

Basin Summary Reports

Supplement to the Statewide Water Quality Toxics Assessment Report

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State of Oregon
Department of
Environmental
Quality

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Environmental
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1. Introduction

In April 2015, Oregon Department of Environmental Quality released its first Statewide Water Quality Toxics Assessment Report ([DEQ15-LAB-0065-TR](#)). This report provided a high level statewide overview of the agency's water quality toxics monitoring program.

As a supplemental report, this document is a compilation of detailed, basin specific data summaries. These summaries are meant to be interpreted in conjunction with the statewide assessment report. Please refer to the statewide report for more information on the monitoring program including descriptions of and information about chemicals monitored, sampling methods, analytical methods and complete lists of compounds analyzed, general statewide summaries of data and references.

The data collected under this monitoring program are utilized by DEQ and its partner agencies for a variety of purposes. The data are evaluated where appropriate as part of Integrated Report (303d listing process). The data may be utilized by the National Pollutant Discharge Elimination System (NPDES) program in the permitting process. Stakeholder and local groups may use the data to focus their monitoring efforts or to support grant applications for additional monitoring resources. The data are also used in communication and outreach efforts as part of DEQ's overall Toxics Reduction Strategy.

2. Basin Summaries

2.1 Deschutes

In 2012, DEQ laboratory staff collected seasonal (June, September and October) water samples at 19 locations across the basin (Table 1). These sampling sites represented a range of watershed sizes and land uses. Samples from two sites, Trout Creek downstream of Mud Springs Creek and Crooked River at Lone Pine Rd., contained the greatest numbers of unique chemicals (Figure 1). The laboratory analyzed samples collected in the Deschutes Basin for more than 500 unique chemicals. Of these, detections occurred at least once for 39 unique analytes (Figures 3 and 4, Statewide Report).

Seasonality

In order to capture seasonal use patterns and hydrologic differences, collection of water samples took place three times during the year. Figure 2 shows the unique number of chemical detected by chemical group in each of the seasonal sampling events. This figure does not include data for PCBs, flame retardants or dioxins and furans. Due to laboratory capacity limitations, analysis for these chemicals only occurred during one sampling event at each site. In addition, this figure does not include plant and animal sterols. Detections for the four most common sterols occurred during each season.

In general, the greatest number of unique chemicals detected occurred in the summer samples, followed by the spring and then the fall.

Priority metals

This group includes all metals for which Oregon has existing water quality criteria. These metals occur naturally and may also be enriched by human activities. Because of this, detections of these metals are

common in water. While samples from each site in the Deschutes Basin contained at least one metal, only two sites contained metals at levels of concern over established aquatic life criteria. Arsenic (inorganic) at Trout Creek downstream of Mud Springs Creek exceeded the DEQ Table 40 human health criterion (2.1 µg/L). This is the only site in the basin that exceeded the inorganic arsenic criterion. Levels measured at all other sites were less than half the criterion. In addition, the other Trout Creek site did not show any levels of arsenic above the criterion. Due to analytical difficulties, inorganic arsenic analyses were not completed for the summer sampling. Another metal, copper, exceeded the DEQ Table 30 aquatic life criterion in samples from the White River at Tygh Valley State Park.

Metals occurred in the samples consistently during each season. Both exceedances of water quality criteria described above occurred during the fall sampling.

Table 1 – Deschutes Basin sampling locations.

Station	Site Code	Site Description	Watershed Area (km ²)
10411	D01	Deschutes River at Deschutes River Park	27774
10506	D02	Deschutes River at Hwy 26 (Warm Springs)	20893
10508	D03	Deschutes River at Lower Bridge	5442
10517	D04	Crooked River at Lone Pine Road (Terrebonne)	11636
10684	D05	Deschutes River at Benham Falls Footbridge	4522
10689	D06	Deschutes River at Wickiup Reservoir Gauge Station	1061
10696	D07	Little Deschutes River at HWY 42 (Road 2114)	2663
10697	D08	Little Deschutes River at Burgess Road	2301
11387	D09	White River at Tygh Valley State Park	1080
11477	D10	Crooked River at Conant Basin Road	6097
12561	D11	Deschutes River upstream of Riverhouse Hotel	4810
25558	D12	Metolius River at Track C Bridge	2
32475	D13	Crooked River at County Park	7151
32494	D14	Crooked River at Elliot Drive	8384
33093	D15	Ochoco Creek at mouth of Duncan Creek	127
33939	D16	Trout Creek in lower canyon on Trout Creek Ranch	1486
36030	D17	Deschutes River at Shears Falls Fish Ladder	26762
36776	D18	Trout Creek downstream of Mud Springs Creek	1726
37106	D19	Tumalo Creek downstream of Bridge Creek at Skyliner Road (County Hwy 4601)	77

Current use pesticides

Detections of at least one current use pesticide occurred at 10 of the 19 sites sampled in the Deschutes Basin. Of the seven different current use pesticides detected in the basin, none exceeded the EPA aquatic life benchmarks or DEQ criteria and most occurred individually. However, persistent low-level detections and multiple chemicals at one site may act synergistically or additively in the environment resulting in impacts to the aquatic community.

Seasonally, spring and summer samples contained the most pesticides. Detections typically did not occur across seasons, with the exception of diuron at the Trout Creek site downstream of Mud Springs Creek, which occurred during each sampling event. Diuron is a broad-spectrum herbicide used to control plant growth along roadsides and right of ways. Diuron and 2,4-D were each detected at five sites. Detections of linuron, an herbicide used on broadleaf and grassy weeds, only occurred at two sites across the state and both were within the Deschutes Basin (Deschutes River at Hwy 26 and Trout Creek downstream of Mud Springs Creek). Fluridone, an aquatic weed herbicide, occurred once during the fall at the Deschutes River at Benham Falls.

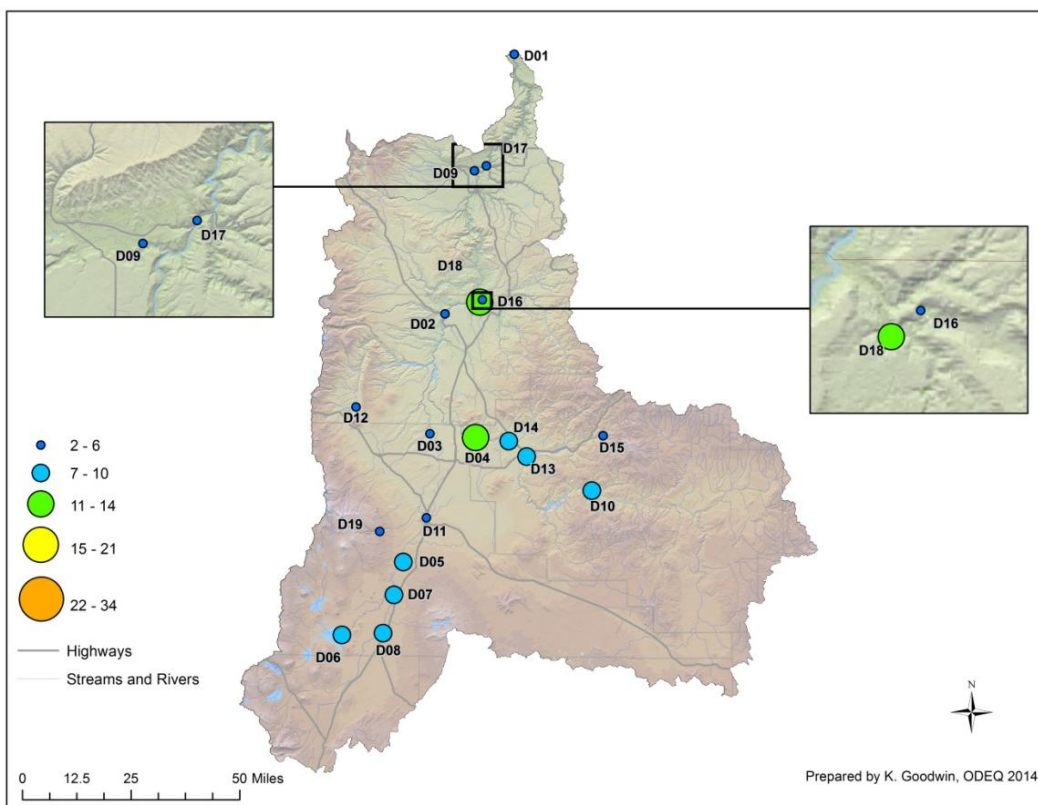


Figure 1 - Number of unique chemicals detected by site in the Deschutes Basin.

Legacy pesticides

Samples from 7 of 19 sites in the Deschutes Basin contained at least one legacy pesticide compound. Similar to current use pesticides, these compounds occurred more commonly in spring and summer samples. Dieldrin and endosulfan sulfate were present in samples from all seasons at the Trout Creek downstream of Mud Springs Creek site.

Unlike current use pesticides, detections of legacy pesticides exceeded Oregon DEQ Table 40 water quality criteria for at the Trout Creek downstream of Mud Springs Creek (dieldrin and 4,4'-DDE) and the Crooked River at County Park (heptachlor epoxide) sites.

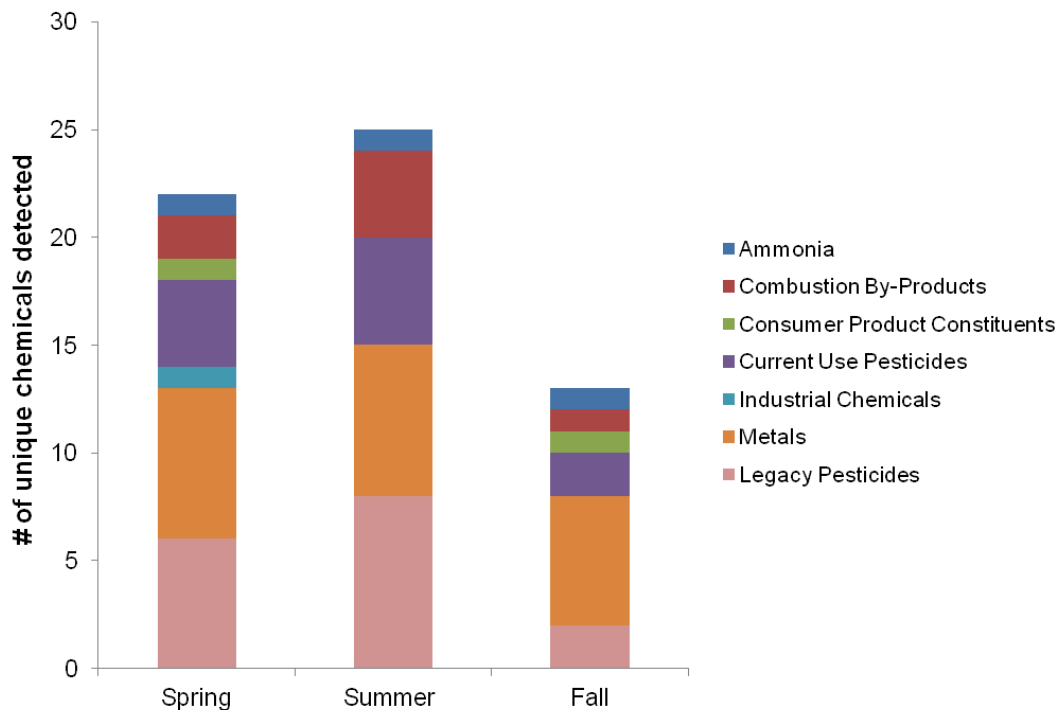


Figure 2 – Seasonality of detections in the Deschutes Basin by chemical group.

Combustion by-products (including dioxins and furans)

Detections of five combustion by-products occurred within the basin. Seasonally, most detections occurred in the summer (September). Two sites, Little Deschutes at Hwy 42 and Metolius River, contained levels of dibenzo(a,h)anthracene, a PAH, above applicable water quality criterion. This exceedance occurred during the September sampling at both sites.

In addition, one site (Deschutes River at Shears Falls) contained the dioxin octachlorodibenzodioxin or OCDD during the spring sampling. This is the least toxic of the dioxin congeners. Dioxins tend to sequester to the sediments because of their chemical make-up and are rarely detected in the water column.

Flame retardants

Four brominated flame retardants were detected in the basin. Samples from the Deschutes River at Benham Falls footbridge contained three of the four compounds. PBDE-209, the most common flame retardant congener detected statewide, occurred at three sites in the Deschutes Basin. Due to laboratory capacity, analysis for this group of chemicals only took place once; therefore, seasonality of these compounds cannot be discussed. There are no federal or state criteria developed for this chemical group, however, concern over these chemicals in humans and the environment prompted a ban on their manufacture and use. Similar to PCBs in structure, these chemicals tend to bio-accumulate in the food chain.

Plant and animal sterols

The laboratory measured four plant and animal sterols in the Deschutes Basin. All four of 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 fully evaluate this data and its implications and relationship to other contaminants.

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 in the Deschutes Basin except at the Metolius River site where stigmastanol was not detected. Levels varied across the basin with the lowest values at the Metolius River site and the highest values at the Crooked River at Conant Basin Rd. (beta-sitosterol) and Crooked River at Lone Pine Rd. (stigmastanol) sites.

The laboratory also measured two animal sterols, cholesterol (100 percent detection) and coprostanol (95 percent detection). As with the plant sterols, measured levels varied across the basin with the lowest levels at the Metolius River site and the highest levels at the Crooked River at Lone Pine Rd. site. While cholesterol is ubiquitous and found in a variety of different species, coprostanol is specific to fecal matter from humans and higher mammals (i.e., cattle and birds) as it is formed during digestion from cholesterol. The ratio of coprostanol to cholesterol may be used to evaluate contamination by human sewage. A ratio less than one indicates a biogenic source (i.e., livestock, higher animals) and greater than one a sewage or human source. Ratios measured at all sites in this study were less than one, potentially indicating a biogenic source of coprostanol.

Consumer product constituents including pharmaceuticals

In addition, the laboratory analyzed water samples for 28 consumer product constituents including pharmaceuticals and personal care products. Out of these, only two chemicals in this group occurred in the basin. DEET, a common insect repellent, was measured during the fall sampling at the Deschutes River at Wickiup Reservoir site. The consumer product constituent, butylbenzylphthalate, detected at the Little Deschutes River at Burgess Road site, exceeded the applicable DEQ Table 40 human health criterion. Butylbenzylphthalate is a common plasticizer used in PVC and may be found in carpets and other consumer products. No samples contained measureable levels of pharmaceuticals.

Industrial chemicals, ammonia and PCBs

One industrial chemical, 2,4-dimethylphenol, was detected at 9 of 19 sites. The chemical is used in the manufacture of pesticides, dyes and disinfectants. It was the most commonly found industrial chemical in the statewide study but it does not have an associated criterion or screening value.

Ammonia is a naturally occurring compound commonly found in waste products. It is included as an industrial compound because of its use in fertilizers and dyes. It may be extremely toxic to aquatic organisms. Its toxicity increases with increasing pH and temperature. Detectable levels of ammonia occurred in samples from 10 of 19 sites. Most of these detections were measured during the summer sampling event. No samples exceeded current DEQ aquatic life water quality criteria.

No water samples from the Deschutes Basin contained measurable levels of PCBs.

Summary

In general, based on the sampling conducted in this study, legacy and current use pesticides may be a concern in this basin. Criteria were exceeded for one chemical at the following five sites: Little Deschutes at Hwy 42 and Burgess Rd., White River, Metolius River and Crooked River at County Park. Samples from Trout Creek Downstream of Mud Springs Creek contained levels of three chemicals over applicable criteria. Sampling of Mud Springs Creek and its watershed may be an area for future work given its apparent contributions to the Trout Creek system. The basin detection table summarizes the detections at each site (see Appendix B).

2.2 Grande Ronde

In 2011, DEQ laboratory staff collected seasonal (June, August and November) water samples at three locations across the basin (Table 2). The sampling locations represented a range of watershed areas and land uses. Samples from the Grande Ronde River at Hwy 82 site contained the greatest number of unique chemicals (Figure 3). In total, eight unique chemicals were detected in the Grande Ronde Basin (Figures 3 and 4, Statewide Report).

Table 2 – Grande Ronde Basin sampling locations.

Station	Site Code	Site Description	Watershed Area (km ²)
10719	GR01	Grande Ronde River at Hwy 82 (North Elgin)	3656
10720	GR02	Grande Ronde River at Hilgard Park	1411
11521	GR03	Grande Ronde River at Peach Lane (Island City)	1889

Seasonality

In order to capture seasonal use patterns and hydrologic differences, collection of water samples took place three times during the year. Figure 4 shows the unique number of chemical detected by chemical group in each of the seasonal sampling events. This figure does not include plant and animal sterols. Detections for the four most common sterols occurred during each season.

In general, metals were detected across all seasons with current use pesticides only in the spring and consumer product constituents only in the fall.

Priority metals

This group includes all metals for which Oregon has existing water quality criteria. These metals occur naturally and may also be enriched by human activities. Because of this, detections of these metals are common in water. Four priority metals (arsenic, barium, iron and manganese) were detected in the basin. Detections of all four metals occurred across seasons at one site, Grande Ronde River at Hwy 82. All four metals were also detected in samples from the other two sites in the basin. None of the detections exceeded the applicable DEQ aquatic life criteria for these metals within the basin.

Current use pesticides

Three current use herbicides (bromacil, diuron and hexazinone) occurred in samples from the Grande Ronde at Hwy 82 site but not at the other sites within the basin. Bromacil is a non-selective herbicide commonly used for brush control on non-croplands. Geographically, detections of this herbicide only occurred in sample sites in the northeast portion of the state. All detections of the herbicides within the basin occurred during the spring sampling and none of the detections exceeded applicable EPA aquatic life benchmarks.

Combustion by-products

No detections occurred for combustion by-products in this basin.

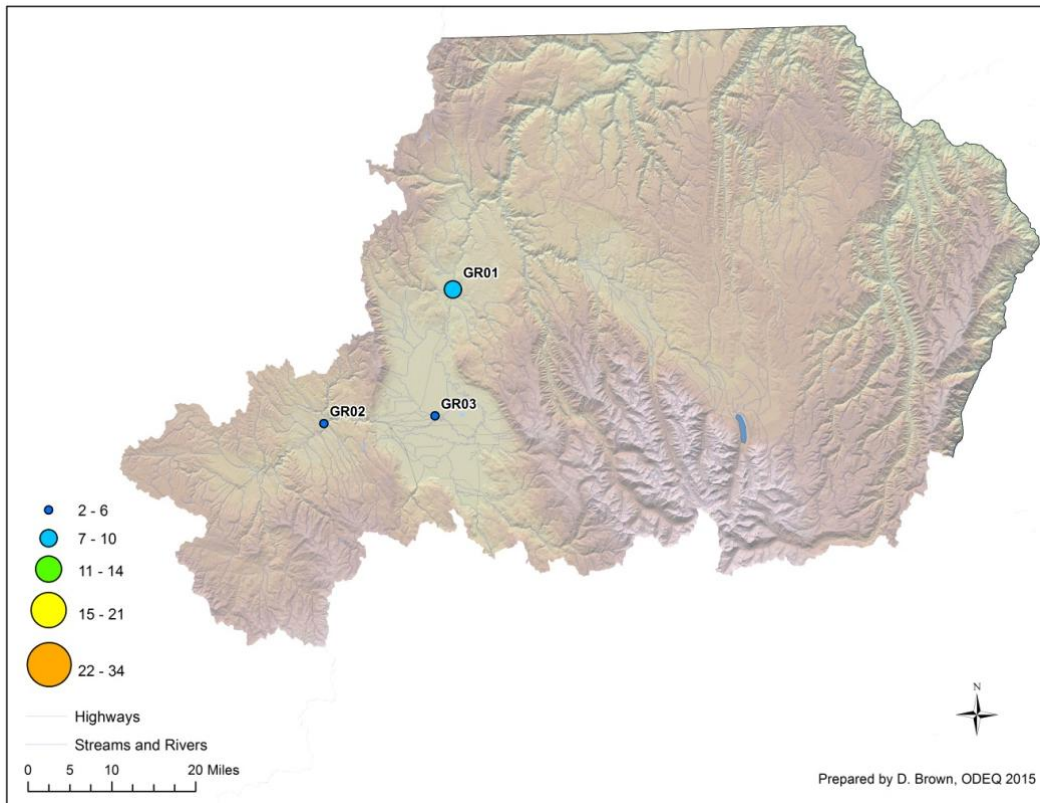


Figure 3 – Number of unique chemicals detected by site in the Grande Ronde Basin.

Plant and animal sterols

The laboratory measured four plant and animal sterols in the Grande Ronde Basin. All four of 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 fully evaluate this data and its implications and relationship to other contaminants.

The predominant source of the two plant sterols analyzed, beta-sitosterol and stigmasterol, is terrestrial plants. Other sources of these sterols may be industrial processes (wood pulping, food oils) and modern pharmaceutical supplements. Beta-sitosterol and stigmasterol were detected at all locations. Levels varied across the basins with the lowest levels at the Grande Ronde River at Hilgard Park site and the highest levels at the Grande Ronde River at Hwy 82 site.

The laboratory also measured two animal sterols, cholesterol and coprostanol (both 100 percent detection). As with the plant sterols, measured levels varied across the Grande Ronde Basin with the lowest levels at the Grande Ronde at Hilgard Park site and the highest levels at the Grande Ronde at Hwy 82 site. While cholesterol is ubiquitous and found in a variety of different species, coprostanol is specific to fecal matter from humans and higher mammals (i.e., cattle and birds) as it is formed during digestion from cholesterol. The ratio of coprostanol to cholesterol may be used to evaluate contamination by human sewage. A ratio less than one indicates a biogenic source (i.e., livestock, higher animals) and greater than one a sewage or human source. Ratios measured at all sites in this study were less than one, potentially indicating a biogenic source of coprostanol.

Consumer product constituents including pharmaceuticals

In addition, the laboratory analyzed water samples for 28 consumer product constituents including pharmaceuticals and personal care products. Two of these compounds were found in samples from the Grande Ronde River at Hwy 82. Two of these compounds, sulfamethoxazole, a common antibiotic and bis (2-ethylhexyl) adipate, a solvent and plasticizer found in common cosmetics and hydraulic fluid among other uses, were found in samples from the Grande Ronde River at Hwy 82. These compounds were only detected during the fall sampling. There are no established screening levels or criteria for these compounds.

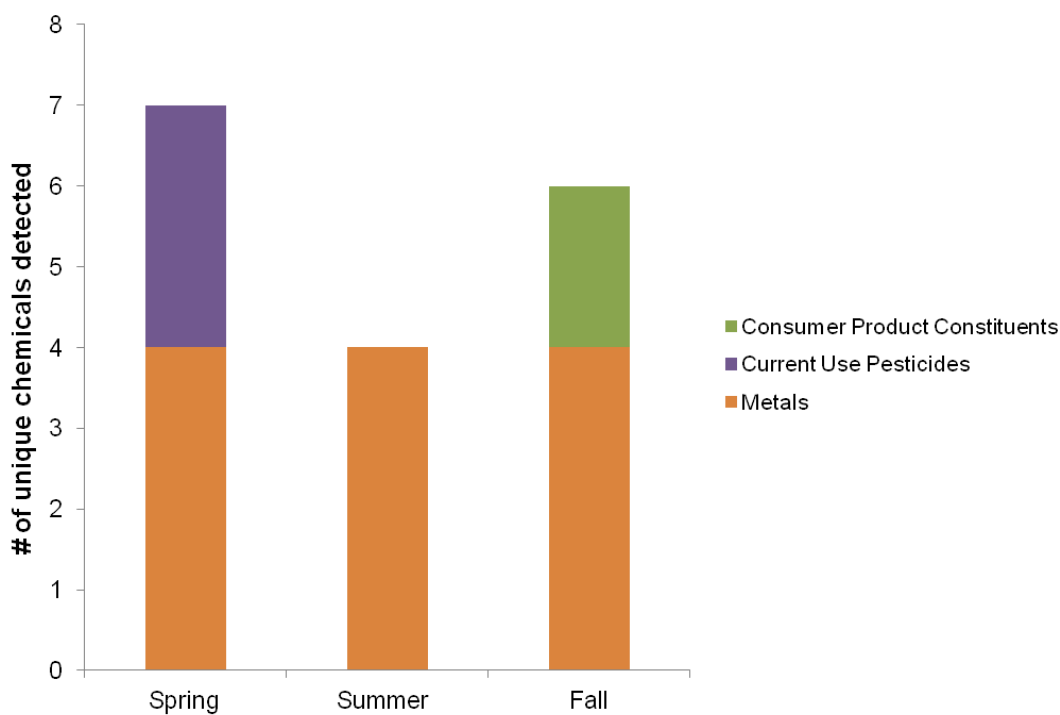


Figure 4 – Seasonality of detections by chemical group in the Grande Ronde Basin.

Data gaps & summary

Since this monitoring program evolved over time, improvements and additions to analytical methods occurred. Samples collected in 2011 did not include low-level analyses for legacy pesticides, PCBs, flame retardants or dioxins and furans. In addition, analysis did not include speciation of inorganic arsenic. While some combustion by-products were included, new methods allowing low-level analysis were not. Nutrient measurements including analysis for ammonia were also not included. Future toxics monitoring work in this basin should include these analyses. Additional sampling may also help identify

any potential trends emerging within the basins. In the Grande Ronde Basin, only three sites were initially sampled. Additional work should increase geographic coverage in the basin. The basin detection table summarizes the data from this basin (see Appendix C).

2.3 Hood

In 2012, DEQ laboratory staff collected seasonal (May, August and November) water samples at 13 locations across the basin (Table 3). The sampling locations represented a range of watershed sizes and land uses. Samples from Lenz Creek and Odell Creek, two of the smallest watersheds sampled in the basin, contained the greatest numbers of unique chemicals (Figure 5). The laboratory analyzed samples collected in the Hood Basin for more than 500 unique chemicals. Of these, 57 chemicals were detected at least once. Compared to other basins across the state, this is the second highest number of unique chemicals detected in a basin (Figures 3 and 4, Statewide Report).

Table 3 – Hood Basin sampling locations.

Station	Site Code	Site Description	Watershed Area (km ²)
11972	H01	Lenz Creek at mouth	9
12012	H02	Hood River at footbridge downstream of I-84	878
12550	H03	Fifteenmile Creek at Boyd Market Road at Dufur	220
13138	H04	East Fork Hood River at County Gravel Pit (River Mile 0.75)	274
13139	H05	Middle Fork Hood River at River Mile 1.0 (ODFW Smolt Trap)	105
13140	H06	West Fork Hood River at Lost Lake Road (River Mile 4.7)	178
13141	H07	Neal Creek at mouth (upstream of bridge)	86
13148	H08	Indian Creek at Union Avenue near Ppl power station	17
13253	H09	Odell Creek at 200 feet downstream of Odell WWTP outfall	25
25204	H10	Threemile Creek at Hwy 197	53
28333	H11	Fifteenmile Creek at Petersburg, OR	642
28574	H12	Mill Creek at 2nd Street, The Dalles	163
32982	H13	South Fork Mill Creek upstream of Wicks Treatment Plant diversion (Mill Creek, Columbia River)	71

Seasonality

In order to capture seasonal use patterns and hydrologic differences, collection of water samples took place three times during the year. Figure 6 shows the number of unique chemicals detected by chemical group in each of the seasonal sampling events. This figure does not include data for PCBs, flame retardants or dioxins and furans. Due to laboratory capacity limitations, analysis for these chemical

groups only occurred during one sampling event at each site. In addition, this figure does not include plant and animal sterols. Detections for the four common sterols occurred during each season.

In general, the summer samples contained slightly more chemicals than the other two seasons, however, the number of unique chemicals was similar throughout the three seasons. Seasonal differences by chemical group are discussed below.

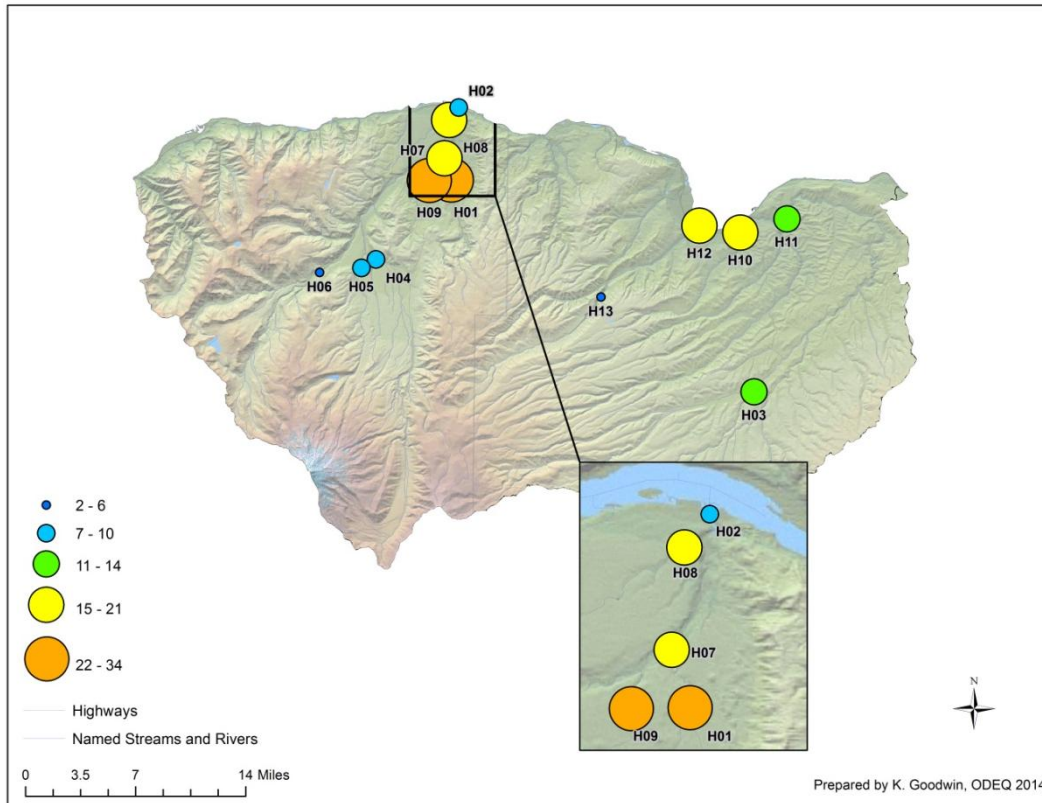


Figure 5 – Number of unique chemicals detected by site in the Hood Basin.

Priority metals

This group includes all metals for which Oregon has existing water quality criteria. These metals occur naturally and may also be enriched by human activities. Because of this, detections of these metals are common in water. While at least one metal was detected at every site in the basin, water samples from Odell Creek contained the greatest number of unique metals (8 metals). Although frequently detected across the basin, concentrations of detected metals did not exceed Oregon water quality criteria except at one site. The inorganic arsenic concentration measured at Threemile Creek at Hwy 197 exceeded the Oregon Table 40 criterion for the protection of human health (2.1 µg/L) during the spring and fall. Summer samples were not analyzed for inorganic arsenic due to laboratory issues, however, the measured concentration of total arsenic in the summer sample was higher than the other two seasons. This is the only site in the basin where the inorganic arsenic concentration exceeded or even approached the criterion. Measured concentrations at all other sites were less than one-third of the criterion.

Across the basin, in general detections of metals were consistent by season. Odell Creek showed some seasonal difference with all eight metals detected during the summer sampling and only three and four detected during the spring and fall, respectively.

Current use pesticides

Twenty-one different current use pesticides, including degradates, were detected in the Hood Basin. At least one of these chemicals was detected at 8 of the 13 sites sampled. Samples collected from Lenz Creek and Threemile Creek accounted for a majority of the detections. The two most commonly detected herbicides, diuron and simazine, occurred at 6 of the 13 sampling locations. Consistent detections of current use pesticides occurred across seasons with four compounds occurring in all samples from Threemile Creek and three compounds in all samples from Lenz Creek, Odell Creek and Indian Creek. The fall season had the greatest variety of pesticides detected. Though common, none of the detected chemicals exceeded applicable EPA benchmarks or water quality criteria. However, persistent low-level detections and multiple pesticides at one site may act synergistically or additively in the environment resulting in impacts to the aquatic community.

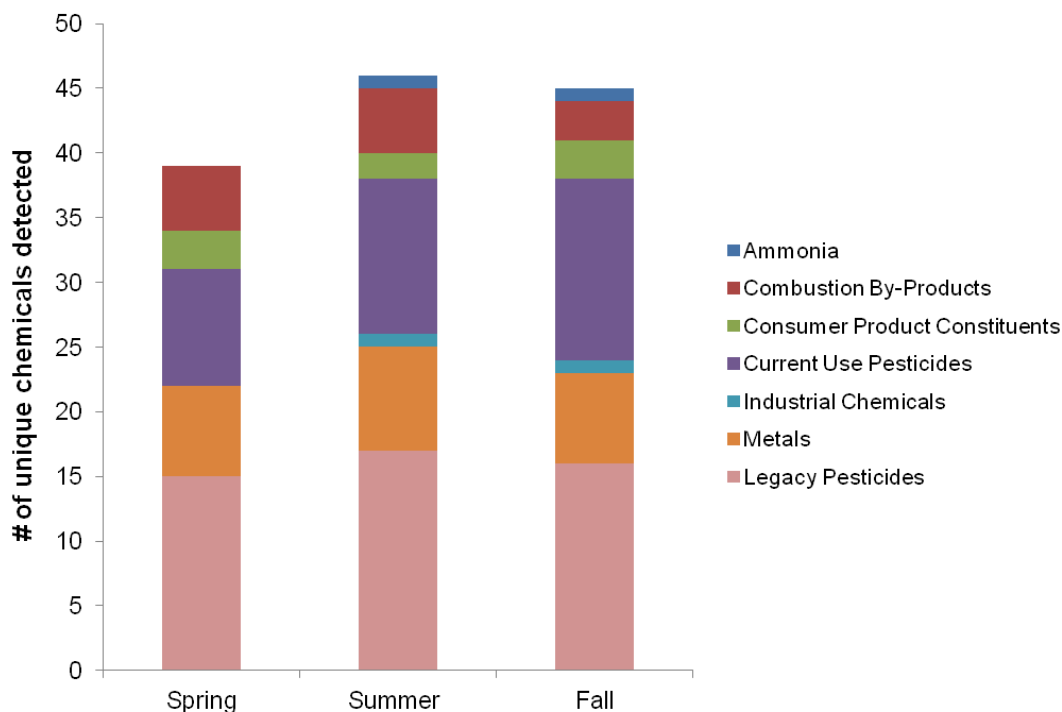


Figure 6 – Seasonality of detections in the Hood Basin by chemical group.

Legacy pesticides

In addition to current use pesticides, detections of legacy pesticides occurred frequently at a number of sampling locations with applicable criteria exceeded at the Lenz Creek, Hood River, East Fork Hood River, Neal Creek, Indian Creek, Odell Creek, Fifteenmile Creek at Dufur, Threemile Creek and Mill Creek sites. Technically still in use, endosulfan (I + II) and endosulfan sulfate occurred at all 13 sampling locations at concentrations below applicable water quality criteria. All registrations of this pesticide will be cancelled by July 31, 2016. Four sites (Lenz Creek, Neal Creek, Indian Creek and Odell Creek) had occurrences of 10 or more of the 14 unique compounds detected. Exceedances of DEQ water quality criteria occurred for seven compounds at the Lenz Creek and Odell Creek sampling locations. Exceedances of the Oregon DEQ human health criterion for dieldrin ($5.3 \times 10^{-6} \mu\text{g/L}$) occurred in Lenz Creek at a level of 103 times the criterion, in Neal Creek at 87 times the criterion and in Indian Creek at 73 times the criterion. This was also the case for exceedances of 4,4'-DDE, a degradate of DDT, at the same sampling locations (73x, 59x and 89x, respectively). Detections of legacy pesticides were consistent across sites and seasons.

Combustion By-products (including dioxins and furans)

Detections occurred for seven combustion by-products in the basin. These chemicals are associated with incomplete combustion of organic matter from automobiles, fossil fuels burning, woodstoves, and cigarette smoke. They may also be the result of stormwater run-off. Seasonally, the number of chemicals detected was equal in spring and summer samples and slightly less in fall samples. Phenanthrene was the most commonly detected compound with detections at five sites. Three Mile Creek samples contained the greatest number of combustion by-products, five. One site, Mill Creek, contained levels of one combustion by-product, benzo(b)fluoranthene, above applicable water quality criterion detected during the spring sampling.

No detected concentrations of dioxins and furans occurred in any samples in the Hood Basin.

Flame retardants

Two brominated flame retardants occurred in the basin with one occurring at the Indian Creek and Mill Creek sites. PBDE-209, detected at the Indian Creek site, was the most commonly detected congener across the state. Due to laboratory capacity, analysis for this group of chemicals only took place once, therefore, seasonality of these compounds cannot be discussed. There are no federal or state criteria developed for this chemical group, however, concern over these chemicals in humans and the environment prompted a ban on their manufacture and use. Similar to PCBs in structure, these chemicals tend to bio-accumulate in the food chain and are most often associated with sediments in the aquatic environment.

Plant and animal sterols

The laboratory measured four plant and animal sterols in the Hood Basin. All four of 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 fully evaluate this data and its implications and relationship to other contaminants.

The predominant source of the two plant sterols analyzed, beta-sitosterol and stigmasterol, is terrestrial plants. Other sources of these sterols may be industrial processes (wood pulping, food oils) and modern pharmaceutical supplements. Beta-sitosterol and stigmasterol were detected at all locations in the Hood Basin. Levels varied across the basin with the lowest values detected at the West Fork Hood River site and the highest values at the Neal Creek at mouth site.

The laboratory also measured two animal sterols, cholesterol (100 percent detection) and coprostanol (86 percent detection). Cholesterol and coprostanol were detected at all sites with the exception of the West Fork Hood River site where coprostanol was not detected. As with the plant sterols, measured levels varied across the basin with the lowest levels detected at the West Fork Hood River site and the highest levels at the Fifteenmile Creek at Dufur (cholesterol) and Fifteenmile Creek at Petersburg (coprostanol) sites. While cholesterol is ubiquitous and found in a variety of different species, coprostanol is specific to fecal matter from humans and higher mammals (i.e., cattle and birds) as it is formed during digestion from cholesterol. The ratio of coprostanol to cholesterol may be used to evaluate contamination by human sewage. A ratio less than one indicates a biogenic source (i.e., livestock, higher animals) and greater than one a sewage or human source. Ratios measured at all sites in this study were less than one, potentially indicating a biogenic source of coprostanol.

Consumer product constituents including pharmaceuticals

The laboratory analyzed water samples for 28 consumer product constituents including pharmaceuticals. Four of these were detected in the Hood Basin. Odell Creek samples contained three consumer product constituents, the insect repellent, DEET, and the pharmaceuticals, sulfamethoxazole and venlafaxine. Detections of the two pharmaceuticals occurred during each sampling event in Odell Creek. In addition, sulfamethoxazole was detected during the fall sampling at the Fifteenmile Creek at Dufur site. Both of these sites receive effluent from wastewater treatment facilities. The only sample containing a measurable level of 17 β -estradiol, a natural estrogen hormone, statewide occurred during the fall sampling in Mill Creek. There are no existing criteria or benchmarks for pharmaceuticals.

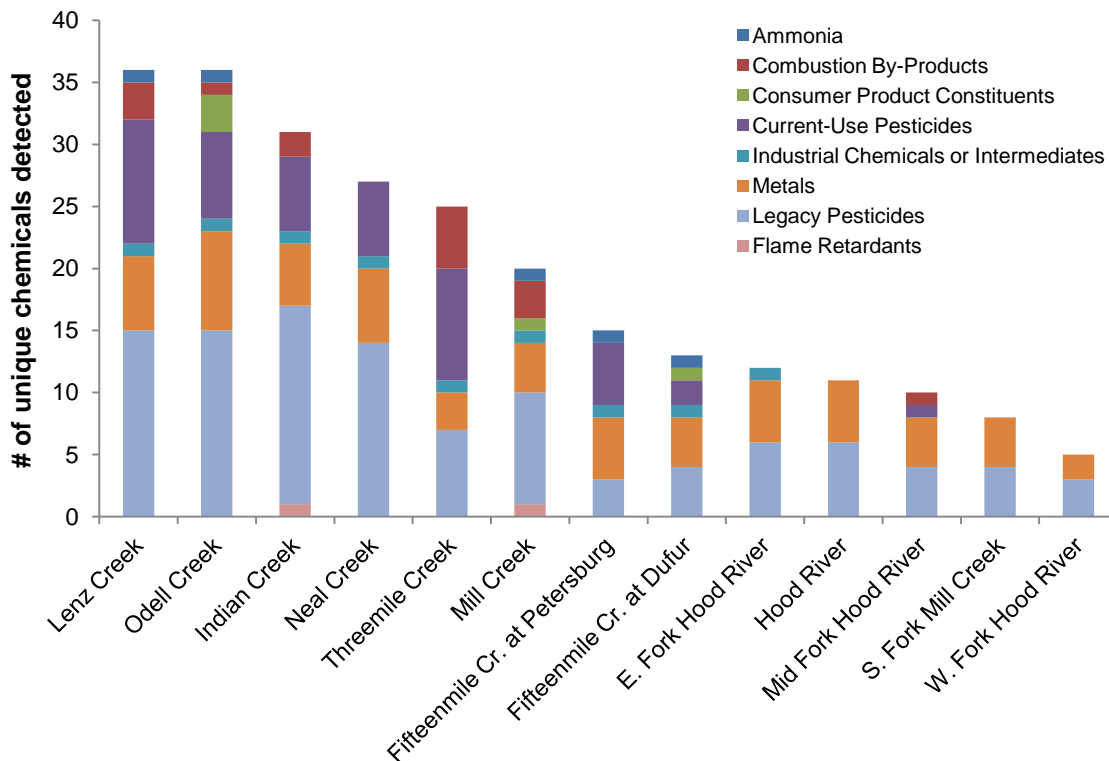


Figure 7 – Number of unique chemicals detected in each chemical group by site in the Hood Basin.

Industrial chemicals, ammonia and PCBs

In addition, 8 of the 22 detections statewide of the industrial chemical, 2,4-dimethylphenol, occurred in the Hood Basin during November 2012. Also known as xylenol, this chemical is used in the production of pharmaceuticals, insecticides, fungicides, dyes and plastics. In addition, 1,2,4-trichlorobenzene, a strong solvent used in dyes and pesticide production with past uses as a soil treatment and wood preservative was detected in the Hood Basin during August 2012. This detection, at the Threemile Creek site, was 1 of only 2 detections of this industrial chemical statewide. No criteria exist for either of these chemicals.

Ammonia is a naturally occurring compound commonly found in waste products. It is included as an industrial compound because of its use in fertilizers and dyes. It may be extremely toxic to aquatic organisms. Its toxicity increases with increasing pH and temperature. Detectable levels of ammonia occurred in samples from 5 of 13 sites. Most of these detections were measured during summer and fall

samples. The highest level occurred at the Fifteenmile Creek at Dufur site during the fall sampling. No samples exceeded current DEQ aquatic life water quality criteria.

No water samples from the Hood Basin contained measurable amounts of PCBs.

Summary

A large number of chemicals were detected in this basin with the largest number of unique chemicals occurring in the smaller watersheds of Lenz Creek and Odell Creek as compared to the large, mainstem site in Hood River (Figure 7). These smaller watersheds contain the majority of point sources in the basin. Criteria were exceeded for one or more chemicals at the following seven sites: Lenz Creek, Fifteenmile Creek at Dufur, Neal Creek at mouth, Indian Creek, Odell Creek, Threemile Creek and Mill Creek. The basin detection table summarizes the detections at each site (see Appendix D).

Based on the sampling conducted in this study, legacy pesticides are of particular concern in the Hood Basin. The number and extent of the exceedances detected at a number of sampling locations warrants further investigation. In addition, although no exceedances of current use pesticides occurred, persistent low-level detections and multiple chemicals present at one site may act synergistically or additively in the environment resulting in impacts to the aquatic community. This basin currently participates as part of the Pesticide Stewardship Partnerships program. This program addresses the occurrence of current use pesticides through cooperation between multiple stakeholder groups in the basin.

2.4 John Day

In 2012, DEQ laboratory staff collected seasonal (June, August and October) water samples at ten locations across the basin (Table 4). The sampling locations represented a range of watershed sizes and land uses across the basin. Samples from three sites, two on the John Day River (at Service Creek and Clyde Holliday State Park) and one on Canyon Creek, contained the greatest number of unique chemicals (Figure 8). The laboratory analyzed samples from the John Day Basin for over 500 unique chemicals. Of these, detections occurred at least once for 23 different analytes (Figures 3 and 4, Statewide Report).

Seasonality

In order to capture seasonal use patterns and hydrologic differences, collection of water samples took place three times during the year. Figure 9 shows the number of unique chemicals detected by chemical group in each of the seasonal sampling events. This figure does not include data for PCBs, flame retardants or dioxins and furans. Due to laboratory capacity limitations, analysis for these chemicals only occurred during one sampling event at each site. In addition, this figure does not include plant and animal sterols. Detections for the four most common sterols occurred during each season.

