs, continued							
PCB-50	20		—	—	—	*nsv*	
PCB-51	40		70	—	—	*nsv*	
PCB-53	60		213	—	25.8	*nsv*	
PCB-54	20		—	—	—	*nsv*	
PCB-55	40		11	—	—	*nsv*	
PCB-56	80		470	—	133	*nsv*	
PCB-57	20		—	—	—	*nsv*	
PCB-58+67	40		33.2	—	—	*nsv*	
PCB-59	60		87.5	—	13.5	*nsv*	
PCB-60	80		258	—	92.2	*nsv*	
PCB-63	60		45.2	—	12.7	*nsv*	
PCB-64+68	80		681	—	114	*nsv*	
PCB-65+75	60		356	—	59.1	*nsv*	
PCB-66	100		999	19.4	295	*nsv*	
PCB-69	20		—	—	—	*nsv*	
PCB-70	100		1440	28.9	514	*nsv*	
PCB-71	80		410	—	54.5	*nsv*	
PCB-73	20		—	—	—	*nsv*	
PCB-74+76	80		736	—	206	*nsv*	
PCB-77	50	3	75.4	—	38.4	6.4	11
PCB-81	50	3	12.1	—	12.8	2.1	11
PCB-82	67		126	—	164	*nsv*	
PCB-83	50		19.1	—	23.4	*nsv*	
PCB-84	83		420	12.9	306	*nsv*	
PCB-85	83		158	19.4	253	*nsv*	
PCB-87+111+116+117	67		347	—	531	*nsv*	
PCB-89	83		207	14.2	268	*nsv*	
PCB-91	67		238	—	195	*nsv*	
PCB-93	17		—	—	—	*nsv*	
PCB-94	17		—	—	—	*nsv*	
PCB-95+121	83		1120	42.4	978	*nsv*	
PCB-96	33		17	—	—	*nsv*	
PCB-97	83		367	26	490	*nsv*	
PCB-98	17		—	—	—	*nsv*	
PCB-99	83		445	41.3	639	*nsv*	
Priority Metals (Total)			Maximum Values (mg/kg)				
Aluminum	100		19100	19600	21500	*nsv*	
Antimony	60		1.15	—	0.35	*nsv*	
Arsenic	100	3	11.5	3.46	2.91	7	11

Appendix C Sediment Sample Results			LOWER WILLAMETTE BASIN Station ID and Description				
Samples collected in July or August 2016	Percent Detection	Number of samples over screening value	WM21 - Willamette River at St. John's Bridge	WM22 - Tualatin River at Bridge upstream of mouth	WM23 - Johnson Creek at SE 17th Avenue	Screening Value	S.V. Reference
			10821	10916	11321		
			Maximum Values (mg/kg)				
Priority Metals (Total), continued							
Barium	100		151	113	128	*nsv*	
Cadmium	100	0	0.17	—	0.16	1	11
Chromium	100		39.1	22.1	42	*nsv*	
Cobalt	100		13.2	11.3	17	*nsv*	
Copper	100		160	12.8	34.5	*nsv*	
Lead	100	4	110	8.8	19.8	17	11
Manganese	100		606	951	514	*nsv*	
Nickel	100		21.7	16.4	48.5	*nsv*	
Silver	20		0.11	—	—	*nsv*	
Thallium	20		—	—	—	*nsv*	
Zinc	100		154	88.7	143	*nsv*	

Appendix C Sediment Sample Results	LOWER WILLAMETTE BASIN Station ID and Description				
Samples collected in July or August 2016	WM23 - Johnson Creek at Stanley Avenue	WM25 - East Fork Dairy Creek at Fern Flat Road	WM33 - Johnson Creek at SE Harney Drive	Screening Value	S.V. Reference
	11324	22459	38584		
	Maximum Values (ng/kg)				
Current Use Pesticides					
Cypermethrin	—	—	—	*nsv*	
Trifluralin	—	—	22500	*nsv*	
Dioxins and Furans					
1,2,3,4,6,7,8-HpCDD	67.9	—	312	85	11
1,2,3,4,6,7,8-HpCDF	18.7	—	63.6	85	11
1,2,3,4,7,8-HxCDF	—	—	18.5	0.34	11
1,2,3,6,7,8-HxCDD	—	—	13.8	0.34	11
OCDD	501	18.5	2570	2800	11
OCDF	61.8	—	172	2800	11
Flame Retardants					
PBDE-100	361	—	342	*nsv*	
PBDE-138	23.3	—	—	*nsv*	
PBDE-139	17.8	—	—	*nsv*	
PBDE-140	—	—	—	*nsv*	
PBDE-153	196	—	137	*nsv*	
PBDE-154	152	—	115	*nsv*	
PBDE-17	10.1	—	12.1	*nsv*	
PBDE-171	—	—	—	*nsv*	
PBDE-180	—	—	—	*nsv*	
PBDE-183	37.6	—	85.9	*nsv*	
PBDE-191	—	—	—	*nsv*	
PBDE-196	36.4	—	111	*nsv*	
PBDE-197	27.5	—	67	*nsv*	
PBDE-201	31.9	—	59.4	*nsv*	
PBDE-203	48.4	—	106	*nsv*	
PBDE-206	445	—	3520	*nsv*	
PBDE-207	243	—	1990	*nsv*	
PBDE-208	171	—	1080	*nsv*	
PBDE-209	10200	—	14400	*nsv*	
PBDE-28	18.1	—	38.6	*nsv*	
PBDE-47	1430	—	1670	*nsv*	
PBDE-49	79.8	—	98	*nsv*	
PBDE-66	51.1	—	70	*nsv*	
PBDE-85	67.5	—	57.8	*nsv*	
PBDE-99	1850	—	1560	*nsv*	
Legacy Pesticides					
Aldrin	72.6	—	—	*nsv*	
Total Chlordane	2839	—	5315	*nsv*	
alpha-Chlordane	683	—	1540	*nsv*	

Appendix C Sediment Sample Results	LOWER WILLAMETTE BASIN Station ID and Description				
Samples collected in July or August 2016	WM23 - Johnson Creek at Stanley Avenue	WM25 - East Fork Dairy Creek at Fern Flat Road	WM33 - Johnson Creek at SE Harney Drive	Screening Value	S.V. Reference
	11324	22459	38584		
	Maximum Values (ng/kg)				
Legacy Pesticides, continued					
cis-Nonachlor	377	—	615	*nsv*	
gamma-Chlordane+trans-Nonachlor	1340	—	2730	*nsv*	
Oxychlordane	83.6	—	—	*nsv*	
Dieldrin	3100	—	1710	1	11
Endosulfan II	—	—	—	*nsv*	
Endosulfan sulfate	175	—	—	*nsv*	
Endrin+cis-Nonachlor	355	—	430	*nsv*	
Heptachlor	818	—	—	*nsv*	
Heptachlor epoxide	74.1	—	340	*nsv*	
Hexachlorobenzene	1110	—	1820	2300	11
Methoxychlor	—	—	—	*nsv*	
Total DDT	11008	23.9	4403	40	11
2,4´-DDD	746	—	380	*nsv*	
2,4´-DDE	154	—	119	*nsv*	
2,4´-DDT	388	—	306	*nsv*	
4,4´-DDD	2090	—	1460	*nsv*	
4,4´-DDE	6380	—	1510	*nsv*	
4,4´-DDT	1250	23.9	628	*nsv*	
PCBs					
Total PCBs	3559.24	54.6	378709.5	48	11
PCB-100	—	—	192	*nsv*	
PCB-101+113	188	24.3	31500	*nsv*	
PCB-102	—	—	917	*nsv*	
PCB-103	—	—	252	*nsv*	
PCB-105	74.6	—	8760	21	11
PCB-107+123	—	—	1510	*nsv*	
PCB-110	247	30.3	34200	*nsv*	
PCB-112+119	—	—	1510	*nsv*	
PCB-114	—	—	521	21	11
PCB-115	—	—	640	*nsv*	
PCB-118	169	—	2300	26	11
PCB-122	—	—	144	*nsv*	
PCB-124	—	—	661	*nsv*	
PCB-125	—	—	109	*nsv*	
PCB-128	47.4	—	3840	*nsv*	
PCB-129	—	—	1260	*nsv*	
PCB-130	17.6	—	1530	*nsv*	
PCB-131+133	—	—	446	*nsv*	
PCB-132+153	357	—	25400	*nsv*	

Appendix C Sediment Sample Results	LOWER WILLAMETTE BASIN Station ID and Description				
Samples collected in July or August 2016	WM23 - Johnson Creek at Stanley Avenue	WM25 - East Fork Dairy Creek at Fern Flat Road	WM33 - Johnson Creek at SE Harney Drive	Screening Value	S.V. Reference
	11324	22459	38584		
	Maximum Values (ng/kg)				
PCBs, continued					
PCB-134	16	—	1940	*nsv*	
PCB-135	36.8	—	2960	*nsv*	
PCB-136	—	—	26.3	*nsv*	
PCB-137	16.3	—	1490	*nsv*	
PCB-138+163	286	—	20500	*nsv*	
PCB-140	—	—	102	*nsv*	
PCB-141	47	—	3320	*nsv*	
PCB-142	—	—	—	*nsv*	
PCB-143	—	—	97.7	*nsv*	
PCB-144	11.8	—	1100	*nsv*	
PCB-146	51.1	—	3390	*nsv*	
PCB-147	—	—	661	*nsv*	
PCB-148	33.3	—	3880	*nsv*	
PCB-149	217	—	16200	*nsv*	
PCB-150	—	—	35.6	*nsv*	
PCB-151	54.8	—	3450	*nsv*	
PCB-152	—	—	39.1	*nsv*	
PCB-154	—	—	227	*nsv*	
PCB-156	29.3	—	3060	26	11
PCB-157	—	—	648	26	11
PCB-158+160	27.6	—	2380	*nsv*	
PCB-16+32	—	—	677	*nsv*	
PCB-164	19.4	—	1410	*nsv*	
PCB-166	—	—	69.5	*nsv*	
PCB-167	13.8	—	1030	26	11
PCB-17	—	—	668	*nsv*	
PCB-170	42.4	—	687	*nsv*	
PCB-171	13.1	—	515	*nsv*	
PCB-172	—	—	264	*nsv*	
PCB-173	—	—	58.3	*nsv*	
PCB-174	55	—	1280	*nsv*	
PCB-175+182	—	—	82.9	*nsv*	
PCB-176	—	—	214	*nsv*	
PCB-177	30.8	—	822	*nsv*	
PCB-178	14.3	—	282	*nsv*	
PCB-179	26.4	—	585	*nsv*	
PCB-18	7.89	—	1090	*nsv*	
PCB-180+193	116	—	2620	*nsv*	
PCB-181	—	—	44.9	*nsv*	

Appendix C Sediment Sample Results	LOWER WILLAMETTE BASIN Station ID and Description				
Samples collected in July or August 2016	WM23 - Johnson Creek at Stanley Avenue	WM25 - East Fork Dairy Creek at Fern Flat Road	WM33 - Johnson Creek at SE Harney Drive	Screening Value	S.V. Reference
	11324	22459	38584		
	Maximum Values (ng/kg)				
PCBs, continued					
PCB-183	28.7	—	417	*nsv*	
PCB-185	—	—	119	*nsv*	
PCB-187	84.7	—	1660	*nsv*	
PCB-189	—	—	96.9	140	11
PCB-19	—	—	784	*nsv*	
PCB-190	11	—	301	*nsv*	
PCB-191	—	—	64.6	*nsv*	
PCB-194	30.9	—	306	*nsv*	
PCB-195	—	—	131	*nsv*	
PCB-196	—	—	—	*nsv*	
PCB-199	50.8	—	265	*nsv*	
PCB-20+21+33	—	—	512	*nsv*	
PCB-200	—	—	48.8	*nsv*	
PCB-201	—	—	58.2	*nsv*	
PCB-202	—	—	111	*nsv*	
PCB-203	22.8	—	253	*nsv*	
PCB-206	40.3	—	212	*nsv*	
PCB-207	—	—	—	*nsv*	
PCB-208	—	—	63.1	*nsv*	
PCB-209	36.1	—	145	*nsv*	
PCB-22	8.15	—	416	*nsv*	
PCB-24	—	—	16.1	*nsv*	
PCB-25	—	—	177	*nsv*	
PCB-26	—	—	328	*nsv*	
PCB-27	—	—	303	*nsv*	
PCB-28	25.3	—	1300	*nsv*	
PCB-31	16.2	—	1050	*nsv*	
PCB-35	—	—	46.7	*nsv*	
PCB-37	15.8	—	426	*nsv*	
PCB-39	—	—	97.2	*nsv*	
PCB-40	—	—	709	*nsv*	
PCB-41+72	—	—	301	*nsv*	
PCB-42	12.5	—	1430	*nsv*	
PCB-43+52	102	—	26000	*nsv*	
PCB-44	53.2	—	12700	*nsv*	
PCB-45	—	—	463	*nsv*	
PCB-46	—	—	251	*nsv*	
PCB-48	—	—	490	*nsv*	
PCB-49	35.9	—	7290	*nsv*	

DEQ State of Oregon Department of Environmental Quality	Appendix C Sediment Sample Results	LOWER WILLAMETTE BASIN Station ID and Description				
	Samples collected in July or August 2016	WM23 - Johnson Creek at Stanley Avenue	WM25 - East Fork Dairy Creek at Fern Flat Road	WM33 - Johnson Creek at SE Harney Drive	Screening Value	S.V. Reference
		11324	22459	38584		
		Maximum Values (ng/kg)				
PCBs, continued						
PCB-50		—	—	23.7	*nsv*	
PCB-51		—	—	248	*nsv*	
PCB-53		—	—	928	*nsv*	
PCB-54		—	—	41.5	*nsv*	
PCB-55		—	—	25.7	*nsv*	
PCB-56		18.6	—	1740	*nsv*	
PCB-57		—	—	44.2	*nsv*	
PCB-58+67		—	—	170	*nsv*	
PCB-59		—	—	214	*nsv*	
PCB-60		11.6	—	1050	*nsv*	
PCB-63		—	—	183	*nsv*	
PCB-64+68		23.3	—	3380	*nsv*	
PCB-65+75		—	—	1800	*nsv*	
PCB-66		40.1	—	3490	*nsv*	
PCB-69		—	—	22.2	*nsv*	
PCB-70		66.5	—	11200	*nsv*	
PCB-71		11.1	—	1400	*nsv*	
PCB-73		—	—	21.2	*nsv*	
PCB-74+76		27.8	—	3450	*nsv*	
PCB-77		—	—	318	6.4	11
PCB-81		—	—	182	2.1	11
PCB-82		18.8	—	2450	*nsv*	
PCB-83		—	—	599	*nsv*	
PCB-84		47.1	—	10800	*nsv*	
PCB-85		30.6	—	4020	*nsv*	
PCB-87+111+116+117		71.2	—	12400	*nsv*	
PCB-89		37.1	—	7380	*nsv*	
PCB-91		27.7	—	4640	*nsv*	
PCB-93		—	—	46.9	*nsv*	
PCB-94		—	—	118	*nsv*	
PCB-95+121		137	—	26600	*nsv*	
PCB-96		—	—	226	*nsv*	
PCB-97		60.5	—	11800	*nsv*	
PCB-98		—	—	58.2	*nsv*	
PCB-99		89.2	—	14700	*nsv*	
Priority Metals (Total)		Maximum Values (mg/kg)				
Aluminum		18200	45600	16900	*nsv*	
Antimony		—	—	0.39	*nsv*	
Arsenic		2.05	6.82	2.27	7	11

Appendix C Sediment Sample Results	LOWER WILLAMETTE BASIN Station ID and Description				
Samples collected in July or August 2016	WM23 - Johnson Creek at Stanley Avenue	WM25 - East Fork Dairy Creek at Fern Flat Road	WM33 - Johnson Creek at SE Harney Drive	Screening Value	S.V. Reference
	11324	22459	38584		
	Maximum Values (mg/kg)				
Priority Metals (Total), continued					
Barium	104	268	114	*nsv*	
Cadmium	0.16	0.15	0.22	1	11
Chromium	53.2	22.9	476	*nsv*	
Cobalt	13.8	15.7	131	*nsv*	
Copper	18.4	13.9	42.4	*nsv*	
Lead	24.3	8.75	42.3	17	11
Manganese	549	774	268	*nsv*	
Nickel	61.5	12.4	1600	*nsv*	
Silver	—	—	—	*nsv*	
Thallium	—	0.21	—	*nsv*	
Zinc	125	95	179	*nsv*	

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Appendix C
Tissue Sample Results

LOWER WILLAMETTE BASIN

Samples collected in Fall 2008 or 2009	Percent Detection	Number of samples over screening value	Station ID and Description: WM36 - Willamette River at SP&S RR Bridge (SMB, fillet) 10332	WM12 - Tualatin River at Boones Ferry Rd (SMB, fillet) 10456	WM39 - Multnomah Channel at St. Helens (SMB, fillet) 10549	WM40 - Multnomah Channel at Coon Pt. (2009, SMB, fillet) 10550	WM43 - Clackamas River at High Rocks (2008, NPM, fillet) 11233	Screening Value	S.V. Reference
			Maximum Values (mg/kg)						
Flame Retardants									
PBDE-100	95		0.00379	0.00083	0.00094	0.00043	0.00047	*nsv*	
PBDE-119	31		2.4E-05	3.3E-06	4.1E-06	—	—	*nsv*	
PBDE-138	32		1.2E-05	—	3.9E-06	—	—	*nsv*	
PBDE-139	42		2.3E-05	3.4E-06	6.8E-06	—	—	*nsv*	
PBDE-140	38		6.8E-06	—	2.2E-06	—	—	*nsv*	
PBDE-15	62		4.8E-05	1.6E-05	3E-05	6.2E-06	8.6E-06	*nsv*	
PBDE-153	95	0	0.00061	0.00013	0.00012	0.00013	1.9E-05	0.2	12
PBDE-154	95		0.00035	0.0001	0.0001	9.4E-05	0.00011	*nsv*	
PBDE-17	55		0.00077	—	0.00036	1.9E-05	—	*nsv*	
PBDE-171	4		2.4E-06	—	—	—	—	*nsv*	
PBDE-180	4		2.2E-06	—	—	—	—	*nsv*	
PBDE-183	42		4.6E-06	—	1.6E-06	—	—	*nsv*	
PBDE-184	31		2.8E-06	—	6.3E-07	—	—	*nsv*	
PBDE-191	4		2.5E-06	—	—	—	—	*nsv*	
PBDE-196	5		4.8E-06	—	—	—	—	*nsv*	
PBDE-197	23		3.9E-06	—	8.3E-07	—	—	*nsv*	
PBDE-201	23		7.7E-06	—	1.3E-06	—	—	*nsv*	
PBDE-206	9		2E-05	—	—	—	—	*nsv*	
PBDE-209	70	0	0.00049	—	0.00013	0.00022	—	16.3	12
PBDE-28	67		0.00221	—	0.001	7.8E-05	—	*nsv*	
PBDE-47	100	0	0.0209	0.00962	0.0128	0.00328	0.00404	0.2	12
PBDE-49	64		0.00148	0.00026	0.00063	0.00013	0.00012	*nsv*	
PBDE-66	69		0.00108	0.00017	0.00041	3.6E-05	4.7E-05	*nsv*	
PBDE-71	38		0.00013	—	5.9E-05	—	—	*nsv*	
PBDE-77	27		3.9E-06	—	4.6E-07	—	—	*nsv*	
PBDE-85	50		0.00024	4.9E-05	7.2E-05	—	1.5E-05	*nsv*	
PBDE-99	100	0	0.00951	0.00252	0.00276	0.00051	0.00061	0.2	12
Pentabromoethylbenzene	50		9.9E-06	—	—	—	5E-06	*nsv*	
Legacy Pesticides									
BHC-alpha	7		—	—	—	—	1.6E-05	*nsv*	
Total Chlordane	92	0	0.00202	0.00138	0.00094	0.00061	0.00097	1.2	12
alpha-Chlordane	100		0.00027	0.00024	0.00017	0.00013	0.00013	*nsv*	
cis-Nonachlor	86		0.00034	0.00021	0.00018	0.00014	0.00014	*nsv*	
gamma-Chlordane+trans-Nonachlor	89		—	—	—	—	—	*nsv*	
gamma-Clordane	100		8.3E-05	7.6E-05	4.4E-05	0.00031	4.5E-05	*nsv*	
Oxychlordane	50		0.00015	9.3E-05	8.2E-05	4.2E-05	3.9E-05	*nsv*	