In general, a greater variety of chemicals was detected during the summer and fall versus the spring.

Priority metals

This group includes all metals for which Oregon has existing water quality criteria. These metals occur naturally and may also be enriched by human activities. Because of this, detections of these metals are common in water. Some metals were detected across all seasons with the greatest number in the summer. Samples from each site in the John Day Basin contained at least one metal, while seven metals were detected at the John Day River at Service Creek site. Also at this site, iron was detected at a level

of concern over the established aquatic life criterion, during the summer sampling. Due to analytical difficulties, inorganic arsenic analyses were not completed during the summer sampling.

Current use pesticides

Detections of current use pesticides occurred at five sites within the basin. Detections occurred individually and a different pesticide was detected at each of the five sites. Two commonly used herbicides, diuron and atrazine, were detected within the basin during the spring sampling event. Diuron was found at the John Day River at Clyde Holliday State Park and atrazine at the Rock Creek at mouth site. None of the pesticides detected exceeded established EPA benchmark values or DEQ water quality criteria.

Table 4 – John Day Basin sampling locations.

Station	Site Code	Site Description	Watershed Area (km ²)
11016	JD01	John Day River downstream of South Fork John Day (Dayville)	4150
11020	JD02	South Fork John Day River at Dayville	1566
11386	JD03	John Day River at Hwy 206	17927
11478	JD04	John Day River at Service Creek	13289
24135	JD05	Clear Cr. (near Red Boy Mine)	125
31987	JD06	Canyon Creek at John Day City Park	299
31990	JD07	John Day River at Clyde Holliday State Park	1487
36787	JD08	Rock Creek at mouth	1319
37118	JD09	Middle Fork John Day River at Hwy 395 RM 25.4	1238
37135	JD10	North Fork John Day Basin at river mile 73.2 10 meters upstream of Oriental Cr	972

Legacy pesticides

Two compounds in this category were detected in the John Day Basin. BHC-beta (hexachlorocyclohexane-beta), a banned insecticide, was detected at one site, John Day River at Clyde Holliday State Park. Endosulfan sulfate, a breakdown product of the insecticide endosulfan, was detected at two sites, John Day River at Hwy 206 and Rock Creek at mouth. The parent compound, endosulfan, is still registered for use, however, all registrations will be cancelled by July 31, 2016. For this reason, it is included as a legacy pesticide. All detected concentrations were below applicable criteria.

Combustion by-products (including dioxins and furans)

Detections occurred for three combustion by-products in the basin. These compounds may be produced during incomplete combustion of organic materials and be contained in the smoke from fires, woodstove, automobiles and cigarettes. Two of these, fluoranthene and phenanthrene, were found in samples from John Day River at Service Creek. Phenanthrene was also found at the Canyon Creek site.

One combustion by-product, dibenzo(a,h)anthracene was detected at a level of concern over the DEQ established water quality criterion at the North Fork John Day site.

No measured levels of dioxins and furans occurred in water samples from this basin.

Flame retardants

No measured levels of brominated flame retardants occurred in water samples from this basin.

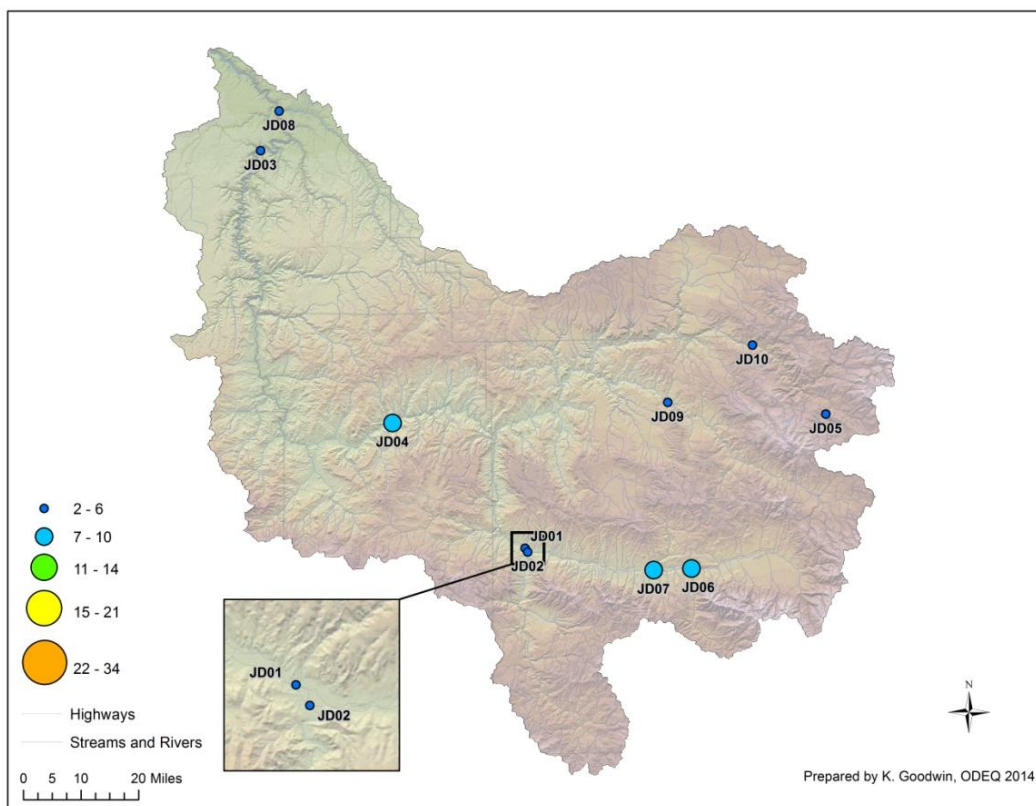


Figure 8 – Number of unique chemicals detected by site in the John Day Basin.

Plant and animal sterols

The laboratory measured four plant and animal sterols in the John Day Basin. All four of 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 fully evaluate this data and its implications and relationship to other contaminants.

The predominant source of the two plant sterols analyzed, beta-sitosterol and stigmasterol, is terrestrial plants. Other sources of these sterols may be industrial processes (wood pulping, food oils) and modern pharmaceutical supplements. Beta-sitosterol and stigmasterol were detected at all locations in the John Day Basin. Levels varied across the basin with the lowest values at the North Fork John Day site and the highest values at the John Day River at Service Creek (beta-sitosterol) and South Fork John Day at Dayville (stigmasterol) sites.

The laboratory also measured two animal sterols, cholesterol and coprostanol. As with the plant sterols, measured levels varied across the basin with the lowest levels at the Clear Creek site and the highest levels at the Middle Fork John Day (cholesterol) and John Day River at Clyde Holliday State Park

(coprostanol) sites. While cholesterol is ubiquitous and found in a variety of different species, coprostanol is specific to fecal matter from humans and higher mammals (i.e., cattle and birds) as it is formed during digestion from cholesterol. The ratio of coprostanol to cholesterol may be used to evaluate contamination by human sewage. A ratio less than one indicates a biogenic source (i.e., livestock, higher animals) and greater than one a sewage or human source. Ratios measured at all sites in this study were less than one, potentially indicating a biogenic source of coprostanol.

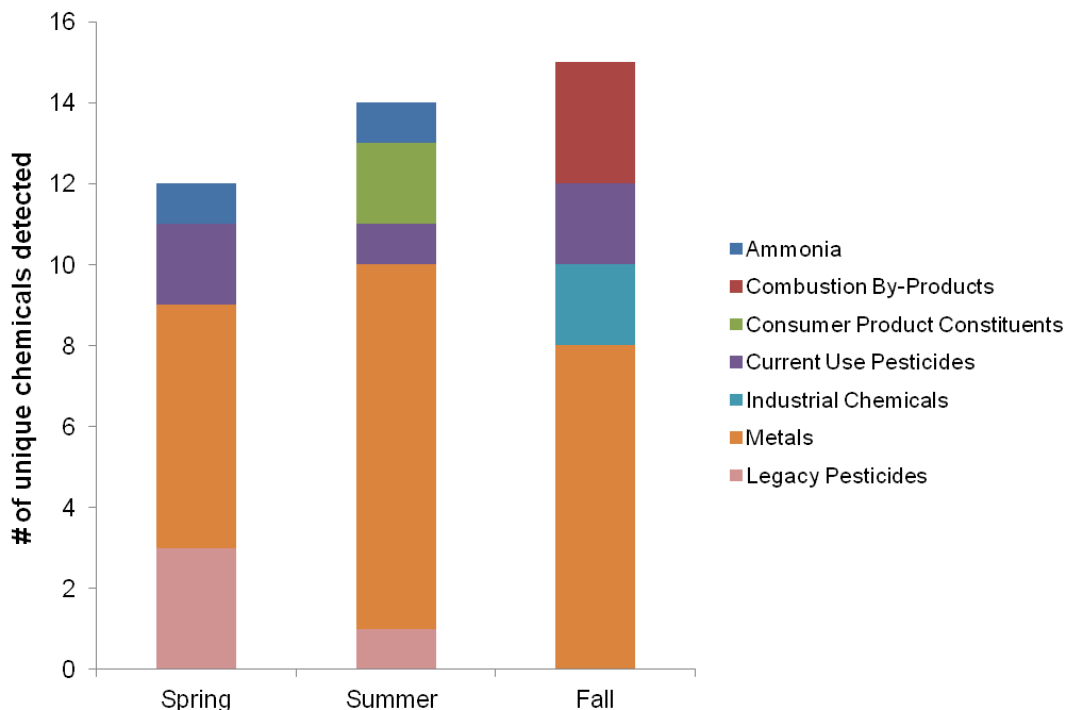


Figure 9 – Seasonality of detections in the John Day Basin by chemical group.

Consumer product constituents including pharmaceuticals

This study found two consumer product constituents, DEET and diphenhydramine. DEET is an insect repellent that is contained in many products as well as clothing. DEET was detected during the summer sampling at one site, Middle Fork John Day. Diphenhydramine, a common antihistamine, was detected at one site, Rock Creek., also during the summer sampling. There are no benchmarks or established criteria for these compounds.

Industrial chemicals, ammonia and PCBs

Two industrial chemicals were detected in the basin and both occurred at the North Fork John Day site. Nitrobenzene, used in the production of dyes, pesticides and explosives, and 2,4-dinitrotoluene, mainly used to produce flexible foam, but also used as a plasticizer as well as in explosives, were detected during the fall sampling event. Industrial chemicals were not expected at this site, as it is located in the upper watershed.

Ammonia is a naturally occurring compound commonly found in waste products. It is included as an industrial compound because of its use in fertilizers and dyes. It may be extremely toxic to aquatic organisms. Its toxicity is dependent on pH and temperature and increases as pH and temperature increase. Detectable levels of ammonia occurred at the Rock Creek site during the spring and summer sampling events; however, neither sample exceeded current DEQ aquatic life water quality criteria.

One PCB congener, PCB-209, was present at the John Day at Clyde Holliday State Park site. This is the only location statewide with a detection of a PCB congener in water. Although present at a very low level, this sample exceeded DEQ’s Table 40 criterion for the protection of human health. This criterion was developed to protect human health from the consumption of fish and water at a site.

Summary

Three sites contained chemicals at levels above DEQ’s water quality criteria in the John Day Basin. Exceedances occurred at the John Day at Service Creek for iron, John Day River at Clyde Holliday State Park for PCBs and in the North Fork John Day for dibenzo(a,h)anthracene. Each of these exceedances occurred only once at each site. The detection of industrial chemicals in conjunction with a PAH over the applicable criterion at the upper North Fork John Day site may warrant additional investigation given this site’s location in the watershed. In addition, the detection of PCBs at Clyde Holliday State Park is worthy of further investigation potentially including sediment and fish collection. Analysis for PCBs, flame retardants as well as dioxins and furans only took place during the spring sampling event. During the next rotation of sampling, these methods will be included for each event to investigate potential seasonal differences. Future sampling will help assess any potential trends developing in the basin as well as expand geographic coverage. The basin detection table summarizes the detections at each site (see Appendix E).

2.5 Klamath

In 2011, DEQ laboratory staff collected seasonal (May, August and November) water samples from five locations across the basin (Table 5). The sampling locations represented a range of watershed areas and land uses. Samples from the Grande Ronde River at Hwy 82 site contained the greatest number of unique chemicals (Figure 10). In total, ten unique chemicals were detected in the Klamath Basin (Figures 3 and 4, Statewide Report).

Table 5 – Klamath Basin sampling locations.

Station	Site Code	Site Description	Watershed Area (km ²)
10759	K01	Lost River at Hwy 39 (Merrill)	3478
10763	K02	Klamath Strait at USBR Pump Station F	53
10765	K03	Klamath River at Hwy 66 (Keno)	18027
10768	K04	Link River at mouth (Klamath Falls)	9788
10770	K05	Williamson River at Williamson River Store	7848

Seasonality

In order to capture seasonal use patterns and hydrologic differences, collection of water samples took place three times during the year. Figure 11 shows the unique number of chemical detected by chemical group in each of the seasonal events. This figure does not include plant and animal sterols. Detections for the four most common sterols occurred during each season.

In general, metals were detected across all seasons, current use pesticides were detected more often during the spring and summer sampling events than the fall sampling and consumer product constituents occurred more often during the summer and fall sampling events than the spring sampling.

Priority metals

This group includes all metals for which Oregon has existing water quality criteria. These metals occur naturally and may also be enriched by human activities. Because of this, detections of these metals are common in water. Six priority metals were detected within the basin and at least four metals were detected at each site. Samples from the Lost River at Hwy 39 site contained all six metals. All metals were detected across seasons except copper, which was only detected during spring sampling at one site (Lost River at Hwy 39).

Given its geology, this area of the state is naturally high in arsenic. DEQ established a criterion for inorganic arsenic ($2.1 \mu\text{g/L}$) for the protection of human health. In 2011, DEQ did not measure the inorganic form of arsenic but instead measured total arsenic. Samples from the all sites except the Williamson River site contained levels of total arsenic that indicate a potential concern for inorganic arsenic. Other than potentially arsenic, no exceedances of water quality criteria were measured.

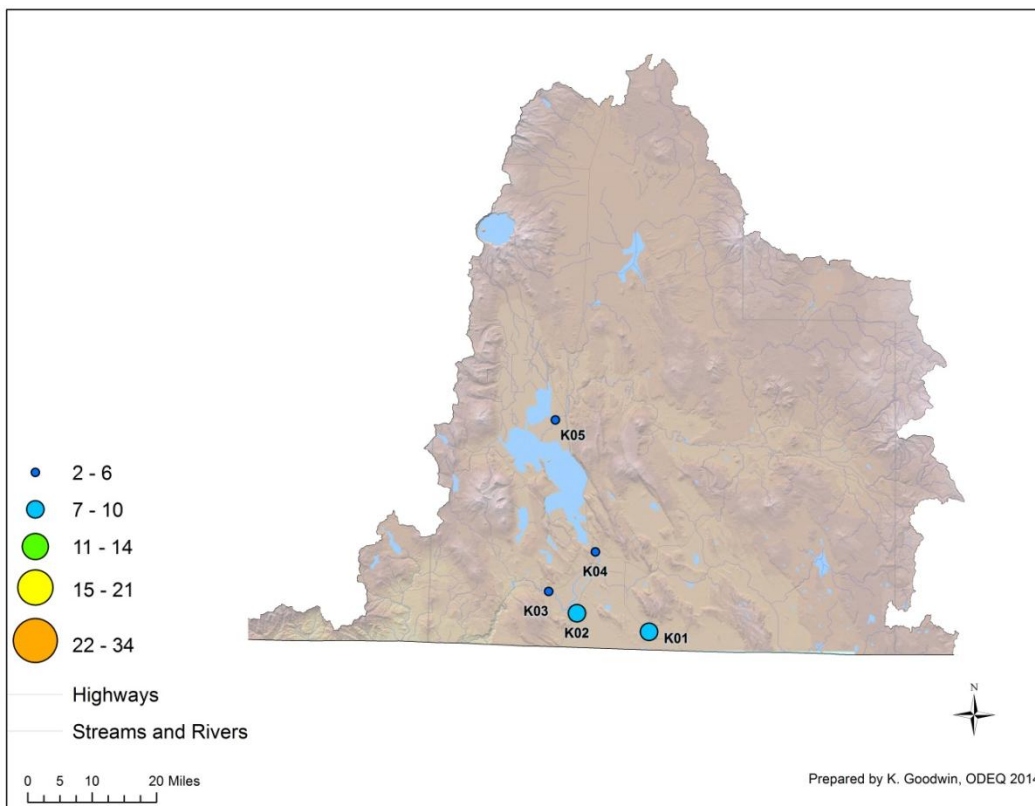


Figure 10 – Number of unique chemicals detected by site in the Klamath Basin.

Current use pesticides

Samples from the basin contained two current use pesticides. Diuron, a commonly used herbicide, was detected at the Lost River at Highway 39 and Klamath Strait at USBR pump station sites. Detections occurred at both sites during the spring sampling, but only at the Lost River site during the summer sampling. Summer samples from the Lost River at Highway 39 site also contained oxamyl, a carbamate insecticide. Detected concentrations of both current use pesticides were below EPA benchmarks,

however, persistent low-level detections and multiple chemicals at one site may act synergistically or additively in the environment resulting in impacts to the aquatic community.

Combustion by-products

No detections occurred for combustion by-products in this basin.

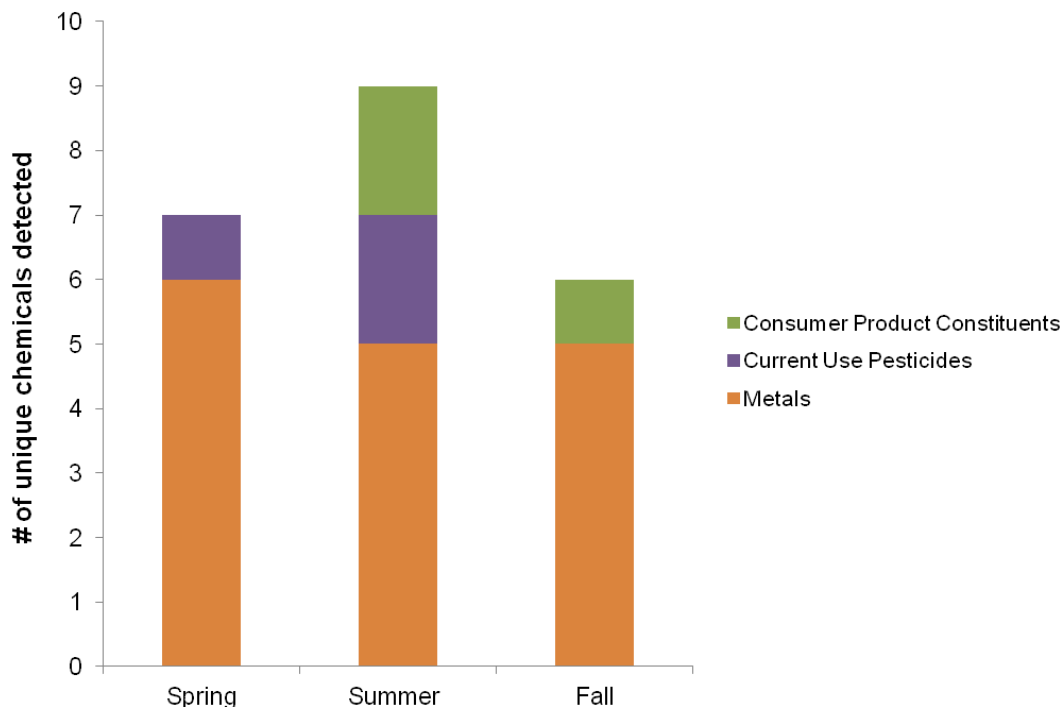


Figure 11 – Seasonality of detections in the Klamath Basin by chemical group.

Plant and animal sterols

The laboratory measured four plant and animal sterols in the Klamath Basin. All four of 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 fully evaluate this data and its implications and relationship to other contaminants.

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 basins with the lowest levels detected at the Williamson River (beta-sitosterol) and the Klamath River at Hwy 66 (stigmastanol) sites and the highest levels detected at the Klamath Strait at USBR pump station site.

The laboratory also measured two animal sterols, cholesterol and coprostanol (both 100 percent detection). As with the plant sterols, measured levels varied across the basin with the lowest levels detected at the Williamson River site and the highest levels detected at the Klamath Strait at USBR pump station site. While cholesterol is ubiquitous and found in a variety of different species, coprostanol is specific to fecal matter from humans and higher mammals (i.e., cattle and birds) as it is formed during digestion from cholesterol. The ratio of coprostanol to cholesterol may be used to evaluate contamination by human sewage. A ratio less than one indicates a biogenic source (i.e., livestock, higher

animals) and greater than one a sewage or human source. Ratios measured at all sites in this study were less than one, potentially indicating a biogenic source of coprostanol.

Consumer product constituents including pharmaceuticals

In addition, the laboratory analyzed water samples for 28 consumer product constituents including pharmaceuticals and personal care products. Three compounds were detected in the Klamath Basin. DEET, a common insect repellent, was detected during summer sampling at the Williamson River site. Estrone, a natural estrogen hormone, and diethylstilbesterol, a synthetic estrogen compound, occurred at only one site, the Klamath Strait at the USBR pump station site. Estrone and synthetic estrogen compounds are typical of what would be found in a wastewater treatment plant (WWTP) discharge. The Klamath Strait is not located at or near an outlet for a WWTP, but the North Canal and Ady Canal that feed irrigation water to the Klamath Drainage District (KDD) take in water just a few short miles from the WWTP release points. The irrigation water from the North and Ady Canals is used on KDD land and then discharged or drained into the Klamath Straits Drain. There are no established screening levels or criteria for these compounds.

Data gaps & summary

Since this monitoring program evolved over time, improvements and additions to analytical methods occurred. Samples collected in 2011 did not include low-level analyses for legacy pesticides, PCBs, flame retardants or dioxins and furans. In addition, analysis did not include speciation of inorganic arsenic. While some combustion by-products were included, new methods allowing low-level analysis were not. Nutrient measurements including analysis for ammonia were also not included. Future toxics monitoring work in this basin (currently underway in 2015) includes these analyses. Additional sampling may also help identify any potential trends emerging within the basins. In the Klamath Basin, only five sites were initially sampled. Additional work in 2015 will increase geographic coverage in the basin. The basin detection table summarizes the data from this basin (see Appendix F).

2.6 Malheur

In 2011, DEQ laboratory staff collected seasonal (June, August and November) water samples from two locations across the basin (Table 6). In September 2013, staff collected water samples from two additional locations. The 2013 sampling only included one event and does not represent seasonal variations. The sampling locations represented a range of watershed areas and land uses. Two sites (Malheur River at Hwy 201 and Willow Creek @ RR Crossing (Vale)) contained the greatest numbers of unique chemicals (Figure 12). In total, 22 unique chemicals were detected at sites within the Malheur Basin (Figures 3 and 4, Statewide Report).

Seasonality

In order to capture seasonal use patterns and hydrologic differences, collection of water samples took place three times during the year. Figure 13 shows the unique number of chemicals detected by chemical group in each of the seasonal sampling events. This figure does not include plant and animal sterols. Detections for the four most common sterols occurred during each season.

Priority metals

This group includes all metals for which Oregon has existing water quality criteria. These metals occur naturally and may also be enriched by human activities. Because of this, detections of these metals are

common in water. Ten different priority metals were detected in the Malheur Basin. Detections of five of these metals occurred across seasons in each sample at both sites sampled in 2011 (Malheur River at Hwy 201 and Malheur River near Little Valley). Given its geology, this area of the state is naturally high in arsenic. DEQ established a criterion for inorganic arsenic (2.1 µg/L) for the protection of human health. In 2011, DEQ did not measure the inorganic form of arsenic but instead measured total arsenic. Samples from the two sites sampled in 2011 (Malheur River at Hwy 201, Malheur River near Little Valley), contained levels of total arsenic that indicate a potential concern for inorganic arsenic. In 2013, direct measurement of inorganic arsenic was included. At the locations sampled during 2013, the measured inorganic arsenic levels exceeded the criterion at both locations. In general, the highest measured value for total arsenic occurred at the Malheur River site near Little Valley (37.1 µg/L) and the upper river site at Highway 20 contained much lower levels of inorganic arsenic (2.95 µg/L). At the two sites measured in 2011, arsenic levels varied seasonally with the highest levels measured during the fall sampling. The 2013 locations were only sampled once, therefore, seasonal variations cannot be evaluated.

In addition to arsenic, the same three sites with the highest arsenic levels (Malheur River at Hwy 201, Willow Creek at RR Crossing (Vale) and Malheur River at Little Valley) also exceeded the Oregon DEQ water quality criterion for iron (1000 µg/L). Iron was detected in all three seasons (at the 2011 sites), however, exceedances of the criterion only occurred during spring and summer sampling events at the Malheur River near Little Valley and the Malheur River at Hwy 201 sites.

Table 6 – Malheur Basin sampling locations. Asterisks indicate sites sampled in 2013.

Station	Site Code	Site Description	Watershed Area (km ²)
10407	MA01	Malheur River at Hwy 201 (Ontario)	12233
10728	MA02	Willow Creek @ RR Crossing (Vale)*	1991
11047	MA03	Malheur River at Hwy 20 (Drewsey)*	2452
11480	MA04	Malheur River near Little Valley	7826

Current use pesticides

In the Malheur Basin, detections for seven current use pesticides occurred. Six of these detections occurred at the most downstream river site, Malheur River at Hwy 201. At this site, detected chemicals included two herbicides, diuron and metolachlor; two insecticides, imidacloprid and methomyl; one fungicide, pyraclostrobin; and one herbicide degradate, desethylatrazine. Methomyl is a highly toxic carbamate insecticide. The only detections of this chemical in Oregon during this monitoring program occurred in the Malheur and Owyhee basins. One additional herbicide, 2,4-D, was detected at the Willow Creek site. Although no individual pesticide was present above EPA established benchmarks, the presence of multiple low-level pesticides may have impacts on aquatic life.

Legacy pesticides

In the Malheur Basin, legacy pesticides were only sampled for at the two sites monitored in 2013, Willow Creek and Malheur River at Hwy 20, and detections only occurred at the Willow Creek site. Two degradates of the chlorinated insecticide DDT were detected at levels above the Oregon DEQ water

quality criteria for the protection of human health. Dieldrin, another chlorinated insecticide, was also present at a level exceeding its applicable criterion at the same site.

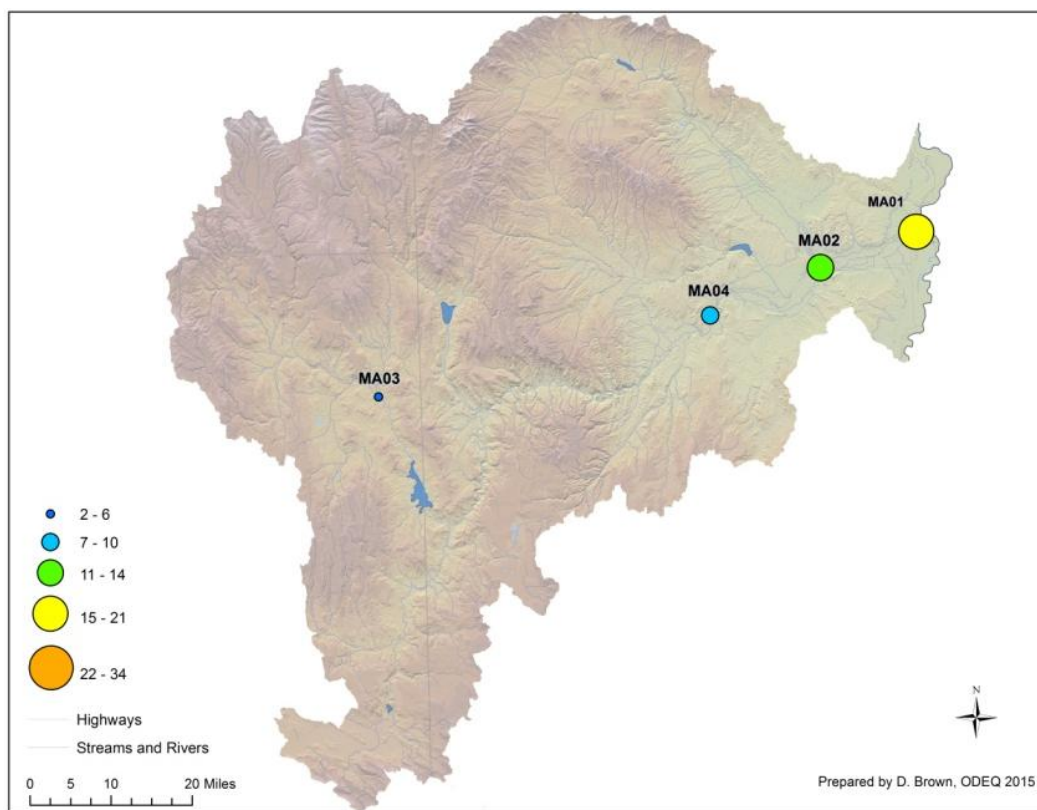


Figure 12 – Number of unique chemicals detected by site in the Malheur Basin.

Combustion by-products (including dioxins and furans)

No detections occurred for combustion by-products in the Malheur Basin.

In addition, no detections for dioxins and furans occurred at the two sites sampled in 2013. Samples were not analyzed for these chemicals during 2011.

Flame retardants

Sampling and analysis for brominated flame retardants only occurred once at the sites sampled in 2013. No detections were recorded.

Plant and animal sterols

The laboratory measured four plant and animal sterols in the Malheur Basin. All four of 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 fully evaluate this data and its implications and relationship to other contaminants.

The predominant source of the two plant sterols analyzed, beta-sitosterol and stigmasterol, is terrestrial plants. Other sources of these sterols may be industrial processes (wood pulping, food oils) and modern pharmaceutical supplements. Beta-sitosterol and stigmasterol were detected at all locations in the Malheur Basin. Levels varied across the basin with the lowest values detected at the Malheur River at Hwy 20 (beta-sitosterol) and Willow Creek at RR crossing (stigmasterol) sites and the highest values

detected at the Malheur River at Hwy 201 (beta-sitosterol) and Malheur River near Little Valley (stigmastanol) sites.

The laboratory also measured two animal sterols, cholesterol and coprostanol (both 100 percent detection). As with the plant sterols, measured levels varied across the basin with the lowest levels detected at the Malheur River at Hwy 20 (cholesterol) and Willow Creek at RR crossing (coprostanol) sites and the highest levels detected at the Malheur River at Hwy 201 (cholesterol) and Malheur River at Little Valley (coprostanol) sites. While cholesterol is ubiquitous and found in a variety of different species, coprostanol is specific to fecal matter from humans and higher mammals (i.e., cattle and birds) as it is formed during digestion from cholesterol. The ratio of coprostanol to cholesterol may be used to evaluate contamination by human sewage. A ratio less than one indicates a biogenic source (i.e., livestock, higher animals) and greater than one a sewage or human source. Ratios measured at all sites in this study were less than one, potentially indicating a biogenic source of coprostanol.

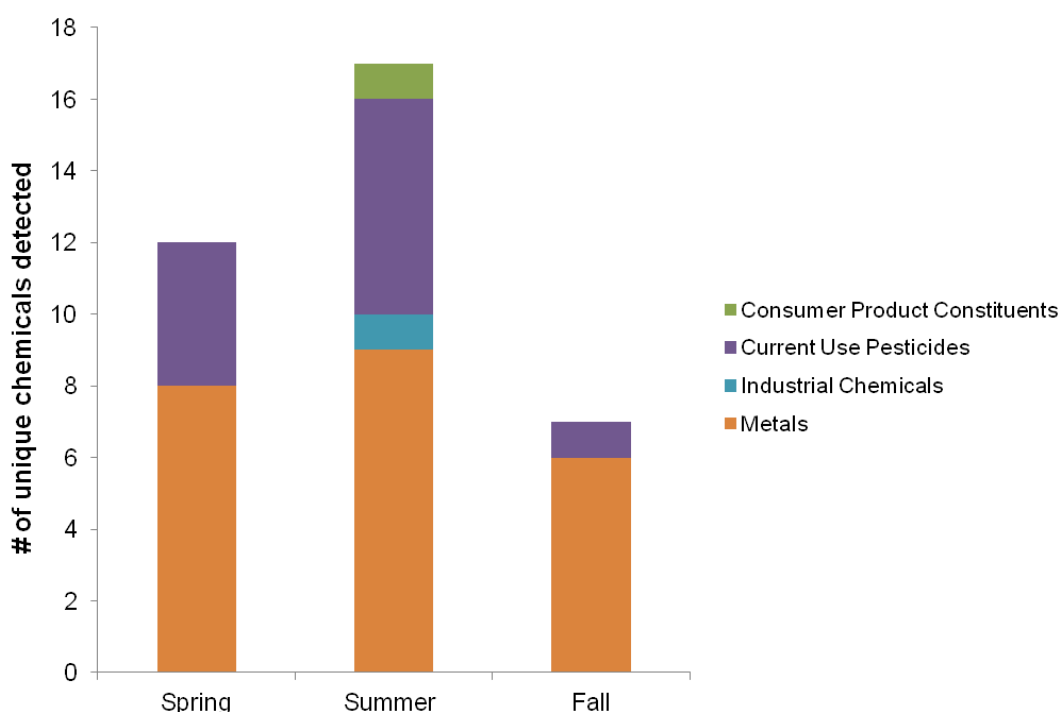


Figure 13 – Seasonality of detections in the Malheur Basin by chemical group.

Consumer product constituents including pharmaceuticals

In addition, the laboratory analyzed samples for 28 consumer product constituents including pharmaceuticals. This category includes chemicals found in commonly used household products, cleaning products, medications and insect repellent. The insect repellent DEET was detected at the Willow Creek at RR crossing (Vale) site during the summer sampling event. This site was not monitored seasonally, therefore, seasonality cannot be evaluated. Screening levels for these chemicals do not exist and their effects in the aquatic environment are not well understood.

Industrial chemicals, ammonia and PCBs

The industrial chemical 2,6-dinitrotoluene was detected at the Willow Creek site. This chemical is mainly used to produce flexible foam, but also may be used as a plasticizer and in explosives.

Ammonia is a naturally occurring compound commonly found in waste products. It is included as an industrial compound because of its use in fertilizers and dyes. It may be extremely toxic to aquatic organisms. Its toxicity is dependent on pH and temperature with toxicity increasing as pH and temperature increase. Detectable levels of ammonia occurred at the Willow Creek site. The two sites sampled in 2011 were not monitored for ammonia.

Data gaps & summary

Since this monitoring program evolved over time, improvements and additions to analytical methods occurred. Samples collected in 2011 did not include low-level analyses for legacy pesticides, PCBs, flame retardants or dioxins and furans. In addition, analysis did not include speciation of inorganic arsenic. While some combustion by-products were included, new methods allowing low-level analysis were not. Nutrient measurements including analysis for ammonia were also not included.

Because of this, only the results for the sites sampled in 2013 contains data for these methods. At these sites, no detections were measured for chemicals in these methods. All samples will be analyzed for these methods in the next round of sampling in the basin. In addition, no seasonal sampling occurred for these methods. Seasonality will also be evaluated during the next round.

In general, based on the sampling conducted in this study the high levels of arsenic and iron in the basin may warrant further investigation. In addition, the number current use pesticide detections at the Malheur River at Hwy 20 and the legacy pesticides exceedances at the Willow Creek site may warrant additional sampling due to the fact that persistent low-level detections and multiple chemicals at one site may act synergistically or additively in the environment resulting in impacts to the aquatic community. During the next round of sampling in these basins, seasonal sampling as well as the methods added in 2012 will be included at all sites. The basin detection table summarizes the detections at each site (see Appendix G).

2.7 Mid Coast

In 2013, DEQ laboratory staff collected seasonal (April, September and November) water samples at 18 locations across the Mid Coast Basin (Table 7). The sampling locations represented a range of watershed sizes and land uses as well as both freshwater and estuarine environments. Samples collected at the sampling location farthest upstream in the Siuslaw River watershed at Siuslaw Falls contained the greatest number of unique chemicals (Figure 14). The laboratory analyzed samples collected in the Mid Coast Basin for more than 500 unique chemicals. Of these, 49 chemicals were detected at least once (Figures 3 and 4, Statewide Report).

Seasonality

In order to capture seasonal use patterns and hydrologic differences, collection of water samples took place three times during the year. Figure 15 shows the unique number of chemicals detected by chemical group in each of the seasonal sampling events. This figure does not include data for PCBs, flame retardants or dioxins and furans. Due to laboratory capacity limitations, analysis for these chemical groups only occurred during one sampling event at each site. In addition, this figure does not include plant and animal sterols. Detections for the four common sterols occurred during each season.

In general, spring and summer samples contained the greatest number of unique chemicals.

Priority metals

This group includes all metals for which Oregon has existing water quality criteria. These metals occur naturally and may also be enriched by human activities. Because of this, detections of these metals are common in water. Water samples contained nine different metals with the greatest number, six, found at the Cummins Creek site. Iron exceeded the DEQ aquatic life criterion (1000 µg/L) at two sampling locations, Lake Creek at Sumich Rd during summer sampling and Siuslaw River at Siuslaw Falls during the summer and fall sampling events. The inorganic arsenic level at the Alsea River Port Docks site exceeded water quality criterion (1.0 µg/L) for the protection of human health for saltwater during summer sampling. No freshwater locations exceeded the inorganic arsenic criterion. Thallium, a rarely detected compound across the state, exceeded the applicable water quality criterion (0.043 µg/L) at the Siuslaw River sampling location at Siuslaw Falls Park during spring sampling.

Table 7 – Mid Coast Basin sampling locations.

Station	Site Code	Site Description	Watershed Area (km ²)
10391	MC01	Siletz R 5 miles DS of Siletz at RM 29.9	587
10582	MC02	Schooner Creek at Highway 101 Bridge (Lincoln City)	45
10990	MC03	Wolf Creek @ MOUTH	153
11263	MC04	Alsea River at Thissell road	857
11476	MC05	Yaquina River at Trapp Rd.(Chitwood)	183
13336	MC06	Yaquina River at Marker #47	566
20434	MC07	Lake Creek at Deaddog Hole	576
29900	MC08	Cummins Creek	21
33642	MC09	Siuslaw River at Tide, boat ramp	1511
34115	MC10	Panther Creek at North Bank Road (Salmon River)	6
34425	MC11	Yachats River at RM 0.9	109
35486	MC12	Salmon River at Hatchery Below Weir Approx. USGS RM 5.05	153
36432	MC13	Alsea at Mill Creek Boat Landing	350
36803	MC14	Lake Creek at Sumich Rd bridge	104
37396	MC15	Siletz River at Moonshine Park	298
37397	MC16	Alsea R at Port Docks (Waldport)	1216
37398	MC17	Siuslaw River Florence Boat Docks	1989
37400	MC18	Siuslaw River at Siuslaw Falls Park	211

Current use pesticides

Four current use pesticides, all herbicides, were detected in the basin. No site had detections of more than one herbicide. Diuron, a commonly used commercial and agricultural herbicide, was the most common with detections at three sites, Schooner Creek, Yaquina River at Trapp Rd and Marker #47. All

diuron detections occurred during summer sampling. Atrazine was detected at the Wolf Creek site during spring sampling. Fluridone, an herbicide used for aquatic weed control, occurred in the spring sample at the Panther Creek site and trifluralin was detected during the spring at the Siuslaw River at Siuslaw Falls site. The levels of these herbicides did not exceed any applicable EPA benchmark or DEQ criteria for the protection of aquatic life.

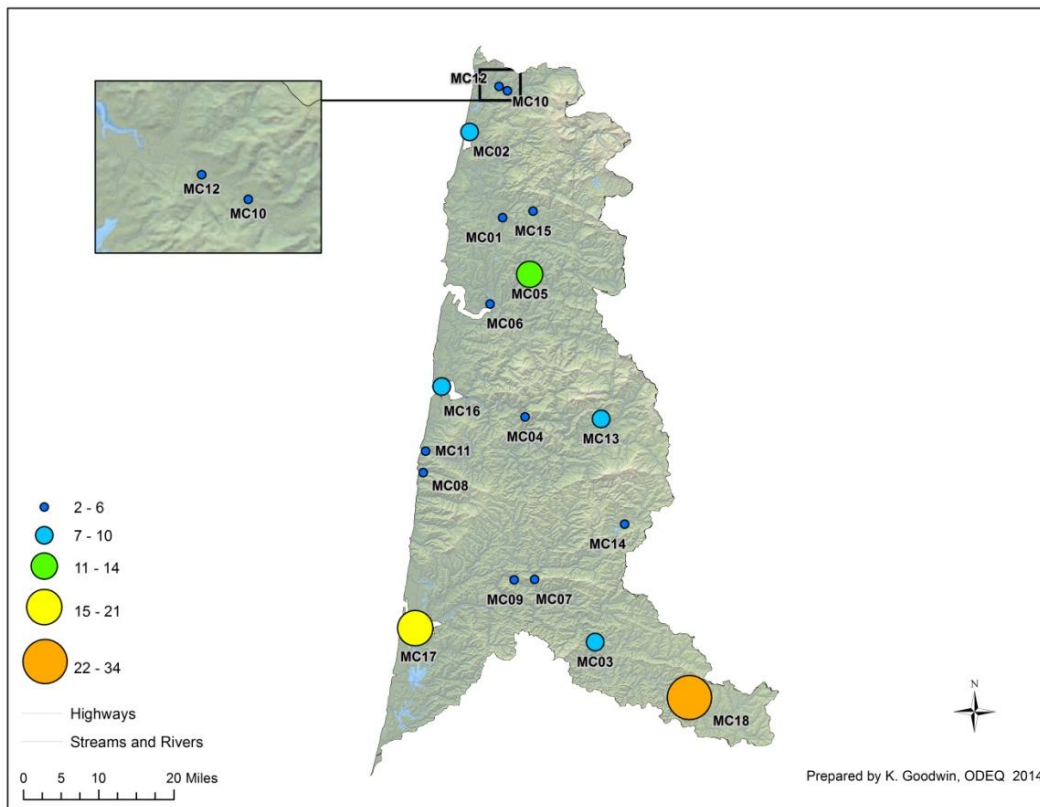


Figure 14 – Number of unique chemicals detected by site in the Mid Coast Basin.

Legacy pesticides

Detections of legacy pesticides occurred at four sites in the Mid Coast Basin. The Siuslaw River at Siuslaw Falls had the greatest number of unique chemicals in this group, eight. Of which, five (aldrin, dieldrin, heptachlor, heptachlor epoxide and hexachlorobenzene) exceeded their applicable Oregon DEQ criteria for the protection human health. All detections at the Siuslaw River at Siuslaw Falls site occurred during the spring with the exception of endosulfan sulfate, which occurred during the summer and fall. Detections of BHC-alpha occurred at one freshwater site, Siletz River at Moonshine Park, during summer sampling. Samples from the two estuary sites, Alsea River at Port Docks and Siuslaw River at Florence, contained detectable levels of BHC-alpha and beta. These compounds also were found in other estuaries along the Oregon coast and may be transported via the air. Because of their chemical nature, legacy pesticides tend to persist in sediments and bio-accumulate in the food chain making them a concern in the environment.

Combustion by-products (including dioxins and furans)

Detections of combustion by-products occurred at three sites in the Mid Coast Basin. In general, these detections occurred during the summer and fall. Combustion by-products are associated with incomplete combustion of organic matter from automobiles, fossil fuels burning, woodstoves and cigarette smoke. They may also be the result of stormwater run-off. All six compounds detected in the basin occurred in

samples from the Yaquina River at Trapp Rd site. Of the six compounds detected at this site, all six were present during the summer sampling, but only two, phenanthrene and fluoranthene, were present during fall. Two compounds, benzo(b)fluoranthene and chrysene, exceeded Oregon DEQ Table 40 water quality criteria at the Yaquina River site, both during the summer sampling. Additionally, the only detection of anthracene, statewide, occurred at the Yaquina River site below the applicable water quality criterion. Three combustion by-products were detected in the estuarine site, Alsea River at Port Docks. One compound, benzo(b)fluoranthene, exceeded its applicable water quality criterion at this site during the fall sampling.

No detectable concentrations of dioxins and furans occurred in any samples in the Mid Coast Basin.