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Appendix C
Tissue Sample Results

LOWER WILLAMETTE BASIN

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			Maximum Values (mg/kg)						
Legacy Pesticides, cont'd									
trans-Nonachlor	80		0.00118	0.00076	0.00047	—	0.00062	*nsv*	
Dieldrin	79	0	0.00019	0.00044	0.00016	0.00012	0.00011	0.1	12
Total Endosulfan	15	0	—	0.00017	—	—	8.4E-05	14	12
Endosulfan I	15		—	4E-05	—	—	8.4E-05	*nsv*	
Endosulfan II	8		—	0.00013	—	—	—	*nsv*	
Endrin	20	0	—	—	—	0.00013	—	0.7	12
Endrin+cis-Nonachlor	67		—	—	—	—	—	*nsv*	
Heptachlor epoxide	14	0	—	3E-05	—	—	—	0.03	12
Hexachlorobenzene	58	0	0.0003	—	0.00017	0.00025	0.00019	1.9	12
Methoxychlor	9	0	—	—	—	0.00015	—	11.7	12
Mirex	43	0	4.4E-05	1.2E-05	—	7.1E-06	1.7E-05	0.5	12
Total DDT	92	0	0.01071	0.00352	0.00734	0.0054	0.00515	1.2	12
2,4´-DDD	71		0.00036	0.00011	0.00023	0.00024	4.2E-05	*nsv*	
2,4´-DDE	50		9.5E-05	1.8E-05	6.3E-05	5.9E-05	4.4E-05	*nsv*	
2,4´-DDT	46		0.00026	1.6E-05	4.9E-05	4.2E-05	6.5E-05	*nsv*	
4,4´-DDD	100		0.00208	0.00051	0.00108	0.00089	0.00028	*nsv*	
4,4´-DDE	100		0.0055	0.00266	0.00554	0.00395	0.00472	*nsv*	
4,4´-DDT	71		0.00242	0.00021	0.00038	0.00022	—	*nsv*	
PCBs									
Total PCBs	100	1	0.05605	0.00464	0.01544	0.00972	0.0115	0.05	12
PCB-10+4	25		2E-05	—	—	—	—	*nsv*	
PCB-100	8		4E-06	—	—	—	—	*nsv*	
PCB-101	100		0.00121	—	0.00026	0.00035	—	*nsv*	
PCB-101+113	57		0.00096	0.00014	0.00049	—	0.0007	*nsv*	
PCB-102	38		1.6E-05	—	6.9E-06	—	—	*nsv*	
PCB-103	54		2.3E-05	—	7.9E-06	5.1E-06	—	*nsv*	
PCB-104	4		1.5E-06	—	—	—	—	*nsv*	
PCB-105	100	0	0.00115	0.00013	0.00026	0.00018	0.00035	*nsv*	
PCB-107	75		0.00028	—	3.6E-05	5.1E-05	—	*nsv*	
PCB-107+123	80		—	—	—	—	—	*nsv*	
PCB-109+123	100		0.0002	5.4E-05	8.5E-05	—	0.00012	*nsv*	
PCB-11	100		3.8E-05	2.6E-05	3.8E-05	—	4.4E-05	*nsv*	
PCB-110	100		0.00093	0.00013	0.00055	0.00033	0.00061	*nsv*	
PCB-112	100		4.1E-05	—	9.6E-06	1.4E-05	—	*nsv*	
PCB-112+119	10		—	—	—	—	—	*nsv*	
PCB-114	88	0	0.00012	1.7E-05	2.7E-05	1E-05	4.7E-05	*nsv*	

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			Maximum Values (mg/kg)						
PCBs, continued									
PCB-115	59		7.2E-05	—	8.9E-06	9.6E-06	—	*nsv*	
PCB-115+111	100		4.8E-05	7.1E-06	1.8E-05	—	2.2E-05	*nsv*	
PCB-117+87	100		0.0004	6.6E-05	0.0002	—	0.00027	*nsv*	
PCB-118	100	0	0.00313	0.00044	0.00067	0.00049	0.00129	*nsv*	
PCB-119+112	100		3.6E-05	7.3E-06	2E-05	—	1.9E-05	*nsv*	
PCB-120	38		5.3E-05	9.1E-06	3.6E-05	3.5E-06	3.7E-05	*nsv*	
PCB-121	25		0.0001	1.6E-05	6.1E-05	—	6E-05	*nsv*	
PCB-122	19		—	—	6.3E-06	1.6E-05	—	*nsv*	
PCB-124	69		4.7E-05	5.5E-06	1.7E-05	1.4E-05	2.1E-05	*nsv*	
PCB-125	14		5.9E-06	—	—	—	—	*nsv*	
PCB-125+86	25		7.5E-06	—	—	—	—	*nsv*	
PCB-126	35	0	7E-06	—	1.6E-06	—	—	*nsv*	
PCB-128	73		0.00056	—	8.1E-05	0.00013	—	*nsv*	
PCB-128+162	100		0.00046	4.6E-05	0.00018	—	0.00016	*nsv*	
PCB-129	73		6.9E-05	5.8E-06	1.9E-05	2.5E-05	2.7E-05	*nsv*	
PCB-130	77		0.00013	1.4E-05	5.4E-05	5.9E-05	4.7E-05	*nsv*	
PCB-131	8		6.6E-06	—	—	—	—	*nsv*	
PCB-132	75		0.00615	—	0.00087	0.00136	—	*nsv*	
PCB-132+153	100		—	—	—	—	—	*nsv*	
PCB-133+131+142	100		7.4E-05	7.1E-06	3E-05	—	2.2E-05	*nsv*	
PCB-134	69		5.6E-05	6.4E-06	3.4E-05	2.1E-05	2.5E-05	*nsv*	
PCB-135	77		9.6E-05	8.5E-06	6E-05	5.1E-05	3.9E-05	*nsv*	
PCB-136	50		9.8E-06	—	1.9E-06	3E-06	—	*nsv*	
PCB-137	96		0.00021	2.5E-05	4.8E-05	3.7E-05	9.4E-05	*nsv*	
PCB-138	100		0.00404	—	0.00062	0.00096	—	*nsv*	
PCB-138+163	100		—	—	—	—	—	*nsv*	
PCB-139	12		2.6E-05	—	8.8E-06	—	1.3E-05	*nsv*	
PCB-140	54		1.9E-05	—	4.8E-06	4.1E-06	—	*nsv*	
PCB-141	77		0.00042	2.5E-05	0.00014	0.00012	0.0001	*nsv*	
PCB-142	82		8.9E-05	—	1.7E-05	2.8E-05	—	*nsv*	
PCB-144	65		6.1E-05	—	2.3E-05	2.2E-05	1.7E-05	*nsv*	
PCB-146	96		0.00054	6.1E-05	0.00019	0.00023	0.00016	*nsv*	
PCB-147	77		7.6E-05	5.9E-06	2.6E-05	1.6E-05	1.9E-05	*nsv*	
PCB-148	73		0.00012	7.4E-06	4.1E-05	4.3E-05	1.4E-05	*nsv*	
PCB-149	100		0.00054	5.2E-05	0.00039	0.00041	0.00029	*nsv*	
PCB-150	19		2.7E-06	—	1E-06	—	—	*nsv*	

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			Maximum Values (mg/kg)						
PCBs, continued									
PCB-151	88		0.00059	3.2E-05	0.00018	0.00018	6.3E-05	*nsv*	
PCB-152	8		3.7E-06	—	—	—	—	*nsv*	
PCB-153	25		0.00425	0.00044	0.00128	—	0.00137	*nsv*	
PCB-154	65		8.1E-05	—	2.4E-05	1.8E-05	7.3E-06	*nsv*	
PCB-155	8		3.9E-06	—	—	—	—	*nsv*	
PCB-156	100	0	0.00051	4E-05	8.7E-05	8.2E-05	0.00013	*nsv*	
PCB-157	77	0	8.6E-05	8.7E-06	1.9E-05	1.6E-05	2.8E-05	*nsv*	
PCB-158	100		0.00042	3E-05	0.0001	7.7E-05	0.0001	*nsv*	
PCB-158+160	30		—	—	—	—	—	*nsv*	
PCB-159	4		1.3E-06	—	—	—	—	*nsv*	
PCB-16	94		5.3E-05	9.8E-06	2E-05	8.4E-06	2.1E-05	*nsv*	
PCB-16+32	13		—	—	—	—	—	*nsv*	
PCB-161	4		—	—	—	—	—	*nsv*	
PCB-162	9		—	—	—	—	—	*nsv*	
PCB-163+138	100		0.00305	0.00034	0.00112	—	0.00097	*nsv*	
PCB-164	77		0.00011	9.9E-06	4.9E-05	3.9E-05	3.9E-05	*nsv*	
PCB-165	4		4.6E-06	—	—	—	—	*nsv*	
PCB-166	62		3.9E-05	—	5.1E-06	8.1E-06	8E-06	*nsv*	
PCB-167	100	0	0.00017	2E-05	4.5E-05	4.4E-05	6.4E-05	*nsv*	
PCB-168	4		—	—	0.0002	—	—	*nsv*	
PCB-169	23	0	7.1E-06	—	7.4E-07	—	—	*nsv*	
PCB-17	67		4.2E-05	1.3E-05	1.5E-05	7.1E-06	1.7E-05	*nsv*	
PCB-170	100		0.00095	4.8E-05	0.00023	0.00021	9.8E-05	*nsv*	
PCB-171	77		0.00031	1.1E-05	6.2E-05	6.7E-05	1.8E-05	*nsv*	
PCB-172	77		0.00018	1.1E-05	5E-05	0.00005	2.4E-05	*nsv*	
PCB-173	23		3.6E-06	—	1.3E-06	2.5E-06	—	*nsv*	
PCB-174	88		0.00017	1.6E-05	0.00012	0.00011	5.1E-05	*nsv*	
PCB-175	94		3E-05	—	9.5E-06	9E-06	3.9E-06	*nsv*	
PCB-175+182	40		—	—	—	—	—	*nsv*	
PCB-176	58		1.9E-05	—	1.1E-05	1.4E-05	—	*nsv*	
PCB-177	96		0.00023	2.2E-05	0.00013	0.00013	4.6E-05	*nsv*	
PCB-178	88		0.00024	1.5E-05	7.1E-05	7.2E-05	2.2E-05	*nsv*	
PCB-179	73		0.00014	7.4E-06	6.4E-05	7.2E-05	1.3E-05	*nsv*	
PCB-18	79		7.3E-05	1.9E-05	2.5E-05	1.2E-05	3.7E-05	*nsv*	
PCB-180	100		0.00295	—	0.00035	0.00057	—	*nsv*	
PCB-180+193	100		0.00216	0.00019	0.00065	—	0.00036	*nsv*	