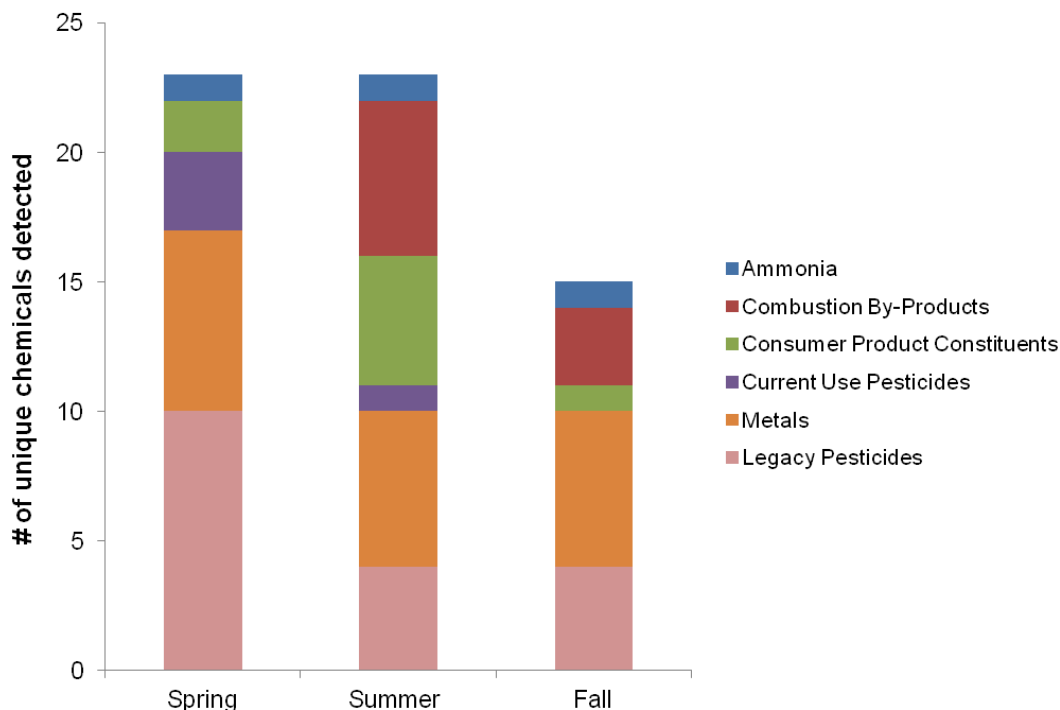


Figure 15 – Seasonality of detections in the Mid Coast Basin by chemical group.

Flame retardants

The most common group of chemicals detected in the basin was flame retardants with 14 compounds detected. Two sites in the Siuslaw River, at Siuslaw Falls Park (10 compounds) and at the Florence Boat Docks (9 compounds), accounted for a majority of these detections. Additional compounds were detected at Yachats River at RM 0.9 (1 compound), Wolf Creek at mouth (1 compound) and Alsea River at Mill Creek (2 compounds). Due to laboratory capacity, analysis for this group of chemicals only took place once, therefore, seasonality of these compounds cannot be discussed. There are no federal or state criteria developed for this chemical group, however, concern over these chemicals in humans and the environment prompted a ban on their manufacture and use. Similar to PCBs in structure, these chemicals tend to bio-accumulate in the food chain and are most often associated with sediments in the aquatic environment.

Plant and animal sterols

The laboratory measured four plant and animal sterols in the Mid Coast Basin. All four of 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 fully evaluate this data and its implications and relationship to other contaminants.

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 in the Mid Coast Basin. Levels varied across the basin with the lowest values detected at the Alsea River at Port Docks (beta-sitosterol) and Siletz River at Moonshine Park (stigmastanol) sites and the highest values detected at the Alsea River at Mill Creek (beta-sitosterol) and Yachats River (stigmastanol) sites.

The laboratory also measured two animal sterols, cholesterol and coprostanol (both 100 percent detection). As with the plant sterols, measured levels varied across the basin with the lowest levels detected at the Cummins Creek (cholesterol) and Siletz River at Moonshine Park (coprostanol) sites and the highest levels detected at the Lake Creek at Deaddog Hole (cholesterol) and Schooner Creek (coprostanol) sites. While cholesterol is ubiquitous and found in a variety of different species, coprostanol is specific to fecal matter from humans and higher mammals (i.e., cattle and birds) as it is formed during digestion from cholesterol. The ratio of coprostanol to cholesterol may be used to evaluate contamination by human sewage. A ratio less than one indicates a biogenic source (i.e., livestock, higher animals) and greater than one a sewage or human source. Ratios measured at all sites in this study were less than one, potentially indicating a biogenic source of coprostanol.

Consumer product constituents including pharmaceuticals

The laboratory analyzed water samples for 28 consumer product constituents including pharmaceuticals. Five compounds in this group were detected across three sites. Three pharmaceuticals, carbamazepine (anti-convulsant), sulfamethoxazole (antihistamine) and venlafaxine (mood enhancer), were detected in Schooner Creek. Carbamazepine and venlafaxine were detected during the summer sampling while sulfamethoxazole was detected during all three sampling events. This location receives discharge from a major wastewater facility. The insect repellent, DEET, was detected at one site, Siletz River at Moonshine Park, during the summer sampling. In addition, the plasticizer, bis(2-ethylhexyl)adipate, was detected in Wolf Creek during the spring sampling. This compound is used in common personal care products such as nail polish and cosmetics as well as in aircraft hydraulic fluids. Water quality criteria or benchmarks do not exist for these compounds.

Industrial chemicals, ammonia and PCBs

Ammonia is a naturally occurring compound commonly found in waste products. It is included as an industrial compound because of its use in fertilizers and dyes. It may be extremely toxic to aquatic organisms. Detectable levels of ammonia occurred in samples from 14 of 18 sites. Most of these detections were measured during the summer with occasional detections in the spring and fall. No samples exceeded current aquatic life water quality criteria.

No samples contained detectable levels of any other industrial chemicals or PCBs.

Summary

In general, based on the sampling conducted in this study flame retardants, legacy pesticides and thallium are a concern in the upper Siuslaw River watershed. Additionally, the consistent detection of BHC compounds along the coast as well as coastal ammonia exceedances is also of concern and may warrant additional investigation. The next round of sampling in this basin will revisit some of the sites of

concern as well as add new sites. In addition, flame retardants, PCBs and dioxins and furans should be measured during all three sampling events to evaluate seasonal differences. The basin detection table summarizes the detections at each site (see Appendix H).

2.8 North Coast

In 2013, DEQ laboratory staff collected seasonal (May, August and December) water samples at 19 locations across the basin (Table 8). The sampling locations represented a range of watershed sizes and land uses as well as both freshwater and estuarine environments. Samples from the Humbug Creek site contained the greatest number of unique chemicals (Figure 16). The laboratory analyzed samples collected in the North Coast Basin for greater than 500 unique chemicals. Of these, 33 chemicals were detected at least once (Figures 3 and 4, Statewide Report).

Table 8 – North Coast Basin sampling locations.

Station	Site Code	Site Description	Watershed Area (km ²)
10521	NC01	Necanicum River at Forest Lake RV Camp (Seaside)	143
10812	NC02	Skipanon River at Hwy 101	33
11005	NC03	Beaver Creek at Beaver	75
11229	NC04	Ecola CR at Cannon Beach Loop RD	53
11849	NC05	Salmonberry River at mouth	184
12187	NC06	Youngs River at Youngs River Loop Road	89
12951	NC07	Wilson River at Hwy 6 (Lee's Camp)	154
12962	NC08	South Fork Trask River downstream of Edwards Creek	53
13308	NC09	Tillamook Bay at Hobsonville Point	1439
13311	NC10	Netarts Bay at CNTY boat ramp	36
13431	NC11	Trask River at Netarts Road (Hwy. 6)	437
13440	NC12	Tillamook River at Bewley Creek Road	93
13553	NC13	Youngs Bay at Old Hwy 101 bridge	315
13654	NC14	Necanicum River @ 12th St. approach	176
18802	NC15	North Fork Nehalem River at Highway 53	119
22394	NC16	Nestucca River at first bridge ramp (upstream of Beaver)	371
24299	NC17	Nehalem River at Hwy 47 bridge, US of Vernonia	244
32980	NC18	Humbug Creek near mouth (Nehalem)	75
34165	NC19	Clatskanie River above Fall Creek at Beaver boat ramp	235

Seasonality

In order to capture seasonal use patterns and hydrologic differences, collection of water samples took place three times during the year. Figure 17 shows the unique number of chemicals detected by chemical group during each of the seasonal sampling events. This figure does not include data for PCBs, flame retardants or dioxins and furans. Due to laboratory capacity limitations, analysis for these chemical groups only occurred during one sampling event at each site. In addition, this figure does not include plant and animal sterols. Detections for the four common sterols occurred during each season.

In general, the greatest number of unique chemicals was detected during the spring sampling.

Priority metals

This group includes all metals for which Oregon has existing water quality criteria. These metals occur naturally and may also be enriched by human activities. Because of this, detections of these metals are common in water. Water samples contained 12 different metals with the greatest number (10) found at the Salmonberry River and Nehalem River at Hwy 47 sites. Iron levels exceeded water quality criterion (1000 µg/L) at 11 of the 15 freshwater sites. This consistency likely points to natural sources of iron in the water. All exceedances were measured during the fall sampling with the exception of the Skipanon River at which the exceedance occurred during the spring. Copper also exceeded its applicable criterion at three sites, the Salmonberry River, the South Fork Trask River and the Trask River at Netarts Rd. Similar to iron, all exceedances occurred during the fall sampling. The presence of these metals may impact salmon and other aquatic species.

The inorganic arsenic level exceeded the water quality criterion (1.0 µg/L) for the protection of human health at two estuary sites, Tillamook Bay and Netarts Bay. The Necanicum River site also contained inorganic arsenic at levels near the criterion. No freshwater sites contained elevated levels of inorganic arsenic.

Current use pesticides

Samples collected in the basin contained two commonly used herbicides and one herbicide degradate. Diuron occurred at two sites during the fall sampling, Skipanon River and Youngs Bay. It also was detected during the spring at the Skipanon River site. The other herbicide, 2,4-D, was only detected during the summer at the Necanicum River site. Samples from the Skipanon River also contained 2,6-dichlorobenzamide, a degradate of the herbicide dichlobenil, during the summer and fall sampling events. The measured levels of these herbicides did not exceed any applicable EPA benchmark or DEQ criteria for the protection of aquatic life.

Legacy pesticides

Detections of legacy pesticides occurred at five sites in the North Coast Basin. In the Skipanon River, two degradates of DDT, 4,4'-DDD and 4,4'-DDE, occurred at levels above the Oregon DEQ Table 40 water quality criteria for the protection of human health in the spring samples. These were the only detections of DDT degradates in the basin. Detections of BHC compounds occurred at 3 of the 4 estuary sites (Tillamook Bay, Netarts Bay and Necanicum River) consistently across seasons. These compounds also occurred at estuary sites in the Mid and South Coast basins. These compounds also were found in other estuaries along the Oregon coast and may be transported via the air. Endosulfan sulfate occurred at the Young's Bay site during the summer and fall samples. These detections did not exceed the applicable criterion. Due to their chemical nature, legacy pesticides tend to persist in the environment

and bio-accumulate in the food chain making them a concern in the environment regardless of detection level.

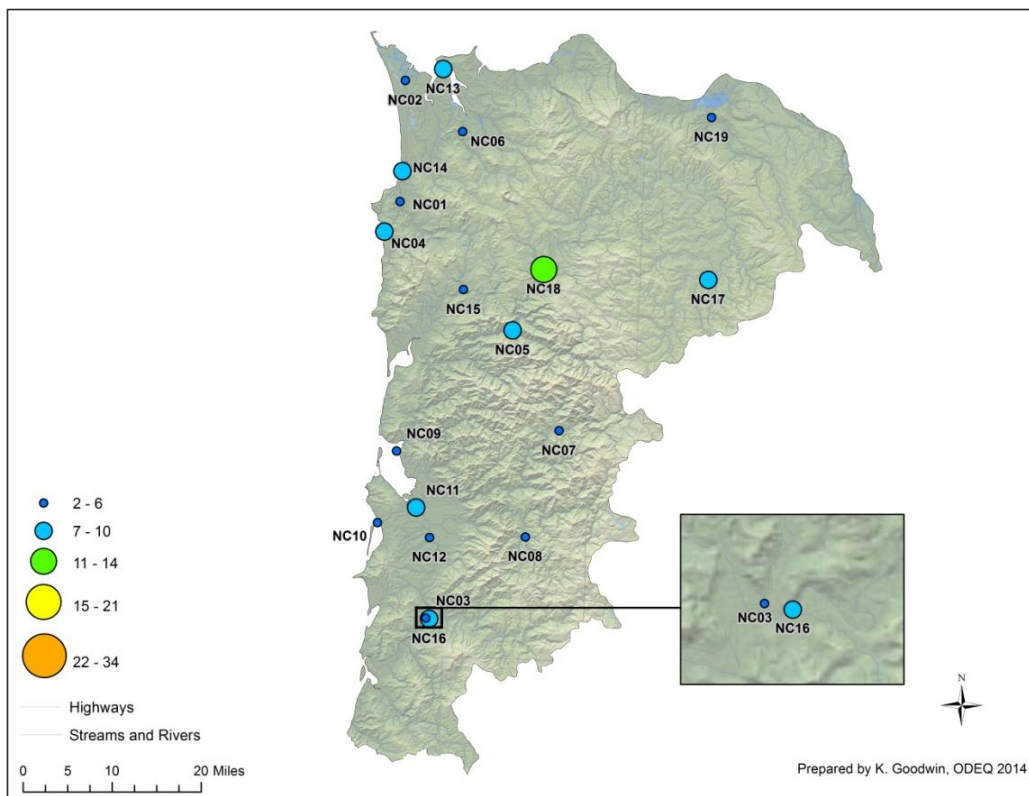


Figure 16 – Number of unique chemicals detected by site in the North Coast Basin.

Combustion by-products (including dioxins and furans)

Detections of combustion by-products occurred at four sites in the North Coast Basin. In general, these detections occurred mostly during the spring and summer. Combustion by-products are associated with the incomplete combustion of organic matter from automobiles, fossil fuels burning, woodstoves and cigarette smoke. They may also be the result of stormwater run-off. Phenanthrene was the most common compound detected in samples from the four sites. Three compounds were detected in samples from the Youngs Bay site during the spring and the Ecola Creek site during the summer. Fluoranthene was detected across seasons at the Youngs Bay site. None of the detected levels of these compounds exceeded applicable water quality criteria.

No detectable concentrations of dioxins and furans occurred in any samples in the North Coast Basin.

Flame retardants

Detections occurred for six brominated flame retardants in the basin. Five of which were only detected at the Trask River sampling location. One congener (PBDE-209) was detected at four sites (Necanicum River, North Fork Nehalem at Hwy 53, Clatskanie River and Ecola Creek). Due to laboratory capacity, analysis for this group of chemicals only took place once, therefore, seasonality of these compounds cannot be discussed. There are no federal or state criteria developed for this chemical group, however, concern over these chemicals in humans and the environment prompted a ban on their manufacture and use. Similar to PCBs in structure, these chemicals tend to bio-accumulate in the food chain and are most often associated with sediments in the aquatic environment.

Plant and animal sterols

The laboratory measured four plant and animal sterols in the North Coast Basin. All four of 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 fully evaluate this data and its implications and relationship to other contaminants.

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 in the basin. Levels varied across the basin with the lowest values detected at the Netarts Bay site and the highest values detected at the Nehalem River at Hwy 47 (beta-sitosterol) and Tillamook River (stigmastanol) sites.

The laboratory also measured two animal sterols, cholesterol and coprostanol (both 100 percent detection). As with the plant sterols, measured levels varied across the basin with the lowest levels detected at the South Fork Trask River (cholesterol) and Netarts Bay (coprostanol) sites and the highest levels detected at the Skipanon River (cholesterol) and Tillamook River (coprostanol) sites. While cholesterol is ubiquitous and found in a variety of different species, coprostanol is specific to fecal matter from humans and higher mammals (i.e., cattle and birds) as it is formed during digestion from cholesterol. The ratio of coprostanol to cholesterol may be used to evaluate contamination by human sewage. A ratio less than one indicates a biogenic source (i.e., livestock, higher animals) and greater than one a sewage or human source. Ratios measured at all sites in this study were less than one, potentially indicating a biogenic source of coprostanol.

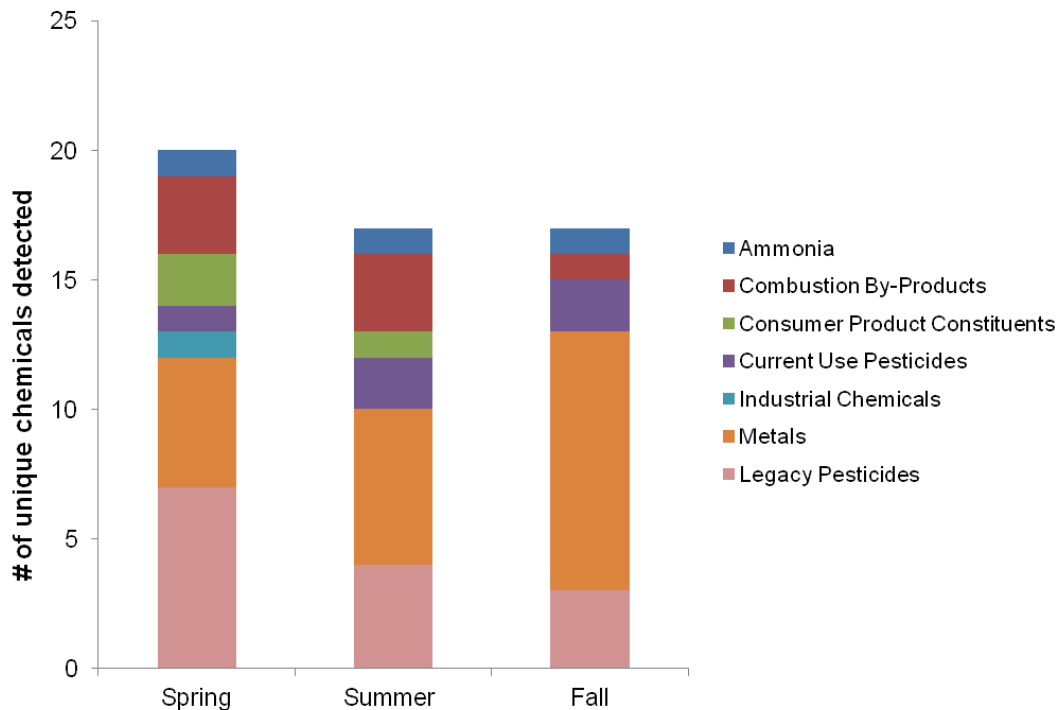


Figure 17 – Seasonality of detections in the North Coast Basin by chemical group.

Consumer product constituents including pharmaceuticals

The laboratory analyzed water samples for 28 consumer product constituents including pharmaceuticals. Four of these were detected in the North Coast Basin. Sulfamethoxazole, a common antibiotic, was detected at two sites, Ecola Creek and Necanicum River, during the summer sampling. The hormone found in oral contraceptive medication, 17 α -ethynyl estradiol, was found at the Youngs River site during the spring. This is the only detection for this compound in this monitoring program statewide. Also during the spring at the Youngs River site, bis(2-ethylhexyl)adipate, a solvent used in plastics, hydraulic fluid and common cosmetics was detected. Water quality criteria or benchmarks do not exist for these compounds.

Industrial chemicals, ammonia and PCBs

Ammonia is a naturally occurring compound commonly found in waste products. It is included as an industrial compound because of its use in fertilizers and dyes. It may be extremely toxic to aquatic organisms. Its toxicity is dependent on pH and temperature and toxicity increases as pH and temperature increase. Detectable levels of ammonia occurred in samples from 13 sites. Most of these detections were measured during the spring and summer with occasional detections in the fall. No samples exceeded current aquatic life water quality criteria.

The industrial chemical, 2,6-dinitrotoluene, was detected at the Necanicum River site during spring sampling. This compound is mainly used in the production of polyurethane foams but may also be used as a plasticizer as well as in explosives. A water quality criterion or benchmark does not exist for this compound.

No samples contained detectable levels of any PCBs.

Summary

Samples from several sites in the basin contained very few chemicals. Detections of priority metals such as copper over criteria are a concern for fish use in the basin. In addition, the occurrence of the legacy compound, BHC, in the basin's estuaries may warrant additional investigation as stated detections of this chemical also were measured in the mid and southern coastal estuaries. Sources may be local but could also include airborne transport. The basin detection table summarizes the detections at each site (see Appendix I). The next round of monitoring in this basin is occurring in 2015. Certain sites will be revisited to evaluate trends in the data and additional sites will be included to increase geographic coverage. In addition, flame retardants, PCBs and dioxins and furans will be measured during all three sampling events to evaluate seasonal changes.

2.9 Oregon Closed Lakes

In 2013, DEQ laboratory staff collected water samples at 12 locations across the basin (Table 9). The sampling locations represented a range of watershed sizes and land uses throughout the basin. The samples collected at the Thomas Creek site contained the greatest number of unique chemicals (Figure 18). The laboratory analyzed samples in the Oregon Closed Lakes Basin for greater than 500 unique chemicals. Of these, 25 unique chemicals were detected at least once (Figures 3 and 4, Statewide Report).

Seasonality

Many of the chemicals sampled may show seasonal differences based on use patterns and hydrologic influences. Therefore, seasonal sampling is recommended. However, due to laboratory restrictions in 2013, samples were collected once during the late summer (September). Therefore, evaluation of seasonal patterns or differences was not conducted in this basin. During the next round of monitoring, three seasonal events will be included to address this issue.

Table 9 – Oregon Closed Lakes Basin sampling locations.

Station	Site Code	Site Description	Watershed Area (km ²)
10741	OC01	Honey Creek at Plush	437
10748	OC02	Antelope Creek at Hwy 140 (Lakeview)	11
12264	OC03	Whitehorse Creek at Whitehorse Ranch Road	279
12265	OC04	Donner Und Blitzen River upstream of Page Springs Campground	541
12266	OC05	Twentymile Creek at Hwy 140	7
12267	OC06	Deep Creek west of Adel	703
13014	OC07	South Fork Blitzen River at Blitzen Crossing	208
24158	OC08	Twentymile Creek at confluence with Twelvemile Creek	129
33929	OC09	Silvies River at West Loop Road	1178
33930	OC10	Chewaucan River, 2.4 miles upstream of Paisley	667
36778	OC11	Thomas Creek at Stock Drive Road	104
37573	OC12	Donner Und Blitzen River at Center Patrol Road	2116

Priority metals

This group includes all metals for which Oregon has existing water quality criteria. These metals occur naturally and may also be enriched by human activities. Because of this, detections of these metals are common in water. Detection of 11 metals occurred in the Oregon Closed Lakes Basin. Three sites, Thomas Creek (11 metals), Silvies River (8 metals) and Antelope Creek (7 metals), accounted for the majority of these detections. Both inorganic arsenic and iron exceeded Oregon DEQ water quality criteria at the Antelope Creek and Thomas Creek sites. Iron also exceeded the aquatic life criterion at the Silvies River site.

Current use pesticides

Detection of one current use herbicide, 2,4-D, occurred in the basin. This herbicide is commonly used in agriculture and home use for the control of broadleaf weeds. Detections were measured at two sites, Antelope Creek and Thomas Creek. The levels measured were below the applicable water quality

criterion. The application of pesticides tends to be seasonal. In the next phase of toxics monitoring in the Oregon Closed Lakes Basin, seasonal samples will be collected to evaluate this.

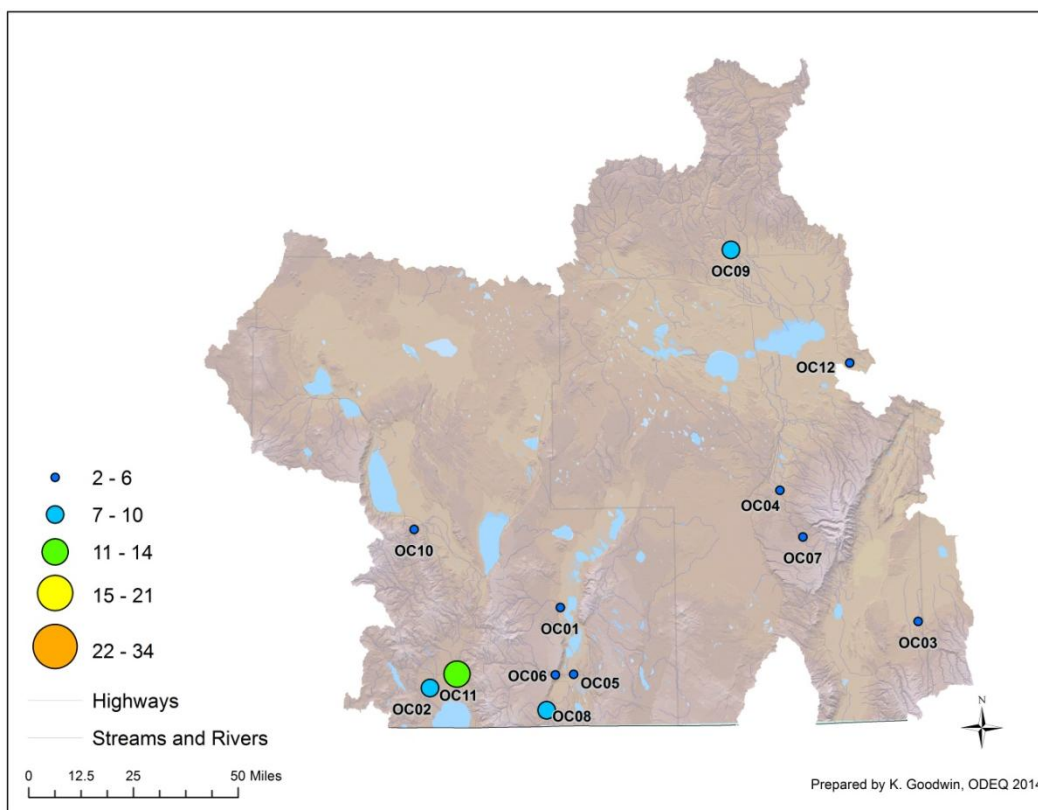


Figure 18 – Number of unique chemicals detected by site in the Oregon Closed Lakes Basin.

Legacy pesticides

One legacy pesticide degradate, endosulfan sulfate, was detected. The parent compound, endosulfan, is actually still registered for use, however, all registrations will be cancelled by July 31, 2016. For this reason, it is included as a legacy pesticide. Endosulfan sulfate was detected at the Thomas Creek site. The detected level was below the applicable water quality criterion.

Combustion by-products (including dioxins and furans)

One combustion by-product, phenanthrene, was detected at one site in the basin. This detection occurred at Twentymile Creek at Hwy 140. Phenanthrene is a polycyclic aromatic hydrocarbon (PAH). PAHs are present in smoke from incomplete combustion of organic materials, woodstoves, automobiles and cigarettes. There is no established screening value or criterion for phenanthrene.

No measured levels of dioxins and furans occurred in water samples from this basin.

Flame retardants

Detections of six brominated flame retardants occurred in the basin. Two sites, South Fork Blitzen River and Twentymile Creek, each contained three PBDE congeners. The congeners detected in this area were also detected in samples from other parts of the state. These compounds may travel via airborne transport. There are no federal or state criteria developed for this chemical group, however, concern over

these chemicals in humans and the environment prompted a ban on their manufacture and use. Similar to PCBs in structure, these chemicals tend to bio-accumulate in the food chain.

Plant and animal sterols

The laboratory measured four plant and animal sterols in the Oregon Closed Lakes Basin. All four of 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 fully evaluate this data and its implications and relationship to other contaminants.

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 in the Oregon Closed Lakes Basin. Levels varied across the basin with the lowest values detected at the Twentymile Creek at Twelvemile Creek site (beta-sitosterol) and the Donner Und Blitzen site (stigmastanol) and the highest values detected at the Thomas Creek site.

The laboratory also measured two animal sterols, cholesterol and coprostanol. As with the plant sterols, measured levels varied across the basin with the lowest levels detected at the Twentymile Creek at Hwy 140 (cholesterol) and South Fork Blitzen (coprostanol) sites and the highest levels detected at the Thomas Creek site. While cholesterol is ubiquitous and found in a variety of different species, coprostanol is specific to fecal matter from humans and higher mammals (i.e., cattle and birds) as it is formed during digestion from cholesterol. The ratio of coprostanol to cholesterol may be used to evaluate contamination by human sewage. A ratio less than one indicates a biogenic source (i.e., livestock, higher animals) and greater than one a sewage or human source. Ratios measured at all sites in this study were less than one, potentially indicating a biogenic source of coprostanol.

Consumer product constituents (including pharmaceuticals)

No detections occurred for any chemicals in this group in the Oregon Closed Lakes Basin.

Industrial chemicals, ammonia and PCBs

Two industrial chemicals were detected in the basin. Isophorone, a solvent used in a variety of products including some pesticide formulations, was detected at two sites, Antelope Creek and Thomas Creek. These are the only locations in the state that isophorone was detected during this study. The other chemical, 2,6-dinitrotoluene, was also detected at two sites, Twentymile Creek at Twelvemile Creek and Silvies River. This chemical is an industrial intermediate in the manufacture of polyurethane foams and explosives. Neither chemical was present at levels above the associated water quality criteria.

Ammonia is a naturally occurring compound commonly found in waste products. It is included as an industrial compound because of its use in fertilizers and dyes. It may be extremely toxic to aquatic organisms. Its toxicity is dependent on pH and temperature with toxicity increasing as pH and temperature increases. Detectable levels of ammonia occurred in samples from 5 of 12 sites. No samples exceeded the current DEQ aquatic life water quality criterion.

No water samples from this basin contained measurable levels of PCBs.

Data gaps & summary

Due to laboratory capacity during this round of sampling, only one sampling event occurred in the Oregon Closed Lakes Basin. Because of this, seasonal use or hydrologic differences cannot be evaluated. The next round of sampling in this area will include seasonal sampling.

In general, based on the sampling conducted in this study, detections for few chemicals occurred in the Oregon Closed Lakes Basin. Criteria were exceeded at three sites in the basin, Antelope Creek, Silvies River and Thomas Creek. High levels of, possibly naturally occurring, inorganic arsenic and iron may warrant additional sampling. Detections of brominated flame retardants in this basin may be evidence of airborne transport of these chemicals. The basin detection table summarizes the detections at each site (see Appendix J).

2.10 Owyhee

In 2011, DEQ laboratory staff collected seasonal (June, August and November) water samples from one location in the Owyhee Basin (Table 10). In September 2013, staff collected water samples from four additional locations. The 2013 sampling only included one event and does not represent seasonal variations. The sampling locations represented a range of watershed areas and land uses. The Owyhee River at Hwy 201 contained the greatest number of unique chemicals (Figure 19). In total, 19 unique chemicals were detected in the Owyhee Basin (Figures 3 and 4, Statewide Report).

Table 10 – Owyhee Basin sampling locations. Asterisks indicate sites sampled in 2013.

Station	Site Code	Site Description	Watershed Area (km ²)
10729	OW01	Owyhee River at Hwy 201 Bridge (Owyhee)	28427
10730	OW02	Owyhee River at Rome (Hwy 95)*	16579
11050	OW03	Jordan Creek at Arock Bridge*	2945
12261	OW04	Jordan Creek u/s of Jordan Valley, OR at Pleasant Valley Road Bridge*	1196
36783	OW05	Crooked Creek at Kiger Road*	3468

Seasonality

In order to capture seasonal use patterns and hydrologic differences, collection of water samples took place three times during the year. Figure 20 shows the unique number of chemical detected by chemical group during each of the seasonal sampling events. This figure does not include plant and animal sterols. Detections for the four most common sterols occurred during each season.

Generally, priority metals were detected across seasons, while current use pesticides were detected during both the summer and fall and one consumer product constituent was detected during the summer.

Priority metals

This group includes all metals for which Oregon has existing water quality criteria. These metals occur naturally and may also be enriched by human activities. Because of this, detections of these metals are common in water. Eleven priority metals were detected in this basin. Given its geology, this area of the state is naturally high in arsenic. DEQ established a criterion for inorganic arsenic ($2.1 \mu\text{g/L}$) for the protection of human health. In 2011, DEQ did not measure the inorganic form of arsenic but instead measured total arsenic. In 2013 samples, inorganic arsenic exceeded the DEQ Table 40 criterion at two sites, Owyhee River at Rome, Crooked Creek at Kiger Rd. Total arsenic, measured in 2011, samples from the Owyhee River at Hwy 201 were over the inorganic criterion in all seasons with the highest level detected during the fall ($41 \mu\text{g/L}$). While comparison of total arsenic to the inorganic arsenic criterion is a conservative approach, the very high levels measured indicate that inorganic arsenic is likely present at a level of concern at this site.

Iron levels measured at one site, Owyhee River at Hwy 201, exceeded the applicable DEQ water quality criterion ($1000 \mu\text{g/L}$) during the summer and fall sampling events. Iron was detected at the other sites within the basin but not at levels above the criterion.

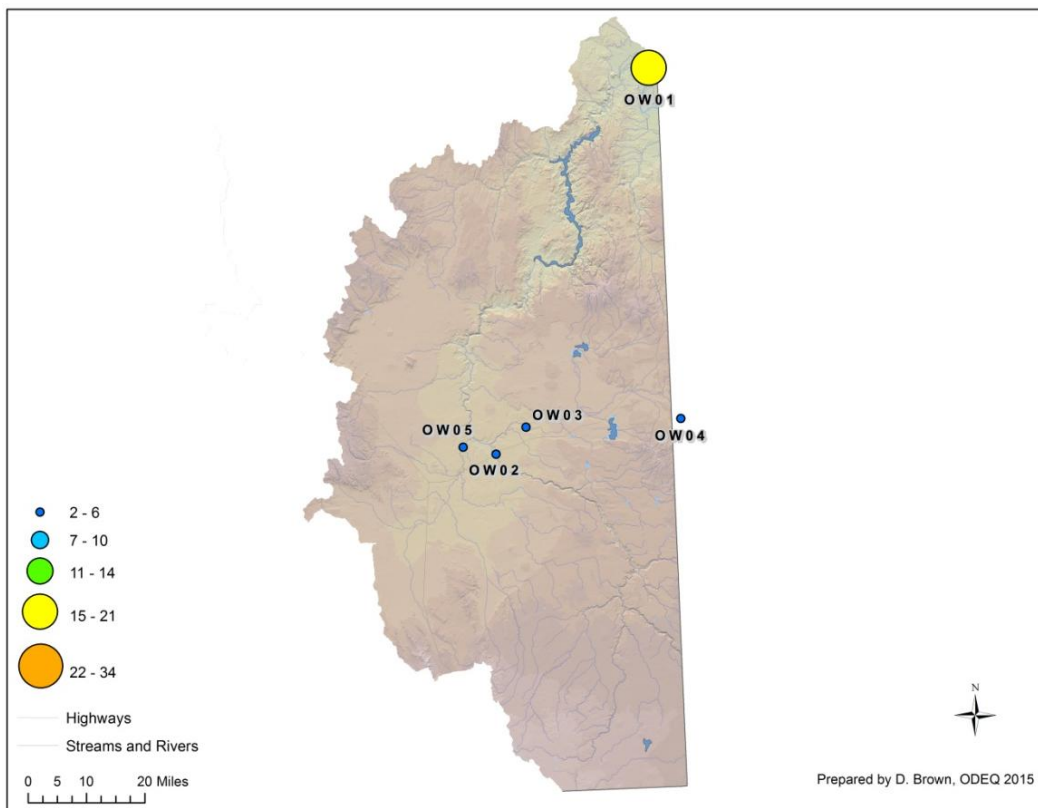


Figure 19 – Number of unique chemicals detected by site in the Owyhee Basin.

Current use pesticides

Samples from the Owyhee Basin, specifically, the most downstream site, Owyhee River at Hwy 201 contained nine current use pesticides. Of these, the insecticide dichlorvos was present at a level that exceeded its EPA aquatic life benchmark. This organophosphate insecticide has a variety of uses including agricultural uses, slow release pest strips, flea collars and as a worming agent for dogs and livestock. This is the only location where a detection for dichlorvos occurred in the statewide study. In addition, detections for the insecticide, methomyl, only occurred in the Malheur and Owyhee basins. No

current use pesticides were detected at the other sites in the Owyhee Basin, however, it should be noted that samples were only collected at these sites during September. Most pesticides detections occurred in the spring samples (statewide); therefore, seasonal sampling during the next round of monitoring is warranted.

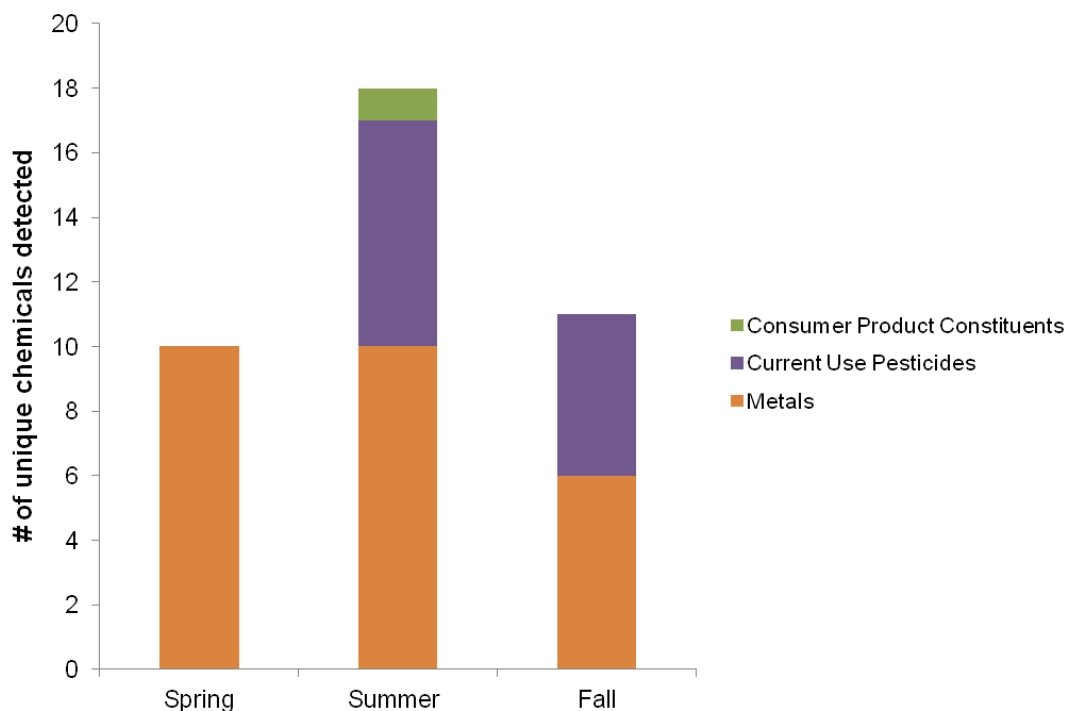


Figure 20 – Seasonality of detections in the Owyhee Basin by chemical group.

Legacy pesticides

Legacy pesticides were not detected at the four sites sampled in 2013 in the Owyhee Basin. It should be noted that the 2013 samples were collected only during September. Seasonal variations may occur in these chemicals. In addition, the Owyhee River at Hwy 201 site, the site with the most current use pesticide detections, was not sampled for legacy pesticides.

Combustion by-products (including dioxins and furans)

No detections occurred for combustion by-products in the Owyhee Basin.

In addition, no detections for dioxins and furans occurred at the four sites sampled in 2013. Samples were not analyzed for these chemicals during 2011.

Flame retardants

Sampling and analysis for brominated flame retardants only occurred once at the sites sampled in 2013. No detections were recorded.

Plant and animal sterols

The laboratory measured four plant and animal sterols in the Owyhee Basin. All four of 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 fully evaluate this data and its implications and relationship to other contaminants.

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 in the Owyhee Basin. Levels varied across the basin with the lowest values detected at the Jordan Creek upstream of Jordan Valley site and the highest values detected at the Jordan Creek at Arock Bridge site.

The laboratory also measured two animal sterols, cholesterol and coprostanol (both 100 percent detection). As with the plant sterols, measured levels varied across the basin with the lowest levels detected at the Jordan Creek upstream of Jordan Valley (cholesterol) and Owyhee River at Rome (coprostanol) sites and the highest levels detected at the Jordan Valley at Arock Bridge site. While cholesterol is ubiquitous and found in a variety of different species, coprostanol is specific to fecal matter from humans and higher mammals (i.e., cattle and birds) as it is formed during digestion from cholesterol. The ratio of coprostanol to cholesterol may be used to evaluate contamination by human sewage. A ratio less than one indicates a biogenic source (i.e., livestock, higher animals) and greater than one a sewage or human source. Ratios measured at all sites in this study were less than one, potentially indicating a biogenic source of coprostanol.

Consumer product constituents

Diphenhydramine, a common antihistamine, was detected at the Owyhee River at Hwy 201 site. The detection occurred only during the summer sampling. Screening levels for these chemicals do not exist and their effects in the aquatic environment are not well understood.

Industrial chemicals, ammonia and PCBs

No industrial chemicals were detected in the Owyhee Basin.

Ammonia is a naturally occurring compound commonly found in waste products. It is included as an industrial compound because of its use in fertilizers and dyes. It may be extremely toxic to aquatic organisms. Its toxicity is dependent on pH and temperature with toxicity increasing as pH and temperature increase. No detectable levels of ammonia occurred at the 2013 monitoring sites. The site sampled in 2011 was not monitored for ammonia.

No water samples from the Owyhee Basin contained measurable amounts of PCBs.

Data gaps & summary

Since this monitoring program evolved over time, improvements and additions to analytical methods occurred. Samples collected in 2011 did not include low-level analyses for legacy pesticides, PCBs, flame retardants or dioxins and furans. In addition, analysis did not include speciation of inorganic arsenic. While some combustion by-products were included, new methods allowing low-level analysis were not. Nutrient measurements including analysis for ammonia were also not included.

Because of this, only the results for the sites sampled in 2013 contain data using these methods. At these sites, no detections were measured for chemicals in these methods. All samples should be analyzed for these methods in the next round of sampling in the basin. In addition, no seasonal sampling occurred for these methods. Seasonality should also be evaluated during the next round.

In general, based on the sampling conducted in this study the high levels of arsenic and iron in the basin may warrant further investigation. In addition, though the number of exceedances was low, a large number current use pesticide detections occurred at a one site (Owyhee River at Hwy 201). This may also warrant additional sampling because persistent low-level detections and multiple chemicals at one site may act synergistically or additively in the environment resulting in impacts to the aquatic community. The basin detection table summarizes the detections at each site (see Appendix K).

2.11 Powder and Burnt

In 2011, DEQ laboratory staff collected seasonal (June, August and November) water samples at three locations across the Powder and Burnt basins (Table 11). The sampling locations represented different watershed areas and land uses within the basins. Samples from the Powder River at Snake River Road contained the greatest number of unique chemicals (Figure 21). In total, 12 unique chemicals were detected in the Powder and Burnt basins (Figures 3 and 4, Statewide Report).

Table 11 – Powder and Burnt basin sampling locations.

Station	Site Code	Site Description	Watershed Area (km ²)
10724	P01	Powder River at Hwy 86 (east of Baker City)	3176
11494	P02	Burnt River at Snake River Road (Huntington)	2846
11857	P03	Powder River at Snake River Road (Richland)	3672

Seasonality

In order to capture seasonal use patterns and hydrologic differences, collection of water samples took place three times during the year. Figure 22 shows the unique number of chemical detected by chemical group during each of the seasonal sampling events. This figure does not include plant and animal sterols. Detections for the four most common sterols occurred during each season.

In general, metals were detected across all seasons with the greatest number detected during the spring. Current use pesticides were detected in both the spring and summer.

Priority metals

This group includes all metals for which Oregon has existing water quality criteria. These metals occur naturally and may also be enriched by human activities. Because of this, detections of these metals are common in water. Nine different metals were detected in the basins. Detections of all nine metals occurred at the Burnt River site during spring sampling. Only detections of arsenic, barium and manganese occurred across all seasons at the three sites. Iron exceeded the DEQ criterion for the protection of aquatic life (1000 µg/L) at two sites, Burnt River at Snake River Rd and Powder River at Snake River Rd. Both of these exceedances occurred only during the spring sampling.

DEQ established a criterion for inorganic arsenic (2.1 µg/L) for the protection of human health. In 2011, DEQ did not measure the inorganic form of arsenic but instead measured total arsenic. Samples from all three sites in the basins contained levels of total arsenic that may indicate a potential concern for

inorganic arsenic. Seasonally the highest arsenic concentrations were measured in the summer samples from all three sites. This seasonal component to the arsenic levels may indicate a natural or groundwater source.

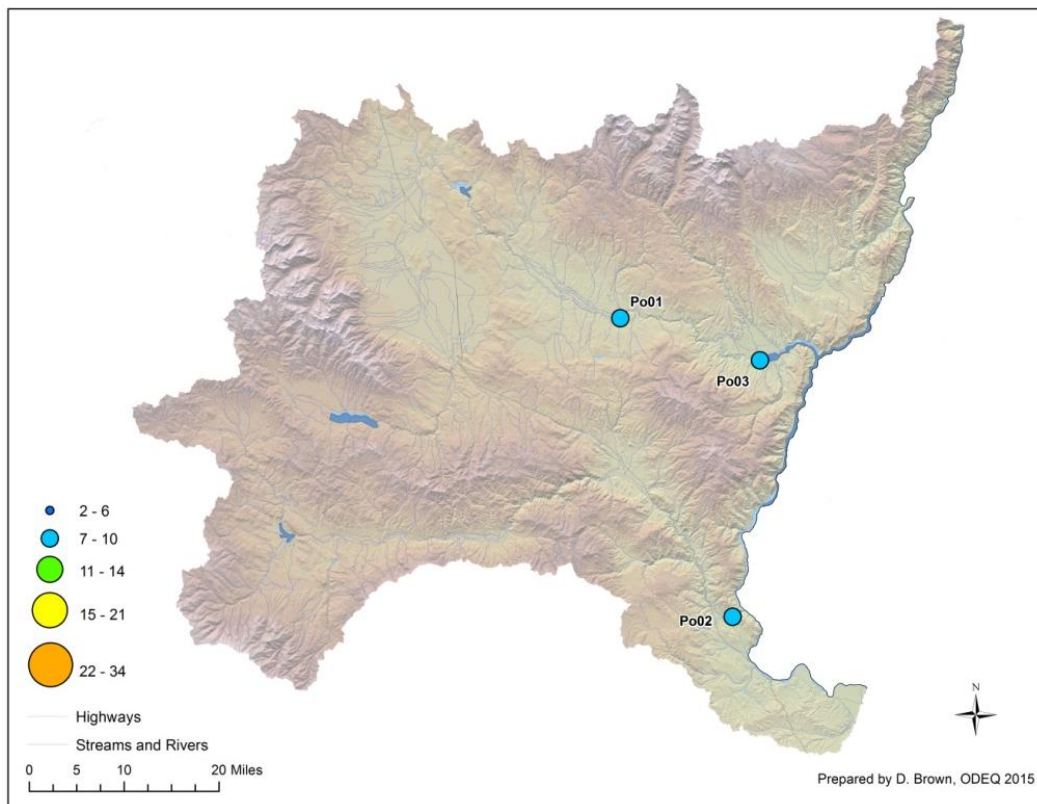


Figure 21 – Number of unique chemicals detected by site in the Powder and Burnt basins.

Current use pesticides

Current use pesticide detections also occurred at all three sites. Detections included three unique parent herbicides (atrazine, diuron, sulfometuron-methyl) and two degradates of atrazine (deisopropylatrazine, desethylatrazine). Diuron, a commonly detected herbicide in other parts of the state, occurred only at the Burnt River site, while the other two herbicides (atrazine and sulfometuron-methyl) were present at the other two sites on the Powder River. Diuron and sulfometuron-methyl were detected only during the spring sampling and atrazine and its degradates only during the summer sampling. None of the detections exceeded EPA aquatic life benchmarks. None occurred in combination with another herbicide in the same sample (with the exception of atrazine that occurred with its degradates).

Combustion by-products

No detections occurred for combustion by-products in these basins.

Plant and animal sterols

The laboratory measured four plant and animal sterols in the Powder and Burnt basins. All four of 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 fully evaluate this data and its implications and relationship to other contaminants.

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 basins with the lowest levels detected at the Powder River at Snake River Rd (beta-sitosterol) and the Burnt River at Snake River Rd (stigmastanol) sites and the highest levels detected at the Powder River at Hwy 86 site.

The laboratory also measured two animal sterols, cholesterol and coprostanol (both 100 percent detection). As with the plant sterols, measured levels varied across the basins with the lowest levels detected at the Powder River at Snake River Rd site and the highest levels detected at Powder River at Hwy 86 site. While cholesterol is ubiquitous and found in a variety of different species, coprostanol is specific to fecal matter from humans and higher mammals (i.e., cattle and birds) as it is formed during digestion from cholesterol. The ratio of coprostanol to cholesterol may be used to evaluate contamination by human sewage. A ratio less than one indicates a biogenic source (i.e., livestock and higher animals) and greater than one a sewage or human source. Ratios measured at all sites in this study were less than one, potentially indicating a biogenic source of coprostanol.

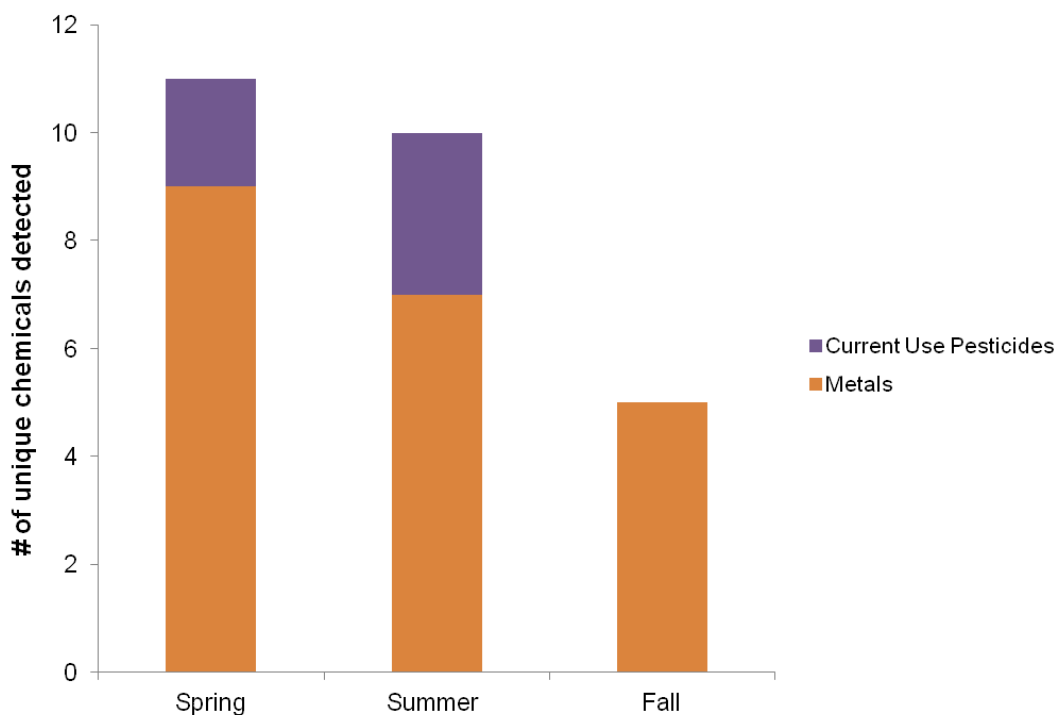


Figure 22 – Seasonality of detections in the Powder and Burnt basins by chemical group.

Consumer product constituents including pharmaceuticals

In addition, the laboratory analyzed water samples for 28 consumer product constituents including pharmaceuticals and personal care products. No detections occurred for these compounds in the basins.

Data gaps & summary

Since this monitoring program evolved over time, improvements and additions to analytical methods occurred. Samples collected in 2011 did not include low-level analyses for legacy pesticides, PCBs, flame retardants or dioxins and furans. In addition, analysis did not include speciation of inorganic arsenic. While some combustion by-products were included, new methods allowing low-level analysis

were not. Nutrient measurements including analysis for ammonia were also not included. Future toxics monitoring work in these basins should include these analyses. Additional sampling may also help identify any potential trends emerging within the basins. In the Powder and Burnt basins, only three sites were initially sampled. Additional work should increase geographic coverage in the basin. The basin detection table summarizes the data from this basin (see Appendix L).

2.12 Rogue

In 2011, DEQ laboratory staff collected seasonal (May, August and November) water samples at nine locations across the basin (Table 12). Lab staff also collected seasonal (April, August and October) samples from one additional site in the basin in 2013 (Rogue River at Lobster Creek). The sampling locations represented a range of watershed areas and land uses within the basin. The two sites along Bear Creek contained the greatest number of unique chemicals (Figure 23). In total, 18 unique chemicals were detected in water samples from the Rogue basin (Figure 3, Statewide Report).

Table 12 – Rogue Basin sampling locations. Asterisk indicates the site added in 2013.

Station	Site Code	Site Description	Watershed Area (km ²)
10414	R01	Rogue River at Lobster Creek Bridge*	13267
10418	R02	Rogue River at Robertson Bridge (Merlin)	8559
10423	R03	Rogue River at Hwy 234 (Dodge Park)	3155
10428	R04	Applegate River at Hwy 199 (near Wilderville)	1990
10434	R05	Bear Creek at Valley View Road (North of Ashland)	482
10602	R06	Little Butte Creek at Agate Road (White City)	971
11051	R07	Bear Creek at Kirtland Road (Central Point)	936
11375	R08	Rogue River at Casey State Park	2430
11482	R09	Illinois River downstream of Kerby	1104
34860	R10	Rogue River at RM 120.76, 200 yards upstream of City of Gold Hill PWS Intake	5388

Seasonality

In order to capture seasonal use patterns and hydrologic differences, collection of water samples took place three times during the year. Figure 24 shows the unique number of chemical detected by chemical group in each of the seasonal events. This figure does not include plant and animal sterols. Detections for the four most common sterols occurred during each season.

In general, an equal number of unique chemicals were detected in both summer and fall.

Priority metals

This group includes all metals for which Oregon has existing water quality criteria. These metals occur naturally and may also be enriched by human activities. Because of this, detections of these metals are common in water. At least one priority metal was detected at all sites in the basin. Detections of metals were consistent across seasons. Samples from two sites, Rogue River at Lobster Creek and Bear Creek at Kirtland Road, contained the greatest number of metals, eight and seven respectively. Despite detection of a number of metals, only one metal, iron, exceeded DEQ aquatic life criteria at the Rogue River at Lobster Creek sampling site. This exceedance occurred during the spring sampling event.

DEQ established a criterion for inorganic arsenic ($2.1 \mu\text{g/L}$) for the protection of human health. In 2011, DEQ did not measure the inorganic form of arsenic but instead measured total arsenic. Samples from two sites, Little Butte Creek and Bear Creek at Kirtland Rd contained levels of total arsenic that may indicate a potential concern for inorganic arsenic. Data from the site monitored in 2013 (Rogue River at Lobster Creek) do not indicate a concern for inorganic arsenic.

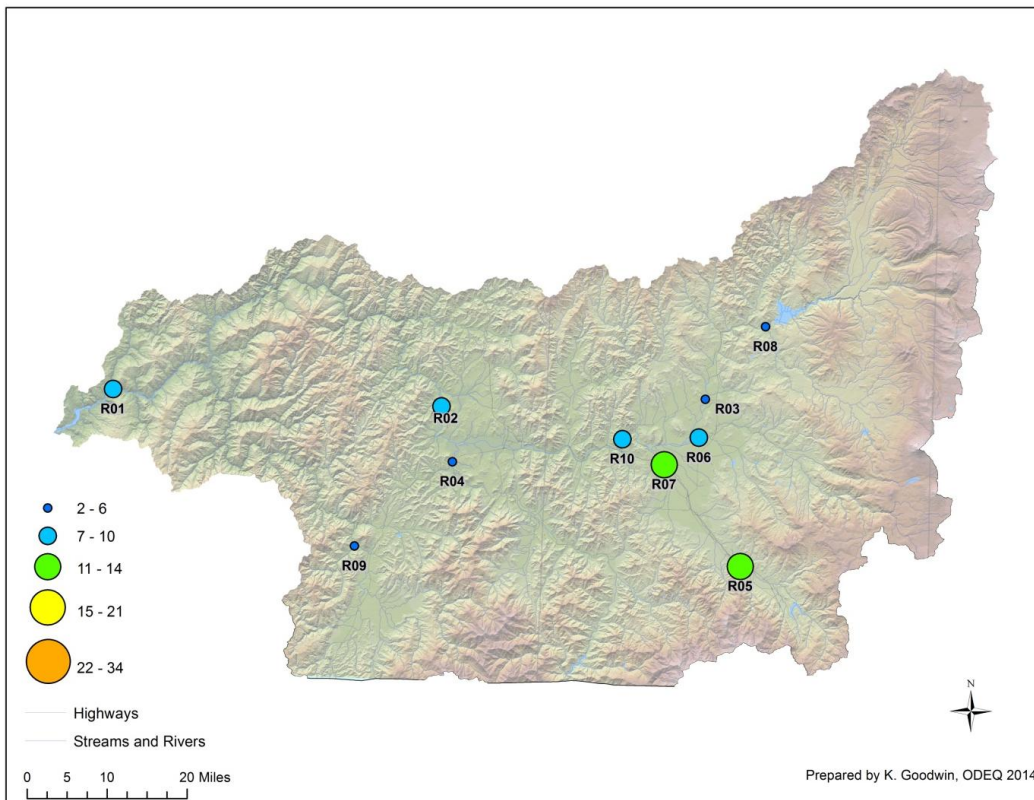


Figure 23 – Number of unique chemicals detected by site in the Rogue Basin.

Current use pesticides

Current use pesticides were also sampled. Those detected included three current use herbicides (atrazine, diuron, and sulfometuron-methyl) and one herbicide degradate (deisopropylatrazine). Detections of diuron, a commonly used herbicide for rights of way, crops and landscaping, occurred at seven of the ten sites sampled. Most detections occurred during the spring and summer, however, diuron occurred in all three seasons at the Bear Creek at Valley View Rd site. Atrazine, a commonly used forestry and agricultural herbicide, was found at four Rogue Basin sites and in 20 percent of all samples collected within the basin. None of these detections exceeded EPA benchmark values, however, pesticides were

not present individually. Persistent low-level detections and multiple chemicals at one site may act synergistically or additively in the environment resulting in impacts to the aquatic community.

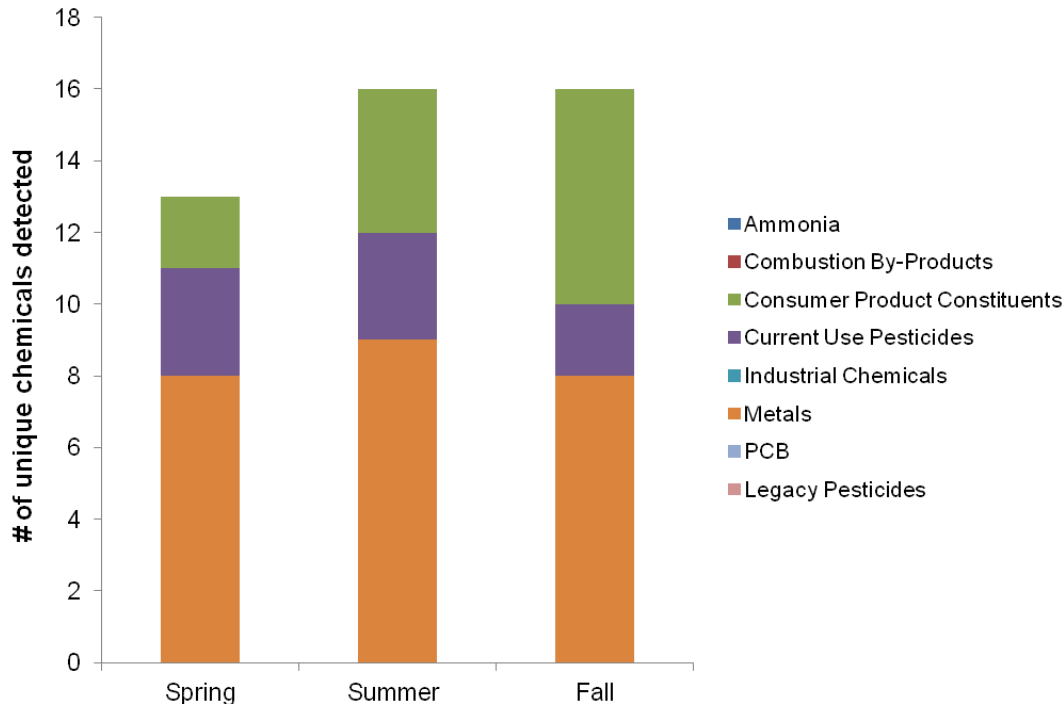


Figure 24 – Seasonality of detections in the Rogue Basin by chemical group.

Plant and animal sterols

The laboratory measured four plant and animal sterols in the Rogue Basin. All four of 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 fully evaluate this data and its implications and relationship to other contaminants.

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 in the Rogue Basin. Levels varied across the basin with the lowest values at the Illinois River site and the highest values in the Bear Creek at Valley View Rd (beta-sitosterol) and Little Butte Creek (stigmastanol) sites.

The laboratory also measured two animal sterols, cholesterol (100 percent detection) and coprostanol (73 percent detection). Cholesterol was detected at all sites, whereas coprostanol was not detected at two sites, Rogue River at Hwy 234 and Rogue River at Casey State Park. As with the plant sterols, measured levels varied across the basin with the lowest levels at the Rogue River at Casey State Park site and the highest levels at the Little Butte Creek (cholesterol) and Rogue River at RM120.76 (coprostanol) sites. While cholesterol is ubiquitous and found in a variety of different species, coprostanol is specific to fecal matter from humans and higher mammals (i.e., cattle and birds) as it is formed during digestion from cholesterol. The ratio of coprostanol to cholesterol may be used to evaluate contamination by human sewage. A ratio less than one indicates a biogenic source (i.e., livestock, higher animals) and greater than one a sewage or human source. Ratios measured at all sites in this study were less than one, potentially indicating a biogenic source of coprostanol.

Consumer product constituents including pharmaceuticals

In addition, the laboratory analyzed samples for 28 consumer product constituents including pharmaceuticals. This category includes chemicals found in commonly used household products, cleaning products, medications and insect repellent. Seasonally more chemicals in this group were detected during the fall sampling. Six unique consumer products occurred in the Rogue Basin with at least one at five sites. Samples from Bear Creek at Valley View Rd. contained all six chemicals, which included four pharmaceuticals, an insect repellent and a natural estrogen. The most common chemical detected, sulfamethoxazole, a commonly used antibiotic, was found at five sites during summer and fall dates. Most consumer product constituents do not have established criteria or benchmarks and their potential effects in the aquatic environment are not well understood.

Data gaps & summary

Since this monitoring program evolved over time, improvements and additions to analytical methods occurred. Samples collected in 2011 did not include low-level analyses for legacy pesticides, PCBs, flame retardants or dioxins and furans. In addition, analysis did not include speciation of inorganic arsenic. While some combustion by-products were included, new methods allowing low-level analysis were not. Nutrient measurements including analysis for ammonia were also not included.

Because of this, only the results for the Rogue River at Lobster Creek sampling site contain data using these methods. At this site, no detections were measured for chemicals in these methods. Samples will be collected and analyzed for these methods in the next round of sampling that is currently occurring in the basin (2015).

From the data collected, samples from one site, Rogue River at Lobster Creek, exceeded the water quality criterion for iron. Detections for multiple unique chemicals including consumer products, current use pesticides and metals occurred at the two Bear Creek sites. These sites receive point source inputs as well as urban run-off. The basin detection table summarizes the detections at each site (see Appendix M).

2.13 Sandy

In 2012, DEQ laboratory staff collected seasonal (May, August and November) water samples at five locations across the basin (Table 13). The sampling locations represented a range of watershed sizes and land uses. Samples from two sites, Beaver Creek and Kelly Creek, contained the greatest numbers of unique chemicals (Figure 25). The laboratory analyzed samples collected in the Sandy Basin for more than 500 unique chemicals. Of which, 43 chemicals were detected at least once. Compared to other basins across the state, this is the third highest number of unique chemicals detected within a single basin (Figures 3 and 4, Statewide Report).

Seasonality

In order to capture seasonal use patterns and hydrologic differences, collection of water samples took place three times during the year. Figure 26 shows the unique number of chemicals detected by chemical group in each of the seasonal events. This figure does not include data for PCBs, flame retardants or dioxins and furans. Due to laboratory capacity limitations, analysis for these chemical groups only occurred during one sampling event at each site. In addition, this figure does not include plant and animal sterols. Detections for the four common sterols occurred during each season.

In general the fall contained slightly more unique chemicals than the spring samples with the summer samples containing the lowest number. Seasonal differences by chemical group are discussed below.

Priority metals

The group, priority metals, includes all metals for which Oregon has existing water quality criteria. These metals occur naturally and may also be enriched by human activities. Because of this, detections of these metals are common in water. While at least one metal was detected at every site in the basin, water samples from Kelly Creek contained the greatest number of unique metals (seven). Although detected, these metals did not exceed water quality criteria with the exception of iron. Iron exceeded the applicable criterion in samples from the Kelly Creek site during the spring sampling.

Table 13 – Sandy Basin sampling locations.

Station	Site Code	Site Description	Watershed Area (km ²)
10674	SA01	Sandy River at Troutdale Bridge	1258
11025	SA02	Gordon Creek	46
26419	SA03	Camp Creek at campground downstream of Bruin Run Creek (Zigzag River, Sandy River tributary)	23
34102	SA04	Beaver Creek at river mile 0.9 north of Otto Park (Sandy)	32
37091	SA05	Kelly Creek at Kane Rd Gresham upstream of Mt Hood Community College Pond	12

Current use pesticides

Fourteen unique current use pesticides including degradates were detected in the Sandy Basin. Two sites, Beaver Creek and Kelly Creek, accounted for the majority of these detections. Samples from Beaver Creek contained seven herbicides, one insecticide, one fungicide and one herbicide degradate. Similarly samples from Kelly Creek contained six herbicides, one insecticide and one herbicide degradate. Some detections occurred during each season at both sites. Every sample collected from these two sites contained measurable amounts of the herbicides, diuron and simazine. In addition, the herbicide, prometon, occurred in every sample from Kelly Creek. Though common, none of these detected chemicals exceeded applicable EPA benchmarks or water quality criteria. Persistent low-level detections and multiple pesticides at one site may act synergistically or additively in the environment resulting in impacts to the aquatic community.

One exceedance of a benchmark occurred for the current use insecticide, esfenvalerate, in the spring sample from Camp Creek. This is the only pesticide detected at this location and the only location across the state where a detection of this pesticide occurred. Esfenvalerate is a general pyrethroid insecticide used both in household and commercial applications to control a variety of pests. The level detected in the sample was more than 13 times the chronic aquatic life benchmark for invertebrates.

Legacy pesticides

The most common group of chemicals was legacy pesticides with 15 compounds detected (includes parent compounds and degradates). Two sites, Beaver Creek and Kelly Creek, accounted for the majority of these detections with 15 and 12 unique compounds detected respectively. Levels of these compounds exceeded applicable water quality criteria for seven legacy pesticides in Beaver Creek and six in Kelly Creek. Consistent detections for these pesticides occurred across seasons with six compounds occurring in all samples from Kelly Creek and 11 compounds in all samples from Beaver Creek. In addition, three legacy pesticides were detected at the Sandy River site and one at the Camp Creek site only during the summer sampling. Technically still in use, endosulfan is included in this category. All registrations of this pesticide will be cancelled by July 31, 2016. Because of their chemical nature, these pesticides tend to persist and bio-accumulate in the food chain making them a concern in the environment.

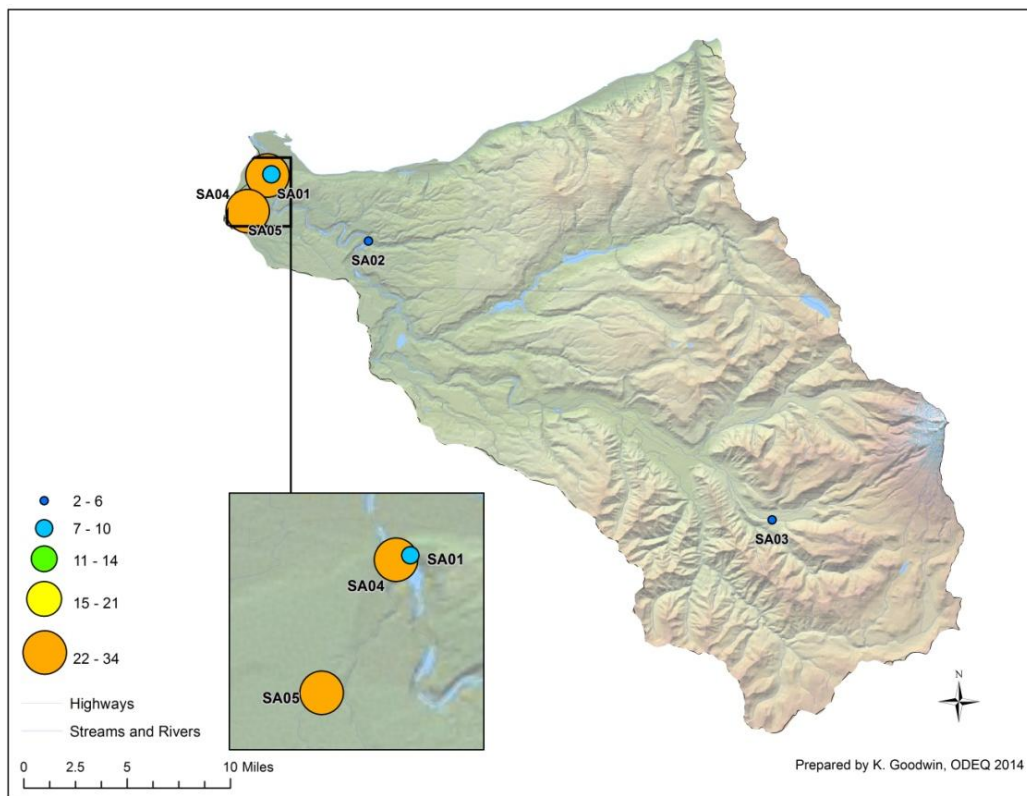


Figure 25 - Number of unique chemicals detected by site in the Sandy Basin.

Combustion by-products (including dioxins and furans)

Detections occurred for two combustion by-products in the basin. These chemicals are associated with incomplete combustion of organic matter from automobiles, fossil fuels burning, woodstoves and cigarette smoke. They may also be the result of stormwater run-off. Naphthalene was detected at the Camp Creek site and phenanthrene at the Beaver Creek site, both in the fall sampling. Neither of these compounds have established criteria or benchmarks.

No detected concentrations of dioxins and furans occurred in any samples in the Sandy Basin.

Flame retardants

Two brominated flame retardants occurred in the basin with one occurring at each of the following sites, Sandy River and Kelly Creek. PBDE-209 was the congener detected at Kelly Creek. It is the most commonly detected congener across the state. Due to laboratory capacity, analysis for this group of chemicals only took place once, therefore, seasonality of these compounds cannot be discussed. There are no federal or state criteria developed for this chemical group, however, concern over these chemicals in humans and the environment prompted a ban on their manufacture and use. Similar to PCBs in structure, these chemicals tend to bio-accumulate in the food chain and are most often associated with sediments in the aquatic environment.

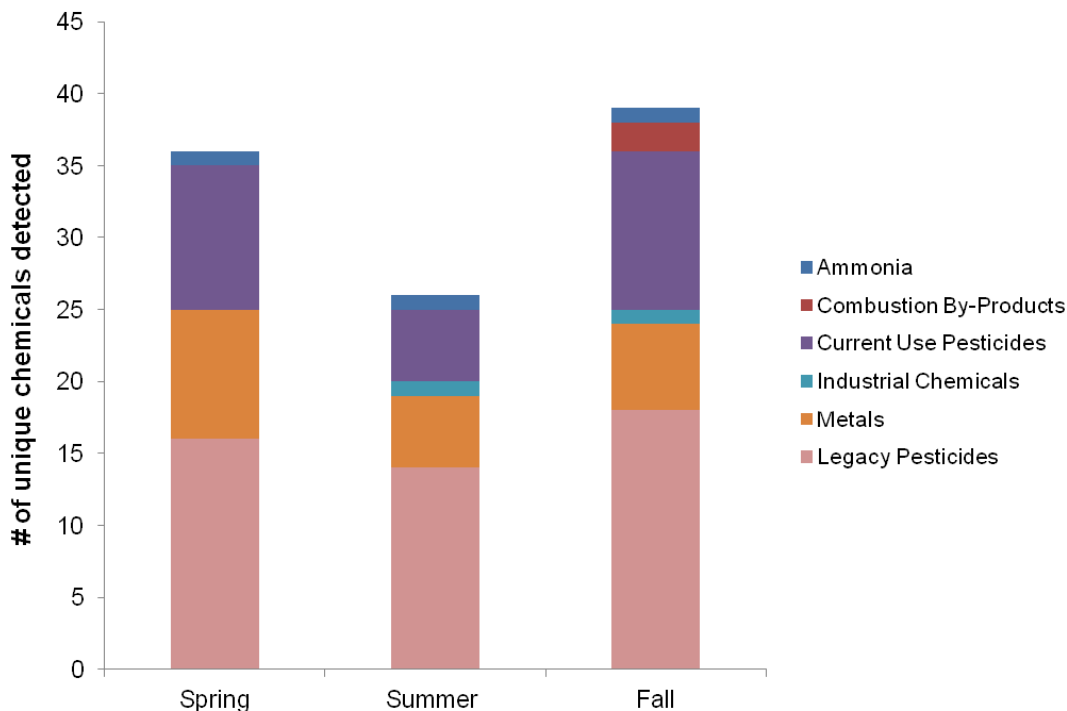


Figure 26 – Seasonality of detections in the Sandy Basin by chemical group.

Plant and animal sterols

The laboratory measured four plant and animal sterols in the Sandy Basin. All four of 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 fully evaluate this data and its implications and relationship to other contaminants.

The predominant source of the two plant sterols analyzed, beta-sitosterol and stigmasterol, is terrestrial plants. Other sources of these sterols may be industrial processes (wood pulping, food oils) and modern pharmaceutical supplements. Beta-sitosterol and stigmasterol were detected at all locations in the basin. Levels varied across the basin with the lowest values in the Camp Creek (beta-sitosterol) and Sandy River (stigmasterol) sites and the highest values in the Kelly Creek site.

The laboratory also measured two animal sterols, cholesterol (100 percent detection) and coprostanol (93 percent detection). Cholesterol and coprostanol was detected at all sites. As with the plant sterols, measured levels varied across the basin with the lowest levels in the Gordon Creek site and the highest levels in the Kelly Creek (cholesterol) and Beaver Creek (coprostanol). While cholesterol is ubiquitous and found in a variety of different species, coprostanol is specific to fecal matter from humans and

higher mammals (i.e., cattle and birds) as it is formed during digestion from cholesterol. The ratio of coprostanol to cholesterol may be used to evaluate contamination by human sewage. A ratio less than one indicates a biogenic source (i.e., livestock, higher animals) and greater than one a sewage or human source. Ratios measured at all sites in this study were less than one, potentially indicating a biogenic source of coprostanol.

Consumer product constituents including pharmaceuticals

The laboratory analyzed water samples for 28 consumer product constituents including pharmaceuticals. None of these compounds were detected in the basin.

Industrial chemicals, ammonia and PCBs

One industrial chemical occurred in samples from three sites, 2,4-dimethylphenol. Also known as xylenol, this chemical is used in the production of pharmaceuticals, insecticides, fungicides, dyes and plastics. Detections occurred in the summer and fall at both the Kelly Creek and Beaver Creek sites, but only in the fall at the Sandy River site. No criterion exists for this chemical.

Ammonia is a naturally occurring compound commonly found in waste product. It is included as an industrial compound because of its use in fertilizers and dyes. It may be extremely toxic to aquatic organisms. Its toxicity is dependent on pH and temperature with toxicity increasing with increasing pH and temperature. Detectable levels of ammonia occurred in samples from two sites, Beaver Creek and Kelly Creek. Detections occurred consistently across seasons at both sites. No samples exceeded current DEQ aquatic life water quality criteria.

No water samples from the Sandy Basin contained measurable amounts of PCBs.

Summary

Based on this study, a large number of chemicals were detected in this basin especially given the limited number of sampling locations. The largest number of unique chemicals occurred in the small watersheds of Beaver and Kelly Creek. Criteria were exceeded for one or more chemicals at the following three sites: Beaver Creek, Kelly Creek and Camp Creek. The basin detection table summarizes the detections at each site.

Based on the sampling conducted in this study, legacy pesticides are of particular concern in the Sandy Basin. The number and extent of the exceedances detected warrants further investigation. In addition, although no exceedances of current use pesticides occurred at Beaver Creek or Kelly Creek, persistent low-level detections and multiple chemicals present at one site may act synergistically or additively in the environment resulting in impacts to the aquatic community. Also, the relatively high detection of esfenvalerate in the sample from the Camp Creek site may warrant additional investigation given the location and land use in the area.

The next round of sampling in this basin will revisit some of the sites of concern as well as add new sites. In addition, flame retardants, PCBs and dioxins and furans will be measured during all three sampling events to evaluate seasonal differences (see Appendix N).

2.14 South Coast

In 2013, DEQ laboratory staff collected seasonal (April, August and October) water samples at 18 locations across the basin (Table 14). The sampling locations represented a range of watershed sizes and land uses as well as both freshwater and estuarine environments. Samples from two sites, North Slough and Johnson Creek, contained the greatest number of unique chemicals (Figure 27). The laboratory analyzed samples collected in the South Coast Basin for greater than 500 unique chemicals. Of these, 29 chemicals were detected at least once (Figures 3 and 4, Statewide Report).

Table 14 – South Coast Basin sampling locations.

Station	Site Code	Site Description	Watershed Area (km ²)
11571	SC01	NF Coquille River @ Cooper Bridge	733
12607	SC02	Tenmile Creek at Lakeside Marina (off Park Street)	183
13400	SC03	Joe Ney Slough at east end of dock	14
13405	SC04	Coquille River at Riverton Boat Ramp	2542
13569	SC05	West Fork Millicoma River at Allegany	142
13574	SC06	S Fork Coos River at Anson Rodgers bridge	603
13587	SC07	North Slough at mouth (Causeway Bridge)	38
13680	SC08	Coquille Bay at Bandon Boat Launch-Conc. Pier	2733
25754	SC09	SFC River @ RM 1, Myrtle Point Boat Ramp	1535
28303	SC10	Elk Creek at ODFW Hatchery	183
28803	SC11	Ferry Creek D/S of ODFW Hatchery	10
30670	SC12	Chetco River below Jacks creek	893
33476	SC13	Coos Bay @ City Dock	87
34309	SC14	Sixes River @ RM 1.1	344
36638	SC15	New River Near Storm Ranch Boat Ramp	269
36750	SC16	Winchuck River Estuary @ 101	184
37405	SC17	Johnson Creek upstream of golf course (Bandon)	11
37415	SC18	Coos Bay at North Spit BLM Boat Ramp	1455

Seasonality

In order to capture seasonal use patterns and hydrologic differences, collection of water samples took place three times during the year. Figure 28 shows the unique number of chemicals detected by chemical group in each of the seasonal events. This figure does not include data for PCBs, flame retardants or

dioxins and furans. Due to laboratory capacity limitations, analysis for these chemical groups only occurred during one sampling event at each site. In addition, this figure does not include plant and animal sterols. Detections for the four common sterols occurred during each season.

In general, slightly more chemicals were detected during the summer sampling than during the spring and fall, however, most categories of chemicals were detected across seasons.

Priority metals

This group includes all metals for which Oregon has existing water quality criteria. These metals occur naturally and may also be enriched by human activities. Because of this, detections of these metals are common in water. The greatest number of metal detections (nine) occurred at the Johnson Creek site. Of these, only iron exceeded water quality criterion (1000 µg/L) for the protection of aquatic life across all seasons. Additionally, iron also exceeded criterion at the New River sampling location during the spring. The inorganic arsenic level exceeded water quality criterion (1.0 µg/L) for the protection of human health in saltwater at the Joe Ney Slough, North Slough, Coquille Bay and Coos Bay at North Spit sampling sites. Although detected across all seasons, criteria exceedances occurred mostly during the summer and fall sampling events. No freshwater locations exceeded the inorganic arsenic criterion.

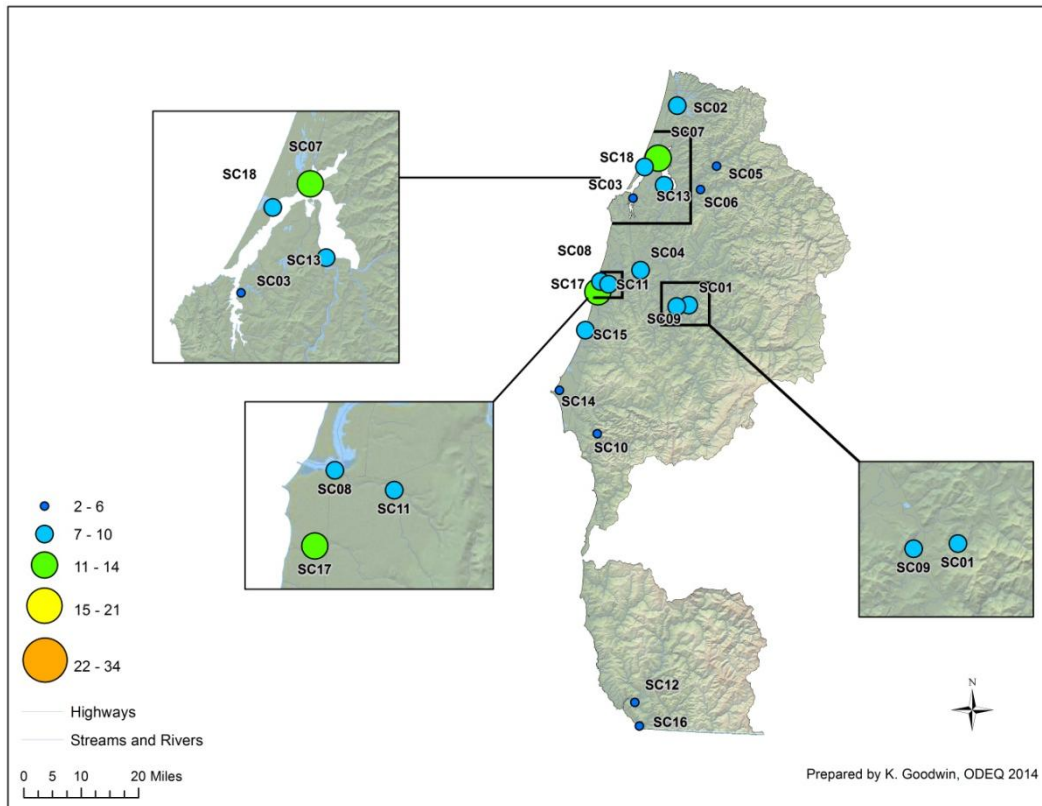


Figure 27 – Number of unique chemicals detected by site in the South Coast Basin.

Current use pesticides

Samples contained two current use herbicides, atrazine and norflurazon, and two herbicide degradates, 2,6-dichlorobenzamide (dichlobenil degradate) and desethylatrazine (atrazine degradate). Samples from New River contained three of these compounds. Atrazine occurred at six sites across the basin. Norflurazon, a common pre-emergent herbicide, was consistently present with detections in all three seasonal samples from Ferry Creek and Johnson Creek. It was also present in the spring and fall samples

from the New River. All levels of current use pesticides were below applicable EPA screening benchmarks; however, multiple low-level detections of different pesticides may have implications for aquatic life.

Legacy pesticides

Detections of legacy insecticides occurred at seven locations within the basin. Dieldrin exceeded its applicable water quality criterion for the protection of human health at two sites, Ferry Creek and Johnson Creek. Detections occurred across seasons at the Johnson Creek site and during the spring and summer at the Ferry Creek site. BHC-compounds occurred at five of the nine estuarine sites but were not detected at freshwater sites. These compounds also occurred at estuary sites in the north and mid coast basins. These patterns may indicate airborne transport in addition to historic local sources. Because of their chemical nature, these pesticides tend to persist and bio-accumulate in the food chain making them a concern in the environment.

Combustion by-products (including dioxins and furans)

Detections of combustion by-products occurred at seven sites in the South Coast Basin. In general, these detections occurred during the summer and fall. These chemicals are associated with incomplete combustion of organic matter from automobiles, fossil fuels burning, woodstoves and cigarette smoke. They may also be the result of stormwater run-off. Benzo(a)anthracene exceeded DEQ's water quality criterion for the protection of human health at one site, West Fork Millicoma River.

No detectable concentrations of dioxins and furans occurred in any samples in the South Coast Basin.

Flame retardants

Detections of brominated flame retardants occurred at five sites throughout the basin. Samples from the North Fork Coquille River site contained the greatest number of flame retardants (six). All six compounds were not detected elsewhere in the basin. PBDE-209 was detected at four sites and was the only flame retardant at those sites. Due to laboratory capacity, analysis for this group of chemicals only took place once, therefore, seasonality of these compounds cannot be discussed. There are no federal or state criteria developed for this chemical group, however, concern over these chemicals in humans and the environment prompted a ban on their manufacture and use. Similar to PCBs in structure, these chemicals tend to bio-accumulate in the food chain and are most often associated with sediments in the aquatic environment.

Plant and animal sterols

The laboratory measured four plant and animal sterols in the South Coast Basin. All four of 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 fully evaluate this data and its implications and relationship to other contaminants.

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 in the South Coast Basin. Levels varied across the basin with the lowest values detected at the Coos Bay at City Dock (beta-sitosterol) and Chetco River (stigmastanol) sites and the highest values detected at the Ten Mile Creek (beta-sitosterol) and Johnson Creek (stigmastanol) sites.

The laboratory also measured two animal sterols, cholesterol and coprostanol. As with the plant sterols, measured levels varied across the basin with the lowest level of cholesterol and no detection for coprostanol at the Chetco River and the highest levels detected at the Ferry Creek (cholesterol) and Johnson Creek (coprostanol) sites. While cholesterol is ubiquitous and found in a variety of different species, coprostanol is specific to fecal matter from humans and higher mammals (i.e., cattle and birds) as it is formed during digestion from cholesterol. The ratio of coprostanol to cholesterol may be used to evaluate contamination by human sewage. A ratio less than one indicates a biogenic source (i.e., livestock, higher animals) and greater than one a sewage or human source. Ratios measured at all sites in this study were less than one, potentially indicating a biogenic source of coprostanol.

Consumer product constituents including pharmaceuticals

The laboratory analyzed water samples for 28 consumer product constituents including pharmaceuticals and personal care products. Two of these were detected in the South Coast Basin. Caffeine was measured at two sites, Tenmile Creek and Elk River, during the spring sampling. Although commonly consumed throughout the state, caffeine was not frequently detected in water by the toxics monitoring program. In addition, the natural estrogenic hormone, estrone, occurred at two estuarine sites in Coos Bay, North Spit and North Slough, during the summer sampling. Water quality criteria or benchmarks do not exist for these compounds.

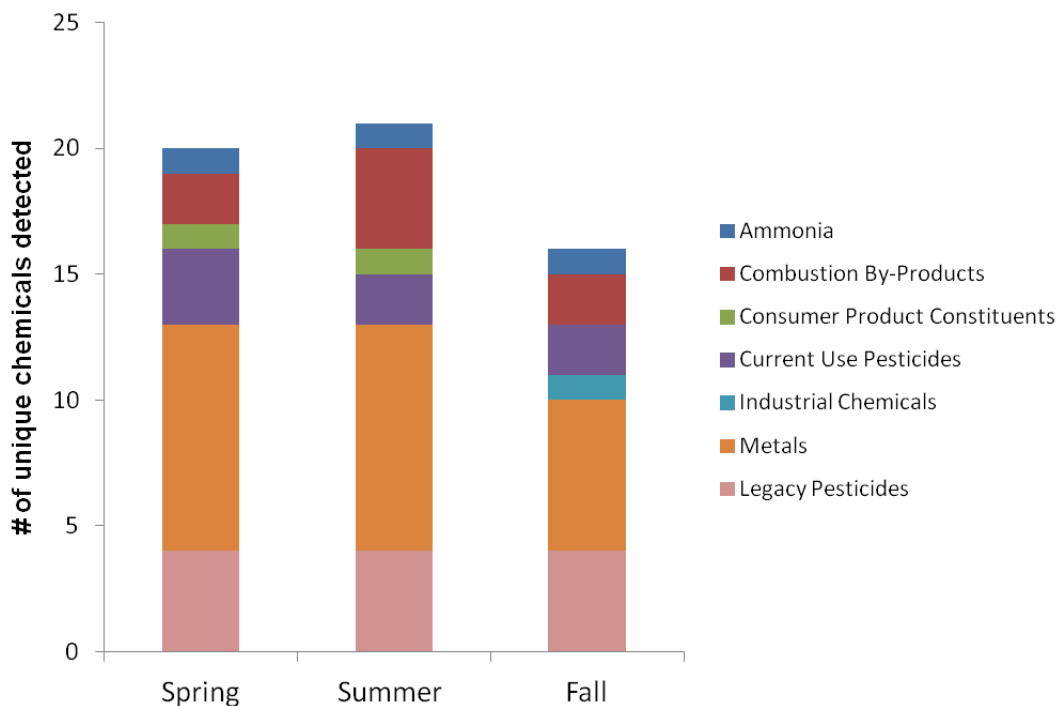


Figure 28 – Seasonality of detections in the South Coast Basin by chemical group.

Industrial chemicals, ammonia and PCBs

Ammonia is a naturally occurring compound commonly found in waste products. It is included as an industrial compound because of its use in fertilizers and dyes. It may be extremely toxic to aquatic organisms. Its toxicity is dependent on pH and temperature with toxicity increasing as pH and temperature increase. Detectable levels of ammonia occurred in samples from 8 of 18 sites. Most

detections occurred during the summer and fall sampling events. No samples exceeded current aquatic life water quality criteria.