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			Maximum Values (mg/kg)						
PCBs, continued									
PCB-181	58		1.2E-05	—	1.7E-06	2.7E-06	—	*nsv*	
PCB-183	100		0.00071	3.4E-05	0.00016	0.00016	6.2E-05	*nsv*	
PCB-184	4		2.4E-06	—	—	—	—	*nsv*	
PCB-185	69		4.6E-05	4.2E-06	2.7E-05	2.1E-05	8.9E-06	*nsv*	
PCB-187	92		0.00098	0.00016	0.0005	0.00039	0.00024	*nsv*	
PCB-188	8		3E-06	—	—	—	—	*nsv*	
PCB-189	72	0	3.9E-05	—	7.5E-06	8.5E-06	6E-06	*nsv*	
PCB-19	63		4E-05	—	1.9E-05	7E-06	3.7E-06	*nsv*	
PCB-190	88		0.00027	1.7E-05	6.7E-05	5.3E-05	2.8E-05	*nsv*	
PCB-191	73		5.5E-05	—	8.2E-06	9.4E-06	4.8E-06	*nsv*	
PCB-194	85		0.00047	2.8E-05	0.0001	9.6E-05	6.8E-05	*nsv*	
PCB-195	73		0.0002	1E-05	4.7E-05	4.8E-05	1.8E-05	*nsv*	
PCB-196	77		0.0003	1.3E-05	5.8E-05	4.9E-05	2.7E-05	*nsv*	
PCB-197	58		2E-05	—	5.6E-06	5.1E-06	—	*nsv*	
PCB-198	15		—	—	5.6E-06	—	—	*nsv*	
PCB-199	81		0.00028	4.1E-05	0.00016	9.9E-05	9E-05	*nsv*	
PCB-2	25		—	—	6.7E-06	—	—	*nsv*	
PCB-20	100		9.9E-05	—	3.3E-05	1.7E-05	—	*nsv*	
PCB-20+21+33	33		9.9E-05	2.5E-05	2.8E-05	—	4.7E-05	*nsv*	
PCB-200	54		6.9E-06	—	7E-06	7.8E-06	—	*nsv*	
PCB-201	73		3.7E-05	—	1.4E-05	1.4E-05	6.9E-06	*nsv*	
PCB-202	73		0.0001	8.8E-06	3.2E-05	3.2E-05	1.6E-05	*nsv*	
PCB-203	77		0.00029	2.7E-05	0.00011	7.9E-05	6E-05	*nsv*	
PCB-205	54		2.1E-05	—	4.8E-06	5.3E-06	—	*nsv*	
PCB-206	77		0.00013	1.1E-05	3.3E-05	4.1E-05	2.4E-05	*nsv*	
PCB-207	64		2.3E-05	—	5.6E-06	9E-06	4E-06	*nsv*	
PCB-208	76		3.3E-05	4.6E-06	1.4E-05	1.8E-05	1E-05	*nsv*	
PCB-209	81		4E-05	7.2E-06	1.8E-05	2.4E-05	1.2E-05	*nsv*	
PCB-25	67		1.5E-05	8.7E-06	5.6E-06	2.7E-06	5.8E-06	*nsv*	
PCB-26	75		4.4E-05	2.2E-05	1.3E-05	7.7E-06	1.3E-05	*nsv*	
PCB-27	50		8.5E-06	—	2.6E-06	—	—	*nsv*	
PCB-28	100		0.0004	0.0001	1E-04	3.8E-05	9.3E-05	*nsv*	
PCB-29	13		1.5E-06	—	1.7E-06	—	6.2E-06	*nsv*	
PCB-31	88		0.00018	4.7E-05	5.7E-05	3.3E-05	7.2E-05	*nsv*	
PCB-32	25		2.6E-05	9.6E-06	8.4E-06	—	9.6E-06	*nsv*	
PCB-34	4		1.2E-06	—	—	—	—	*nsv*	

State of Oregon Department of Environmental Quality

Appendix C
Tissue Sample Results

LOWER WILLAMETTE BASIN

Samples collected in Fall 2008 or 2009	Percent Detection	Number of samples over screening value	Station ID and Description: WM36 - Willamette River at SP&S RR Bridge (SMB, fillet) 10332	WM12 - Tualatin River at Boones Ferry Rd (SMB, fillet) 10456	WM39 - Multnomah Channel at St. Helens (SMB, fillet) 10549	WM40 - Multnomah Channel at Coon Pt. (2009, SMB, fillet) 10550	WM43 - Clackamas River at High Rocks (2008, NPM, fillet) 11233	Screening Value	S.V. Reference
			Maximum Values (mg/kg)						
PCBs, continued									
PCB-35	21		4.6E-06	—	—	—	—	*nsv*	
PCB-37	100		4.6E-05	1.3E-05	1.5E-05	1.1E-05	1.5E-05	*nsv*	
PCB-39	54		1.6E-05	—	6.4E-06	2.2E-06	—	*nsv*	
PCB-40	58		3.3E-05	7E-06	9.4E-06	7.1E-06	8.7E-06	*nsv*	
PCB-41	100		4.3E-05	—	5.3E-06	6.1E-06	—	*nsv*	
PCB-41+72	29		3.2E-05	6.4E-06	1E-05	—	4.2E-06	*nsv*	
PCB-42	62		0.00011	2E-05	3.4E-05	1.9E-05	2E-05	*nsv*	
PCB-43	100		0.00087	—	0.0002	0.00012	—	*nsv*	
PCB-43+52	40		0.00068	0.00015	0.00024	—	0.0003	*nsv*	
PCB-44	77		0.0003	5.2E-05	8.3E-05	5E-05	0.00011	*nsv*	
PCB-45	62		2.3E-05	4.4E-06	7E-06	4.6E-06	6.1E-06	*nsv*	
PCB-46	23		7.4E-06	—	2.7E-06	—	—	*nsv*	
PCB-47	15		0.00034	6.5E-05	9.1E-05	—	4.5E-05	*nsv*	
PCB-48	62		6.5E-05	9.5E-06	1.9E-05	7.8E-06	1.1E-05	*nsv*	
PCB-49	73		0.00066	7.1E-05	0.00012	7.4E-05	7.9E-05	*nsv*	
PCB-50	4		3.2E-06	—	—	—	—	*nsv*	
PCB-51	62		3.8E-05	4.7E-06	1.2E-05	4.8E-06	5.3E-06	*nsv*	
PCB-53	62		4.3E-05	8E-06	1.6E-05	6.4E-06	7.2E-06	*nsv*	
PCB-54	15		8.1E-06	—	—	—	—	*nsv*	
PCB-55	8		2.9E-06	—	—	—	—	*nsv*	
PCB-56	65		0.0001	2.1E-05	6E-05	3.2E-05	3.1E-05	*nsv*	
PCB-57	8		6.3E-06	—	—	—	—	*nsv*	
PCB-58	100		1.6E-05	—	2.2E-06	3.6E-06	—	*nsv*	
PCB-59	54		2.5E-05	—	8.9E-06	4.3E-06	4.8E-06	*nsv*	
PCB-6	75		5.6E-06	4.1E-06	—	—	6.8E-06	*nsv*	
PCB-60	77		0.00028	3.1E-05	7E-05	4E-05	3.3E-05	*nsv*	
PCB-63	69		7.3E-05	1.4E-05	1.1E-05	8.5E-06	7.8E-06	*nsv*	
PCB-64	88		0.00028	2.8E-05	7.1E-05	4.3E-05	4.6E-05	*nsv*	
PCB-64+68	20		—	—	—	—	—	*nsv*	
PCB-65	100		0.0006	—	6.7E-05	5.6E-05	—	*nsv*	
PCB-65+75	40		—	—	—	—	—	*nsv*	
PCB-66	100		0.00129	0.00023	0.00029	0.00016	0.00013	*nsv*	
PCB-67+58	25		1.3E-05	—	—	—	—	*nsv*	
PCB-68	19		8.1E-06	7.7E-06	—	—	4.5E-06	*nsv*	
PCB-69	4		3E-06	—	—	—	—	*nsv*	
PCB-70	100		0.00046	8.8E-05	0.00019	0.00011	0.00021	*nsv*	

State of Oregon Department of Environmental Quality

Appendix C
Tissue Sample Results

LOWER WILLAMETTE BASIN

Samples collected in Fall 2008 or 2009	Percent Detection	Number of samples over screening value	Station ID and Description: WM36 - Willamette River at SP&S RR Bridge (SMB, fillet) 10332	WM12 - Tualatin River at Boones Ferry Rd (SMB, fillet) 10456	WM39 - Multnomah Channel at St. Helens (SMB, fillet) 10549	WM40 - Multnomah Channel at Coon Pt. (2009, SMB, fillet) 10550	WM43 - Clackamas River at High Rocks (2008, NPM, fillet) 11233	Screening Value	S.V. Reference
			Maximum Values (mg/kg)						
PCBs, continued									
PCB-71	65		9.1E-05	2.2E-05	2.9E-05	4.4E-06	9E-06	*nsv*	
PCB-73	4		3.5E-06	—	—	—	—	*nsv*	
PCB-74	100		0.00083	0.00016	0.00024	8.1E-05	0.00019	*nsv*	
PCB-74+76	70		—	—	—	—	—	*nsv*	
PCB-77	77	0	4E-05	1.6E-05	1.4E-05	9.9E-06	1.2E-05	*nsv*	
PCB-79	4		8.1E-07	—	—	—	—	*nsv*	
PCB-8	25		—	—	—	—	—	*nsv*	
PCB-81	46	0	1.5E-05	—	3.7E-06	5E-06	—	*nsv*	
PCB-82	50		4.9E-05	—	2E-05	2.6E-05	—	*nsv*	
PCB-83	69		0.0001	6.8E-06	2.4E-05	1.7E-05	5.1E-06	*nsv*	
PCB-84	54		8.9E-05	—	3.4E-05	2.8E-05	—	*nsv*	
PCB-85	77		0.00054	5.8E-05	0.00013	8.2E-05	0.00013	*nsv*	
PCB-87	100		0.0004	—	8.2E-05	9.4E-05	3.8E-05	*nsv*	
PCB-87+111+116+117	30		—	—	—	—	—	*nsv*	
PCB-89	77		0.00036	3.1E-05	0.00011	8.3E-05	0.0001	*nsv*	
PCB-90	77		0.00015	2.7E-05	5.7E-05	2E-05	3.5E-05	*nsv*	
PCB-91	68		0.0001	—	2.8E-05	3.1E-05	—	*nsv*	
PCB-92	15		7E-05	1.6E-05	4.6E-05	—	4.8E-05	*nsv*	
PCB-94	58		7.9E-05	—	1.8E-05	8.9E-06	—	*nsv*	
PCB-95	100		0.00044	6.9E-05	0.00021	0.00012	0.00025	*nsv*	
PCB-95+121	40		—	—	—	—	—	*nsv*	
PCB-96	27		7.5E-06	—	1.4E-06	—	—	*nsv*	
PCB-97	81		0.00023	4.8E-05	0.00014	8.5E-05	0.00018	*nsv*	
PCB-99	100		0.00145	0.00019	0.0004	0.00022	0.00037	*nsv*	
Priority Metals (Total)									
Arsenic	100		—	—	—	—	—	*nsv*	
Cadmium	10	0	—	—	—	—	—	2.3	12
Chromium	10		—	—	—	—	—	*nsv*	
Cobalt	80		—	—	—	—	—	*nsv*	
Mercury	97	21	0.61	0.54	0.32	0.12	2.53	0.04	13
Nickel	50		—	—	—	—	—	*nsv*	
Selenium	10	1	—	—	—	—	—	11.7	12
Titanium	100		—	—	—	—	—	*nsv*	
Zinc	100		—	—	—	—	—	*nsv*	