The industrial chemical, 1,2,4-trichlorobenzene, was detected at the South Fork Coquille River. This chemical is used in dyes, as a solvent in wood preservatives and may be used in herbicides. This chemical was only detected during the fall sampling. There is no a water quality criterion or benchmark for this chemical.

No samples contained detectable levels of PCBs.

Summary

In general, based on the sampling conducted in this study, the number of compounds detected at the Johnson Creek and North Slough sites may be a concern. Additionally, the detections of atrazine across the basin and the detections of BHC compounds at the estuarine sites may warrant further investigation to determine the sources of these compounds. Given the historic use patterns of BHC compounds, sources may be local or airborne. The next round of sampling in this basin will revisit some of the sites of concern, add new sites and should include analysis of flame retardants, PCBs and dioxins and furans during all three sampling events to evaluate seasonal differences. The basin detection table summarizes the data collected (see Appendix O).

2.15 Umatilla and Walla Walla

In 2011, DEQ laboratory staff collected seasonal (June, August and November) water samples from seven locations in the Umatilla Basin and one location in the Walla Walla Basin (Table 15). The sampling locations represented a range of watershed sizes and land uses throughout the basins. Two sites, Willow Creek and Butter Creek, contained the greatest number of unique chemicals (Figure 29). In total, 24 unique chemicals were detected in these basins (Figure 3, Statewide Report).

Table 15 – Umatilla and Walla Walla basin sampling locations.

Station	Site Code	Site Description	Watershed Area (km ²)
10404	UT01	Umatilla River at Yoakum Bridge	3303
10406	UT02	Umatilla River at Hwy 11 (Pendleton)	1148
10708	UT03	Willow Creek at Heppner Junction	2209
11489	UT04	Umatilla River at Westland Road (Hermiston)	5891
12005	UT05	McKay Creek at Kirk Road (Pendleton)	513
12015	UT06	Butter Creek at Old Stanfield Road (Bucks Corner)	1160
36445	UT07	Wildhorse Creek at McCormach Rd	495
23497	WA01	Walla Walla River at OR/WA state line	40

Seasonality

In order to capture seasonal use patterns and hydrologic differences, collection of water samples took place three times during the year. Figures 30 and 31 show the unique number of chemicals detected by chemical group in each of the seasonal events. These figures do not include plant and animal sterols. Detections for the four most common sterols occurred during each season.

In general, more unique chemicals were detected during the spring sample collection than during the summer or fall sampling events.

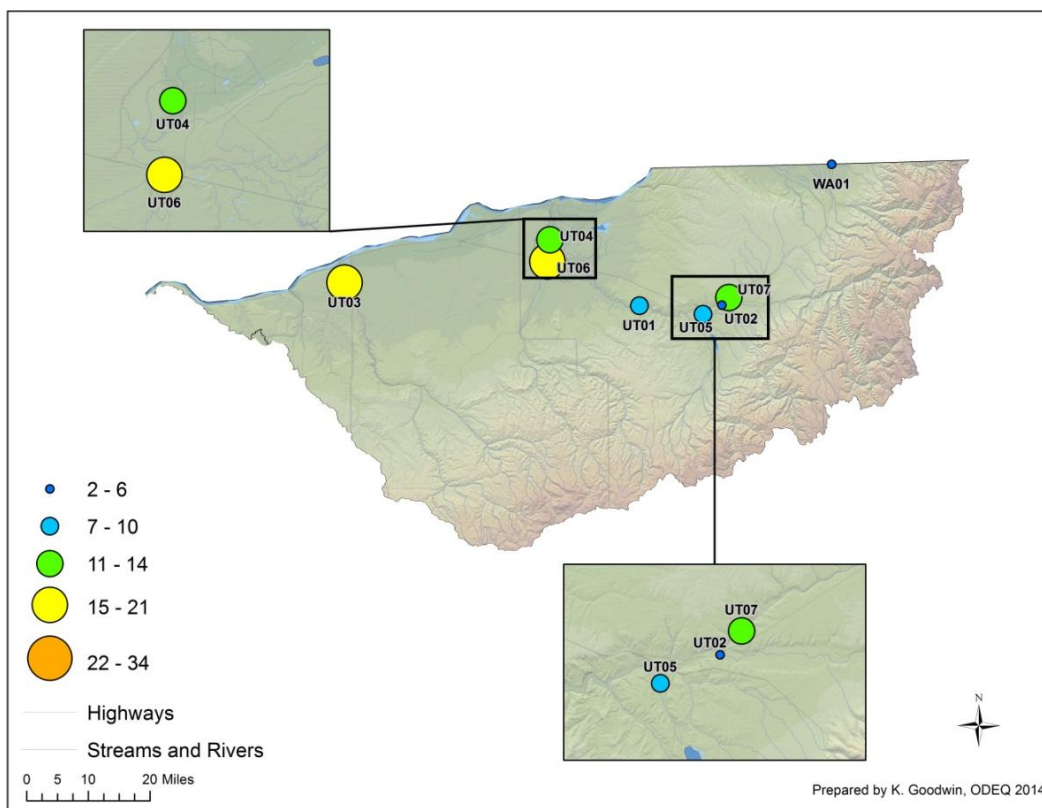


Figure 29 – Number of unique chemicals detected by site in the Umatilla and Walla Walla basins.

Priority metals

This group includes all metals for which Oregon has existing water quality criteria. These metals occur naturally and may also be enriched by human activities. Because of this, detections of these metals are common in water. Twelve metals were detected in the basin with at least one metal detected at all sites in the basins. Seasonally, a greater variety of metals was detected during the spring than during the summer and fall. One site, Willow Creek, accounted for the majority of these detections with all twelve metals detected at this site. Samples from Willow Creek exceeded DEQ water quality criteria for three metals: copper, iron and thallium. Five additional sites within the Umatilla Basin, Umatilla River at Yoakum Bridge, Umatilla River at Westland Rd., McKay Creek, Butter Creek and Wildhorse Creek, exceeded DEQ's criterion for iron and one additional site, Umatilla River at Westland Rd., exceeded DEQ's criterion for lead. The highest exceedance of iron occurred at the Willow Creek site where the concentration was nearly 19 times higher than the criterion. Most high iron levels occurred during the spring sampling except at McKay Creek where measured levels of iron exceeded the criterion during both spring and summer and Umatilla River at Yoakum Bridge where the exceedance occurred during summer.

DEQ established a criterion for inorganic arsenic (2.1 µg/L) for the protection of human health. In 2011, DEQ did not measure the inorganic form of arsenic but instead measured total arsenic. Samples from two sites, Willow Creek and Wildhorse Creek, contained levels of total arsenic that may indicate a potential concern for inorganic arsenic. Arsenic concentrations were consistent across seasons at these two sites.

Current use pesticides

Detections of at least one current use pesticide occurred at 6 of 7 sites in the Umatilla. The only site in the Umatilla without a detection was the Umatilla River at Hwy 11 site. No pesticides were detected in samples from the site in the Walla Walla Basin. Seasonally, the greatest number of pesticides was detected during the spring, followed by the summer, than the fall. The sites with the greatest number of pesticides detected were Butter Creek (7 metals) and Wildhorse Creek (6 metals).

Detected compounds included eight herbicides (atrazine, bromacil, diuron, fluridone, hexazinone, imazapyr, norflurazon and sulfometuron-methyl), one fungicide (propiconazole) and one herbicide degradate (desethylatrazine). Bromacil, an herbicide used for weed and brush control, was only detected at locations in the northeast portion of the state and was most common in the Umatilla Basin with detections at five sites. Atrazine, a commonly used agricultural and forestry herbicide, was detected in 39 percent of samples within the basins. None of these detections exceeded EPA benchmark values and pesticides did not occur individually. Persistent low-level detections and multiple chemicals at one site may act synergistically or additively in the environment resulting in impacts to the aquatic community.

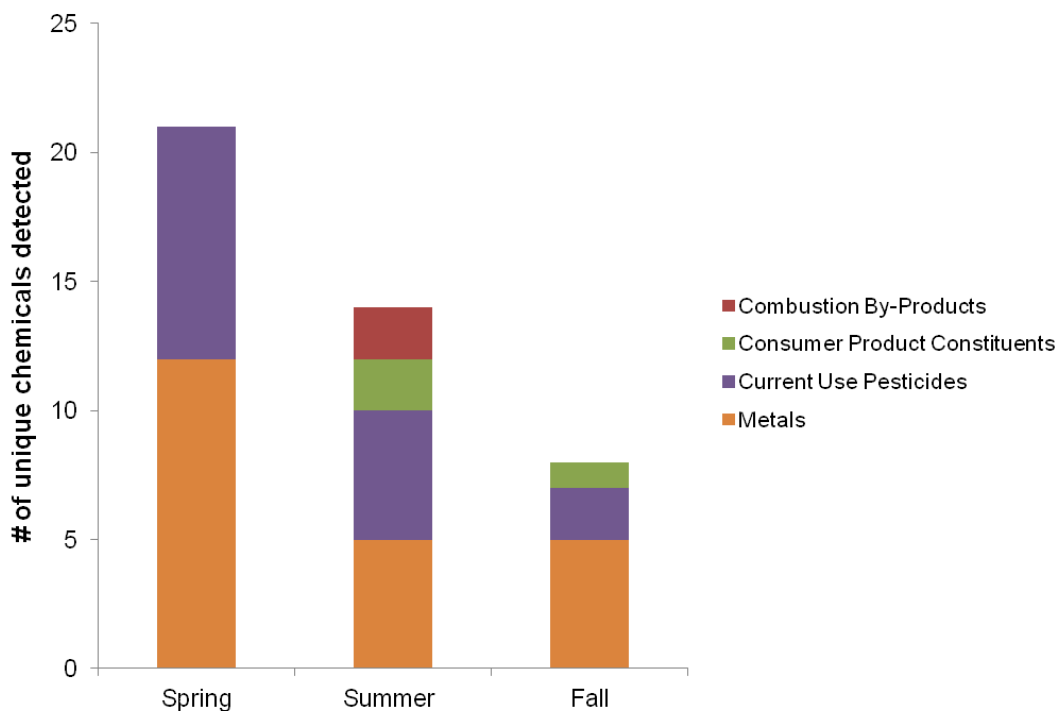


Figure 30 – Seasonality of detections in the Umatilla Basin by chemical group.

Combustion by-products

Two combustion by-products were detected at one site at the Umatilla River at Yoakum Bridge site. Flourene and phenanthrene are by-products of incomplete combustion of organic materials and are

found in smoke associated with fires, woodstoves, automobiles and cigarettes among other sources. Seasonally, both compounds occurred only during the summer.

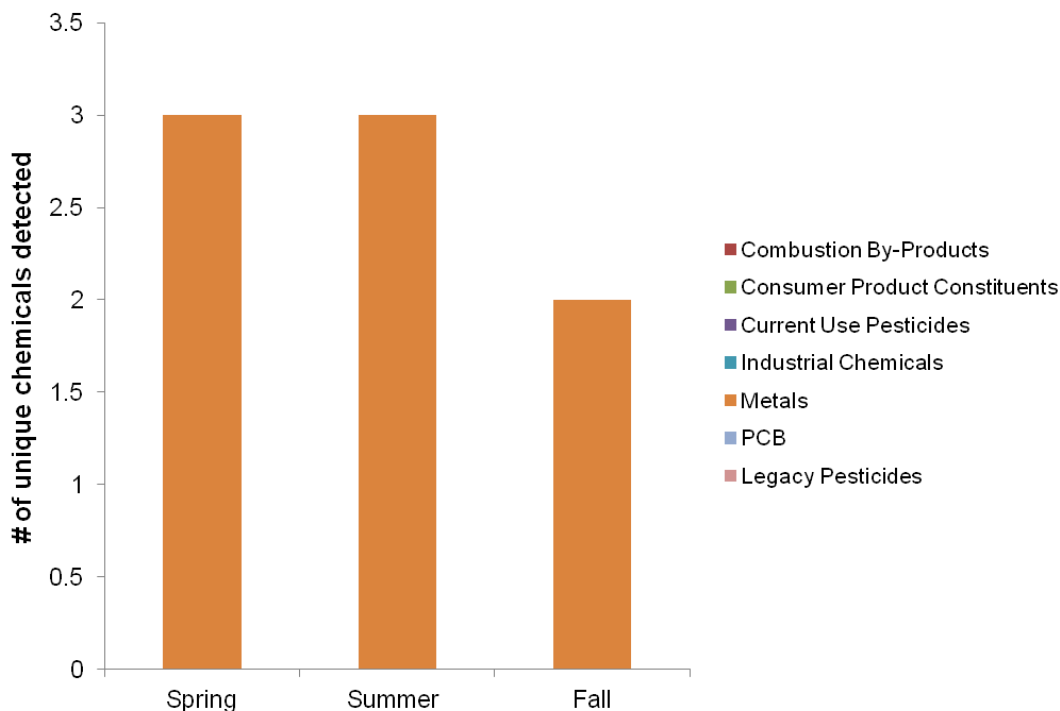


Figure 31 – Seasonality of detections in the Walla Walla Basin by chemical group.

Plant and animal sterols

The laboratory measured four plant and animal sterols in the Umatilla and Walla Walla basins. All four of 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 fully evaluate this data and its implications and relationship to other contaminants.

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 basins with the lowest levels detected at the McKay Creek (beta-sitosterol) and Umatilla River at Hwy 11 (stigmastanol) sites and the highest levels detected at the Butter Creek (beta-sitosterol) and Willow Creek (stigmastanol) sites. The Walla Walla River site levels were slightly higher than the lowest site in the Umatilla Basin for beta-sitosterol but lower than the lowest Umatilla Basin site for stigmastanol.

The laboratory also measured two animal sterols, cholesterol (100 percent detection) and coprostanol (91 percent detection). As with the plant sterols, measured levels varied across the Umatilla Basin with the lowest levels detected at the McKay Creek (cholesterol) and Umatilla River at Hwy 11 (coprostanol) sites and the highest levels detected at the Butter Creek (cholesterol) and Umatilla River at Westland Rd (coprostanol) sites. The Walla Walla River site levels were lower than the lowest site in the Umatilla Basin for both animal sterols. While cholesterol is ubiquitous and found in a variety of different species, coprostanol is specific to fecal matter from humans and higher mammals (i.e., cattle and birds) as it is formed during digestion from cholesterol. The ratio of coprostanol to cholesterol may

be used to evaluate contamination by human sewage. A ratio less than one indicates a biogenic source (i.e., livestock, higher animals) and greater than one a sewage or human source. Ratios measured at all sites in this study were less than one, potentially indicating a biogenic source of coprostanol.

Consumer product constituents including pharmaceuticals

In addition, the laboratory analyzed water samples for 28 consumer product constituents including pharmaceuticals and personal care products. Of these, two were detected in the Umatilla Basin. Sulfamethoxazole, a common antibiotic, was detected at three sites, two mainstem Umatilla River sites and Butter Creek. The natural estrogen, 17 α -estradiol, was also detected in Butter Creek. Both detections in Butter Creek occurred during the summer sampling, while the detections in at the mainstem Umatilla sites occurred during the summer and fall sampling. There are no established benchmarks or criteria for these compounds.

Data gaps & summary

Since this monitoring program evolved over time, improvements and additions to analytical methods occurred. Samples collected in 2011 did not include low-level analyses for legacy pesticides, PCBs, flame retardants or dioxins and furans. In addition, analysis did not include speciation of inorganic arsenic. While some combustion by-products were included, new methods allowing low-level analysis were not. Nutrient measurements including analysis for ammonia were also not included. Future toxics monitoring work in these basins should include these analyses. Additional sampling may also help identify any potential trends emerging within the basins and increase geographic coverage in the basins.

From this sampling, six locations in the Umatilla Basin contained levels of metals above associated water quality criteria. Detections of multiple current use pesticides occurred in the Umatilla Basin at six sites. The basin detection table summarizes the detections at each site (see Appendix P).

2.16 Umpqua

In 2011, DEQ laboratory staff collected seasonal (May, August and November) water samples at four locations across the basin (Table 16). Lab staff also collected seasonal (April, September and November) samples from one additional site in 2013 (Umpqua River at Discovery Center Docks). The sampling locations represented a range of watershed areas and land uses within the basin. Two sampling locations, South Umpqua at Melrose Road and the Umpqua River, contained the greatest number of unique chemicals (Figure 32). In total 14 unique chemicals were detected in water samples from the Umpqua Basin (Figure 3, Statewide Report).

Seasonality

In order to capture seasonal use patterns and hydrologic differences, collection of water samples took place three times during the year. Figure 33 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. Detections for the four most common sterols occurred during each season.

In general, a greater number of unique chemicals were detected during the spring sampling.

Table 16 – Umpqua Basin sampling locations. Asterisk indicates the site added in 2013.

Station	Site Code	Site Description	Watershed Area (km ²)
10442	UQ01	South Umpqua at Melrose Road	4575
10451	UQ02	North Umpqua at Garden Valley Road (Roseburg)	3516
10997	UQ03	Cow Creek at mouth	1291
11484	UQ04	South Umpqua at Days Creek Cutoff Road (Canyonville)	1778
37399	UQ05	Umpqua River at Discovery Center Docks*	11980

Priority metals

This group includes all metals for which Oregon has existing water quality criteria. These metals occur naturally and may also be enriched by human activities. Because of this, detections of these metals are common in water. At least one priority metal was detected at all sites in the basin. Samples from the Umpqua River at Discovery Docks contained the greatest number of metals, six. Detections of metals occurred across seasons, however, the greatest number of unique metals were detected during the spring sampling event. Despite detection of a number of metals, no concentrations exceeded DEQ aquatic life criteria.

DEQ established a criterion for inorganic arsenic (2.1 µg/L) for the protection of human health. In 2011, DEQ did not measure the inorganic form of arsenic but instead measured total arsenic. The total arsenic levels measured at the sites in the basin do not raise a concern for inorganic arsenic. Data from the site monitored in 2013 (Umpqua River at Discovery Center Docks) also do not indicate a concern for inorganic arsenic.

Current use pesticides

Three current use herbicides were detected in the basin. The South Umpqua at Melrose Road site contained both diuron and sulfometuron-methyl. Diuron also appeared in samples collected from Cow Creek. The only detection of atrazine within the basin occurred at the estuarine Umpqua River site. All of these individual pesticide detections were below EPA benchmarks, however, persistent low-level detections and multiple chemicals at one site may act synergistically or additively in the environment resulting in impacts to aquatic life. Seasonally, detections for current use pesticides only occurred during the spring sampling.

Combustion by-products (not including dioxins and furans)

One combustion by-product, fluoranthene, was detected at the Umpqua River at Discovery Center Docks site. Fluoranthene is a by-product of incomplete combustion of organic materials and is found in smoke associated with fires, woodstoves, automobiles and cigarettes among other sources. This detection occurred during the fall sampling and did not exceed the DEQ water quality criterion.

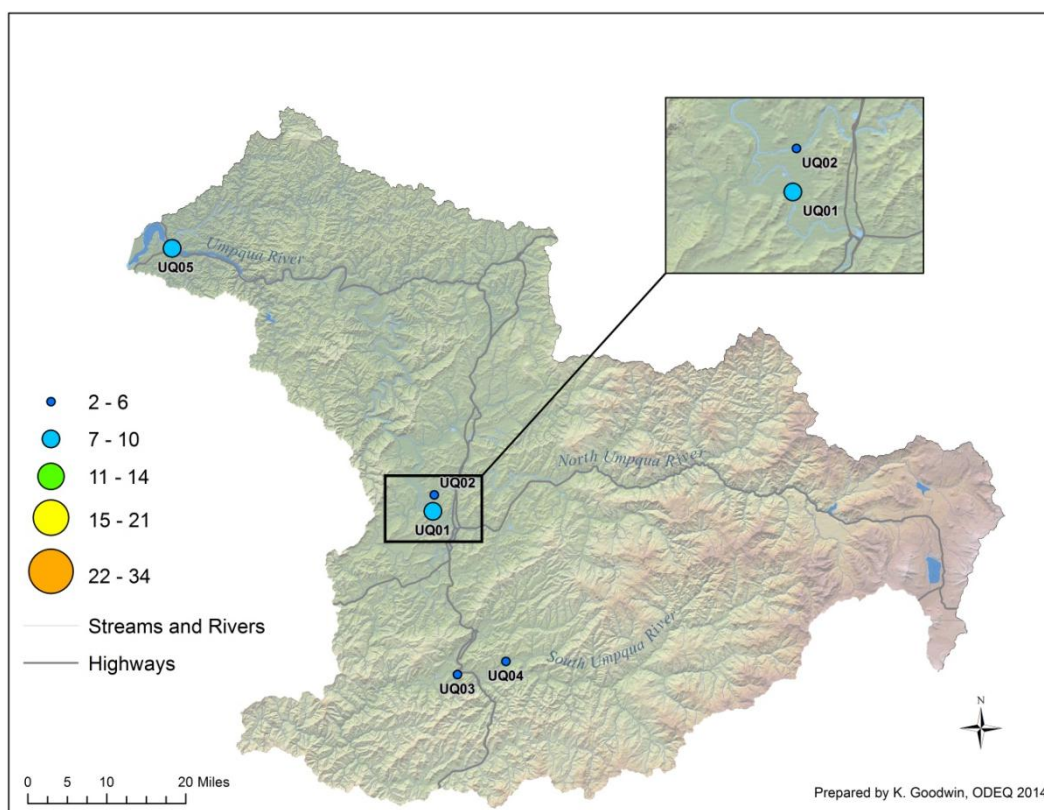


Figure 32 – Number of unique chemicals detected by site in the Umpqua Basin.

Plant and animal sterols

The laboratory measured four plant and animal sterols in the Umpqua Basin. All four of 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 fully evaluate this data and its implications and relationship to other contaminants.

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 in the Umpqua Basin. Levels varied across the basin with the lowest values detected at the Umpqua River at Discovery Docks site (beta-sitosterol) and North Umpqua at Garden Valley Road (stigmastanol) and the highest values at the South Umpqua at Melrose Rd (beta-sitosterol) and Cow Creek at mouth (stigmastanol) sites.

The laboratory also measured two animal sterols, cholesterol (100 percent detection) and coprostanol (87 percent detection). Both cholesterol and coprostanol were detected at all sites. As with the plant sterols, measured levels varied across the basin with the lowest levels detected at the Umpqua River at Discovery Docks (cholesterol) and North Umpqua at Garden Valley Rd (coprostanol) sites and the highest levels for both compounds at the South Umpqua at Melrose Rd. site. While cholesterol is ubiquitous and found in a variety of different species, coprostanol is specific to fecal matter from humans and higher mammals (i.e., cattle and birds) as it is formed during digestion from cholesterol. The ratio of coprostanol to cholesterol may be used to evaluate contamination by human sewage. A ratio less than one indicates a biogenic source (i.e., livestock, higher animals) and greater than one indicates a

sewage or human source. Ratios measured at all sites in this study were less than one, potentially indicating a biogenic source of coprostanol.

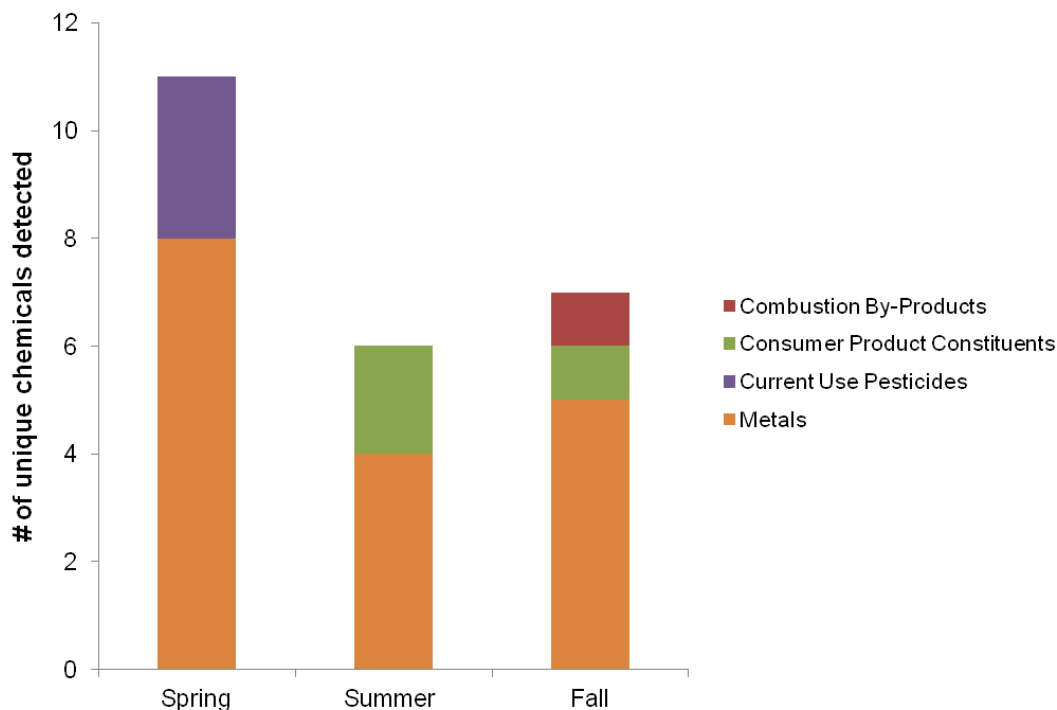


Figure 33 – Seasonality of detections in the Umpqua Basin by chemical group.

Consumer product constituents including pharmaceuticals

In addition, the laboratory analyzed samples for 28 consumer product constituents including pharmaceuticals. This category includes chemicals found in commonly used household products, cleaning products, medications and insect repellent. Seasonally, these chemicals were detected in the spring and fall. Only two of the 28 chemicals in this group were detected, DEET, an insect repellent, and sulfamethoxazole, an antihistamine. DEET was only detected in the summer at one site, Umpqua River at Days Creek Cut-off, while sulfamethoxazole was detected in the summer and fall at one site, South Umpqua at Melrose Rd. Most consumer product constituents do not have established criteria or benchmarks and their potential effects in the aquatic environment are not well understood.

Data gaps & summary

Since this monitoring program evolved over time, improvements and additions to analytical methods occurred. Samples collected in 2011 did not include low-level analyses for legacy pesticides, PCBs, flame retardants or dioxins and furans. In addition, analysis did not include speciation of inorganic arsenic. While some combustion by-products were included, new methods allowing low-level analysis were not. Nutrient measurements including analysis for ammonia were also not included.

Because of this, only the results for the Umpqua River at Discovery Center Docks sampling site contain data using these methods. At this site, no detections were measured for legacy pesticides, PCBs, flame retardants or dioxins and furans. Samples will be collected and analyzed for these methods in the next round of sampling that is currently occurring in the basin (2015). Additional sites are also being monitored to increase geographic coverage in the Umpqua Basin.

From the data collected during this monitoring effort, the number of compounds detected was low. No detected compounds exceeded applicable DEQ water quality criteria. The basin detection table summarizes the detections at each site (see Appendix Q).

2.17 Willamette (Whole)

Between April 2008 and May 2010, DEQ laboratory staff collected seasonal water samples at 20 locations within the Willamette Basin. The sampling locations represented a wide range of watershed areas and land uses. In total, 46 unique compounds were detected across the basin (Figure 3, Statewide Report).

In general, the number of unique chemicals detected increased moving downstream. In addition, the tributary sites contained a greater diversity of unique chemicals than the mainstem sites, with the Tualatin River site containing the greatest number (Figure 34). Metals and current use pesticides were detected consistently throughout the basin.

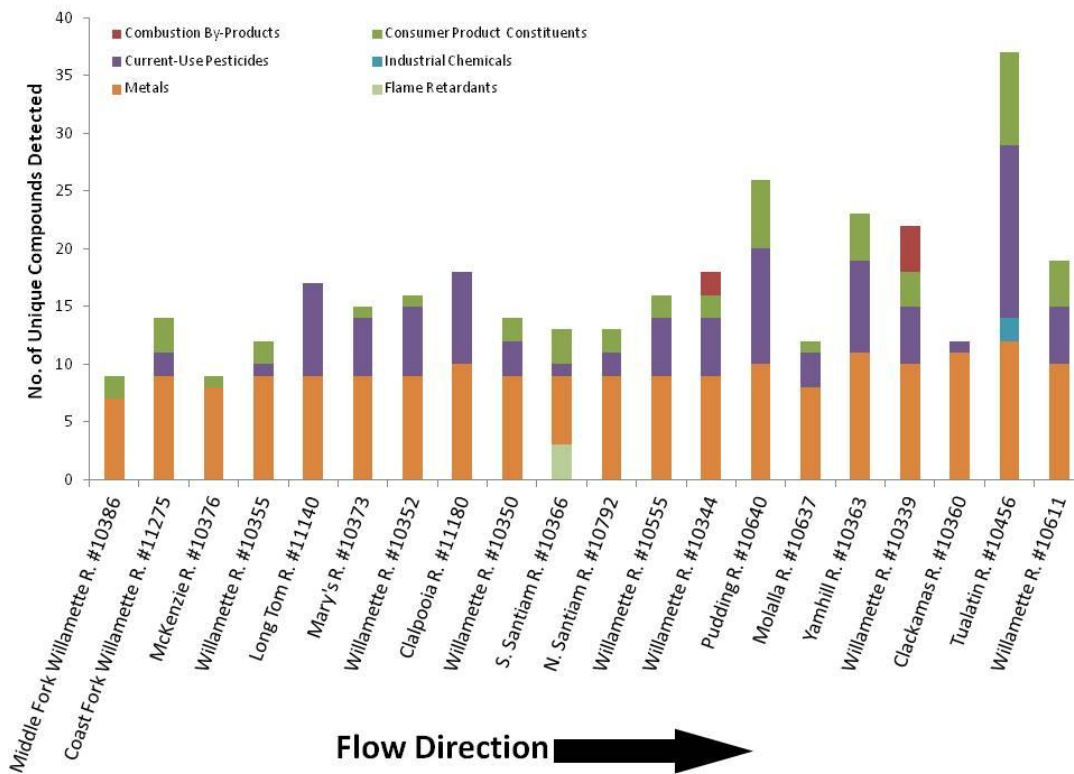


Figure 34 – The number of unique compounds detected by site and chemical group along a downstream gradient.

The following pages discuss the results in detail as three geographic areas, Upper, Mid, and Lower Willamette. Each geographic summary includes the site information and data tables for that portion of the river and its tributaries.

2.18 Willamette (Upper)

including the Coast Fork Willamette, McKenzie, Middle Fork Willamette, South Santiam and Upper Willamette sub-basins

Between April 2008 and May 2010, DEQ laboratory staff collected seasonal water samples at ten locations within the Coast Fork Willamette, McKenzie, Middle Fork Willamette, South Santiam and Upper Willamette sub-basins collectively referred to here as the Upper Willamette (Table 17). The sampling locations represented a wide range of watershed areas and land uses. Samples from two sites, Long Tom River and Calapooia River, in the Upper Willamette area contained the greatest numbers of unique chemicals (Figure 35).

Table 17 – Upper Willamette sample locations.

Station	Site Code	Site Description	Watershed Area (km ²)
10350	WM03	Willamette River at Albany (eastbound Hwy 20 bridge)	12575
10352	WM04	Willamette River at Old Hwy 34 Bridge (Corvallis)	11438
10355	WM05	Willamette River at Hwy 99E (Harrisburg)	8895
10366	WM08	South Santiam River Hwy 226 (Crabtree)	1853
10373	WM09	Mary's River at 99W (Corvallis)	781
10376	WM10	McKenzie River at Coburg Road	3453
10386	WM11	Middle Fork Willamette River at Jasper Bridge	3491
11140	WM18	Long Tom River at Stow Pit Road (Monroe)	1049
11180	WM19	Calapooia River at Queen Road	963
11275	WM20	Coast Fork Willamette at Mt. Pisgah Park	1699

Seasonality

In order to capture seasonal use patterns and hydrologic differences, collection of water samples took place six times over the course of two years. Figure 36 shows the unique number of chemical detected by chemical group by season. This figure does not include animal sterols. Detections for the most common sterols occurred during each season.

In general, more chemicals were detected during the spring than the other two seasons. Seasonal variations occurred within chemical groups. These variations are discussed below.

Priority metals

This group includes all metals for which Oregon has existing water quality criteria. These metals occur naturally and may also be enriched by human activities. Because of this, detections of these metals are common in water. Ten metals were detected in the sub-basin with at least one metal detected at each site. Samples from the Calapooia River site contained all 10 metals. Iron exceeded its applicable water

quality criterion for aquatic life (1000 µg/L) at 7 of the 10 sites. These exceedances occurred during spring and fall sampling events. Copper exceeded its applicable water quality criterion at 6 of the 10 sites. Similar to iron, these exceedances occurred during the spring and fall. Lead also potentially exceeded its water quality criterion at 9 of the 10 sites. These data only include results for total lead while the criterion is expressed as dissolved, therefore, this comparison is conservative. Total chromium potentially exceeded aquatic life criterion at the Mary's River site. Similar to lead, total chromium was measured while the criterion is expressed as chromium VI making this comparison conservative as well. Although exceedances occurred during specific seasons, several metals were consistently detected across seasons at all sites. The only site in this portion of the basin with no water quality exceedances for metals was the Middle Fork Willamette River site.

Current use pesticides

The most common group of chemicals was current use pesticides with 11 compounds detected. Samples collected at the Long Tom River site accounted for a majority of these detections. Detections of both diuron and pentachlorophenol occurred at 6 of the 10 sampling locations in this sub-basin. One detection, pentachlorophenol at the Long Tom River site, exceeded its Oregon DEQ criterion for human health during the spring sampling event. Consistent detections of diuron occurred across seasons and in all samples at three sites, Mary's River, Long Tom River and Calapooia River. The detection of dicamba, an herbicide used to control pre- and post-emergent broadleaf weeds, in the Calapooia River was the only detection of this compound in the state.

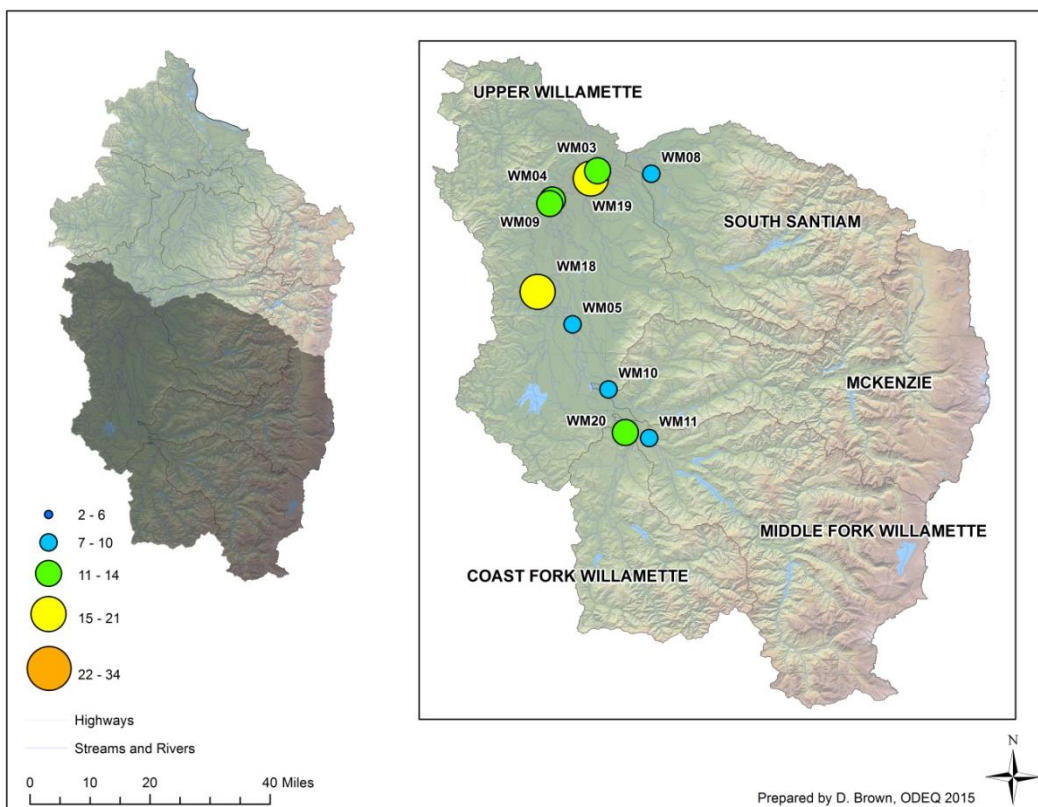


Figure 35 – Willamette Basin with the Upper Willamette area shown in black. Number of unique chemicals detected by site in the Upper Willamette area (inset).

Combustion by-products

No combustion by-products were detected in this portion of the basin.

Flame retardants

Three brominated flame retardants were detected in samples from the South Santiam River site. The low-level analytical method utilized in other basins was not available at this time. These compounds were detected utilizing another method. This is the only location in the Willamette basin with detections for brominated flame retardants. Future sampling in the basin will include the low-level method.

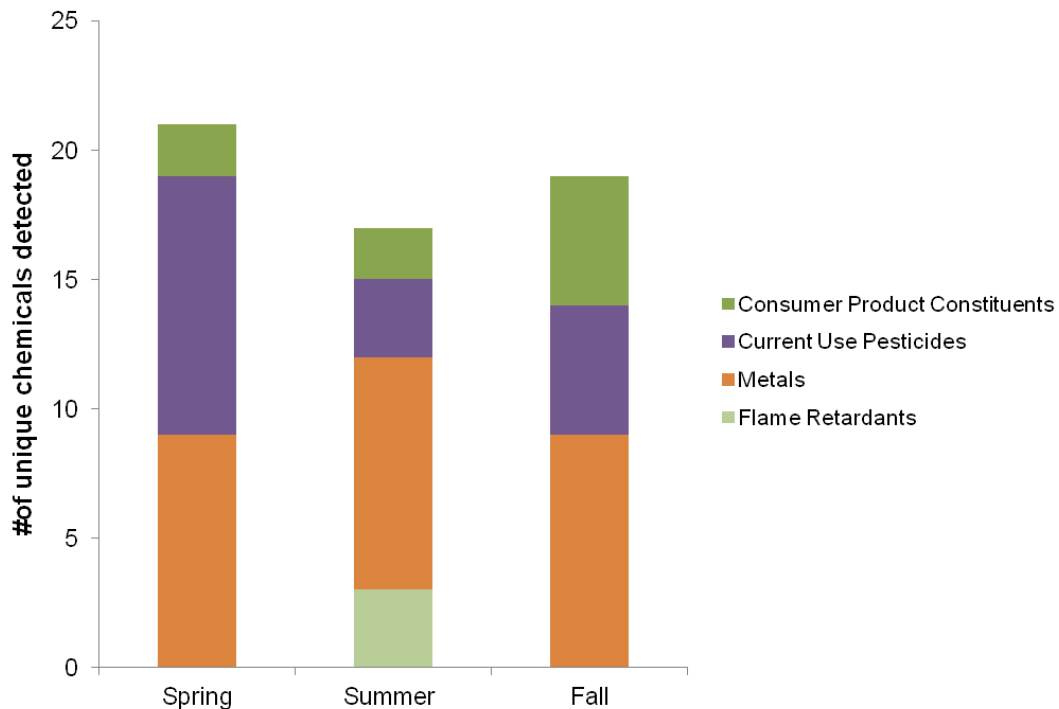


Figure 36 – Seasonality of detections in the Upper Willamette area by chemical group.

Plant and animal sterols

The laboratory measured two animal sterols in the Upper Willamette. These sterols occur naturally in the environment but may also be enriched by humans and human activities. Measured levels varied across the 10 sites in this portion of the basin with the lowest levels detected at the McKenzie River (cholesterol) and at the Middle Fork Willamette (coprostanol) sites and the highest levels detected at the Calapooia River (cholesterol) and at the Willamette River at Albany (coprostanol) sites. Neither sterol detected currently has a screening value. While cholesterol is ubiquitous and found in a variety of different species, coprostanol is specific to fecal matter from humans and higher mammals (i.e., cattle and birds) as it is formed during digestion from cholesterol. The ratio of coprostanol to cholesterol may be used to evaluate contamination by human sewage. A ratio less than one indicates a biogenic source (i.e., livestock, higher animals) and greater than one a sewage or human source. Ratios measured at all sites in this study were less than one, potentially indicating a biogenic source of coprostanol.

Additional work is required to fully evaluate this data and its implications and relationship to other contaminants. Two plant sterols were added during subsequent monitoring years. These will be included in future monitoring in the Willamette Basin.

Consumer product constituents including pharmaceuticals

In addition, the laboratory analyzed water samples for 28 consumer product constituents including pharmaceuticals and personal care products. Of these, four were detected in this portion of the Willamette Basin. The antibiotic, sulfamethoxazole, was detected at five sites during summer and winter samplings. The natural estrogen, estriol, was detected in the South Santiam River during a fall sampling. Another pharmaceutical, carbamazepine, was detected at the Coast Fork Willamette site. These compounds do not have applicable criteria or screening levels. The plasticizer, diethylphthalate, was detected three sites below its applicable water quality criteria. With the exception of estriol, each of these compounds was detected at the Coast Fork Willamette site.

Data gaps & summary

In general, based on the sampling conducted in this study, current use pesticides are a concern in the Long Tom and Calapooia rivers. Even though only one of the detections exceeded DEQ criteria or EPA benchmarks, persistent low-level detections and multiple chemicals at one site may act synergistically or additively in the environment resulting in impacts to the aquatic community. The widespread exceedances of priority metals within the basin are also concerning. Further investigation may help identify potential sources of these contaminants. Future basin studies will measure dissolved metals concentrations to confirm potential exceedances of metals criteria.

Since this monitoring program evolved over time, improvements and additions to analytical methods occurred. Samples collected in 2008-2010 did not include low-level analyses for legacy pesticides, PCBs, flame retardants or dioxins and furans. In addition, analysis did not include speciation of inorganic arsenic. While some combustion by-products were included, new methods allowing low-level analysis were not. Nutrient measurements including analysis for ammonia were also not included. Future toxics monitoring work in the Willamette Basin should include these analyses. Additional sampling may also help identify any potential trends emerging within the basins and increase geographic coverage in the basins. The basin detection table summarizes the detections at each site (see Appendix R).

2.19 Willamette (Mid)

including the North Santiam, Mid Willamette, Molalla/Pudding and Yamhill sub-basins

Between April 2008 and May 2010, DEQ laboratory staff collected seasonal water samples at seven locations in the North Santiam, Mid Willamette, Molalla/Pudding and Yamhill watersheds collectively referred to here as the Mid Willamette (Table 18). The sampling locations represented different watershed areas and land uses. The Pudding River site contained the greatest number of unique chemicals in this portion of the Willamette Basin (Figure 37) and the second highest number statewide.

Seasonality

In order to capture seasonal use patterns and hydrologic differences, collection of water samples took place six times over the course of two years. Figure 38 shows the unique number of chemicals detected by chemical group by season. This figure does not include animal sterols. Detections for the most common sterols occurred during each season.

In general, more chemicals were detected during the spring sampling events than during the summer or fall sampling events. Seasonal variations within chemical groups occurred and are discussed below.

Table 18 – Mid Willamette sampling locations.

Station	Site Code	Site Description	Watershed Area (km ²)
10339	WM01	Willamette River at Canby Ferry	24153
10344	WM02	Willamette River at Wheatland Ferry	20599
10363	WM07	Yamhill River at Dayton	1905
10555	WM13	Willamette River at Marion Street (Salem)	18772
10637	WM15	Molalla River at Knights Bridge Road (Canby)	892
10640	WM16	Pudding River at Hwy 211 (Woodburn)	821
10792	WM17	North Santiam River at Greens Bridge	1895

Priority metals

This group includes all metals for which Oregon has existing water quality criteria. These metals occur naturally and may also be enriched by human activities. Because of this, detections of these metals are common in water. Eleven metals were detected in the Mid Willamette area with at least one detected at all sites. All 11 metals were detected in the Yamhill River. Copper exceeded applicable aquatic life criterion at four sites, Molalla River at Knights Bridge, Willamette River at Canby Ferry, Yamhill River and Willamette River at Marion Street. These occurred during spring and fall samplings. Iron also exceeded DEQ water quality criterion for aquatic life at five sites, Pudding River, North Santiam, Willamette River at Canby Ferry, Yamhill River and Willamette River at Marion Street. All iron exceedances occurred during spring and fall sampling events. Lead potentially exceeded aquatic life criterion at the same five sites as iron and also at the Molalla River site. These data only include results for total lead while the criterion is expressed as dissolved, therefore, this comparison is conservative. Total chromium also potentially exceeded aquatic life criterion at the Yamhill River site. Similar to lead, total chromium was measured while the criterion is expressed at chromium VI making this comparison conservative as well. Although exceedances occurred during specific seasons, several metals were consistently detected across seasons at all sites.

Current use pesticides

The most common group of chemicals was current use pesticides with 14 compounds detected. At least two current use pesticides were detected at every site in this portion of the basin. Herbicides were the most common group of pesticides detected. Diuron was detected at every site and the herbicides, atrazine and simazine, occurred at all but one site, North Santiam River. The Pudding River site accounted for the majority of these detections, however, none of the detected current use pesticides exceeded DEQ water quality criteria or applicable EPA aquatic life benchmarks at this site.

Two compounds, diuron and pentachlorophenol, exceeded the applicable EPA aquatic life benchmark and DEQ water quality criterion for human health, respectively, at the Yamhill River sampling location. Both exceedances occurred during a spring sampling event, however, diuron was detected across seasons at this location. While detection levels were sporadic at most of the Willamette River sites, consistent detections of diuron at the Willamette River at Canby Ferry location occurred across seasons

and in every sample. Persistent low-level detections and multiple chemicals at one site may act synergistically or additively in the environment resulting in impacts to the aquatic community.

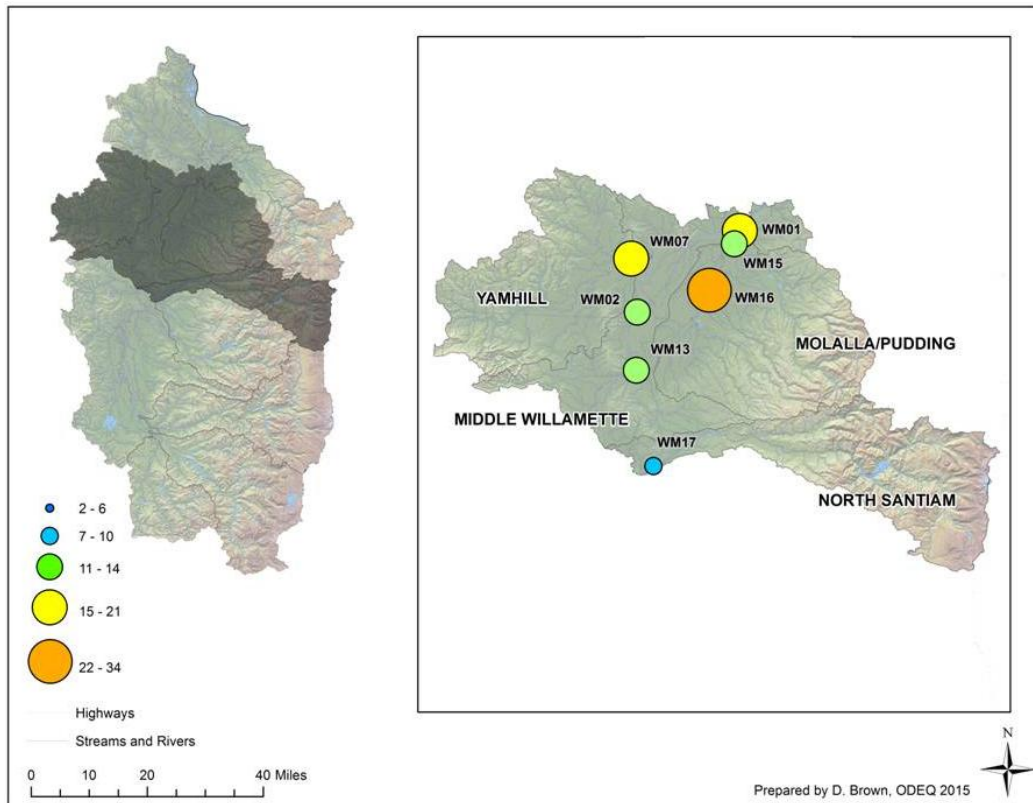


Figure 37 – Willamette Basin with the Mid Willamette area shown in black. Number of unique chemicals detected by site in the Mid Willamette area (inset).

Combustion by-products

Six combustion by-products were detected in this portion of the Willamette Basin. Two sites accounted for all the detections, Willamette River at Canby Ferry and Willamette River at Wheatland Ferry. The Canby Ferry site contained levels of two compounds, benzo(b)fluoranthene and chrysene, over DEQ water quality criteria for human health protection. The Wheatland Ferry site contained levels of indeno(1,2,3-cd)pyrene over applicable criterion. Given these compounds are associated with the incomplete combustion of fossil fuels, it is not unexpected that they may be present at these sites as automobile ferries are located at both sites. Detections occurred during spring and summer sampling events.

Plant and animal sterols

The laboratory measured two animal sterols in the Mid Willamette. These sterols occur naturally in the environment but may also be enriched by humans and human activities. Measured levels varied across the seven sites in this portion of the basin with the lowest levels detected at the Molalla River site and the highest levels detected at the Willamette River at Wheatland Ferry site. Neither sterol detected currently has a screening value. While cholesterol is ubiquitous and found in a variety of different species, coprostanol is specific to fecal matter from humans and higher mammals (i.e., cattle and birds) as it is formed during digestion from cholesterol. The ratio of coprostanol to cholesterol may be used to evaluate contamination by human sewage. A ratio less than one indicates a biogenic source (i.e.,

livestock, higher animals) and greater than one a sewage or human source. Ratios measured at all sites in this study were less than one, potentially indicating a biogenic source of coprostanol.

Additional work is required to fully evaluate this data and its implications and relationship to other contaminants. Two plant sterols were added during subsequent monitoring years. These will be included in future monitoring in the Willamette Basin.

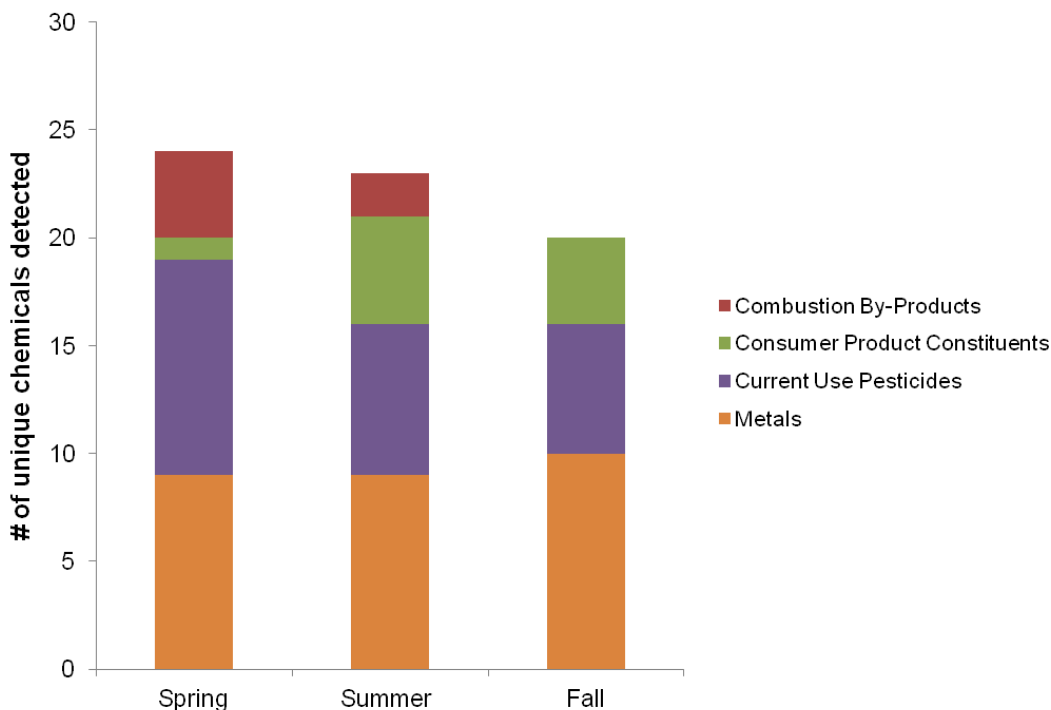


Figure 38 – Seasonality of detections in the Mid Willamette area by chemical group.

Consumer product constituents including pharmaceuticals

In addition, the laboratory analyzed water samples for 28 consumer product constituents including pharmaceuticals and personal care products. Of these, six were detected in this portion of the Willamette Basin. All six compounds were detected in the Pudding River samples. The antibiotic, sulfamethoxazole, was detected at five of the seven sites. Other pharmaceuticals detected include the anti-seizure medication, carbamazepine (3 sites) and the mood regulator, venlafaxine (2 sites). These pharmaceuticals were most commonly detected during summer sampling events with sporadic detections during other seasons. The insect repellent, DEET, was detected at one site, Pudding River, during the summer sampling. These compounds do not have established benchmarks or criteria. The plasticizer, bis(2-ethylhexyl)phthalate, was detected above its applicable water quality criterion in the Pudding River during the spring sampling.

Industrial chemicals

No industrial chemicals were detected in this portion of the Willamette Basin.

Data gaps & summary

In general, based on the sampling conducted in this study, the large number of compounds detected in the Pudding and Yamhill Rivers may be a concern. These tributaries to the Willamette River receive input from wastewater facilities as well as urban and agricultural run-off. Consistent detections of multiple chemicals may have an impact on aquatic life. These two watersheds are part of the Pesticide Stewardship Partnerships, a voluntary program working to reduce impacts from pesticide use. In addition, the general presence of multiple metals over criteria in this portion of the Willamette may also impact aquatic life. Future toxics monitoring in the basin will measure dissolved metals concentrations to confirm potential exceedances of metals criteria.

Since this monitoring program evolved over time, improvements and additions to analytical methods occurred. Samples collected from 2008 to 2010 did not include low-level analyses for legacy pesticides, PCBs, flame retardants or dioxins and furans. In addition, analysis did not include speciation of inorganic arsenic. While some combustion by-products were included, new methods allowing low-level analysis were not. Nutrient measurements including analysis for ammonia were also not included. Future toxics monitoring work in the Willamette Basin should include these analyses. Additional sampling may also help identify any potential trends emerging within the basins and increase geographic coverage in the basins. The basin detection table summarizes the detections at each site (see Appendix S).

2.20 Willamette (Lower) including the Clackamas, Tualatin and Lower Willamette sub-basins

Between April 2008 and May 2010, DEQ laboratory staff collected seasonal water samples at three locations within the Clackamas, Tualatin and Lower Willamette watersheds collectively referred to here as the Lower Willamette (Table 19). The sampling locations represented different watershed areas and land uses. Samples from the Tualatin River site contained the greatest number of unique chemicals in this portion of the Willamette Basin (Figure 39) and statewide.

Table 19 – Lower Willamette sampling locations.

Station	Site Code	Site Description	Watershed Area (km ²)
10360	WM06	Clackamas River at Hwy 99E (Gladstone)	2444
10456	WM12	Tualatin River at Boones Ferry Road	1792
10611	WM14	Willamette River at Hawthorne Bridge	28935

Seasonality

In order to capture seasonal use patterns and hydrologic differences, collection of water samples took place six times over the course of two years. Figure 40 shows the unique number of chemical detected by chemical group by season. This figure does not include animal sterols. Detections for the most common sterols occurred during each season.

In general, total number of unique chemicals did not vary much by season, but variations were seen in individual compounds. These are discussed below.

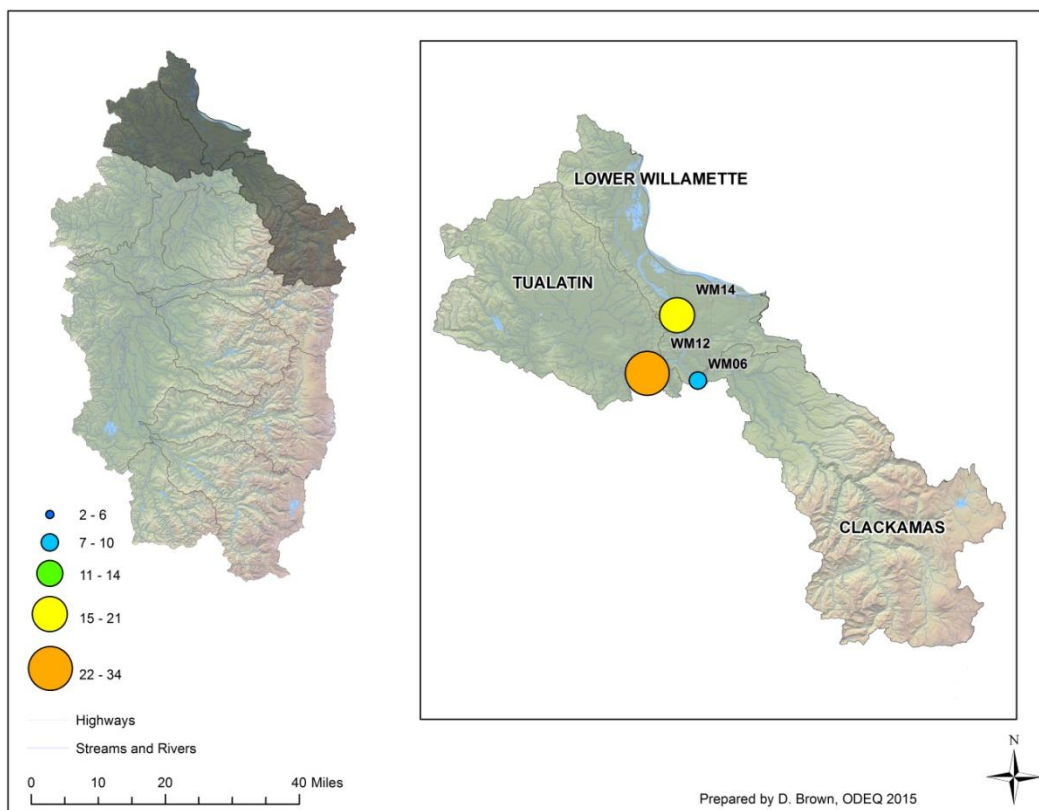


Figure 39 – Willamette Basin with the Lower Willamette area shown in black. Number of unique chemicals detected by site in the Lower Willamette area (inset).

Priority metals

This group includes all metals for which Oregon has existing water quality criteria. These metals occur naturally and may also be enriched by human activities. Because of this, detections of these metals are common in water. Thirteen metals were detected in the sub-basin with at least one metal detected at all sites. The Tualatin River site contained the largest number of different metals (12). Two metals exceeded their applicable water quality criteria, copper and iron, at two sites, Clackamas River and Willamette River at Hawthorne Bridge. Lead also potentially exceeded its water quality criterion at all three sites. These data only include results for total lead while the criterion is expressed as dissolved, therefore, this comparison is conservative. Detections of metals occurred across seasons.

Current use pesticides

The most common group of chemicals was current use pesticides with 16 compounds detected. One site, Tualatin River, accounted for the majority of these detections. While fewer compounds occurred at the other two sites, pentachlorophenol exceeded DEQ water quality criterion for the protection of human health ($0.15 \mu\text{g/L}$) at each site sampled. Detections of triclopyr, an herbicide used to control broadleaf weeds, occurred at two sites statewide including the Tualatin River site. Consistent detections for current use pesticides occurred across seasons with five compounds occurring in all samples at the Tualatin River site and two compounds at the Willamette River site. Neither compound detected at the Clackamas River occurred consistently across seasons. Persistent low-level detections and multiple

chemicals at one site may act synergistically or additively in the environment resulting in impacts to the aquatic community.

Combustion by-products

No combustion by-products were detected in this portion of the Willamette Basin.

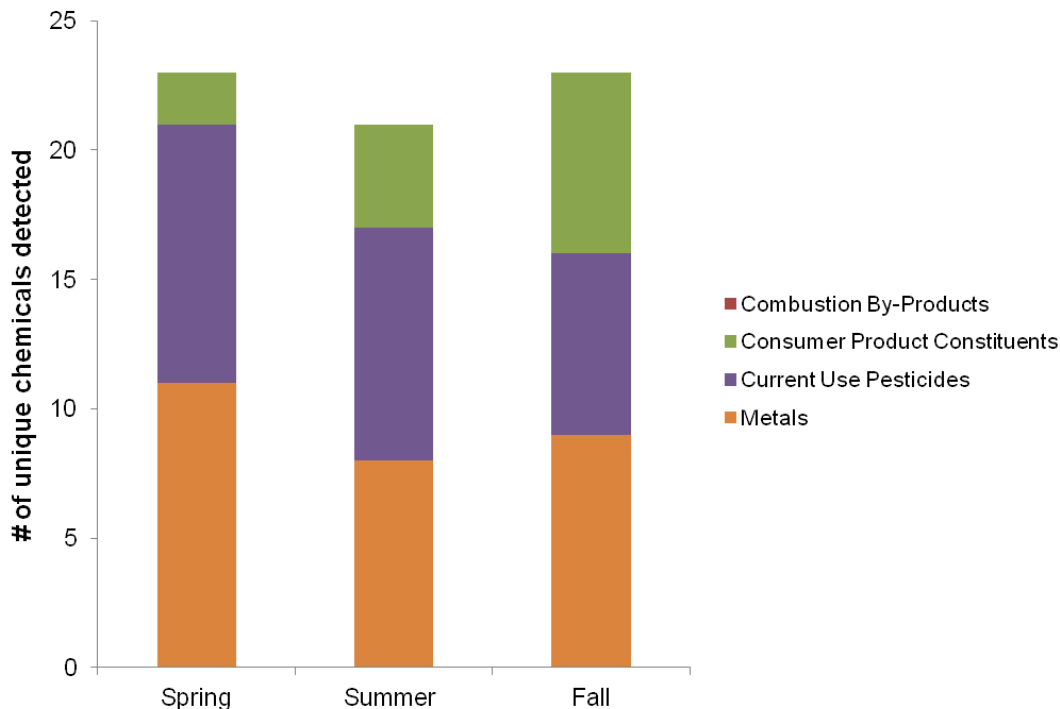


Figure 40 – Seasonality of detections in the Lower Willamette area by chemical group.

Plant and animal sterols

The laboratory measured two animal sterols in the Lower Willamette. These sterols occur naturally in the environment but may also be enriched by humans and human activities. Measured levels varied across the three sites with the lowest levels detected at the Clackamas River site and the highest levels detected at Tualatin River site. Neither sterol detected currently has a screening value. While cholesterol is ubiquitous and found in a variety of different species, coprostanol is specific to fecal matter from humans and higher mammals (i.e., cattle and birds) as it is formed during digestion from cholesterol. The ratio of coprostanol to cholesterol may be used to evaluate contamination by human sewage. A ratio less than one indicates a biogenic source (i.e., livestock, higher animals) and greater than one a sewage or human source. Ratios measured at all sites in this study were less than one, potentially indicating a biogenic source of coprostanol.

Additional work is required to fully evaluate this data and its implications and relationship to other contaminants. Two plant sterols were added during subsequent monitoring years. These will be included in future monitoring in the Willamette Basin.

Consumer product constituents including pharmaceuticals

In addition, the laboratory analyzed water samples for 28 consumer product constituents including pharmaceuticals and personal care products. Of these, seven were detected in this portion of the

Willamette Basin. While the Tualatin River site contained measureable amounts of all seven compounds, only detections sulfamethoxazole, a commonly used antibiotic, occurred in every sample. Samples from the Willamette River at the Hawthorne Bridge contained three compounds, carbamazepine (an antiepileptic), diethylphthalate (a plasticizer) and sulfamethoxazole. Consumer products did not occur in samples collected in the Clackamas River. With the exception of diethylphthalate, there are no established screening levels or criteria for these compounds.

Industrial chemicals

Two industrial chemicals, chloroform and dichlorobromomethane, were detected in samples collected at the Tualatin River site. These compounds are part of a group of compounds called trihalomethanes. They are associated with the chlorination of organic matter and may be found in treated wastewater. Both compounds were detected during the September 2008 sampling event. However, monitoring for these chemicals did not continue through all the events so seasonality cannot be evaluated.

Data gaps & summary

In general, based on the sampling conducted in this study, the large number of compounds detected in the Tualatin River may be a concern. This tributary to the Willamette River receives input from major wastewater facilities as well as urban and agricultural run-off. Consistent detections of multiple chemicals as well as multiple metals over criteria this portion of the Willamette may have an impact on aquatic life. Dissolved metals concentrations will be measured to confirm potential exceedances of metals criteria during the next round of toxics monitoring in the Willamette Basin.

Since this monitoring program evolved over time, improvements and additions to analytical methods occurred. Samples collected from 2008 to 2010 did not include low-level analyses for legacy pesticides, PCBs, flame retardants or dioxins and furans. In addition, analysis did not include speciation of inorganic arsenic. While some combustion by-products were included, new methods allowing low-level analysis were not. Nutrient measurements including analysis for ammonia were also not included. Future toxics monitoring work in the Willamette Basin should include these analyses. Additional sampling may also help identify any potential trends emerging within the basins and increase geographic coverage in the basins. The basin detection table summarizes the detections at each site (see Appendix T).

3. Appendices

Appendix A

Screening Value Reference Key

nsv: No screening value has been assigned

N/A: Sampling occurred prior to development of analytical method

1. Human Health Criteria: Water + Organism

2. Freshwater Chronic Criteria (CCC)

3. Saltwater Chronic Criteria (CCC)

4. Saltwater Acute Criteria (CMC)

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

<http://www.deq.state.or.us/wq/standards/docs/tables303140.pdf>

http://www.epa.gov/oppefed1/ecorisk_ders/aquatic_life_benchmark.htm

* 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



**Appendix B
DETECTION SUMMARY**

**DESCHUTES BASIN
Station ID and Description**

Samples collected
between June and
October 2012

Percent Detection
Number of samples over
screening value

Deschutes River at
Deschutes River Park
10411
Deschutes River at Hwy
26 (Warm Springs)
10506
Deschutes River at
Lower Bridge
10508
Crooked River at Lone
Pine Road (Terrebonne)
10517
Deschutes River at
Benham Falls
Footbridge
10684
Deschutes River at
Wickiup Reservoir
Gauge Station
10689

Screening Value (µg/L)
S.V. Reference

Maximum Values (µg/L)

	Percent Detection	Number of samples over screening value	10411	10506	10508	10517	10684	10689	Screening Value (µg/L)	S.V. Reference
Ammonia										
Ammonia as N	30	0	—	24.0	—	24.0	—	60.0	‡	2
Combustion By-Products										
Acenaphthylene	2	—	—	—	—	0.0044	—	—	nsv	
Dibenzo(a,h)anthracene	4	2	—	—	—	—	—	—	0.0013	1
Fluoranthene	4	0	—	—	—	0.00365	—	—	0.014	1
Phenanthrene	4	—	0.00315	—	—	—	—	—	nsv	
Pyrene	2	0	—	—	—	0.00316	—	—	0.29	1
Consumer Product Constituents										
Butylbenzylphthalate	2	1	—	—	—	—	—	—	0.19	1
DEET	2	—	—	—	—	—	—	1.32	nsv	
Current Use Pesticides										
2,3,4,6-Tetrachlorophenol	4	—	—	—	—	—	0.0859	—	nsv	
2,4-D	9	0	—	—	—	0.3	—	—	100	1
2,4,6-Trichlorophenol	2	0	—	—	—	—	—	—	0.023	1
Diuron	13	0	—	0.00589	—	0.187	—	—	2.4	9
Fluridone	2	0	—	—	—	—	0.0217	—	480	6
Linuron	4	0	—	0.0042	—	—	—	—	0.09	8
Sulfometuron-methyl	2	0	—	—	—	—	—	—	0.45	10
Dioxins and Furans										
OCDD	5	—	—	—	—	—	—	—	nsv	
Flame retardants										
PBDE-208	7	—	—	—	—	—	0.000429	—	nsv	
PBDE-209	23	—	—	—	—	0.00198	0.00221	—	nsv	
PBDE-3	11	—	—	—	—	—	0.0000523	—	nsv	
PBDE-99	5	—	—	—	—	—	—	—	nsv	
Industrial Chemicals or Intermediates										
2,4-Dimethylphenol	19	—	—	—	—	—	0.0108	0.0109	nsv	
Legacy Pesticides										
Dieldrin	3	3	—	—	—	—	—	—	0.0000053	1
Endosulfan (I + II)	2	0	—	—	—	—	—	0.000107	0.056	2
Endosulfan I	2	0	—	—	—	—	—	0.000107	0.056	2
Endosulfan II	1	0	—	—	—	—	—	—	0.056	2
Endosulfan sulfate	5	0	—	0.0000697	—	—	—	—	8.5	1
Heptachlor epoxide	1	1	—	—	—	—	—	—	0.0000039	1
Total DDT	2	0	—	—	—	—	—	—	0.001	2
4,4'-DDE	2	2	—	—	—	—	—	—	0.000022	1
Plant or animal sterols										
beta-Sitosterol	100	—	0.43	0.551	0.461	1.26	0.644	0.908	nsv	
Cholesterol	100	—	1.2	1.14	0.619	2.3	0.817	1.24	nsv	
Coprostanol	95	—	0.0186	0.0126	0.023	0.0935	0.0159	0.0182	nsv	
Stigmastanol	95	—	0.0458	0.036	0.0883	0.24	0.078	0.0519	nsv	
Priority Metals										
<i>Dissolved</i>										
Arsenic	94	2	1.28	1.26	0.99	1.88	1.05	0.53	nsv	
Barium	77	—	4.02	3.06	—	24.0	2.11	2.35	nsv	
Copper	4	0	—	—	—	—	—	—	*#	2
Iron	11	0	—	—	—	—	—	—	1000#	2
Manganese	79	—	—	—	3.12	41.6	8.63	4.43	nsv	
Nickel	2	0	—	—	—	—	—	—	*	2
Zinc	2	0	—	—	—	—	—	—	*	2
<i>Total Inorganic</i>										
Arsenic	100	1	1.0	0.9	0.74	1.3	0.6	0.25	2.1	1
<i>Total Recoverable</i>										
Arsenic	98	3	1.32	1.24	1.02	1.92	1.1	0.56	nsv	
Barium	89	0	4.56	4.39	2.3	24.9	2.64	3.23	1000	1
Copper	16	1	—	—	—	1.66	—	—	*	2
Iron	51	0	—	—	188	284	211	195	1000	2
Lead	4	0	—	—	—	—	—	—	*§	2
Manganese	95	—	6.06	6.94	11.0	55.7	10.1	17.5	nsv	
Nickel	2	0	—	—	—	—	—	—	*§	2
Average Values										
Standard Parameters (mg/L)										
Dissolved Organic Carbon	89	—	1.2	1.2	1.7	5.3	1.6	1.8		
Sulfate	95	—	2.0	2.0	0.6	10.2	0.5	0.3		
Total Organic Carbon	89	—	1.4	2.4	1.6	5.0	1.7	1.6		
Total Solids	100	—	99.3	96.0	58.7	246.0	73.7	45.3		
Total Suspended Solids	86	—	5.0	4.0	1.7	8.3	4.0	1.3		
Field Parameters										
Conductivity (µmhos/cm @ 25° C)	100	—	118	123	61	368	69	57		
Dissolved Oxygen (mg/L)	100	—	10.9	10.7	10.6	9.9	9.5	10.0		
pH (SU)	100	—	8.3	8.8	7.9	8.2	7.7	7.6		
Temperature (°C)	100	—	14.7	13.0	10.6	11.4	9.8	11.4		
Turbidity (NTU)	90	—	4	2	2	9	2	2		



State of Oregon
Department of
Environmental
Quality

Samples collected
between June and
October 2012

DESCHUTES BASIN
Station ID and Description

	Little Deschutes River at HWY 42 (Road 2114)	Little Deschutes River at Burgess Road	White River at Tygh Valley State Park	Crooked River at Conant Basin Road	Deschutes River upstream of Riverhouse Hotel	Metolius River at Track C Bridge	Crooked River at County Park	Screening Value (µg/L)	S.V. Reference
	10696	10697	11387	11477	12561	25558	32475		
	Maximum Values (µg/L)								
Ammonia									
Ammonia as N	—	11.0	—	10.0	—	—	22.0	‡	2
Combustion By-Products									
Acenaphthylene	—	—	—	—	—	—	—	<i>nsv</i>	
Dibenzo(a,h)anthracene	0.00588	—	—	—	—	0.00573	—	0.0013	1
Fluoranthene	—	—	—	—	—	—	—	0.014	1
Phenanthrene	—	—	—	—	—	—	0.011	<i>nsv</i>	
Pyrene	—	—	—	—	—	—	—	0.29	1
Consumer Product Constituents									
Butylbenzylphthalate	—	0.261	—	—	—	—	—	0.19	1
DEET	—	—	—	—	—	—	—	<i>nsv</i>	
Current Use Pesticides									
2,3,4,6-Tetrachlorophenol	0.0858	—	—	—	—	—	—	<i>nsv</i>	
2,4-D	0.1	0.1	—	0.2	—	—	—	100	1
2,4,6-Trichlorophenol	—	—	—	—	—	—	—	0.023	1
Diuron	—	—	0.00493	—	—	—	—	2.4	9
Fluridone	—	—	—	—	—	—	—	480	6
Linuron	—	—	—	—	—	—	—	0.09	8
Sulfometuron-methyl	—	—	—	—	—	—	—	0.45	10
Dioxins and Furans									
OCDD	—	—	—	—	—	—	—	<i>nsv</i>	
Flame retardants									
PBDE-208	—	—	—	—	—	—	—	<i>nsv</i>	
PBDE-209	—	—	—	—	—	—	—	<i>nsv</i>	
PBDE-3	—	0.0000599	—	—	—	—	—	<i>nsv</i>	
PBDE-99	—	—	—	—	—	—	—	<i>nsv</i>	
Industrial Chemicals or Intermediates									
2,4-Dimethylphenol	0.0116	0.0121	—	0.0178	0.011	—	0.0227	<i>nsv</i>	
Legacy Pesticides									
Dieldrin	—	—	—	—	—	—	—	0.0000053	1
Endosulfan (I + II)	—	—	—	—	—	—	—	0.056	2
Endosulfan I	—	—	—	—	—	—	—	0.056	2
Endosulfan II	—	—	—	—	—	—	—	0.056	2
Endosulfan sulfate	0.0000982	0.0000683	—	—	—	—	—	8.5	1
Heptachlor epoxide	—	—	—	—	—	—	0.000156	0.0000039	1
Total DDT	—	—	—	—	—	—	—	0.001	2
4,4'-DDE	—	—	—	—	—	—	—	0.000022	1
Plant or animal sterols									
beta-Sitosterol	0.914	1.03	0.625	1.65	0.63	0.0669	0.557	<i>nsv</i>	
Cholesterol	0.823	0.889	0.425	1.95	0.735	0.0996	1.47	<i>nsv</i>	
Coprostanol	0.0483	0.0456	0.00988	0.0832	0.0215	0.00275	0.0479	<i>nsv</i>	
Stigmastanol	0.159	0.173	0.0488	0.176	0.0743	—	0.13	<i>nsv</i>	
Priority Metals									
<i>Dissolved</i>									
Arsenic	0.28	0.28	—	1.53	1.02	1.2	1.36	<i>nsv</i>	
Barium	5.19	5.35	3.63	23.8	—	—	20.6	<i>nsv</i>	
Copper	—	—	—	—	—	—	1.62	*#	2
Iron	333	379	—	—	—	—	—	1000#	2
Manganese	9.62	13.9	7.41	29.9	3.34	—	38.8	<i>nsv</i>	
Nickel	—	—	—	—	—	—	—	*	2
Zinc	—	—	—	5.08	—	—	—	*	2
<i>Total Inorganic</i>									
Arsenic	0.17	0.16	0.16	1	0.74	0.97	0.94	2.1	1
<i>Total Recoverable</i>									
Arsenic	0.32	0.33	0.31	1.56	1.07	1.22	1.37	<i>nsv</i>	
Barium	5.68	5.91	15.7	25.5	2.58	—	21.3	1000	1
Copper	—	—	6.84	—	—	—	1.81	*	2
Iron	606	692	926	157	223	—	450	1000	2
Lead	—	—	0.25	—	—	—	—	*§	2
Manganese	13.1	17.9	17.4	78	9.42	—	47.6	<i>nsv</i>	
Nickel	—	—	—	—	—	—	—	*§	2
	Average Values								
Standard Parameters (mg/L)									
Dissolved Organic Carbon	3.5	2.9	1.6	6.1	1.7	—	4.9		
Sulfate	0.4	0.5	2.6	11.8	0.5	0.7	6.8		
Total Organic Carbon	3.2	3.0	1.4	5.6	1.4	—	13.7		
Total Solids	60.3	59.7	94.7	276.7	68.0	87.7	178.3		
Total Suspended Solids	2.3	1.7	20.0	1.5	2.0	2.5	1.7		
Field Parameters									
Conductivity (µmhos/cm @ 25° C)	53	47	81	406	65	123	262		
Dissolved Oxygen (mg/L)	8.8	9.0	11.3	10.2	10.1	11.1	10.8		
pH (SU)	7.6	7.6	7.9	8.4	8.1	8.3	8.3		
Temperature (°C)	12.1	12.4	10.8	13.3	10.8	9.9	11.5		
Turbidity (NTU)	2	2	16	2	1	1	5		



State of Oregon
Department of
Environmental
Quality

Samples collected
between June and
October 2012

DESCHUTES BASIN
Station ID and Description

	Crooked River at Elliot Drive 32494	Ochoco Creek at mouth of Duncan Creek 33093	Trout Creek in lower canyon on Trout Creek Ranch 33939	Deschutes River at Shears Falls Fish Ladder 36030	Trout Creek downstream of Mud Springs Creek 36776	Tumalo Creek downstream of Bridge Creek at Skyliner Road (County Hwy 4601) 37106	Screening Value (µg/L)	S.V. Reference
Maximum Values (µg/L)								
Ammonia								
Ammonia as N	16.0	—	18.0	21.0	12.0	—	‡	2
Combustion By-Products								
Acenaphthylene	—	—	—	—	—	—	nsv	
Dibenzo(a,h)anthracene	—	—	—	—	—	—	0.0013	1
Fluoranthene	—	—	—	—	0.00401	—	0.014	1
Phenanthrene	—	—	—	—	—	—	nsv	
Pyrene	—	—	—	—	—	—	0.29	1
Consumer Product Constituents								
Butylbenzylphthalate	—	—	—	—	—	—	0.19	1
DEET	—	—	—	—	—	—	nsv	
Current Use Pesticides								
2,3,4,6-Tetrachlorophenol	—	—	—	—	—	—	nsv	
2,4-D	0.2	—	—	—	—	—	100	1
2,4,6-Trichlorophenol	—	—	—	—	—	0.0149	0.023	1
Diuron	0.409	—	—	—	0.0283	—	2.4	9
Fluridone	—	—	—	—	—	—	480	6
Linuron	—	—	—	—	0.00526	—	0.09	8
Sulfometuron-methyl	0.00576	—	—	—	—	—	0.45	10
Dioxins and Furans								
OCDD	—	—	—	0.000142	—	—	nsv	
Flame retardants								
PBDE-208	—	—	—	—	—	—	nsv	
PBDE-209	—	—	—	—	0.00225	—	nsv	
PBDE-3	—	—	—	—	—	—	nsv	
PBDE-99	—	—	—	—	—	0.000985	nsv	
Industrial Chemicals or Intermediates								
2,4-Dimethylphenol	—	0.013	—	—	—	0.00993	nsv	
Legacy Pesticides								
Dieldrin	—	—	—	—	0.000107	—	0.0000053	1
Endosulfan (I + II)	—	—	—	0.0001719	—	—	0.056	2
Endosulfan I	—	—	—	0.0000669	—	—	0.056	2
Endosulfan II	—	—	—	0.000105	—	—	0.056	2
Endosulfan sulfate	—	—	—	—	0.00018	—	8.5	1
Heptachlor epoxide	—	—	—	—	—	—	0.0000039	1
Total DDT	—	—	—	—	0.000168	—	0.001	2
4,4'-DDE	—	—	—	—	0.000168	—	0.000022	1
Plant or animal sterols								
beta-Sitosterol	0.74	0.447	0.999	0.532	1.2	0.505	nsv	
Cholesterol	2.09	0.537	1.45	1.12	1.9	0.116	nsv	
Coprostanol	0.0482	0.0427	0.0728	0.0321	0.0712	0.00335	nsv	
Stigmastanol	0.122	0.132	0.12	0.0382	0.203	0.052	nsv	
Priority Metals								
<i>Dissolved</i>								
Arsenic	1.26	1.36	1.87	1.31	3.73	0.89	nsv	
Barium	23.0	22.6	68	3.62	35.2	—	nsv	
Copper	—	1.54	—	—	—	—	*#	2
Iron	—	—	—	—	—	—	1000#	2
Manganese	20.8	21.7	99.4	2.13	3.06	2.35	nsv	
Nickel	—	—	1.2	—	—	—	*	2
Zinc	—	—	—	—	—	—	*	2
<i>Total Inorganic</i>								
Arsenic	0.95	0.75	1.1	0.87	2.5	0.67	2.1	1
<i>Total Recoverable</i>								
Arsenic	1.29	1.33	1.99	1.33	3.71	0.91	nsv	
Barium	24.6	23.6	68.3	3.92	37.4	2.0	1000	1
Copper	1.63	—	—	—	1.74	—	*	2
Iron	249	262	166	—	988	185	1000	2
Lead	—	—	—	—	0.25	—	*§	2
Manganese	38.9	26.0	113	8.06	37.3	7.25	nsv	
Nickel	—	—	—	—	1.0	—	*§	2
Average Values								
Standard Parameters (mg/L)								
Dissolved Organic Carbon	4.9	2.8	5.5	1.5	3.8	1.6		
Sulfate	9.6	6.9	42.3	1.9	18.5	0.4		
Total Organic Carbon	4.5	2.4	5.1	1.2	2.7	3.2		
Total Solids	239.7	234.7	354.0	102.7	279.3	60.0		
Total Suspended Solids	4.0	3.0	4.0	5.7	12.7	8.0		
Field Parameters								
Conductivity (µmhos/cm @ 25° C)	348	358	501	119	413	36		
Dissolved Oxygen (mg/L)	9.9	9.8	8.8	11.6	10.1	11.3		
pH (SU)	8.1	7.9	8.2	8.2	8.4	7.7		
Temperature (°C)	10.1	11.8	14.8	12.7	14.0	3.5		
Turbidity (NTU)	5	3	3	4	10	3		



State of Oregon
Department of
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Quality

Appendix C
DETECTION SUMMARY

Samples collected
between June and
November 2011

GRANDE RONDE BASIN
Station ID and Description

	Percent Detection	Number of samples over screening value	GRANDE RONDE BASIN Station ID and Description			Screening Value (µg/L)	S.V. Reference
			Grande Ronde River at Hwy 82 (Elgin)	Grande Ronde River at Peach Lane (Island City)	Grande Ronde River at Hilgard Park		
			10719	10720	11521		
Maximum Values (µg/L)							
Consumer Product Constituents							
bis(2-ethylhexyl)adipate	11		0.471	—	—	<i>nsv</i>	
Sulfamethoxazole	11		0.014	—	—	<i>nsv</i>	
Current Use Pesticides							
Bromacil	11	0	0.027	—	—	6.8	9
Diuron	11	0	0.006	—	—	2.4	9
Hexazinone	11	0	0.026	—	—	7	9
Plant or animal sterols							
beta-Sitosterol	100		1.11	0.619	0.343	<i>nsv</i>	
Cholesterol	100		2.74	1.14	0.346	<i>nsv</i>	
Coprostanol	100		0.0816	0.022	0.012	<i>nsv</i>	
Stigmastanol	100		0.292	0.088	0.053	<i>nsv</i>	
Priority Metals							
<i>Dissolved</i>							
Arsenic	78	0	0.74	0.44	0.37	<i>nsv</i>	
Barium	100		19.1	19.1	29.9	<i>nsv</i>	
Manganese	100		16.6	3.9	5.8	<i>nsv</i>	
<i>Total Recoverable</i>							
Arsenic	100	0	0.81	0.45	0.4	<i>nsv</i>	
Barium	100	0	23.4	19.2	30.1	1000	1
Iron	56	0	790	820	870	1000	2
Manganese	100		133	11.1	11.7	<i>nsv</i>	
Average Values							
Standard Parameters (mg/L)							
Dissolved Organic Carbon	100		3.5	3.0	2.7		
Sulfate	100		2.9	1.3	1.9		
Total Organic Carbon	100		3.4	2.7	2.9		
Total Solids	100		114.3	87.7	88.0		
Total Suspended Solids	100		10.3	4.7	3.0		
Field Parameters							
Conductivity (µmhos/cm @ 25° C)	100		132	85	99		
Dissolved Oxygen (mg/L)	100		10.5	11.0	10.9		
pH (SU)	100		8.5	8.3	7.9		
Temperature (°C)	100		11.5	10.6	10.7		
Turbidity (NTU)	100		8	5	4		



**Appendix D
DETECTION SUMMARY**

Samples collected
between May and
November 2012

HOOD BASIN

Station ID and Description

	Percent Detection	Number of samples over screening value	Station ID and Description						Screening Value (µg/L)	S.V. Reference
			11972 Lenz Creek at mouth	12012 Hood River at footbridge downstream of I-84	12550 Fifteenmile Creek at Boyd Market Road at Dufur	13138 East Fork Hood River at County Gravel Pit (River Mile 0.75)	13139 Middle Fork Hood River at River Mile 1.0 (ODFW Smolt Trap)	13140 West Fork Hood River at Lost Lake Road (River Mile 4.7)		
Maximum Values (µg/L)										
Ammonia										
Ammonia as N	16	0	34.0	—	238	—	—	—	†	2
Combustion By-Products										
Acenaphthene	9	0	0.00421	—	—	—	—	—	95	1
Benzo(b)fluoranthene	3	1	—	—	—	—	—	—	0.0013	1
Dibenzo(a,h)anthracene	3	—	—	—	—	—	0.00524	—	<i>nsv</i>	
Fluoranthene	5	0	—	—	—	—	—	—	14	1
Fluorene	8	0	—	—	—	—	—	—	390	1
Naphthalene	21	—	0.0354	—	—	—	—	—	<i>nsv</i>	
Phenanthrene	31	—	0.00586	—	—	—	—	—	<i>nsv</i>	
Consumer Product Constituents										
17β-Estradiol	3	—	—	—	—	—	—	—	<i>nsv</i>	
DEET	3	—	—	—	—	—	—	—	<i>nsv</i>	
Sulfamethoxazole	11	—	—	—	0.0213	—	—	—	<i>nsv</i>	
Venlafaxine	8	—	—	—	—	—	—	—	<i>nsv</i>	
Current Use Pesticides										
2,3,4,6-Tetrachlorophenol	3	—	—	—	—	—	—	—	<i>nsv</i>	
2,3,5,6-Tetrachlorophenol	8	—	0.0869	—	—	—	—	—	<i>nsv</i>	
2,4,5-Trichlorophenol	5	0	0.0273	—	—	—	—	—	330	1
2,4,6-Trichlorophenol	6	0	—	—	—	—	0.0132	—	0.023	1
Acetamiprid	3	0	0.0043	—	—	—	—	—	2.1	8
Atrazine	8	0	—	—	—	—	—	—	1.0	9
Bromacil	3	0	—	—	—	—	—	—	6.8	9
Carbaryl	14	0	0.0862	—	—	—	—	—	0.5	8
Deisopropylatrazine	41	0	0.0277	—	—	—	—	—	1000	9
Desethylatrazine	11	0	—	—	—	—	—	—	2500	9
Diuron	41	0	0.0628	—	0.0192	—	—	—	2.4	9
Hexazinone	8	0	—	—	—	—	—	—	7	9
Imazapyr	3	0	—	—	—	—	—	—	24	10
Imidacloprid	3	0	0.0314	—	—	—	—	—	1.05	8
Metribuzin	5	0	—	—	—	—	—	—	8.7	9
Norflurazon	3	0	—	—	—	—	—	—	9.7	9
Propiconazole	3	0	0.126	—	—	—	—	—	21	9
Pyraclostrobin	5	0	0.0286	—	—	—	—	—	1.5	9
Simazine	41	0	0.0322	—	0.00622	—	—	—	36	9
Sulfometuron-methyl	3	0	—	—	—	—	—	—	0.45	10
Triclopyr	3	0	—	—	—	—	—	—	29800	9
Flame retardants										
PBDE-3	8	—	—	—	—	—	—	—	<i>nsv</i>	
PBDE-209	11	—	—	—	—	—	—	—	<i>nsv</i>	
Industrial Chemicals or Intermediates										
1,2,4-Trichlorobenzene	3	—	—	—	—	—	—	—	<i>nsv</i>	
2,4-Dimethylphenol	22	—	0.00938	—	0.0071	0.00704	—	—	<i>nsv</i>	
Legacy Pesticides										
BHC-technical (HCH)	7	0	0.0000985	—	—	—	—	—	0.0014	1
BHC-beta	12	0	0.0000985	—	—	—	—	—	0.0016	1
BHC-gamma (Lindane)	1	0	—	—	—	—	—	—	0.08	2
Chlordane	14	10	0.00148	—	—	—	—	—	0.000081	1
alpha-Chlordane	1	—	—	—	—	—	—	—	<i>nsv</i>	
Oxychlordane	24	—	0.00148	—	—	—	—	—	<i>nsv</i>	
Dieldrin	19	14	0.000546	—	0.0000854	—	—	—	0.0000053	1
Endosulfan (I + II)	34	0	0.00555	0.00065	0.000113	0.001019	0.000477	0.00012	0.056	2
Endosulfan I	30	0	0.00247	0.000426	0.000113	0.000656	0.000307	0.00012	0.056	2
Endosulfan II	29	0	0.00308	0.000255	—	0.000363	0.00017	—	0.056	2
Endosulfan sulfate	47	0	0.0144	0.000922	0.000197	0.000633	0.000351	0.00013	8.5	1
Heptachlor epoxide	9	7	0.000156	—	—	—	—	—	0.0000039	1