State of Oregon Department of Environmental Quality	Appendix C Tissue Sample Results	LOWER WILLAMETTE BASIN Station ID and Description					
	Samples collected in Fall 2016	WM21 - Willamette River at St. John's Bridge (Crayfish)	WM21 - Willamette River at St. John's Bridge (Prawn)	WM24 - Johnson Creek at Stanley Avenue (Crayfish)	WM33 - Johnson Creek at SE Harney Drive (Crayfish)	Screening Value	S.V. Reference
	2016 Samples	10821	10821	11324	38584		
		Maximum Values (mg/kg)					
Flame Retardants							
PBDE-100		—	0.00043	—	—	*nsv*	
PBDE-119		—	—	—	—	*nsv*	
PBDE-138		—	—	—	—	*nsv*	
PBDE-139		—	—	—	—	*nsv*	
PBDE-140		—	—	—	—	*nsv*	
PBDE-15		—	—	—	—	*nsv*	
PBDE-153		—	3.2E-05	—	—	0.2	12
PBDE-154		—	2E-05	—	—	*nsv*	
PBDE-17		—	—	—	—	*nsv*	
PBDE-171		—	—	—	—	*nsv*	
PBDE-180		—	—	—	—	*nsv*	
PBDE-183		—	—	—	—	*nsv*	
PBDE-184		—	—	—	—	*nsv*	
PBDE-191		—	—	—	—	*nsv*	
PBDE-196		—	—	—	—	*nsv*	
PBDE-197		—	—	—	—	*nsv*	
PBDE-201		—	—	—	—	*nsv*	
PBDE-206		—	—	0.00019	—	*nsv*	
PBDE-209		—	—	0.00427	—	16.3	12
PBDE-28		—	1.3E-05	—	—	*nsv*	
PBDE-47		—	0.00182	—	—	0.2	12
PBDE-49		—	—	—	—	*nsv*	
PBDE-66		—	1.2E-05	—	—	*nsv*	
PBDE-71		—	—	—	—	*nsv*	
PBDE-77		—	—	—	—	*nsv*	
PBDE-85		—	—	—	—	*nsv*	
PBDE-99		—	0.00025	—	—	0.2	12
Pentabromoethylbenzene		—	—	—	—	*nsv*	
Legacy Pesticides							
BHC-alpha		—	—	—	—	*nsv*	
Total Chlordane		0.00011	0.00104	0.00031	0.00040	1.2	14
alpha-Chlordane		—	0.00011	—	1.6E-05	*nsv*	
cis-Nonachlor		4.1E-05	0.00015	8.9E-05	0.00011	*nsv*	
gamma-Chlordane+trans-Nonachlor		6.9E-05	0.00027	0.00022	0.00027	*nsv*	
gamma-Clordane		—	—	—	—	*nsv*	
Oxychlordane		—	0.00051	—	—	*nsv*	

State of Oregon Department of Environmental Quality	Appendix C Tissue Sample Results	LOWER WILLAMETTE BASIN Station ID and Description					
	Samples collected in Fall 2016	WM21 - Willamette River at St. John's Bridge (Crayfish)	WM21 - Willamette River at St. John's Bridge (Prawn)	WM24 - Johnson Creek at Stanley Avenue (Crayfish)	WM33 - Johnson Creek at SE Harney Drive (Crayfish)	Screening Value	S.V. Reference
	2016 Samples	10821	10821	11324	38584		
		Maximum Values (mg/kg)					
Legacy Pesticides, cont'd							
trans-Nonachlor		—	—	—	—	*nsv*	
Dieldrin		1.4E-05	0.00049	0.0001	8.5E-05	0.044	14
Total Endosulfan		—	—	—	—	*nsv*	
Endosulfan I		—	—	—	—	*nsv*	
Endosulfan II		—	—	—	—	*nsv*	
Endrin		—	—	—	—	*nsv*	
Endrin+cis-Nonachlor		4.8E-05	0.00017	0.0001	0.00013	*nsv*	
Heptachlor epoxide		—	2.2E-05	—	—	*nsv*	
Hexachlorobenzene		4.3E-05	—	—	8.1E-05	*nsv*	
Methoxychlor		—	—	—	—	*nsv*	
Mirex		—	1.1E-05	—	—	*nsv*	
Total DDT		0.00188	0.005	0.00265	0.00371	0.051	14
2,4´-DDD		2.5E-05	0.00025	—	—	*nsv*	
2,4´-DDE		—	2.2E-05	—	—	*nsv*	
2,4´-DDT		—	—	—	—	*nsv*	
4,4´-DDD		0.00011	0.00015	7.2E-05	6.5E-05	*nsv*	
4,4´-DDE		0.00163	0.00451	0.00251	0.00359	*nsv*	
4,4´-DDT		0.00011	7.3E-05	7.2E-05	5.9E-05	*nsv*	
PCBs							
Total PCBs		0.00767	0.01417	0.00166	0.03329	0.88	14
PCB-10+4		—	—	—	—	*nsv*	
PCB-100		—	—	—	—	*nsv*	
PCB-101		—	—	—	—	*nsv*	
PCB-101+113		6.5E-05	9.4E-05	—	0.00038	*nsv*	
PCB-102		—	—	—	—	*nsv*	
PCB-103		—	—	—	—	*nsv*	
PCB-104		—	—	—	—	*nsv*	
PCB-105		8.7E-05	0.0002	4.7E-05	0.001	0.02	14
PCB-107		—	—	—	—	*nsv*	
PCB-107+123		5.9E-05	7.3E-05	4.3E-05	0.00079	*nsv*	
PCB-109+123		—	—	—	—	*nsv*	
PCB-11		—	—	—	—	*nsv*	
PCB-110		6.1E-05	0.00015	1.2E-05	0.00025	*nsv*	
PCB-112		—	—	—	—	*nsv*	
PCB-112+119		—	—	—	4.8E-05	*nsv*	
PCB-114		1.4E-05	9.7E-06	1.7E-05	0.00026	0.02	14

State of Oregon Department of Environmental Quality	Appendix C Tissue Sample Results	LOWER WILLAMETTE BASIN Station ID and Description					
	Samples collected in Fall 2016	WM21 - Willamette River at St. John's Bridge (Crayfish)	WM21 - Willamette River at St. John's Bridge (Prawn)	WM24 - Johnson Creek at Stanley Avenue (Crayfish)	WM33 - Johnson Creek at SE Harney Drive (Crayfish)	Screening Value	S.V. Reference
	2016 Samples	10821	10821	11324	38584		
		Maximum Values (mg/kg)					
PCBs, continued							
PCB-115		—	1.4E-05	—	—	*nsv*	
PCB-115+111		—	—	—	—	*nsv*	
PCB-117+87		—	—	—	—	*nsv*	
PCB-118		0.00046	0.00064	0.00034	0.00843	0.02	14
PCB-119+112		—	—	—	—	*nsv*	
PCB-120		—	—	—	1.4E-05	*nsv*	
PCB-121		—	—	—	—	*nsv*	
PCB-122		—	1.2E-05	—	—	*nsv*	
PCB-124		—	—	—	7.3E-05	*nsv*	
PCB-125		—	—	—	—	*nsv*	
PCB-125+86		—	—	—	—	*nsv*	
PCB-126		—	—	—	1.2E-05	1.6E-04	14
PCB-128		3E-05	0.00019	—	6.7E-05	*nsv*	
PCB-128+162		—	—	—	—	*nsv*	
PCB-129		1.1E-05	—	—	0.0001	*nsv*	
PCB-130		2.9E-05	5.7E-05	—	0.00027	*nsv*	
PCB-131		—	—	—	—	*nsv*	
PCB-132		—	—	—	—	*nsv*	
PCB-132+153		0.00104	0.00231	0.00029	0.0051	*nsv*	
PCB-133+131+142		—	—	—	—	*nsv*	
PCB-134		—	—	—	3.6E-05	*nsv*	
PCB-135		1.6E-05	3.3E-05	—	4.9E-05	*nsv*	
PCB-136		—	1E-05	—	—	*nsv*	
PCB-137		3.9E-05	4.8E-05	3.5E-05	0.00065	*nsv*	
PCB-138		—	—	—	—	*nsv*	
PCB-138+163		0.00052	0.00159	0.00015	0.00304	*nsv*	
PCB-139		—	—	—	—	*nsv*	
PCB-140		—	—	—	—	*nsv*	
PCB-141		1.9E-05	4.2E-05	—	5.6E-05	*nsv*	
PCB-142		2.2E-05	3.7E-05	—	9.7E-05	*nsv*	
PCB-144		—	—	—	2.1E-05	*nsv*	
PCB-146		0.00022	—	7.9E-05	0.00136	*nsv*	
PCB-147		2E-05	5.7E-05	—	0.00016	*nsv*	
PCB-148		—	2.1E-05	—	5.7E-05	*nsv*	
PCB-149		8.2E-05	0.00025	1.2E-05	0.00025	*nsv*	
PCB-150		—	—	—	—	*nsv*	

Appendix C Tissue Sample Results	LOWER WILLAMETTE BASIN Station ID and Description					
Samples collected in Fall 2016	WM21 - Willamette River at St. John's Bridge (Crayfish)	WM21 - Willamette River at St. John's Bridge (Prawn)	WM24 - Johnson Creek at Stanley Avenue (Crayfish)	WM33 - Johnson Creek at SE Harney Drive (Crayfish)	Screening Value	S.V. Reference
2016 Samples	10821	10821	11324	38584		
	Maximum Values (mg/kg)					
PCBs, continued						
PCB-151	3.6E-05	2.2E-05	—	7.3E-05	*nsv*	
PCB-152	—	—	—	—	*nsv*	
PCB-153	—	—	—	—	*nsv*	
PCB-154	—	4.2E-05	—	—	*nsv*	
PCB-155	—	—	—	—	*nsv*	
PCB-156	9.3E-05	0.00011	5.4E-05	0.00104	0.02	14
PCB-157	1.3E-05	1.7E-05	—	0.00018	0.02	14
PCB-158	—	—	—	—	*nsv*	
PCB-158+160	—	0.00015	—	8.9E-05	*nsv*	
PCB-159	—	—	—	—	*nsv*	
PCB-16	—	—	—	—	*nsv*	
PCB-16+32	—	1.7E-05	—	—	*nsv*	
PCB-161	—	0.00034	—	—	*nsv*	
PCB-162	—	—	—	3.5E-05	*nsv*	
PCB-163+138	—	—	—	—	*nsv*	
PCB-164	1.4E-05	6.2E-05	—	7.8E-05	*nsv*	
PCB-165	—	—	—	—	*nsv*	
PCB-166	—	1.1E-05	—	5.5E-05	*nsv*	
PCB-167	5.8E-05	6.1E-05	3E-05	0.00041	0.02	14
PCB-168	—	—	—	—	*nsv*	
PCB-169	—	—	—	—	2.0E-05	14
PCB-17	—	—	—	—	*nsv*	
PCB-170	0.0002	0.00039	2.3E-05	0.00026	*nsv*	
PCB-171	3.4E-05	0.00016	—	2.5E-05	*nsv*	
PCB-172	5.2E-05	0.00011	—	6.4E-05	*nsv*	
PCB-173	—	—	—	—	*nsv*	
PCB-174	7.5E-05	0.00016	—	6.7E-05	*nsv*	
PCB-175	—	—	—	—	*nsv*	
PCB-175+182	0.00095	3.2E-05	—	—	*nsv*	
PCB-176	—	—	—	—	*nsv*	
PCB-177	0.00015	0.00039	1.1E-05	0.00017	*nsv*	
PCB-178	6.1E-05	0.00016	—	3.6E-05	*nsv*	
PCB-179	1.4E-05	6.8E-05	—	1.3E-05	*nsv*	
PCB-18	6.9E-06	—	—	9.9E-06	*nsv*	
PCB-180	—	—	—	—	*nsv*	
PCB-180+193	0.00119	0.00159	0.00016	0.00149	*nsv*	

State of Oregon Department of Environmental Quality	Appendix C Tissue Sample Results	LOWER WILLAMETTE BASIN Station ID and Description					
	Samples collected in Fall 2016	WM21 - Willamette River at St. John's Bridge (Crayfish)	WM21 - Willamette River at St. John's Bridge (Prawn)	WM24 - Johnson Creek at Stanley Avenue (Crayfish)	WM33 - Johnson Creek at SE Harney Drive (Crayfish)	Screening Value	S.V. Reference
	2016 Samples	10821	10821	11324	38584		
		Maximum Values (mg/kg)					
PCBs, continued							
PCB-181		—	—	—	2.1E-05	*nsv*	
PCB-183		0.00018	0.00045	1.4E-05	0.00017	*nsv*	
PCB-184		—	—	—	—	*nsv*	
PCB-185		1.3E-05	—	—	—	*nsv*	
PCB-187		0.00053	0.00112	0.00015	0.00101	*nsv*	
PCB-188		—	—	—	—	*nsv*	
PCB-189		—	1.4E-05	—	3E-05	0.02	14
PCB-19		—	—	—	—	*nsv*	
PCB-190		2.6E-05	3.7E-05	—	7.2E-05	*nsv*	
PCB-191		1.4E-05	2E-05	—	2.3E-05	*nsv*	
PCB-194		5.3E-05	0.00015	—	8.2E-05	*nsv*	
PCB-195		—	4.2E-05	—	1.9E-05	*nsv*	
PCB-196		2.7E-05	9.2E-05	—	3.1E-05	*nsv*	
PCB-197		—	—	—	—	*nsv*	
PCB-198		—	—	—	—	*nsv*	
PCB-199		1E-04	0.00029	2E-05	0.0001	*nsv*	
PCB-2		—	—	—	—	*nsv*	
PCB-20		—	—	—	—	*nsv*	
PCB-20+21+33		—	—	—	—	*nsv*	
PCB-200		—	—	—	—	*nsv*	
PCB-201		1.1E-05	3.6E-05	—	1.3E-05	*nsv*	
PCB-202		1.7E-05	7.1E-05	—	—	*nsv*	
PCB-203		2.3E-05	6.8E-05	—	3.7E-05	*nsv*	
PCB-205		—	—	—	—	*nsv*	
PCB-206		5.6E-05	0.00023	—	2.5E-05	*nsv*	
PCB-207		—	—	—	—	*nsv*	
PCB-208		4.9E-05	0.00012	—	—	*nsv*	
PCB-209		6.8E-05	0.00013	—	1.9E-05	*nsv*	
PCB-25		—	—	—	—	*nsv*	
PCB-26		—	—	—	1.3E-05	*nsv*	
PCB-27		—	—	—	—	*nsv*	
PCB-28		4.2E-05	8.3E-05	8.9E-06	3.8E-05	*nsv*	
PCB-29		—	—	—	—	*nsv*	
PCB-31		1.1E-05	1.6E-05	—	6.4E-06	*nsv*	
PCB-32		—	—	—	—	*nsv*	
PCB-34		—	—	—	—	*nsv*	

Appendix C Tissue Sample Results	LOWER WILLAMETTE BASIN Station ID and Description					
Samples collected in Fall 2016	WM21 - Willamette River at St. John's Bridge (Crayfish)	WM21 - Willamette River at St. John's Bridge (Prawn)	WM24 - Johnson Creek at Stanley Avenue (Crayfish)	WM33 - Johnson Creek at SE Harney Drive (Crayfish)	Screening Value	S.V. Reference
2016 Samples	10821	10821	11324	38584		
	Maximum Values (mg/kg)					
PCBs, continued						
PCB-35	—	—	—	—	*nsv*	
PCB-37	3.4E-05	2.4E-05	9.9E-06	8.3E-05	*nsv*	
PCB-39	—	—	—	—	*nsv*	
PCB-40	—	—	—	—	*nsv*	
PCB-41	—	—	—	—	*nsv*	
PCB-41+72	—	—	—	—	*nsv*	
PCB-42	—	—	—	—	*nsv*	
PCB-43	—	—	—	—	*nsv*	
PCB-43+52	2.8E-05	2.4E-05	—	0.00025	*nsv*	
PCB-44	1.5E-05	1E-05	—	8.4E-05	*nsv*	
PCB-45	—	—	—	—	*nsv*	
PCB-46	—	—	—	—	*nsv*	
PCB-47	—	—	—	—	*nsv*	
PCB-48	—	—	—	—	*nsv*	
PCB-49	1.7E-05	—	—	5.1E-05	*nsv*	
PCB-50	—	—	—	—	*nsv*	
PCB-51	—	—	—	—	*nsv*	
PCB-53	—	—	—	—	*nsv*	
PCB-54	—	—	—	—	*nsv*	
PCB-55	—	—	—	—	*nsv*	
PCB-56	—	—	—	1.2E-05	*nsv*	
PCB-57	—	—	—	—	*nsv*	
PCB-58	—	—	—	—	*nsv*	
PCB-59	—	—	—	—	*nsv*	
PCB-6	—	—	—	—	*nsv*	
PCB-60	1.6E-05	2.7E-05	—	3.1E-05	*nsv*	
PCB-63	—	—	—	5.5E-05	*nsv*	
PCB-64	—	—	—	—	*nsv*	
PCB-64+68	—	—	—	3.3E-05	*nsv*	
PCB-65	—	—	—	—	*nsv*	
PCB-65+75	2.6E-05	0.00023	—	3.1E-05	*nsv*	
PCB-66	0.00013	0.00018	4.7E-05	0.00069	*nsv*	
PCB-67+58	—	—	—	—	*nsv*	
PCB-68	—	—	—	—	*nsv*	
PCB-69	—	—	—	—	*nsv*	
PCB-70	5.7E-05	6E-05	1.8E-05	0.00024	*nsv*	