State of Oregon
Department of
Environmental
Quality

Samples collected
between May and
November 2012

HOOD BASIN

Station ID and Description

	Percent Detection	Number of samples over screening value	Station ID and Description						Screening Value (µg/L)	S.V. Reference
			11972 Lenz Creek at mouth	12012 Hood River at footbridge downstream of I-84	12550 Fifteenmile Creek at Boyd Market Road at Dufur	13138 East Fork Hood River at County Gravel Pit (River Mile 0.75)	13139 Middle Fork Hood River at River Mile 1.0 (ODFW Smolt Trap)	13140 West Fork Hood River at Lost Lake Road (River Mile 4.7)		

Maximum Values (µg/L)

Legacy Pesticides, cont'd										
Total DDT	27	10	0.002396	0.000147	—	0.0000613	—	—	0.001	2
2,4'-DDD	24		0.000186	—	—	—	—	—	<i>nsv</i>	
2,4'-DDT	5		—	—	—	—	—	—	<i>nsv</i>	
4,4'-DDD	16	12	0.000397	—	—	—	—	—	0.000031	1
4,4'-DDE	27	20	0.00161	0.000147	—	0.0000613	—	—	0.000022	1
4,4'-DDT	16	12	0.000313	—	—	—	—	—	0.000022	1

Plant or animal sterols

beta-Sitosterol	100		0.847	0.69	0.707	0.464	0.382	0.292	<i>nsv</i>	
Cholesterol	100		0.57	0.339	1.46	0.143	0.133	0.136	<i>nsv</i>	
Coprostanol	86		0.0396	0.00988	0.421	0.00794	0.00215	—	<i>nsv</i>	
Stigmastanol	100		0.139	0.0435	0.363	0.0426	0.0263	0.0237	<i>nsv</i>	

Priority Metals

Dissolved

Arsenic	30	3	0.59	—	—	—	—	—	<i>nsv</i>	
Barium	81		12.9	2.33	7.34	2.64	—	—	<i>nsv</i>	
Cadmium	3	0	—	—	—	—	—	—	*#	2
Iron	5	0	155	—	—	—	—	—	1000 [#]	2
Manganese	81		41.8	3.87	9.23	7.35	5.88	—	<i>nsv</i>	
Zinc	11	0	42.7	—	—	—	—	—	*	2

Total Inorganic

Arsenic	96	2	0.54	0.04	0.04	0.04	0.09	0.03	2.1	1
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Total Recoverable

Arsenic	43	3	0.73	—	—	—	—	—	<i>nsv</i>	
Barium	89	0	16.5	9.06	7.64	6.51	4.16	—	1000	1
Cadmium	3	0	—	—	—	—	—	—	*	2
Chromium	3	0	—	—	—	—	—	1.47	11 [§]	2
Copper	8	0	—	2.54	—	1.59	—	—	*	2
Iron	70	0	715	699	206	417	247	—	1000	2
Lead	24	0	0.49	—	—	—	—	—	+§	2
Manganese	89		66.1	15.9	11.9	11.6	8.89	—	<i>nsv</i>	
Zinc	11	0	54.1	—	—	—	—	—	+§	2

Average Values

Standard Parameters (mg/L)

Dissolved Organic Carbon	84		1.6	1.4	2.4	1.4	1.3	1.0		
Sulfate	100		7.9	1.7	1.1	1.8	1.7	0.4		
Total Organic Carbon	86		1.5	1.2	2.2	1.4	1.0	1.1		
Total Solids	100		158.7	66.7	68.0	76.0	55.5	46.7		
Total Suspended Solids	89		8.7	16.0	2.0	13.0	6.0	3.0		

Field Parameters

Conductivity (µmhos/cm @ 25° C)	100		189	55	68	57	49	36		
Dissolved Oxygen (mg/L)	100		10.7	11.5	10.7	11.8	11.7	11.7		
pH (SU)	100		7.8	7.9	7.9	7.7	7.6	7.4		
Temperature (°C)	100		12.7	12.7	13.6	8.6	8.2	8.9		
Turbidity (NTU)	100		7	15	2	5	3	4		



State of Oregon
Department of
Environmental
Quality

Samples collected
between May and
November 2012

HOOD BASIN

Station ID and Description

	Neal Creek at mouth (upstream of bridge)	Indian Creek at Union Avenue near Ppl power station	Odell Creek at 200 feet downstream of Odell WWTP outfall	Threemile Creek at Hwy 197	Fifteenmile Creek at Petersburg, OR	Mill Creek at 2nd Street, The Dalles	South Fork Mill Creek upstream of Wicks Treatment Plant diversion	Screening Value (µg/L)	S.V. Reference
	13141	13148	13253	25204	28333	28574	32982		
	Maximum Values (µg/L)								
Ammonia									
Ammonia as N	—	—	12.0	—	28.0	13.0	—	†	2
Combustion By-Products									
Acenaphthene	—	—	—	0.0171	—	—	—	95	1
Benzo(b)fluoranthene	—	—	—	—	—	0.00366	—	0.0013	1
Dibenzo(a,h)anthracene	—	—	—	—	—	—	—	nsv	
Fluoranthene	—	—	—	0.00601	—	—	—	14	1
Fluorene	—	—	—	0.0126	—	0.00354	—	390	1
Naphthalene	—	0.105	—	0.0392	—	—	—	nsv	
Phenanthrene	—	0.00337	0.00544	0.0187	—	0.00672	—	nsv	
Consumer Product Constituents									
17β-Estradiol	—	—	—	—	—	0.0025	—	nsv	
DEET	—	—	0.0325	—	—	—	—	nsv	
Sulfamethoxazole	—	—	0.0675	—	—	—	—	nsv	
Venlafaxine	—	—	0.0217	—	—	—	—	nsv	
Current Use Pesticides									
2,3,4,6-Tetrachlorophenol	—	—	—	—	0.0706	—	—	nsv	
2,3,5,6-Tetrachlorophenol	—	0.0868	—	—	0.0897	—	—	nsv	
2,4,5-Trichlorophenol	—	—	—	—	0.0329	—	—	330	1
2,4,6-Trichlorophenol	—	—	0.0144	—	—	—	—	0.023	1
Acetamiprid	—	—	—	—	—	—	—	2.1	8
Atrazine	—	—	—	0.00969	—	—	—	1.0	9
Bromacil	—	—	—	0.064	—	—	—	6.8	9
Carbaryl	0.022	0.006	0.0105	—	—	—	—	0.5	8
Deisopropylatrazine	0.0125	0.0215	0.00885	0.013	—	—	—	1000	9
Desethylatrazine	—	—	—	0.0225	0.00436	—	—	2500	9
Diuron	0.0188	0.0218	0.027	—	0.00397	—	—	2.4	9
Hexazinone	0.0494	—	—	0.0329	—	—	—	7	9
Imazapyr	—	—	—	0.203	—	—	—	24	10
Imidacloprid	—	—	—	—	—	—	—	1.05	8
Metribuzin	—	—	—	0.00531	—	—	—	8.7	9
Norflurazon	—	—	—	0.0385	—	—	—	9.7	9
Propiconazole	—	—	—	—	—	—	—	21	9
Pyraclostrobin	0.00715	—	—	—	—	—	—	1.5	9
Simazine	0.0248	0.0295	0.00855	0.0901	—	—	—	36	9
Sulfometuron-methyl	—	—	0.00491	—	—	—	—	0.45	10
Triclopyr	—	1.1	—	—	—	—	—	29800	9
Flame retardants									
PBDE-3	—	—	—	—	—	0.000107	—	nsv	
PBDE-209	—	0.003	—	—	—	—	—	nsv	
Industrial Chemicals or Intermediates									
1,2,4-Trichlorobenzene	—	—	—	0.00342	—	—	—	nsv	
2,4-Dimethylphenol	0.00778	0.0093	0.00748	—	0.00825	0.0102	—	nsv	
Legacy Pesticides									
BHC-technical (HCH)	0.0000912	0.0000644	0.0001462	—	—	—	—	0.0014	1
BHC-beta	0.0000912	0.0000644	0.0000849	—	—	—	—	0.0016	1
BHC-gamma (Lindane)	—	—	0.0000613	—	—	—	—	0.08	2
Chlordane	0.000594	0.000217	0.000195	0.00019	—	0.0000898	—	0.000081	1
alpha-Chlordane	—	—	—	—	—	0.0000898	—	nsv	
Oxychlordane	0.000594	0.000217	0.000195	0.00019	—	—	—	nsv	
Dieldrin	0.000464	0.000391	0.000179	—	—	0.0000722	—	0.0000053	1
Endosulfan (I + II)	0.00281	0.001264	0.001839	0.0000772	0.0000968	0.000106	0.0001852	0.056	2
Endosulfan I	0.00131	0.000422	0.000819	—	0.0000968	0.000106	0.000122	0.056	2
Endosulfan II	0.0015	0.000842	0.00102	0.0000772	—	—	0.0000632	0.056	2
Endosulfan sulfate	0.00911	0.00489	0.00391	0.000649	0.000228	0.000263	0.000316	8.5	1
Heptachlor epoxide	—	0.000186	—	—	—	0.000143	—	0.0000039	1



Samples collected
between May and
November 2012

HOOD BASIN

Station ID and Description

Station ID and Description	13141	13148	13253	25204	28333	28574	32982	Screening Value (µg/L)	S.V. Reference
Neal Creek at mouth (upstream of bridge)	13141								
Indian Creek at Union Avenue near Ppl power station		13148							
Odell Creek at 200 feet downstream of Odell WWTP outfall			13253						
Threemile Creek at Hwy 197				25204					
Fifteenmile Creek at Petersburg, OR					28333				
Mill Creek at 2nd Street, The Dalles						28574			
South Fork Mill Creek upstream of Wicks Treatment Plant diversion							32982		

Maximum Values (µg/L)

Legacy Pesticides, cont'd

Total DDT	0.0020343	0.0030234	0.0014176	0.000107	—	0.0000837	—	0.001	2
2,4'-DDD	0.000103	0.000107	0.0000686	—	—	—	—	<i>nsv</i>	
2,4'-DDT	—	0.0000731	—	—	—	—	—	<i>nsv</i>	
4,4'-DDD	0.000333	0.000468	0.000286	—	—	—	—	0.000031	1
4,4'-DDE	0.00131	0.00197	0.000863	0.000107	—	0.0000837	—	0.000022	1
4,4'-DDT	0.000434	0.000532	0.000248	—	—	—	—	0.000022	1

Plant or animal sterols

beta-Sitosterol	1.62	0.941	0.882	0.704	0.762	0.891	0.654	<i>nsv</i>	
Cholesterol	0.61	0.714	0.623	0.626	1.91	1.39	0.252	<i>nsv</i>	
Coprostanol	0.0774	0.0356	0.0309	0.0325	0.0549	0.168	0.00332	<i>nsv</i>	
Stigmastanol	0.149	0.11	0.143	0.0824	0.115	0.112	0.0675	<i>nsv</i>	

Priority Metals

Dissolved

Arsenic	0.26	0.28	—	3.84	0.72	1.47	—	<i>nsv</i>	
Barium	12.0	20.0	21.8	68.5	18.8	26.4	4.75	<i>nsv</i>	
Cadmium	—	—	0.12	—	—	—	—	*#	2
Iron	—	—	—	—	177	—	—	1000 [#]	2
Manganese	10.2	20.9	22.0	4.86	14.8	12.0	—	<i>nsv</i>	
Zinc	—	—	7.19	—	6.62	—	—	*	2

Total Inorganic

Arsenic	0.23	0.23	0.12	3.0	0.14	0.53	0.08	2.1	1
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Total Recoverable

Arsenic	0.32	0.41	0.25	3.69	0.75	1.46	—	<i>nsv</i>	
Barium	15.8	24.4	26.9	67.7	19.4	27.3	5.82	1000	1
Cadmium	—	—	0.1	—	—	—	—	*	2
Chromium	—	—	—	—	—	—	—	11 [§]	2
Copper	—	—	2.23	—	—	—	—	*	2
Iron	611	962	796	—	350	177	249	1000	2
Lead	0.29	0.47	0.35	—	—	—	—	*§	2
Manganese	30.7	44.8	43.2	9.74	22.5	17.7	3.84	<i>nsv</i>	
Zinc	9.33	—	9.12	—	—	—	—	*§	2

Average Values

Standard Parameters (mg/L)

Dissolved Organic Carbon	2.0	1.5	1.4	2.2	3.2	2.8	2.0		
Sulfate	4.7	7.2	4.9	22.3	2.5	6.3	0.4		
Total Organic Carbon	2.0	1.6	1.5	13.7	3.1	3.1	1.9		
Total Solids	117.7	118.0	122.3	369.3	104.3	162.3	74.7		
Total Suspended Solids	7.0	9.3	8.3	2.0	2.7	2.5	1.5		

Field Parameters

Conductivity (µmhos/cm @ 25° C)	127	146	128	527	134	203	75		
Dissolved Oxygen (mg/L)	10.9	10.4	10.2	10.6	10.9	10.4	10.7		
pH (SU)	8.1	7.7	7.6	8.5	8.0	8.1	7.8		
Temperature (°C)	13.2	13.4	13.5	15.0	14.5	14.9	12.4		
Turbidity (NTU)	8	9	9	2	3	3	3		



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Appendix E
DETECTION SUMMARY

JOHN DAY BASIN
Station ID and Description

Samples collected
between June and
October 2012

Percent Detection

Number of samples over
screening value

John Day River
downstream of South
Fork John Day (Dayville)

South Fork John Day
River at Dayville

John Day River at Hwy
206

John Day River at
Service Creek

Clear Cr. (near Red Boy
Mine)

Screening Value (µg/L)

S.V. Reference

Maximum Values (µg/L)

	Percent Detection	Number of samples over screening value	John Day River downstream of South Fork John Day (Dayville)	South Fork John Day River at Dayville	John Day River at Hwy 206	John Day River at Service Creek	Clear Cr. (near Red Boy Mine)	Screening Value (µg/L)	S.V. Reference
Ammonia									
Ammonia as N	7	0	—	—	—	—	—	†	2
Combustion By-Products									
Dibenzo(a,h)anthracene	3	1	—	—	—	—	—	0.0013	1
Fluoranthene	3	0	—	—	—	0.00387	—	14	1
Phenanthrene	7	—	—	—	—	0.00303	—	nsv	
Consumer Product Constituents									
DEET	4	—	—	—	—	—	—	nsv	
Diphenhydramine	3	—	—	—	—	—	—	nsv	
Current Use Pesticides									
2,3,5,6-Tetrachlorophenol	3	—	—	—	—	—	0.0939	nsv	
2,4,5-Trichlorophenol	3	0	—	0.0255	—	—	—	330	1
2,4,6-Trichlorophenol	3	0	—	—	—	—	—	0.023	1
Atrazine	3	0	—	—	—	—	—	1.0	9
Diuron	3	0	—	—	—	—	—	2.4	9
Industrial Chemicals or Intermediates									
2,4-Dinitrotoluene	3	0	—	—	—	—	—	0.084	1
Nitrobenzene	3	0	—	—	—	—	—	14	1
Legacy Pesticides									
BHC-technical (HCH)	1	0	—	—	—	—	—	0.0014	1
BHC-beta	2	0	—	—	—	—	—	0.0016	1
Endosulfan sulfate	3	0	—	—	0.000058	—	—	8.5	1
PCBs									
Total PCBs	10	1	—	—	—	—	—	0.0000064	1
PCB-209	10	—	—	—	—	—	—	nsv	
Plant or animal sterols									
beta-Sitosterol	100	—	0.557	0.692	0.684	1.28	0.319	nsv	
Cholesterol	100	—	1.16	1.02	1.07	1.26	0.277	nsv	
Coprostanol	97	—	0.0472	0.0413	0.019	0.0252	0.00226	nsv	
Stigmastanol	100	—	0.109	0.126	0.0462	0.0992	0.0195	nsv	
Priority Metals									
<i>Dissolved</i>									
Antimony	10	—	—	—	—	—	0.48	nsv	
Arsenic	100	1	0.87	0.81	1.38	1.16	2.23	nsv	
Barium	100	—	23.7	25.1	12.7	14.5	15.2	nsv	
Chromium	3	0	—	—	—	—	—	11	2
Copper	7	0	—	—	1.7	2.04	—	*#	2
Manganese	66	—	13.2	—	2.42	2.03	327	nsv	
Nickel	33	0	2.42	—	—	1.32	12.2	*	2
Zinc	7	0	—	—	—	—	7.66	*	2
<i>Total Inorganic</i>									
Arsenic	100	0	0.5	0.37	0.73	0.49	1.48	2.1	1
<i>Total Recoverable</i>									
Antimony	10	0	—	—	—	—	0.48	5.1	1
Arsenic	100	1	0.93	0.84	1.42	1.29	2.31	nsv	
Barium	100	0	24.8	25.8	12.9	18.2	15.3	1000	1
Chromium	7	0	—	—	—	1.07	—	11 [§]	2
Copper	13	0	—	—	2.07	4.28	—	*	2
Iron	20	1	167	—	—	1240	—	1000	2
Manganese	93	—	21.2	8.59	11.7	34.0	330	nsv	
Nickel	43	0	2.99	—	—	1.94	12.2	* [§]	2
Zinc	7	0	—	—	—	—	8.12	* [§]	2

Average Values

	Percent Detection	Number of samples over screening value	John Day River downstream of South Fork John Day (Dayville)	South Fork John Day River at Dayville	John Day River at Hwy 206	John Day River at Service Creek	Clear Cr. (near Red Boy Mine)	Screening Value (µg/L)	S.V. Reference
Standard Parameters (mg/L)									
Dissolved Organic Carbon	97	—	3.0	1.8	3.6	3.3	1.3		
Sulfate	100	—	11.5	18.2	9.2	8.0	14.7		
Total Organic Carbon	93	—	3.0	1.8	3.3	3.1	1.6		
Total Solids	100	—	208.3	225.3	165.0	170.0	98.7		
Total Suspended Solids	72	—	4.3	3.0	4.0	9.3	—		
Field Parameters									
Conductivity (µmhos/cm @ 25° C)	100	—	329	333	251	237	130		
Dissolved Oxygen (mg/L)	100	—	10.5	10.3	10.5	9.2	9.7		
pH (SU)	100	—	8.2	8.3	8.9	8.5	8.0		
Temperature (°C)	100	—	15.4	14.6	20.6	19.0	12.7		
Turbidity (NTU)	89	—	3	2	3	10	2		



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JOHN DAY BASIN							
Station ID and Description							
Samples collected between June and October 2012	Canyon Creek at John Day City Park	John Day River at Clyde Holliday State Park	Rock Creek at mouth	Middle Fork John Day River at Hwy 395 RM 25.4	North Fork John Day Basin at river mile 73.2 10 meters upstream of Oriental Cr.	Screening Value (µg/L)	S.V. Reference
	31987	31990	36787	37118	37135		
Maximum Values (µg/L)							
Ammonia							
Ammonia as N	—	—	37.0	—	—	+	2
Combustion By-Products							
Dibenzo(a,h)anthracene	—	—	—	—	0.006	0.0013	1
Fluoranthene	—	—	—	—	—	14	1
Phenanthrene	0.00342	—	—	—	—	<i>nsv</i>	
Consumer Product Constituents							
DEET	—	—	—	0.031	—	<i>nsv</i>	
Diphenhydramine	—	—	0.0295	—	—	<i>nsv</i>	
Current Use Pesticides							
2,3,5,6-Tetrachlorophenol	—	—	—	—	—	<i>nsv</i>	
2,4,5-Trichlorophenol	—	—	—	—	—	330	1
2,4,6-Trichlorophenol	0.0117	—	—	—	—	0.023	1
Atrazine	—	—	0.0126	—	—	1.0	9
Diuron	—	0.00459	—	—	—	2.4	9
Industrial Chemicals or Intermediates							
2,4-Dinitrotoluene	—	—	—	—	0.0258	0.084	1
Nitrobenzene	—	—	—	—	0.0058	14	1
Legacy Pesticides							
BHC-technical (HCH)	—	0.0000754	—	—	—	0.0014	1
BHC-beta	—	0.0000754	—	—	—	0.0016	1
Endosulfan sulfate	—	—	0.0000645	—	—	8.5	1
PCBs							
Total PCBs	—	0.000437	—	—	—	0.0000064	1
PCB-209	—	0.000437	—	—	—	<i>nsv</i>	
Plant or animal sterols							
beta-Sitosterol	0.663	0.524	0.525	0.734	0.318	<i>nsv</i>	
Cholesterol	1.1	1.3	1.45	2.67	0.821	<i>nsv</i>	
Coprostanol	0.0108	0.0474	0.0419	0.041	0.0153	<i>nsv</i>	
Stigmastanol	0.0513	0.0792	0.0593	0.0844	0.0268	<i>nsv</i>	
Priority Metals							
<i>Dissolved</i>							
Antimony	—	—	—	—	—	<i>nsv</i>	
Arsenic	1.47	1.49	1.41	1.11	1.33	<i>nsv</i>	
Barium	35.8	56.6	26.5	20.7	22.1	<i>nsv</i>	
Chromium	1.42	—	—	—	—	11	2
Copper	—	—	—	—	—	#	2
Manganese	—	34.7	7.95	9.97	2.31	<i>nsv</i>	
Nickel	1.1	4.83	—	—	—	*	2
Zinc	—	—	—	—	—	*	2
<i>Total Inorganic</i>							
Arsenic	1.03	0.49	0.9	0.45	0.78	2.1	1
<i>Total Recoverable</i>							
Antimony	—	—	—	—	—	5.1	1
Arsenic	1.4	1.6	1.43	1.1	1.32	<i>nsv</i>	
Barium	36.8	59.6	26.7	20.5	22.2	1000	1
Chromium	1.43	—	—	—	—	11 [§]	2
Copper	—	—	—	—	—	*	2
Iron	—	256	—	—	—	1000	2
Manganese	2.3	52.1	12.7	18.5	3.91	<i>nsv</i>	
Nickel	1.18	5.53	—	—	—	* [§]	2
Zinc	—	—	—	—	—	* [§]	2
Average Values							
Standard Parameters (mg/L)							
Dissolved Organic Carbon	2.2	3.5	2.6	2.4	1.5		
Sulfate	10.1	3.8	8.2	1.7	6.7		
Total Organic Carbon	1.9	3.6	2.6	2.0	1.5		
Total Solids	186.3	179.7	185.3	96.3	73.7		
Total Suspended Solids	1.5	5.3	2.0	2.0	—		
Field Parameters							
Conductivity (µmhos/cm @ 25° C)	274	246	286	137	95		
Dissolved Oxygen (mg/L)	10.2	10.1	10.8	9.7	10.6		
pH (SU)	8.7	8.3	8.6	8.7	8.0		
Temperature (°C)	15.0	13.8	17.5	15.8	10.5		
Turbidity (NTU)	2	3	4	2	1		



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**Appendix F
DETECTION SUMMARY**

Samples collected
between May and
November 2011

KLAMATH BASIN

Station ID and Description

	Percent Detection	Number of samples over screening value	Station ID and Description					Screening Value (µg/L)	S.V. Reference
			Lost River at Hwy 39 (Merrill) 10759	Klamath Strait at USBR Pump Station F 10763	Klamath River at Hwy 66 (Keno) 10765	Link River at mouth (Klamath Falls) 10768	Williamson River at Williamson River Store 10770		
Maximum Values (µg/L)									
Consumer Product Constituents									
DEET	7		—	—	—	—	0.0544	<i>nsv</i>	
Diethylstilbestrol	7		—	0.0004	—	—	—	<i>nsv</i>	
Estrone	7		—	0.008	—	—	—	<i>nsv</i>	
Current Use Pesticides									
Diuron	20	0	0.21	0.0178	—	—	—	2.4 9	
Oxamyl	7	0	2.15	—	—	—	—	27 8	
Plant or animal sterols									
beta-Sitosterol	100		1.72	4.11	1.83	1.64	0.966	<i>nsv</i>	
Cholesterol	100		3.26	6.17	9.26	9.06	2.02	<i>nsv</i>	
Coprostanol	100		0.146	0.26	0.129	0.0961	0.028	<i>nsv</i>	
Stigmastanol	100		0.315	0.494	0.149	0.151	0.196	<i>nsv</i>	
Priority Metals									
<i>Dissolved</i>									
Arsenic	100	12	5.45	17.3	6.33	6.17	1.8	<i>nsv</i>	
Barium	100		13.9	16.4	7	6.3	7.6	<i>nsv</i>	
Iron	7	0	—	150	—	—	—	1000 [#] 2	
Manganese	100		45.4	49.1	13.4	18.1	6.4	<i>nsv</i>	
Nickel	27	0	1.1	2.4	—	—	—	* 2	
<i>Total Recoverable</i>									
Arsenic	100	12	5.56	18	6.53	6.34	1.79	<i>nsv</i>	
Barium	100	0	14.8	19.3	7.9	7.9	11.0	1000 1	
Copper	7	0	1.8	—	—	—	—	* 2	
Iron	80	0	630	370	400	440	730	1000 2	
Manganese	100		70.9	157	46.8	35.2	18.1	<i>nsv</i>	
Nickel	40	0	1.5	2.7	—	—	—	*§ 2	
Average Values									
Standard Parameters (mg/L)									
Dissolved Organic Carbon	93		10.2	25.7	8.5	8.2	4.9		
Sulfate	100		24.4	76.2	6.4	3.2	1.5		
Total Organic Carbon	100		12.7	29.3	9.5	7.7	2.9		
Total Solids	100		241.3	382.0	137.0	131.7	99.3		
Total Suspended Solids	100		6.7	13.7	9.3	10.0	4.0		
Field Parameters									
Conductivity (µmhos/cm @ 25° C)	100		314	499	138	115	88		
Dissolved Oxygen (mg/L)	100		8.4	8.4	7.2	9.3	9.6		
pH (SU)	100		8.2	8.3	7.8	8.1	8.0		
Temperature (°C)	100		13.3	14.3	12.9	13.2	11.7		
Turbidity (NTU)	100		7	11	9	11	8		



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Appendix G
DETECTION SUMMARY

Samples collected
between June and
November 2011 or
September 2013

MALHEUR BASIN

Station ID and Description

Percent Detection	Number of samples over screening value	MALHEUR BASIN Station ID and Description				Screening Value (µg/L)	S.V. Reference
		Malheur River at Hwy 201 (Ontario)	Willow Creek at RR Crossing (Vale)	Malheur River at Hwy 20 (Drewsey)	Malheur River near Little Valley		
		10407	10728	11047	11480		

Maximum Values (µg/L)

Ammonia								
Ammonia as N	100	0	—	20.0	—	—	†	2
Consumer Product Constituents								
DEET	13		—	0.0528	—	—	nsv	
Current Use Pesticides								
2,4-D	13	0	—	0.2	—	—	100	1
Desethylatrazine	25	0	0.0051	—	—	—	1000	9
Diuron	25	0	0.0089	—	—	—	2.4	9
Imidacloprid	13	0	0.0052	—	—	—	1.05	8
Methomyl	13	0	0.173	—	—	—	0.7	8
Metolachlor	25	0	0.032	—	—	—	1	8
Pyraclostrobin	25	0	0.0111	—	—	—	1.5	9
Industrial Chemicals or Intermediates								
2,6-Dinitrotoluene	13		—	0.0598	—	—	nsv	
Legacy Pesticides								
Dieldrin	10	1	N/A	0.000194	—	N/A	0.0000053	1
Total DDT	10	0	N/A	0.000554	—	N/A	0.001	2
4,4'-DDD	10	1	N/A	0.0000964	—	N/A	0.000031	1
4,4'-DDE	10	1	N/A	0.000458	—	N/A	0.000022	1
Plant or animal sterols								
beta-Sitosterol	100		0.919	0.64	0.567	0.595	nsv	
Cholesterol	100		1.96	1.22	1.11	1.13	nsv	
Coprostanol	100		0.068	0.0359	0.0428	0.0917	nsv	
Stigmastanol	100		0.181	0.132	0.133	0.211	nsv	
Priority Metals								
<i>Dissolved</i>								
Arsenic	100	8	35.7	31.7	2.63	36.5	nsv	
Barium	100		44.8	47.7	20.8	22.7	nsv	
Copper	13	0	1.8	—	—	—	*#	2
Manganese	100		41.4	15.4	35.8	37.7	nsv	
Nickel	75	0	1.6	1.34	1.51	1.1	*	2
Selenium	13	0	2.1	—	—	—	4.6	2
<i>Total Inorganic</i>								
Arsenic	100	2	N/A	30.2	2.95	N/A	2.1	1
<i>Total Recoverable</i>								
Arsenic	100	8	35.2	32.4	2.73	37.1	nsv	
Barium	100	0	57.3	59.1	25.4	23.8	1000	1
Chromium	50	0	2.3	1.32	—	1.8	11 [§]	2
Copper	50	0	3.9	2.46	—	2.8	*	2
Iron	100	5	3770	1540	665	2010	1000	2
Lead	50	0	0.85	0.5	—	0.4	* [§]	2
Manganese	100		88.7	50.6	66.9	46.7	nsv	
Nickel	88	0	3.3	2.41	1.95	2.4	* [§]	2
Selenium	13	0	2.0	—	—	—	4.6 [§]	2
Zinc	13	0	7.8	—	—	—	* [§]	2

Average Values

Standard Parameters (mg/L)								
Dissolved Organic Carbon	100		5.4	5.5	6.0	4.8		
Sulfate	100		80.1	141.0	13.8	21.8		
Total Organic Carbon	100		5.8	7.0	6.3	4.9		
Total Solids	100		559.3	675.0	260.0	261.3		
Total Suspended Solids	100		43.0	35.0	8.0	13.0		
Field Parameters								
Conductivity (µmhos/cm @ 25° C)	100		753	899	334	347		
Dissolved Oxygen (mg/L)	100		10.8	9.2	8.3	11.5		
pH (SU)	100		8.3	8.3	8.0	8.3		
Temperature (°C)	100		15.3	14.3	13.8	14.3		
Turbidity (NTU)	100		36	27	12	16		



**Appendix H
DETECTION SUMMARY**

Samples collected
between April and
November 2013

**MID COAST BASIN
Station ID and Description**

	Percent Detection	Number of samples over screening value	Maximum Values (µg/L)					Screening Value (µg/L)	S.V. Reference
			Siletz R 5 miles DS of Siletz at RM 29.9	Schooner Creek at Highway 101 Bridge (Lincoln City)	Wolf Creek at mouth	Aisea River at Thisseil Road (Mike Bauer Park)	Yaquina River at Trapp Road (Chitwood)		
Ammonia									
Ammonia as N	37	3	—	72.0	11.0	44.0	30.0	‡	2
Combustion By-Products									
Anthracene	2	0	—	—	—	—	0.00856	2900	1
Benzo(b)fluoranthene	4	2	—	—	—	—	0.00894	0.0013	1
Chrysene	2	1	—	—	—	—	0.0181	0.0013	1
Fluoranthene	7	0	—	—	—	—	0.0396	14	1
Phenanthrene	6	—	—	—	—	—	0.0417	<i>nsv</i>	
Pyrene	2	0	—	—	—	—	0.0299	290	1
Consumer Product Constituents									
bis(2-ethylhexyl)adipate	2	—	—	—	0.573	—	—	<i>nsv</i>	
Carbamazepine	2	—	—	0.0455	—	—	—	<i>nsv</i>	
DEET	2	—	—	—	—	—	—	<i>nsv</i>	
Sulfamethoxazole	6	—	—	0.0745	—	—	—	<i>nsv</i>	
Venlafaxine	2	—	—	0.0211	—	—	—	<i>nsv</i>	
Current Use Pesticides									
Atrazine	2	0	—	—	0.0162	—	—	1.0	9
Diuron	6	0	—	0.00526	—	—	0.0102	2.4	9
Fluridone	2	0	—	—	—	—	—	480	6
Trifluralin	1	0	—	—	—	—	—	1.14	6
Flame retardants									
PBDE-100	13	—	—	—	—	—	—	<i>nsv</i>	
PBDE-138	6	—	—	—	—	—	—	<i>nsv</i>	
PBDE-139	6	—	—	—	—	—	—	<i>nsv</i>	
PBDE-15	6	—	—	—	—	—	—	<i>nsv</i>	
PBDE-153	11	—	—	—	—	—	—	<i>nsv</i>	
PBDE-154	11	—	—	—	—	—	—	<i>nsv</i>	
PBDE-17	6	—	—	—	—	—	—	<i>nsv</i>	
PBDE-206	6	—	—	—	—	—	—	<i>nsv</i>	
PBDE-209	9	—	—	—	—	—	—	<i>nsv</i>	
PBDE-28	11	—	—	—	—	—	—	<i>nsv</i>	
PBDE-47	12	—	—	—	—	—	—	<i>nsv</i>	
PBDE-49	11	—	—	—	—	—	—	<i>nsv</i>	
PBDE-85	6	—	—	—	—	—	—	<i>nsv</i>	
PBDE-99	31	—	—	—	0.00122	—	—	<i>nsv</i>	
Legacy Pesticides									
Aldrin	1	1	—	—	—	—	—	0.000005	1
BHC-technical (HCH)	3	0	—	—	—	—	—	0.0014	1
BHC-alpha	5	0	—	—	—	—	—	0.00045	1
BHC-beta	4	0	—	—	—	—	—	0.0016	1
BHC-gamma (Lindane)	1	0	—	—	—	—	—	0.08	2
Dieldrin	1	1	—	—	—	—	—	0.0000053	1
Endosulfan sulfate	2	0	—	—	—	—	—	8.5	1
Heptachlor	1	1	—	—	—	—	—	0.0000079	1
Heptachlor epoxide	1	1	—	—	—	—	—	0.0000039	1
Hexachlorobenzene	1	1	—	—	—	—	—	0.000029	1
Methoxychlor	1	0	—	—	—	—	—	0.03	2



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	Percent Detection	Number of samples over screening value	Station ID and Description					Screening Value (µg/L)	S.V. Reference
			Siletz R 5 miles DS of Siletz at RM 29.9 10391	Schooner Creek at Highway 101 Bridge (Lincoln City) 10582	Wolf Creek at mouth 10990	Aisea River at Thissell Road (Mike Bauer Park) 11263	Yaquina River at Trapp Road (Chitwood) 11476		
Maximum Values (µg/L)									
Plant or animal sterols									
beta-Sitosterol	100		0.459	0.682	0.923	1.5	1.0	<i>nsv</i>	
Cholesterol	100		1.08	1.12	1.32	1.25	1.29	<i>nsv</i>	
Coprostanol	100		0.0195	0.043	0.0397	0.0228	0.0204	<i>nsv</i>	
Stigmastanol	100		0.0468	0.0629	0.127	0.131	0.0972	<i>nsv</i>	
Priority Metals									
<i>Dissolved</i>									
Arsenic	31	4	—	0.44	0.33	0.31	0.81	<i>nsv</i>	
Barium	72		7.25	2.88	21.5	10.5	26.9	<i>nsv</i>	
Cadmium	2	0	—	—	—	—	—	*#	2
Chromium	4	0	—	—	—	—	—	11	2
Iron	20	0	156	172	351	—	450	1000#	2
Manganese	78		6.51	17.4	7.62	6.19	35.6	<i>nsv</i>	
Thallium	2		—	—	—	—	—	<i>nsv</i>	
Zinc	4	0	—	—	—	—	—	*	2
<i>Total Inorganic</i>									
Arsenic	98	1	0.096	0.295	0.217	0.154	0.52	2.1	1
<i>Total Recoverable</i>									
Arsenic	37	5	—	0.47	0.36	0.33	0.78	<i>nsv</i>	
Barium	76	0	6.91	3.49	22.3	14.4	25.4	1000	1
Cadmium	2	0	—	—	—	—	—	*	2
Chromium	7	0	—	—	—	—	—	11 ^s	2
Iron	59	3	294	272	510	506	388	1000	2
Lead	6	0	—	—	—	0.2	—	* ^s	2
Manganese	96		8.04	26.1	12.9	19.9	17.9	<i>nsv</i>	
Thallium	2	1	—	—	—	—	—	0.043	1
Zinc	2	0	—	5.82	—	—	—	* ^s	2
Average Values									
Standard Parameters (mg/L)									
Dissolved Organic Carbon	83		2.0	1.5	2.7	2.0	2.9		
Sulfate	100		2.0	128.9	1.0	1.6	3.5		
Total Organic Carbon	87		1.4	1.5	2.4	2.3	2.8		
Total Solids	100		38.0	1829.0	52.7	55.3	61.0		
Total Suspended Solids	89		2.0	4.0	8.0	7.0	1.7		
Field Parameters									
Conductivity (µmhos/cm @ 25° C)	100		51	3623	56	69	76		
Dissolved Oxygen (mg/L)	100		10.3	10.8	10.4	10.1	10.0		
pH (SU)	100		7.3	7.6	7.3	7.2	7.2		
Temperature (°C)	100		13.6	13.3	13.3	14.1	14.5		
Turbidity (NTU)	97		4	4	2	5	4		



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Station ID	Description	Screening Value (µg/L)	S.V. Reference
20434	Lake Creek at Deaddog Hole		
29900	Cummins Creek		
33642	Siuslaw River at Tide boat ramp		
34115	Panther Creek at North Bank Road (Salmon River)		
34425	Yachats River at RM 0.9		

Maximum Values (µg/L)

Constituent	20434	29900	33642	34115	34425	Screening Value (µg/L)	S.V. Reference
Ammonia							
Ammonia as N	18.0	—	14.0	—	19.0	‡	2
Combustion By-Products							
Anthracene	—	—	—	—	—	2900	1
Benzo(b)fluoranthene	—	—	—	—	—	0.0013	1
Chrysene	—	—	—	—	—	0.0013	1
Fluoranthene	—	—	—	—	—	14	1
Phenanthrene	—	—	—	—	—	<i>nsv</i>	
Pyrene	—	—	—	—	—	290	1
Consumer Product Constituents							
bis(2-ethylhexyl)adipate	—	—	—	—	—	<i>nsv</i>	
Carbamazepine	—	—	—	—	—	<i>nsv</i>	
DEET	—	—	—	—	—	<i>nsv</i>	
Sulfamethoxazole	—	—	—	—	—	<i>nsv</i>	
Venlafaxine	—	—	—	—	—	<i>nsv</i>	
Current Use Pesticides							
Atrazine	—	—	—	—	—	1.0	9
Diuron	—	—	—	—	—	2.4	9
Fluridone	—	—	—	0.0304	—	480	6
Trifluralin	—	—	—	—	—	1.14	6
Flame retardants							
PBDE-100	—	—	—	—	—	<i>nsv</i>	
PBDE-138	—	—	—	—	—	<i>nsv</i>	
PBDE-139	—	—	—	—	—	<i>nsv</i>	
PBDE-15	—	—	—	—	—	<i>nsv</i>	
PBDE-153	—	—	—	—	—	<i>nsv</i>	
PBDE-154	—	—	—	—	—	<i>nsv</i>	
PBDE-17	—	—	—	—	—	<i>nsv</i>	
PBDE-206	—	—	—	—	—	<i>nsv</i>	
PBDE-209	—	—	—	—	—	<i>nsv</i>	
PBDE-28	—	—	—	—	—	<i>nsv</i>	
PBDE-47	—	—	—	—	—	<i>nsv</i>	
PBDE-49	—	—	—	—	—	<i>nsv</i>	
PBDE-85	—	—	—	—	—	<i>nsv</i>	
PBDE-99	—	—	—	—	0.00191	<i>nsv</i>	
Legacy Pesticides							
Aldrin	—	—	—	—	—	0.000005	1
BHC-technical (HCH)	—	—	—	—	—	0.0014	1
BHC-alpha	—	—	—	—	—	0.00045	1
BHC-beta	—	—	—	—	—	0.0016	1
BHC-gamma (Lindane)	—	—	—	—	—	0.08	2
Dieldrin	—	—	—	—	—	0.000053	1
Endosulfan sulfate	—	—	—	—	—	8.5	1
Heptachlor	—	—	—	—	—	0.0000079	1
Heptachlor epoxide	—	—	—	—	—	0.0000039	1
Hexachlorobenzene	—	—	—	—	—	0.000029	1
Methoxychlor	—	—	—	—	—	0.03	2



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Station ID and Description

Station ID	Description	Station ID	Description	Station ID	Description	Station ID	Description
20434	Lake Creek at Deaddog Hole	29900	Cummins Creek	33642	Siuslaw River at Tide boat ramp	34115	Panther Creek at North Bank Road (Salmon River)
34425	Yachats River at RM 0.9						

Screening Value (µg/L)

S.V. Reference

Maximum Values (µg/L)

Plant or animal sterols

beta-Sitosterol	0.467	1.25	0.475	0.51	1.3	nsv	
Cholesterol	1.34	0.4	1.13	0.575	0.559	nsv	
Coprostanol	0.0191	0.0104	0.017	0.0276	0.0218	nsv	
Stigmastanol	0.0621	0.132	0.0621	0.0553	0.149	nsv	

Priority Metals

Dissolved

Arsenic	0.27	—	0.29	—	—	nsv	
Barium	9.39	2.83	10.9	—	8.98	nsv	
Cadmium	—	—	—	—	—	*#	2
Chromium	—	—	—	1.7	—	11	2
Iron	—	—	—	—	172	1000 [#]	2
Manganese	4.16	—	5.22	—	18.5	nsv	
Thallium	—	0.05	—	—	—	nsv	
Zinc	—	6.35	—	—	—	*	2

Total Inorganic

Arsenic	0.116	0.054	0.137	0.086	0.13	2.1	1
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Total Recoverable

Arsenic	—	—	0.31	—	—	nsv	
Barium	10.2	4.03	11.4	—	10.5	1000	1
Cadmium	—	—	—	—	—	*	2
Chromium	—	—	—	2.3	—	11 ^{\$}	2
Iron	199	613	276	694	400	1000	2
Lead	—	—	—	—	—	*\$	2
Manganese	9.05	18.2	9.22	8.14	20.2	nsv	
Thallium	—	—	—	—	—	0.043	1
Zinc	—	—	—	—	—	*\$	2

Average Values

Standard Parameters (mg/L)

Dissolved Organic Carbon	1.8	2.3	2.0	1.5	2.4		
Sulfate	1.1	1.7	1.1	3.8	1.8		
Total Organic Carbon	1.8	1.6	1.9	1.2	1.9		
Total Solids	37.0	47.7	38.3	80.0	54.0		
Total Suspended Solids	3.0	11.0	2.0	2.5	7.5		

Field Parameters

Conductivity (µmhos/cm @ 25° C)	45	65	48	113	65		
Dissolved Oxygen (mg/L)	10.6	10.7	10.5	10.7	10.2		
pH (SU)	7.7	7.2	7.8	7.5	7.0		
Temperature (°C)	14.9	13.0	15.4	12.0	13.1		
Turbidity (NTU)	2	12	2	3	3		



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MID COAST BASIN
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Station ID and Description	Salmon River at Hatchery Below Weir Approx. USGS RM 5.05	Aisea at Mill Creek Boat Landing	Lake Creek at Sumich Rd bridge (above Triangle Lake)	Siletz River at Mooshine Park	Siuslaw River at Siuslaw Falls Park	Screening Value (µg/L)	S.V. Reference
	35486	36432	36803	37396	37400		
Maximum Values (µg/L)							