Appendix C Tissue Sample Results	LOWER WILLAMETTE BASIN Station ID and Description					
Samples collected in Fall 2016	WM21 - Willamette River at St. John's Bridge (Crayfish)	WM21 - Willamette River at St. John's Bridge (Prawn)	WM24 - Johnson Creek at Stanley Avenue (Crayfish)	WM33 - Johnson Creek at SE Harney Drive (Crayfish)	Screening Value	S.V. Reference
2016 Samples	10821	10821	11324	38584		
	Maximum Values (mg/kg)					
PCBs, continued						
PCB-71	—	2.8E-05	—	—	*nsv*	
PCB-73	—	—	—	—	*nsv*	
PCB-74	—	—	—	—	*nsv*	
PCB-74+76	7.1E-05	0.00011	2.8E-05	0.00047	*nsv*	
PCB-77	1.8E-05	1.6E-05	—	7.7E-05	1.6E-04	14
PCB-79	—	—	—	—	*nsv*	
PCB-8	—	—	—	—	*nsv*	
PCB-81	—	—	—	—	8.0E-05	14
PCB-82	—	—	—	2.8E-05	*nsv*	
PCB-83	—	4.1E-05	—	—	*nsv*	
PCB-84	—	—	—	6.9E-05	*nsv*	
PCB-85	2.3E-05	8.1E-05	—	6.8E-05	*nsv*	
PCB-87	—	—	—	—	*nsv*	
PCB-87+111+116+117	—	3.8E-05	—	0.0004	*nsv*	
PCB-89	1.9E-05	1.5E-05	—	0.00011	*nsv*	
PCB-90	4.9E-05	5.8E-05	1.4E-05	0.00035	*nsv*	
PCB-91	—	1.4E-05	—	3.4E-05	*nsv*	
PCB-92	—	—	—	—	*nsv*	
PCB-94	—	3.2E-05	—	—	*nsv*	
PCB-95	—	—	—	—	*nsv*	
PCB-95+121	2.7E-05	2.1E-05	—	0.0003	*nsv*	
PCB-96	—	—	—	—	*nsv*	
PCB-97	3.9E-05	1.4E-05	1.2E-05	0.00032	*nsv*	
PCB-99	0.00014	0.00047	4.1E-05	0.00113	*nsv*	
Priority Metals (Total)						
Arsenic	0.28	0.39	0.22	0.28	7.6	14
Cadmium	—	—	—	—	5.6	14
Chromium	—	—	—	0.63	*nsv*	
Cobalt	0.38	—	0.37	0.26	*nsv*	
Mercury	0.022	—	0.03	0.019	0.04	13
Nickel	0.28	—	0.64	1.08	*nsv*	
Selenium	—	—	—	—	0.036	14
Titanium	14.4	9.72	7.45	11.8	*nsv*	
Zinc	19.4	17.9	26.3	24.1	*nsv*	

Appendix C Tissue Sample Results	LOWER WILLAMETTE BASIN Station ID and Description					
Samples collected in Fall 2016	WM35 - Willamette R at St Johns Bridge (whole body)	WM35 - Willamette R at St Johns Bridge (carcass)	WM35 - Willamette R at St Johns Bridge (ab muscle)	WM35 - Willamette R at St Johns Bridge (viscera)	Screening Value	S.V. Reference
2016 Samples	38813	38813	38813	38813		
	Maximum Values (mg/kg)					
Flame Retardants						
PBDE-100	—	—	—	0.00034	*nsv*	
PBDE-119	—	—	—	—	*nsv*	
PBDE-138	—	—	—	—	*nsv*	
PBDE-139	—	—	—	—	*nsv*	
PBDE-140	—	—	—	—	*nsv*	
PBDE-15	—	—	—	—	*nsv*	
PBDE-153	—	—	—	0.00014	0.2	12
PBDE-154	—	—	—	0.00013	*nsv*	
PBDE-17	—	—	—	—	*nsv*	
PBDE-171	—	—	—	—	*nsv*	
PBDE-180	—	—	—	—	*nsv*	
PBDE-183	—	—	—	—	*nsv*	
PBDE-184	—	—	—	—	*nsv*	
PBDE-191	—	—	—	—	*nsv*	
PBDE-196	—	—	—	—	*nsv*	
PBDE-197	—	—	—	—	*nsv*	
PBDE-201	—	—	—	—	*nsv*	
PBDE-206	—	—	—	—	*nsv*	
PBDE-209	—	—	—	0.0002	16.3	12
PBDE-28	—	—	—	9.3E-06	*nsv*	
PBDE-47	—	—	—	0.00106	0.2	12
PBDE-49	—	—	—	—	*nsv*	
PBDE-66	—	—	—	1.3E-05	*nsv*	
PBDE-71	—	—	—	—	*nsv*	
PBDE-77	—	—	—	—	*nsv*	
PBDE-85	—	—	—	—	*nsv*	
PBDE-99	—	—	—	0.00116	0.2	12
Pentabromoethylbenzene	—	—	—	—	*nsv*	
Legacy Pesticides						
BHC-alpha	—	—	—	—	*nsv*	
Total Chlordane	0.00007	0.00002	—	0.00048	1.2	14
alpha-Chlordane	—	—	—	—	*nsv*	
cis-Nonachlor	1.7E-05	—	—	0.00014	*nsv*	
gamma-Chlordane+trans-Nonachlor	4.8E-05	2.5E-05	—	0.00031	*nsv*	
gamma-Clordane	—	—	—	—	*nsv*	
Oxychlordane	—	—	—	2.3E-05	*nsv*	

Appendix C Tissue Sample Results	LOWER WILLAMETTE BASIN Station ID and Description					
Samples collected in Fall 2016	WM35 - Willamette R at St Johns Bridge (whole body)	WM35 - Willamette R at St Johns Bridge (carcass)	WM35 - Willamette R at St Johns Bridge (ab muscle)	WM35 - Willamette R at St Johns Bridge (viscera)	Screening Value	S.V. Reference
2016 Samples	38813	38813	38813	38813		
	Maximum Values (mg/kg)					
Legacy Pesticides, cont'd						
trans-Nonachlor	—	—	—	—	*nsv*	
Dieldrin	—	—	—	2.5E-05	0.044	14
Total Endosulfan	—	—	—	—	*nsv*	
Endosulfan I	—	—	—	—	*nsv*	
Endosulfan II	—	—	—	—	*nsv*	
Endrin	—	—	—	—	*nsv*	
Endrin+cis-Nonachlor	—	—	—	0.00013	*nsv*	
Heptachlor epoxide	—	—	—	—	*nsv*	
Hexachlorobenzene			—	8.3E-05	*nsv*	
Methoxychlor	—	—	—	—	*nsv*	
Mirex	—	—	—	3.5E-05	*nsv*	
Total DDT	0.00121	0.00041	—	0.0121	0.051	14
2,4´-DDD	1.7E-05	1.4E-05	—	4.4E-05	*nsv*	
2,4´-DDE	—	—	—	2.1E-05	*nsv*	
2,4´-DDT	—	—	—	1.4E-05	*nsv*	
4,4´-DDD	6.2E-05	3.2E-05	—	0.00049	*nsv*	
4,4´-DDE	0.00113	0.00037	—	0.0113	*nsv*	
4,4´-DDT	—	—	—	0.00023	*nsv*	
PCBs						
Total PCBs	0.00232	0.00083	0.00095	0.03113	0.88	14
PCB-10+4	—	—	—	—	*nsv*	
PCB-100	—	—	—	—	*nsv*	
PCB-101	—	—	—	—	*nsv*	
PCB-101+113	—	—	—	8.6E-05	*nsv*	
PCB-102	—	—	—	—	*nsv*	
PCB-103	—	—	—	—	*nsv*	
PCB-104	—	—	—	—	*nsv*	
PCB-105	2.3E-05	1.3E-05	1.3E-05	0.00028	0.02	14
PCB-107	—	—	—	—	*nsv*	
PCB-107+123	2.9E-05	—	—	0.00023	*nsv*	
PCB-109+123	—	—	—	—	*nsv*	
PCB-11	—	—	—	—	*nsv*	
PCB-110	1.5E-05	1.7E-05	8.4E-06	3.3E-05	*nsv*	
PCB-112	—	—	—	—	*nsv*	
PCB-112+119	—	—	—	—	*nsv*	
PCB-114	1.2E-05	—	—	9.2E-05	0.02	14

Appendix C Tissue Sample Results	LOWER WILLAMETTE BASIN Station ID and Description					
Samples collected in Fall 2016	WM35 - Willamette R at St Johns Bridge (whole body)	WM35 - Willamette R at St Johns Bridge (carcass)	WM35 - Willamette R at St Johns Bridge (ab muscle)	WM35 - Willamette R at St Johns Bridge (viscera)	Screening Value	S.V. Reference
2016 Samples	38813	38813	38813	38813		
	Maximum Values (mg/kg)					
PCBs, continued						
PCB-115	—	—	—	—	*nsv*	
PCB-115+111	—	—	—	—	*nsv*	
PCB-117+87	—	—	—	—	*nsv*	
PCB-118	0.00026	7.8E-05	6.7E-05	0.00172	0.02	14
PCB-119+112	—	—	—	—	*nsv*	
PCB-120	—	—	—	1.9E-05	*nsv*	
PCB-121	—	—	—	—	*nsv*	
PCB-122	—	—	—	—	*nsv*	
PCB-124	—	—	—	1.1E-05	*nsv*	
PCB-125	—	—	—	—	*nsv*	
PCB-125+86	—	—	—	—	*nsv*	
PCB-126	—	—	—	1E-05	1.6E-04	14
PCB-128	—	—	—	3.3E-05	*nsv*	
PCB-128+162	—	—	—	—	*nsv*	
PCB-129	—	—	—	3.5E-05	*nsv*	
PCB-130	—	—	—	7.3E-05	*nsv*	
PCB-131	—	—	—	—	*nsv*	
PCB-132	—	—	—	—	*nsv*	
PCB-132+153	0.00037	0.00015	0.00016	0.00461	*nsv*	
PCB-133+131+142	—	—	—	—	*nsv*	
PCB-134	—	—	—	1.2E-05	*nsv*	
PCB-135	—	—	—	2E-05	*nsv*	
PCB-136	—	—	—	—	*nsv*	
PCB-137	2.2E-05	—	7.9E-06	0.00017	*nsv*	
PCB-138	—	—	—	—	*nsv*	
PCB-138+163	0.00022	7.9E-05	8.8E-05	0.00188	*nsv*	
PCB-139	—	—	—	—	*nsv*	
PCB-140	—	—	—	—	*nsv*	
PCB-141	—	—	—	2.5E-05	*nsv*	
PCB-142	1.2E-05	—	—	8.7E-05	*nsv*	
PCB-144	—	—	—	1.2E-05	*nsv*	
PCB-146	0.00017	4.6E-05	5.3E-05	0.00105	*nsv*	
PCB-147	—	—	—	6.8E-05	*nsv*	
PCB-148	—	—	—	1.5E-05	*nsv*	
PCB-149	2.9E-05	2E-05	1.4E-05	0.00013	*nsv*	
PCB-150	—	—	—	—	*nsv*	

Appendix C Tissue Sample Results	LOWER WILLAMETTE BASIN Station ID and Description					
Samples collected in Fall 2016	WM35 - Willamette R at St Johns Bridge (whole body)	WM35 - Willamette R at St Johns Bridge (carcass)	WM35 - Willamette R at St Johns Bridge (ab muscle)	WM35 - Willamette R at St Johns Bridge (viscera)	Screening Value	S.V. Reference
2016 Samples	38813	38813	38813	38813		
	Maximum Values (mg/kg)					
PCBs, continued						
PCB-151	1.6E-05	—	7.2E-06	0.00011	*nsv*	
PCB-152	—	—	—	—	*nsv*	
PCB-153	—	—	—	—	*nsv*	
PCB-154	—	—	—	1.1E-05	*nsv*	
PCB-155	—	—	—	—	*nsv*	
PCB-156	5E-05	1.7E-05	1.4E-05	0.00043	0.02	14
PCB-157	—	—	—	5.1E-05	0.02	14
PCB-158	—	—	—	—	*nsv*	
PCB-158+160	—	—	—	5.6E-05	*nsv*	
PCB-159	—	—	—	—	*nsv*	
PCB-16	—	—	—	—	*nsv*	
PCB-16+32	—	—	—	—	*nsv*	
PCB-161	—	—	—	—	*nsv*	
PCB-162	—	—	—	1.6E-05	*nsv*	
PCB-163+138	—	—	—	—	*nsv*	
PCB-164	—	—	—	2.4E-05	*nsv*	
PCB-165	—	—	—	—	*nsv*	
PCB-166	—	—	—	2.5E-05	*nsv*	
PCB-167	3.2E-05	1.2E-05	1.1E-05	0.00021	0.02	14
PCB-168	—	—	—	—	*nsv*	
PCB-169	—	—	—	—	2.0E-05	14
PCB-17	—	—	—	—	*nsv*	
PCB-170	2.5E-05	1.5E-05	9.6E-06	0.00081	*nsv*	
PCB-171	—	—	—	5.9E-05	*nsv*	
PCB-172	—	—	—	0.00013	*nsv*	
PCB-173	—	—	—	—	*nsv*	
PCB-174	1.4E-05	—	7.1E-06	8.3E-05	*nsv*	
PCB-175	—	—	—	—	*nsv*	
PCB-175+182	—	0.0001	—	2.8E-05	*nsv*	
PCB-176	—	—	—	8.8E-06	*nsv*	
PCB-177	2.6E-05	1.2E-05	1.7E-05	0.00028	*nsv*	
PCB-178	1.4E-05	—	8.1E-06	0.00017	*nsv*	
PCB-179	—	—	—	2.2E-05	*nsv*	
PCB-18	—	—	—	1.4E-05	*nsv*	
PCB-180	—	—	—	—	*nsv*	
PCB-180+193	0.00034	0.00015	0.00018	0.00745	*nsv*	

State of Oregon Department of Environmental Quality	Appendix C Tissue Sample Results	LOWER WILLAMETTE BASIN Station ID and Description					
	Samples collected in Fall 2016	WM35 - Willamette R at St Johns Bridge (whole body)	WM35 - Willamette R at St Johns Bridge (carcass)	WM35 - Willamette R at St Johns Bridge (ab muscle)	WM35 - Willamette R at St Johns Bridge (viscera)	Screening Value	S.V. Reference
	2016 Samples	38813	38813	38813	38813		
		Maximum Values (mg/kg)					
PCBs, continued							
PCB-181		—	—	—	1.4E-05	*nsv*	
PCB-183		2.8E-05	1.5E-05	2.3E-05	0.00064	*nsv*	
PCB-184		—	—	—	—	*nsv*	
PCB-185		—	—	—	2.1E-05	*nsv*	
PCB-187		0.00031	—	0.00019	0.00454	*nsv*	
PCB-188		—	—	—	—	*nsv*	
PCB-189		—	—	—	4.1E-05	0.02	14
PCB-19		—	—	—	—	*nsv*	
PCB-190		1.2E-05	—	—	0.00021	*nsv*	
PCB-191		—	—	—	7.6E-05	*nsv*	
PCB-194		1.9E-05	—	—	0.00066	*nsv*	
PCB-195		—	—	—	0.00019	*nsv*	
PCB-196		—	—	—	0.00035	*nsv*	
PCB-197		—	—	—	1.8E-05	*nsv*	
PCB-198		3.4E-05	1.9E-05	—	—	*nsv*	
PCB-199		3.4E-05	1.9E-05	—	0.00076	*nsv*	
PCB-2		—	—	—	—	*nsv*	
PCB-20		—	—	—	—	*nsv*	
PCB-20+21+33		—	—	—	—	*nsv*	
PCB-200		—	—	—	—	*nsv*	
PCB-201		—	—	—	7.6E-05	*nsv*	
PCB-202		—	—	—	3.9E-05	*nsv*	
PCB-203		—	—	—	6.9E-05	*nsv*	
PCB-205		—	—	—	—	*nsv*	
PCB-206		—	—	—	5.9E-05	*nsv*	
PCB-207		—	—	—	0.00003	*nsv*	
PCB-208		—	—	—	4.9E-05	*nsv*	
PCB-209		1.6E-05	—	—	6.9E-05	*nsv*	
PCB-25		—	—	—	—	*nsv*	
PCB-26		—	—	—	1.2E-05	*nsv*	
PCB-27		—	—	—	—	*nsv*	
PCB-28		1.7E-05	—	6.8E-06	0.00014	*nsv*	
PCB-29		—	—	—	—	*nsv*	
PCB-31		5.5E-06	—	—	2E-05	*nsv*	
PCB-32		—	—	—	—	*nsv*	
PCB-34		—	—	—	—	*nsv*	

Appendix C Tissue Sample Results	LOWER WILLAMETTE BASIN Station ID and Description					
Samples collected in Fall 2016	WM35 - Willamette R at St Johns Bridge (whole body)	WM35 - Willamette R at St Johns Bridge (carcass)	WM35 - Willamette R at St Johns Bridge (ab muscle)	WM35 - Willamette R at St Johns Bridge (viscera)	Screening Value	S.V. Reference
2016 Samples	38813	38813	38813	38813		
	Maximum Values (mg/kg)					
PCBs, continued						
PCB-35	—	—	—	—	*nsv*	
PCB-37	1.6E-05	6.2E-06	5.6E-06	0.0001	*nsv*	
PCB-39	—	—	—	—	*nsv*	
PCB-40	—	—	—	—	*nsv*	
PCB-41	—	—	—	—	*nsv*	
PCB-41+72	—	—	—	—	*nsv*	
PCB-42	—	—	—	—	*nsv*	
PCB-43	—	—	—	—	*nsv*	
PCB-43+52	—	—	—	5.7E-05	*nsv*	
PCB-44	—	—	—	2.9E-05	*nsv*	
PCB-45	—	—	—	—	*nsv*	
PCB-46	—	—	—	—	*nsv*	
PCB-47	—	—	—	—	*nsv*	
PCB-48	—	—	—	—	*nsv*	
PCB-49	—	—	—	2.9E-05	*nsv*	
PCB-50	—	—	—	—	*nsv*	
PCB-51	—	—	—	—	*nsv*	
PCB-53	—	—	—	—	*nsv*	
PCB-54	—	—	—	—	*nsv*	
PCB-55	—	—	—	—	*nsv*	
PCB-56	—	—	—	—	*nsv*	
PCB-57	—	—	—	—	*nsv*	
PCB-58	—	—	—	—	*nsv*	
PCB-59	—	—	—	—	*nsv*	
PCB-6	—	—	—	—	*nsv*	
PCB-60	—	—	—	4.2E-05	*nsv*	
PCB-63	—	—	—	4.5E-05	*nsv*	
PCB-64	—	—	—	—	*nsv*	
PCB-64+68	—	—	—	3.3E-05	*nsv*	
PCB-65	—	—	—	—	*nsv*	
PCB-65+75	—	—	—	6.3E-05	*nsv*	
PCB-66	5.2E-05	2.7E-05	2.1E-05	0.00048	*nsv*	
PCB-67+58	—	—	—	—	*nsv*	
PCB-68	—	—	—	—	*nsv*	
PCB-69	—	—	—	—	*nsv*	
PCB-70	1.9E-05	1.4E-05	8.4E-06	0.00012	*nsv*	

Appendix C Tissue Sample Results	LOWER WILLAMETTE BASIN Station ID and Description					
Samples collected in Fall 2016	WM35 - Willamette R at St Johns Bridge (whole body)	WM35 - Willamette R at St Johns Bridge (carcass)	WM35 - Willamette R at St Johns Bridge (ab muscle)	WM35 - Willamette R at St Johns Bridge (viscera)	Screening Value	S.V. Reference
2016 Samples	38813	38813	38813	38813		
	Maximum Values (mg/kg)					
PCBs, continued						
PCB-71	—	—	—	—	*nsv*	
PCB-73	—	—	—	—	*nsv*	
PCB-74	—	—	—	—	*nsv*	
PCB-74+76	3.2E-05	—	—	0.00033	*nsv*	
PCB-77	—	—	—	5.8E-05	1.6E-04	14
PCB-79	—	—	—	—	*nsv*	
PCB-8	—	—	—	—	*nsv*	
PCB-81	—	—	—	—	8.0E-05	14
PCB-82	—	—	—	—	*nsv*	
PCB-83	—	—	—	7.5E-06	*nsv*	
PCB-84	—	—	—	7.7E-06	*nsv*	
PCB-85	—	—	—	2.4E-05	*nsv*	
PCB-87	—	—	—	—	*nsv*	
PCB-87+111+116+117	—	—	—	9.5E-05	*nsv*	
PCB-89	—	—	—	3.2E-05	*nsv*	
PCB-90	1.9E-05	—	7.4E-06	0.00018	*nsv*	
PCB-91	—	—	—	8.3E-06	*nsv*	
PCB-92	—	—	—	—	*nsv*	
PCB-94	—	—	—	—	*nsv*	
PCB-95	—	—	—	—	*nsv*	
PCB-95+121	—	—	—	5.8E-05	*nsv*	
PCB-96	—	—	—	—	*nsv*	
PCB-97	—	—	—	9.2E-05	*nsv*	
PCB-99	3.4E-05	2.1E-05	2E-05	0.0005	*nsv*	
Priority Metals (Total)						
Arsenic	0.38	0.22	0.17	0.66	7.6	14
Cadmium	—	—	—	0.05	5.6	14
Chromium	—	—	—	—	*nsv*	
Cobalt	0.25	0.21	—	0.45	*nsv*	
Mercury	0.022	0.03	0.102	0.014	0.04	13
Nickel	—	—	—	0.23	*nsv*	
Selenium	—	—	—	0.37	0.036	14
Titanium	13.1	11	7.5	13.1	*nsv*	
Zinc	50	23.1	17.2	21.9	*nsv*	