Ammonia							
Ammonia as N	56.0	18.0	29.0	—	30.0	‡	2
Combustion By-Products							
Anthracene	—	—	—	—	—	2900	1
Benzo(b)fluoranthene	—	—	—	—	—	0.0013	1
Chrysene	—	—	—	—	—	0.0013	1
Fluoranthene	—	—	—	—	—	14	1
Phenanthrene	—	—	—	—	—	nsv	
Pyrene	—	—	—	—	—	290	1
Consumer Product Constituents							
bis(2-ethylhexyl)adipate	—	—	—	—	—	nsv	
Carbamazepine	—	—	—	—	—	nsv	
DEET	—	—	—	0.0344	—	nsv	
Sulfamethoxazole	—	—	—	—	—	nsv	
Venlafaxine	—	—	—	—	—	nsv	
Current Use Pesticides							
Atrazine	—	—	—	—	—	1.0	9
Diuron	—	—	—	—	—	2.4	9
Fluridone	—	—	—	—	—	480	6
Trifluralin	—	—	—	—	0.000442	1.14	6
Flame retardants							
PBDE-100	—	—	—	—	0.00422	nsv	
PBDE-138	—	—	—	—	0.000123	nsv	
PBDE-139	—	—	—	—	0.000115	nsv	
PBDE-15	—	—	—	—	—	nsv	
PBDE-153	—	—	—	—	0.000703	nsv	
PBDE-154	—	—	—	—	0.00153	nsv	
PBDE-17	—	—	—	—	—	nsv	
PBDE-206	—	0.000662	—	—	—	nsv	
PBDE-209	—	0.0265	—	—	—	nsv	
PBDE-28	—	—	—	—	0.000147	nsv	
PBDE-47	—	—	—	—	0.00894	nsv	
PBDE-49	—	—	—	—	0.000172	nsv	
PBDE-85	—	—	—	—	0.000298	nsv	
PBDE-99	—	—	—	—	0.0083	nsv	
Legacy Pesticides							
Aldrin	—	—	—	—	0.0000847	0.000005	1
BHC-technical (HCH)	—	—	—	0.0000901	0.000212	0.0014	1
BHC-alpha	—	—	—	0.0000901	—	0.00045	1
BHC-beta	—	—	—	—	—	0.0016	1
BHC-gamma (Lindane)	—	—	—	—	0.000212	0.08	2
Dieldrin	—	—	—	—	0.0000766	0.0000053	1
Endosulfan sulfate	—	—	—	—	0.000126	8.5	1
Heptachlor	—	—	—	—	0.00015	0.0000079	1
Heptachlor epoxide	—	—	—	—	0.000108	0.0000039	1
Hexachlorobenzene	—	—	—	—	0.000355	0.000029	1
Methoxychlor	—	—	—	—	0.000439	0.03	2



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MID COAST BASIN
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Station ID and Description	35486	36432	36803	37396	37400	Screening Value (µg/L)	S.V. Reference
Salmon River at Hatchery Below Weir Approx. USGS RM 5.05							
Aisea at Mill Creek Boat Landing							
Lake Creek at Sumich Rd bridge (above Triangle Lake)							
Siletz River at Mooshine Park							
Siuslaw River at Siuslaw Falls Park							

Maximum Values (µg/L)

Plant or animal sterols							
beta-Sitosterol	0.373	1.74	0.963	0.346	0.956	nsv	
Cholesterol	1.33	1.29	0.842	0.485	0.987	nsv	
Coprostanol	0.0237	0.0248	0.036	0.0074	0.0404	nsv	
Stigmastanol	0.0529	0.14	0.0838	0.0296	0.102	nsv	
Priority Metals							
<i>Dissolved</i>							
Arsenic	—	—	0.44	—	0.46	nsv	
Barium	2.79	5.72	10.4	2.06	19.5	nsv	
Cadmium	—	—	—	—	—	##	2
Chromium	—	—	—	—	—	11	2
Iron	—	—	404	—	720	1000 [#]	2
Manganese	2.24	5.77	28	2.48	46.6	nsv	
Thallium	—	—	—	—	—	nsv	
Zinc	—	—	—	—	—	*	2
<i>Total Inorganic</i>							
Arsenic	0.06	0.112	0.475	0.044	0.316	2.1	1
<i>Total Recoverable</i>							
Arsenic	—	—	0.63	—	0.54	nsv	
Barium	3.13	8.51	11.4	2.35	21.4	1000	1
Cadmium	—	—	—	—	—	*	2
Chromium	—	1.17	—	—	—	11 [§]	2
Iron	152	661	1110	216	1090	1000	2
Lead	—	—	—	—	—	* [§]	2
Manganese	3.58	23.4	30.6	5.58	61.2	nsv	
Thallium	—	—	—	—	0.05	0.043	1
Zinc	—	—	—	—	—	* [§]	2

Average Values

Standard Parameters (mg/L)							
Dissolved Organic Carbon	1.6	2.3	2.0	1.2	2.9		
Sulfate	3.0	1.5	0.9	1.6	1.0		
Total Organic Carbon	1.7	1.7	1.9	1.3	2.6		
Total Solids	50.0	63.3	39.0	33.7	51.7		
Total Suspended Solids	2.5	6.7	1.7	2.5	3.0		
Field Parameters							
Conductivity (µmhos/cm @ 25° C)	69	70	42	48	59		
Dissolved Oxygen (mg/L)	10.9	10.6	9.3	10.7	9.4		
pH (SU)	7.2	7.5	6.9	7.4	7.1		
Temperature (°C)	12.2	12.9	13.7	12.4	12.6		
Turbidity (NTU)	2	6	4	4	7		



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MID COAST BASIN
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Yaquina River at Marker
#47

Alsea R. Port Docks
(Waldport)

Siuslaw River Florence
Boat Docks

Screening Value (µg/L)

S.V. Reference

Estuary Sites

13336

37397

37398

Maximum Values (µg/L)

Ammonia

Ammonia as N 98.0 72.0 56.0 ‡ 3

Combustion By-Products

Anthracene — — — 4000 1
Benzo(b)fluoranthene — 0.00323 — 0.0018 1
Chrysene — — — 0.0018 1
Fluoranthene 0.00319 0.0155 — 14 1
Phenanthrene — 0.0207 — *nsv*
Pyrene — — — 400 1

Consumer Product Constituents

bis(2-ethylhexyl)adipate — — — *nsv*
Carbamazepine — — — *nsv*
DEET — — — *nsv*
Sulfamethoxazole — — — *nsv*
Venlafaxine — — — *nsv*

Current Use Pesticides

Atrazine — — — 1.0 9[†]
Diuron 0.00865 — — 2.4 9[†]
Fluridone — — — 480 6[†]
Trifluralin — — — 1.14 6[†]

Flame retardants

PBDE-100 — — 0.00256 *nsv*
PBDE-138 — — — *nsv*
PBDE-139 — — — *nsv*
PBDE-15 — — 0.0000809 *nsv*
PBDE-153 — — 0.000236 *nsv*
PBDE-154 — — 0.000624 *nsv*
PBDE-17 — — 0.000159 *nsv*
PBDE-206 — — — *nsv*
PBDE-209 — — — *nsv*
PBDE-28 — — 0.00027 *nsv*
PBDE-47 — — 0.00611 *nsv*
PBDE-49 — — 0.00012 *nsv*
PBDE-85 — — — *nsv*
PBDE-99 — — 0.0039 *nsv*

Legacy Pesticides

Aldrin — — — 0.000005 1
BHC-technical (HCH) — 0.00032 0.0001956 0.0014 1
BHC-alpha — 0.000199 0.000108 0.00045 1
BHC-beta — 0.000121 0.0000876 0.0016 1
BHC-gamma (Lindane) — — — 0.16 4
Dieldrin — — — 0.0000053 1
Endosulfan sulfate — — — 8.5 1
Heptachlor — — — 0.0000079 1
Heptachlor epoxide — — — 0.0000039 1
Hexachlorobenzene — — — 0.000029 1
Methoxychlor — — — 0.03 3



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MID COAST BASIN
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Estuary Sites	Yaquina River at Marker #47	Alsea R. Port Docks (Waldport)	Siuslaw River Florence Boat Docks	Screening Value (µg/L)	S.V. Reference
	13336	37397	37398		

Maximum Values (µg/L)

Plant or animal sterols					
beta-Sitosterol	0.246	0.108	0.248	nsv	
Cholesterol	0.598	0.723	0.631	nsv	
Coprostanol	0.0149	0.0161	0.013	nsv	
Stigmastanol	0.0543	0.0298	0.0388	nsv	
Priority Metals					
<i>Dissolved</i>					
Arsenic	0.94	1.9	1.12	nsv	
Barium	—	—	—	nsv	
Cadmium	—	0.12	—	8.8	3
Chromium	—	—	—	50	3
Iron	—	—	—	nsv	
Manganese	50.2	6.62	15.5	nsv	
Thallium	—	—	—	nsv	
Zinc	—	—	13.2	81	3
<i>Total Inorganic</i>					
Arsenic	0.55	1.27	0.568	1.0	1
<i>Total Recoverable</i>					
Arsenic	1.2	2.13	1.4	nsv	
Barium	—	—	—	nsv	
Cadmium	—	0.13	—	8.8 [§]	3
Chromium	—	1.28	—	50 [§]	3
Iron	—	—	—	nsv	
Lead	0.26	—	—	8.1 [§]	3
Manganese	60.0	7.48	18.9	nsv	
Thallium	—	—	—	0.047	1
Zinc	—	—	—	81 [§]	3

Average Values

Standard Parameters (mg/L)					
Dissolved Organic Carbon	1.8	1.2	1.9		
Sulfate	864.3	2310.0	1090.3		
Total Organic Carbon	2.0	1.3	2.0		
Total Solids	11073.3	33200.0	15033.3		
Total Suspended Solids	16.0	19.0	8.7		
Field Parameters					
Conductivity (µmhos/cm @ 25° C)	17323	43150	21833		
Dissolved Oxygen (mg/L)	8.7	9.5	8.6		
pH (SU)	7.3	8.0	7.4		
Temperature (°C)	15.2	12.2	13.9		
Turbidity (NTU)	9	4	3		



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**Appendix I
DETECTION SUMMARY**

**NORTH COAST BASIN
Station ID and Description**

Samples collected
between May and
December 2013

	Percent Detection	Number of samples over screening value	Station ID and Description					Screening Value (µg/L)	S.V. Reference
			Necanicum R at Forest Lake RV Camp (Seaside) 10521	Skipanon River at Hwy 101 10812	Beaver Creek at Beaver 11005	Ecola CR at Cannon Beach Loop Rd 11229	Salmonberry River at mouth 11849		
Maximum Values (µg/L)									
Ammonia									
Ammonia as N	35	0	11.0	50.0	13.0	—	—	‡	2
Combustion By-Products									
Acenaphthene	2	0	—	—	—	0.00715	—	95	1
Fluoranthene	7	0	—	—	—	0.00721	—	14	1
Phenanthrene	7	0	—	—	—	0.0128	—	<i>nsv</i>	
Pyrene	2	0	—	—	—	—	—	290	1
Consumer Product Constituents									
17a-Ethynyl estradiol	2	0	—	—	—	—	—	<i>nsv</i>	
bis(2-ethylhexyl)adipate	2	0	—	—	—	—	—	<i>nsv</i>	
Sulfamethoxazole	4	0	—	—	—	0.0128	—	<i>nsv</i>	
Current Use Pesticides									
2,4-D	2	0	—	—	—	—	—	100	1
2,6-Dichlorobenzamide	5	0	—	0.0731	—	—	—	<i>nsv</i>	
Diuron	5	0	—	0.00676	—	—	—	2.4	9
Flame retardants									
PBDE-100	5	0	—	—	—	—	—	<i>nsv</i>	
PBDE-138	5	0	—	—	—	—	—	<i>nsv</i>	
PBDE-139	5	0	—	—	—	—	—	<i>nsv</i>	
PBDE-140	5	0	—	—	—	—	—	<i>nsv</i>	
PBDE-209	24	0	0.00274	—	—	0.00291	—	<i>nsv</i>	
PBDE-99	5	0	—	—	—	—	—	<i>nsv</i>	
Industrial Chemicals or Intermediates									
2,6-Dinitrotoluene	2	0	—	—	—	—	—	<i>nsv</i>	
Legacy Pesticides									
BHC-technical (HCH)	3	0	—	—	—	—	—	0.0014	1
BHC-alpha	6	0	—	—	—	—	—	0.00045	1
BHC-beta	6	0	—	—	—	—	—	0.0016	1
Total DDT	1	0	—	0.0001319	—	—	—	0.001	2
4,4'-DDD	1	1	—	0.000068	—	—	—	0.000031	1
4,4'-DDE	1	1	—	0.0000639	—	—	—	0.000022	1
Endosulfan sulfate	2	0	—	—	—	—	—	8.5	1
Plant or animal sterols									
beta-Sitosterol	100	0	0.378	1.01	0.529	0.324	0.962	<i>nsv</i>	
Cholesterol	100	0	0.371	1.32	0.542	0.26	0.198	<i>nsv</i>	
Coprostanol	98	0	0.0171	0.0632	0.0342	0.0101	0.00828	<i>nsv</i>	
Stigmastanol	100	0	0.043	0.241	0.0666	0.058	0.0746	<i>nsv</i>	
Priority Metals									
<i>Dissolved</i>									
Arsenic	37	6	—	0.65	—	0.27	—	<i>nsv</i>	
Barium	61	0	6.27	32.1	3.69	6.96	—	<i>nsv</i>	
Cadmium	4	0	—	—	—	—	—	**	2
Iron	11	1	—	1580	—	—	—	1000 [#]	2
Manganese	75	0	18.9	53.4	3.24	36.5	3.19	<i>nsv</i>	
Thallium	4	0	—	—	—	0.05	—	<i>nsv</i>	
<i>Total Inorganic</i>									
Arsenic	84	4	0.099	0.5	0.098	0.156	0.044	2.1	1
<i>Total Recoverable</i>									
Arsenic	44	6	—	0.86	—	0.29	—	<i>nsv</i>	
Barium	72	0	7.84	32.6	5.79	7.26	17.8	1000	1
Beryllium	4	0	—	—	—	—	0.12	<i>nsv</i>	
Cadmium	4	0	—	—	—	—	—	*	2
Chromium	14	0	—	—	1.65	—	1.94	11 [§]	2
Copper	11	3	—	—	—	—	4.53	*	2
Iron	56	11	569	2750	940	436	5650	1000	2
Lead	14	2	—	—	—	—	0.23	* [§]	2
Manganese	84	0	20.2	56.0	16.7	40.0	81.7	<i>nsv</i>	
Nickel	16	0	—	—	1.78	—	3.34	* [§]	2
Zinc	7	0	—	—	—	—	8.5	* [§]	2
Average Values									
Standard Parameters (mg/L)									
DOC	70	0	1.6	4.4	1.3	2.0	1.3		
Sulfate	100	0	2.7	237.0	2.2	138.6	0.8		
TOC (Total Organic Carbon)	85	0	1.4	4.5	1.2	2.0	1.6		
Total Solids	100	0	51.7	3033.7	63.0	2008.7	95.7		
Total Suspended Solids	77	0	4.5	4.0	14.0	3.0	134.0		
Field Parameters									
Conductivity (µmhos/cm @ 25° C)	100	0	53	5049	75	3189	59		
Dissolved Oxygen (mg/L)	100	0	10.5	8.5	11.1	10.3	11.1		
pH (SU)	100	0	7.3	6.9	7.4	7.4	7.8		
Temperature (°C)	100	0	13.0	15.2	11.3	12.7	12.9		
Turbidity (NTU)	93	0	3	7	4	3	50		



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Samples collected
between May and
December 2013

NORTH COAST BASIN
Station ID and Description

	Youngs River at Youngs River Loop Road 12187	Wilson River at Hwy 6 (Lee's Camp) 12951	South Fork Trask River downstream of Edwards Creek 12962	Trask River at Netarts Road (Hwy. 6) 13431	Tillamook River at Bewley Creek Road 13440	Screening Value (µg/L)	S.V. Reference
Maximum Values (µg/L)							
Ammonia							
Ammonia as N	17.0	—	—	21.0	20.0	‡	2
Combustion By-Products							
Acenaphthene	—	—	—	—	—	95	1
Fluoranthene	—	—	—	—	—	14	1
Phenanthrene	—	—	—	—	—	nsv	
Pyrene	—	—	—	—	—	290	1
Consumer Product Constituents							
17a-Ethynyl estradiol	0.00436	—	—	—	—	nsv	
bis(2-ethylhexyl)adipate	—	0.443	—	—	—	nsv	
Sulfamethoxazole	—	—	—	—	—	nsv	
Current Use Pesticides							
2,4-D	—	—	—	—	—	100	1
2,6-Dichlorobenzamide	—	—	—	—	—	nsv	
Diuron	—	—	—	—	—	2.4	9
Flame retardants							
PBDE-100	—	—	—	0.000453	—	nsv	
PBDE-138	—	—	—	0.000621	—	nsv	
PBDE-139	—	—	—	0.000358	—	nsv	
PBDE-140	—	—	—	0.000113	—	nsv	
PBDE-209	—	—	—	—	—	nsv	
PBDE-99	—	—	—	0.00262	—	nsv	
Industrial Chemicals or Intermediates							
2,6-Dinitrotoluene	—	—	—	—	—	nsv	
Legacy Pesticides							
BHC-technical (HCH)	—	—	—	—	—	0.0014	1
BHC-alpha	—	—	—	—	—	0.00045	1
BHC-beta	—	—	—	—	—	0.0016	1
Total DDT	—	—	—	—	—	0.001	2
4,4'-DDD	—	—	—	—	—	0.000031	1
4,4'-DDE	—	—	—	—	—	0.000022	1
Endosulfan sulfate	—	—	—	—	—	8.5	1
Plant or animal sterols							
beta-Sitosterol	0.694	0.372	0.301	0.385	1.21	nsv	
Cholesterol	0.466	0.302	0.178	0.914	0.994	nsv	
Coprostanol	0.0176	0.00781	0.00722	0.0642	0.356	nsv	
Stigmastanol	0.118	0.0356	0.0604	0.108	0.771	nsv	
Priority Metals							
<i>Dissolved</i>							
Arsenic	—	—	—	0.36	—	nsv	
Barium	7.75	—	—	19.4	5.99	nsv	
Cadmium	—	—	—	—	—	*#	2
Iron	—	—	—	—	—	1000#	2
Manganese	8.12	—	—	33.2	7.13	nsv	
Thallium	—	—	—	—	—	nsv	
<i>Total Inorganic</i>							
Arsenic	0.139	0.046	0.064	0.207	0.089	2.1	1
<i>Total Recoverable</i>							
Arsenic	0.33	—	—	0.43	—	nsv	
Barium	14.0	6.11	6.89	20	7.83	1000	1
Beryllium	—	—	—	—	—	nsv	
Cadmium	—	—	—	—	—	*	2
Chromium	—	1.31	2.92	2.34	—	11 ^{\$}	2
Copper	—	—	2.09	3.73	—	*	2
Iron	1330	1020	2130	2570	530	1000	2
Lead	0.35	—	—	0.2	—	* ^{\$}	2
Manganese	27.6	11.9	27.3	44.8	19	nsv	
Nickel	—	1.12	3.29	2.56	—	* ^{\$}	2
Zinc	—	—	—	—	11.1	* ^{\$}	2
Average Values							
Standard Parameters (mg/L)							
DOC	2.1	1.3	—	1.3	1.3		
Sulfate	2.4	2.3	3.7	205.1	2.6		
TOC (Total Organic Carbon)	2.2	1.5	—	1.5	1.5		
Total Solids	61.0	57.7	76.7	2807.7	56.3		
Total Suspended Solids	13.0	24.0	37.0	16.3	4.3		
Field Parameters							
Conductivity (µmhos/cm @ 25° C)	54	54	83	4587	126		
Dissolved Oxygen (mg/L)	11.0	11.0	11.4	10.2	10.9		
pH (SU)	7.3	7.6	7.7	7.3	7.1		
Temperature (°C)	13.0	11.4	10.5	14.1	13.2		
Turbidity (NTU)	8	21	14	14	4		



DEQ
State of Oregon
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Samples collected
between May and
December 2013

NORTH COAST BASIN
Station ID and Description

	North Fork Nehalem River at Highway 53 18802	Nestucca River at first bridge ramp (upstream of Beaver) 22394	Nehalem River at Hwy 47 Bridge upstream of Venonia (River Mile 92.1) 24299	Humbug Creek near mouth (Nehalem) 32980	Clatskanie River above Fall Creek at Beaver boat ramp (Columbia) 34165	Screening Value (µg/L)	S.V. Reference
Maximum Values (µg/L)							
Ammonia							
Ammonia as N	12.0	33.0	19.0	13.0	66.0	‡	2
Combustion By-Products							
Acenaphthene	—	—	—	—	—	95	1
Fluoranthene	—	—	—	—	—	14	1
Phenanthrene	—	—	—	0.00775	—	<i>nsv</i>	
Pyrene	—	—	—	—	—	290	1
Consumer Product Constituents							
17a-Ethynyl estradiol	—	—	—	—	—	<i>nsv</i>	
bis(2-ethylhexyl)adipate	—	—	—	—	—	<i>nsv</i>	
Sulfamethoxazole	—	—	—	—	—	<i>nsv</i>	
Current Use Pesticides							
2,4-D	—	—	—	—	—	100	1
2,6-Dichlorobenzamide	—	—	—	—	—	<i>nsv</i>	
Diuron	—	—	—	—	—	2.4	9
Flame retardants							
PBDE-100	—	—	—	—	—	<i>nsv</i>	
PBDE-138	—	—	—	—	—	<i>nsv</i>	
PBDE-139	—	—	—	—	—	<i>nsv</i>	
PBDE-140	—	—	—	—	—	<i>nsv</i>	
PBDE-209	0.00386	—	—	—	0.00317	<i>nsv</i>	
PBDE-99	—	—	—	—	—	<i>nsv</i>	
Industrial Chemicals or Intermediates							
2,6-Dinitrotoluene	—	—	—	—	—	<i>nsv</i>	
Legacy Pesticides							
BHC-technical (HCH)	—	—	—	—	—	0.0014	1
BHC-alpha	—	—	—	—	—	0.00045	1
BHC-beta	—	—	—	—	—	0.0016	1
Total DDT	—	—	—	—	—	0.001	2
4,4'-DDD	—	—	—	—	—	0.000031	1
4,4'-DDE	—	—	—	—	—	0.000022	1
Endosulfan sulfate	—	—	—	—	—	8.5	1
Plant or animal sterols							
beta-Sitosterol	0.64	0.485	3.92	1.05	2.44	<i>nsv</i>	
Cholesterol	0.545	0.973	1.1	0.861	0.826	<i>nsv</i>	
Coprostanol	0.0119	0.0552	0.0621	0.0268	0.0621	<i>nsv</i>	
Stigmastanol	0.0908	0.0776	0.416	0.155	0.27	<i>nsv</i>	
Priority Metals							
<i>Dissolved</i>							
Arsenic	—	—	0.44	0.34	0.53	<i>nsv</i>	
Barium	5.89	2.2	3.88	6.23	21.3	<i>nsv</i>	
Cadmium	—	—	—	—	—	*#	2
Iron	—	—	353	220	366	1000#	2
Manganese	5.23	3.97	17.2	9.32	39.4	<i>nsv</i>	
Thallium	—	—	—	0.05	—	<i>nsv</i>	
<i>Total Inorganic</i>							
Arsenic	0.09	0.07	0.481	0.282	0.487	2.1	1
<i>Total Recoverable</i>							
Arsenic	—	—	0.97	0.55	0.62	<i>nsv</i>	
Barium	12.0	9.66	19.7	21.4	26.1	1000	1
Beryllium	—	—	0.12	—	—	<i>nsv</i>	
Cadmium	—	—	—	—	—	*	2
Chromium	—	2.87	3.04	1.42	—	11 [§]	2
Copper	—	2.86	4.07	1.67	—	*	2
Iron	1040	2210	4300	1990	1680	1000	2
Lead	—	0.2	0.98	0.59	0.41	* [§]	2
Manganese	22.8	34.4	89.6	38.4	53.8	<i>nsv</i>	
Nickel	—	2.95	2.87	1.53	—	* [§]	2
Zinc	—	—	11.4	7.05	—	* [§]	2
Average Values							
Standard Parameters (mg/L)							
DOC	1.3	1.1	3.0	1.6	2.7		
Sulfate	3.1	3.4	4.6	3.1	2.9		
TOC (Total Organic Carbon)	2.0	1.3	4.2	2.3	3.3		
Total Solids	62.3	82.7	108.3	65.3	91.0		
Total Suspended Solids	15.0	19.7	41.7	72.0	11.0		
Field Parameters							
Conductivity (µmhos/cm @ 25° C)	57	85	70	47	74		
Dissolved Oxygen (mg/L)	11.1	10.9	9.7	10.7	9.7		
pH (SU)	7.5	7.5	7.0	7.1	7.1		
Temperature (°C)	11.4	12.2	12.8	12.6	13.8		
Turbidity (NTU)	25	11	27	10	9		



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NORTH COAST BASIN						
Station ID and Description						
Samples collected between May and December 2013	Tillamook Bay at Hobsonville Point	Netarts Bay at CNTY boat ramp	Youngs Bay at Old Hwy 101 Bridge	Necanicum R at 12th Street approach	Screening Value (µg/L)	S.V. Reference
	13308	13311	13553	13654		
Estuary Sites	Maximum Values (µg/L)					
Ammonia						
Ammonia as N	62.0	—	—	149.0	‡	3
Combustion By-Products						
Acenaphthene	—	—	—	—	99	1
Fluoranthene	—	—	0.012	—	14	1
Phenanthrene	—	—	0.0195	0.00943	<i>nsv</i>	
Pyrene	—	—	0.00704	—	400	1
Consumer Product Constituents						
17a-Ethynyl estradiol	—	—	—	—	<i>nsv</i>	
bis(2-ethylhexyl)adipate	—	—	—	—	<i>nsv</i>	
Sulfamethoxazole	—	—	—	0.0156	<i>nsv</i>	
Current Use Pesticides						
2,4-D	—	—	—	0.09	12500	7†
2,6-Dichlorobenzamide	—	—	—	—	<i>nsv</i>	
Diuron	—	—	0.00818	—	2.4	9†
Flame retardants						
PBDE-100	—	—	—	—	<i>nsv</i>	
PBDE-138	—	—	—	—	<i>nsv</i>	
PBDE-139	—	—	—	—	<i>nsv</i>	
PBDE-140	—	—	—	—	<i>nsv</i>	
PBDE-209	—	—	—	—	<i>nsv</i>	
PBDE-99	—	—	—	—	<i>nsv</i>	
Industrial Chemicals or Intermediates						
2,6-Dinitrotoluene	—	—	—	0.0641	<i>nsv</i>	
Legacy Pesticides						
BHC-technical (HCH)	0.00027	0.000285	—	0.0001938	0.0014	1
BHC-alpha	0.000158	0.000173	—	0.000113	0.00045	1
BHC-beta	0.000112	0.000118	—	0.0000808	0.0016	1
Total DDT	—	—	—	—	0.001	3
4,4'-DDD	—	—	—	—	0.000031	1
4,4'-DDE	—	—	—	—	0.000022	1
Endosulfan sulfate	—	—	0.000113	—	8.5	1
Plant or animal sterols						
beta-Sitosterol	0.362	0.128	0.32	0.482	<i>nsv</i>	
Cholesterol	1.12	0.838	0.653	1.06	<i>nsv</i>	
Coprostanol	0.0205	0.00473	0.0341	0.0497	<i>nsv</i>	
Stigmastanol	0.0737	0.0222	0.0542	0.0882	<i>nsv</i>	
Priority Metals						
<i>Dissolved</i>						
Arsenic	1.56	2.12	0.79	1.34	<i>nsv</i>	
Barium	13.9	—	27.5	11.7	<i>nsv</i>	
Cadmium	0.13	0.12	—	—	8.8	3
Iron	—	—	—	—	<i>nsv</i>	
Manganese	27.9	2.6	20.4	51.5	<i>nsv</i>	
Thallium	—	—	—	—	<i>nsv</i>	
<i>Total Inorganic</i>						
Arsenic	1.75	1.28	0.688	0.997	1.0	1
<i>Total Recoverable</i>						
Arsenic	1.8	2.15	0.94	1.66	<i>nsv</i>	
Barium	14.7	—	29.3	12.2	<i>nsv</i>	
Beryllium	—	—	—	—	<i>nsv</i>	
Cadmium	0.11	0.14	—	—	8.8 [§]	3
Chromium	—	—	—	—	50 [§]	3
Copper	—	—	—	—	3.1 [§]	3
Iron	—	—	—	542	<i>nsv</i>	
Lead	—	—	0.23	—	8.1 [§]	3
Manganese	32.8	4.26	26.7	52.5	<i>nsv</i>	
Nickel	—	—	1.45	—	8.2 [§]	3
Zinc	—	—	—	—	81 [§]	3
Average Values						
Standard Parameters (mg/L)						
DOC	1.2	1.2	1.7	2.1		
Sulfate	1538.0	2500.0	234.3	695.6		
TOC (Total Organic Carbon)	1.6	1.4	1.8	2.3		
Total Solids	20730.0	33633.3	3220.0	15079.3		
Total Suspended Solids	99.0	12.7	8.0	8.3		
Field Parameters						
Conductivity (µmhos/cm @ 25° C)	31250	47400	5413	22060		
Dissolved Oxygen (mg/L)	8.8	9.6	10.3	10.0		
pH (SU)	7.8	8.1	7.7	7.7		
Temperature (°C)	13.2	12.7	14.9	14.2		
Turbidity (NTU)	23	3	5	4		



State of Oregon
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Appendix J DETECTION SUMMARY		OREGON CLOSED LAKES BASINS Station ID and Description							Screening Value (µg/L)	S.V. Reference
Samples collected during September 2013		Percent Detection	Number of samples over screening value	Honey Creek at Plush	Antelope Creek at County Road Bridge	Whitehorse Creek at Whitehorse Ranch Road	Donner Und Blitzen River upstream of Page Springs Campground	Twenty mile Creek at Hwy 140		
						10741	10748	12264	12265	12266
				Maximum Values (µg/L)						
Ammonia										
Ammonia as N	33	0	23.0	22.0	—	—	—	—	‡	2
Combustion By-Products										
Phenanthrene	8	—	—	—	—	—	—	0.00658	nsv	
Current Use Pesticides										
2,4-D	17	0	—	0.4	—	—	—	—	100	1
Flame retardants										
PBDE-100	9	—	—	—	—	—	—	—	nsv	
PBDE-153	8	—	—	—	—	—	—	—	nsv	
PBDE-154	8	—	—	—	—	—	—	—	nsv	
PBDE-209	13	—	—	—	—	—	—	—	nsv	
PBDE-47	9	—	—	—	—	—	—	—	nsv	
PBDE-99	9	—	—	—	—	—	—	—	nsv	
Industrial Chemicals or Intermediates										
2,4-Dinitrotoluene	17	0	—	—	—	—	—	—	0.084	1
Isophorone	17	0	—	0.124	—	—	—	—	27	1
Legacy Pesticides										
Endosulfan sulfate	4	0	—	—	—	—	—	—	8.5	1
Plant or animal sterols										
beta-Sitosterol	100	0.793	3.21	0.511	0.383	0.884	nsv			
Cholesterol	100	1.74	2.38	0.696	0.682	1.19	nsv			
Coprostanol	100	0.0515	0.287	0.0257	0.0136	0.0239	nsv			
Stigmastanol	100	0.164	0.786	0.0836	0.0379	0.183	nsv			
Priority Metals										
<i>Dissolved</i>										
Antimony	8	—	—	—	—	—	—	—	nsv	
Arsenic	75	2	1.41	4.07	2	—	1.68	nsv		
Barium	100	11.5	9.9	23	3.24	15.2	nsv			
Chromium	8	0	—	—	—	—	11	2		
Copper	17	0	—	2.44	—	—	#	2		
Iron	42	1	—	303	321	—	1000#	2		
Lead	8	0	—	—	—	—	*	2		
Manganese	92	61.4	12.9	4.3	6.49	5.14	nsv			
Nickel	33	0	1.36	1.3	—	—	*	2		
Zinc	8	0	—	—	—	—	*	2		
<i>Total Inorganic</i>										
Arsenic	100	2	1.28	3.24	2.04	0.068	1.63	2.1	1	
<i>Total Recoverable</i>										
Antimony	8	0	—	—	—	—	—	5.1	1	
Arsenic	83	3	1.49	4.22	2.09	—	1.8	nsv		
Barium	100	0	14.7	16.2	25.2	3.6	17.9	1000	1	
Beryllium	8	—	—	—	—	—	—	nsv		
Chromium	17	0	—	—	—	—	—	11§	2	
Copper	33	0	—	3.29	—	—	*	2		
Iron	92	3	573	1330	705	180	452	1000	2	
Lead	25	0	—	0.27	—	—	—	*§	2	
Manganese	100	122	40.9	8.96	9.37	13.7	nsv			
Nickel	42	0	1.61	1.7	—	—	—	*§	2	
Zinc	8	0	—	—	—	—	—	*§	2	
Average Values										
Standard Parameters (mg/L)										
Dissolved Organic Carbon	100	3.4	20.0	2.7	1.4	4.7				
Sulfate	92	3.0	5.3	11.7	1.1	1.9				
Total Organic Carbon	100	4.1	21.0	3.1	1.6	5.0				
Total Solids	100	190.0	405.0	203.0	88.0	112.0				
Total Suspended Solids	100	13.0	5.0	3.0	3.0	—				
Field Parameters										
Conductivity (µmhos/cm @ 25° C)	100	247	469	245	99	156				
Dissolved Oxygen (mg/L)	100	8.6	6.3	9.0	9.2	6.5				
pH (SU)	100	8.0	8.0	8.6	7.8	7.6				
Temperature (°C)	100	15.1	11.8	15.3	10.9	13.8				
Turbidity (NTU)	100	5	24	5	3	7				



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OREGON CLOSED LAKES BASINS									
Station ID and Description									
Samples collected during September 2013	Deep Creek west of Adel	South Fork Blitzen River at Blitzen Crossing	Twentymile Creek at confluence with Twelvemile Creek	Silvies River at West Loop Road	Chewaucan River, 2.4 miles upstream of Paisley	Thomas Creek at Stock Drive Road	Donner und Blitzen River at Center Patrol Road	Screening Value (µg/L)	S.V. Reference
	12267	13014	24158	33929	33930	36778	37573		
Maximum Values (µg/L)									
Ammonia									
Ammonia as N	—	—	—	11.0	12.0	24.0	—	‡	2
Combustion By-Products									
Phenanthrene	—	—	—	—	—	—	—	nsv	
Current Use Pesticides									
2,4-D	—	—	—	—	—	0.3	—	100	1
Flame retardants									
PBDE-100	—	—	0.000384	—	—	—	—	nsv	
PBDE-153	—	0.000542	—	—	—	—	—	nsv	
PBDE-154	—	0.000443	—	—	—	—	—	nsv	
PBDE-209	—	0.00187	—	—	—	—	—	nsv	
PBDE-47	—	—	0.0021	—	—	—	—	nsv	
PBDE-99	—	—	0.00211	—	—	—	—	nsv	
Industrial Chemicals or Intermediates									
2,4-Dinitrotoluene	—	—	0.0758	0.0673	—	—	—	0.084	1
Isophorone	—	—	—	—	—	0.176	—	27	1
Legacy Pesticides									
Endosulfan sulfate	—	—	—	—	—	0.0000675	—	8.5	1
Plant or animal sterols									
beta-Sitosterol	0.448	0.596	0.44	0.81	0.707	3.83	0.484	nsv	
Cholesterol	0.859	0.508	0.415	1.28	0.991	3.91	0.784	nsv	
Coprostanol	0.0137	0.00871	0.0153	0.0425	0.0587	0.297	0.0297	nsv	
Stigmastanol	0.0598	0.0574	0.119	0.183	0.194	0.956	0.0982	nsv	
Priority Metals									
<i>Dissolved</i>									
Antimony	—	—	—	—	—	0.37	—	nsv	
Arsenic	0.62	—	1.96	0.83	—	17.7	0.47	nsv	
Barium	14.0	4.71	41.8	31.8	9.15	25.6	2.31	nsv	
Chromium	—	—	—	—	—	1.21	—	11	2
Copper	—	—	—	—	—	3.1	—	‡	2
Iron	—	—	237	541	—	2130	—	1000 [#]	2
Lead	—	—	—	—	—	0.41	—	*	2
Manganese	6.3	—	144	17.6	2.64	28.4	12.2	nsv	
Nickel	—	—	—	1.26	—	2.05	—	*	2
Zinc	—	—	—	—	—	7.13	—	*	2
<i>Total Inorganic</i>									
Arsenic	0.448	0.062	2.05	0.628	0.16	16.9	0.305	2.1	1
<i>Total Recoverable</i>									
Antimony	—	—	—	—	—	0.33	—	5.1	1
Arsenic	0.61	—	2.15	0.95	0.26	18.6	0.55	nsv	
Barium	14.7	5.31	43.9	37.4	12.2	45.0	6.96	1000	1
Beryllium	—	—	—	—	—	0.18	—	nsv	
Chromium	—	—	—	1.13	—	2.97	—	11 [§]	2
Copper	—	—	—	2.05	—	5.11	3.18	*	2
Iron	—	210	424	1260	426	5010	989	1000	2
Lead	—	—	—	0.3	—	1.12	—	* [§]	2
Manganese	12.8	5.24	157	63.4	18.6	65.6	28	nsv	
Nickel	—	—	—	1.63	—	3.05	1.35	* [§]	2
Zinc	—	—	—	—	—	10.4	—	* [§]	2
Average Values									
Standard Parameters (mg/L)									
Dissolved Organic Carbon	3.0	1.4	2.8	4.0	2.9	20.0	2.2		
Sulfate	1.0	0.8	1.3	1.9	—	23.2	1.6		
Total Organic Carbon	2.8	1.4	2.7	4.5	3.1	18.0	2.8		
Total Solids	117.0	90.0	201.0	148.0	92.0	505.0	104.0		
Total Suspended Solids	—	3.0	3.0	4.0	8.0	25.0	18.0		
Field Parameters									
Conductivity (µmhos/cm @ 25° C)	140	92	236	149	76	456	120		
Dissolved Oxygen (mg/L)	9.8	8.7	6.8	6.5	9.5	5.4	8.7		
pH (SU)	8.6	8.2	7.4	7.6	7.5	7.8	8.0		
Temperature (°C)	14.4	13.4	14.9	13.2	10.4	10.7	13.1		
Turbidity (NTU)	1	2	6	14	7	78	12		



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**Appendix K
DETECTION SUMMARY**

Samples collected
between June and
November 2011 or
September 2013

**OWYHEE BASIN
Station ID and Description**

	Percent Detection	Number of samples over screening value	Maximum Values (µg/L)					Screening Value (µg/L)	S.V. Reference
			Owyhee River at Hwy 201 Bridge (Owyhee)	Owyhee River at Rome (Hwy.95)	Jordan Creek at Arock Bridge	Jordan Creek U/S of Jordan Valley OR at Pleasant Valley Rd Bridge	Crooked Creek at Kiger Road		
			10729	10730	11050	12261	36783		

Consumer Product Constituents									
Diphenhydramine	17		0.176	—	—	—	—	<i>nsv</i>	
Current Use Pesticides									
Atrazine	14	0	0.0107	—	—	—	—	1.0	9
Desethylatrazine	14	0	0.0093	—	—	—	—	1000	9
Dichlorvos	14	1	0.024	—	—	—	—	0.0058	8
Diuron	29	0	0.0043	—	—	—	—	2.4	9
Imidacloprid	29	0	0.0179	—	—	—	—	1.05	8
Methomyl	14	0	0.0812	—	—	—	—	0.7	8
Metolachlor	29	0	0.0785	—	—	—	—	1	8
Oxamyl	14	0	0.0084	—	—	—	—	27	8
Pyraclostrobin	14	0	0.0075	—	—	—	—	1.5	9
Plant or animal sterols									
beta-Sitosterol	100		0.955	0.419	2.76	0.396	0.488	<i>nsv</i>	
Cholesterol	100		1.52	1.43	4.4	0.75	0.888	<i>nsv</i>	
Coprostanol	100		0.0607	0.0182	0.09	0.028	0.0295	<i>nsv</i>	
Stigmastanol	100		0.15	0.0661	0.219	0.0586	0.0961	<i>nsv</i>	
Priority Metals									
<i>Dissolved</i>									
Arsenic	100	5	40.9	10.2	2.06	1.51	20.0	<i>nsv</i>	
Barium	100		34.0	29.8	60.8	56.2	3.91	<i>nsv</i>	
Chromium	14	0	—	—	—	—	1.11	11	2
Manganese	100		35.7	3.6	9.8	75.9	3.54	<i>nsv</i>	
Nickel	57	0	1.1	—	1.14	1.31	—	*	2
Selenium	14	0	2.8	—	—	—	—	4.6	2
<i>Total Inorganic</i>									
Arsenic	100	2	N/A	9.19	1.24	1.4	19.9	2.1	1
<i>Total Recoverable</i>									
Arsenic	100	6	41.0	10.2	2.31	1.71	19.7	<i>nsv</i>	
Barium	100	0	52.4	32.3	64.6	57.6	6.72	1000	1
Beryllium	29		0.16	—	—	—	—	<i>nsv</i>	
Chromium	43	0	3.2	—	—	—	1.39	11 [§]	2
Copper	29	0	4.5	—	—	—	—	*	2
Iron	100	2	3870	248	381	352	324	1000	2
Lead	29	0	1.53	—	—	—	—	* [§]	2
Manganese	100		102	19.1	102	86.1	12.7	<i>nsv</i>	
Nickel	71	0	3.9	—	1.23	1.42	—	* [§]	2
Selenium	14	0	2.8	—	—	—	—	4.6	2
Zinc	29	0	12.2	—	—	—	—	* [§]	2

Average Values

Standard Parameters (mg/L)									
Dissolved Organic Carbon	100		4.3	2.6	5.1	2.6	1.5		
Sulfate	100		71.1	23.9	26.8	9.7	33.8		
Total Organic Carbon	100		5.0	2.4	5.8	—	1.5		
Total Solids	100		364.3	215	310	141	341		
Total Suspended Solids	100		31.3	4	13	4	14		
Field Parameters									
Conductivity (µmhos/cm @ 25° C)	100		483	318	487	195	457		
Dissolved Oxygen (mg/L)	100		9.9	8.9	8.9	4.5	9.6		
pH (SU)	100		8.3	9.1	8.1	7.2	8.6		
Temperature (°C)	100		14.0	15.2	13.3	13.5	16.0		
Turbidity (NTU)	100		30	4	7	3	5		



State of Oregon
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Appendix L
DETECTION SUMMARY

Samples collected
between June and
November 2011

POWDER BASIN

Station ID and Description

	Percent Detection	Number of samples over screening value	Station ID and Description			Screening Value (µg/L)	S.V. Reference
			Powder River at Hwy 86 (east of Baker City) 10724	Burnt River at Snake River Road (Huntington) 11494	Powder River at Snake River Road (Richland) 11857		
Maximum Values (µg/L)							
Current Use Pesticides							
Atrazine	22	0	0.0418	—	0.0275	1.0	9
Deisopropylatrazine	22	0	0.007	—	0.0042	2500	9
Desethylatrazine	22	0	0.015	—	0.0103	1000	9
Diuron	11	0	—	0.0042	—	2.4	9
Sulfometuron-methyl	22	0	0.0048	—	0.005	0.45	10
Plant or animal sterols							
beta-Sitosterol	100		1.65	1.37	0.859	<i>nsv</i>	
Cholesterol	100		2.45	1.54	1.11	<i>nsv</i>	
Coprostanol	100		0.126	0.072	0.0708	<i>nsv</i>	
Stigmastanol	100		0.33	0.198	0.219	<i>nsv</i>	
Priority Metals							
<i>Dissolved</i>							
Arsenic	100	7	4.33	5.79	2.44	<i>nsv</i>	
Barium	100		60.8	68	55.7	<i>nsv</i>	
Manganese	100		32.1	12.5	18.5	<i>nsv</i>	
Nickel	22	0	—	1.4	—	*	2
<i>Total Recoverable</i>							
Arsenic	100	7	4.45	5.97	2.46	<i>nsv</i>	
Barium	100	0	64.4	75.7	56.8	1000	1
Chromium	33	0	—	4.9	1.9	11 [§]	2
Copper	67	0	2.2	6.3	2.5	*	2
Iron	78	2	960	3660	1170	1000	2
Lead	33		0.24	0.79	0.28	*§	2
Manganese	100		80.4	109	50.6	<i>nsv</i>	
Nickel	56		1.2	5.8	1.8	*§	2
Zinc	11		—	10.8	—	*§	2
Average Values							
Standard Parameters (mg/L)							
Dissolved Organic Carbon	100		6.3	5.1	6.2		
Sulfate	100		19.6	49.3	14.4		
Total Organic Carbon	100		6.9	4.9	6.2		
Total Solids	100		242.7	350.7	219.0		
Total Suspended Solids	100		10.0	32.3	7.0		
Field Parameters							
Conductivity (µmhos/cm @ 25° C)	100		357	446	321		
Dissolved Oxygen (mg/L)	100		10.6	10.6	10.9		
pH (SU)	100		8.0	8.5	8.2		
Temperature (°C)	100		13.2	14.9	13.9		
Turbidity (NTU)	100		13	32	11		



**Appendix M
DETECTION SUMMARY**

Samples collected
between May and
November 2011 or April
and October 2013

ROGUE BASIN

Station ID and Description

	Percent Detection	Number of samples over screening value	Station ID and Description					Screening Value (µg/L)	S.V. Reference
			Rogue River at Lobster Creek Bridge 10414	Rogue River at Robertson Bridge (Merlin) 10418	Rogue River at Hwy 234 (Dodge Park) 10423	Applegate River at Hwy 199 (near Wilderville) 10428	Bear Creek at Valley View Road (North of Ashland) 10434		
Maximum Values (µg/L)									
Consumer Product Constituents									
Carbamazepine	7	—	—	—	—	—	0.0424	nsv	
DEET	3	—	—	—	—	—	0.032	nsv	
Diphenhydramine	3	—	—	—	—	—	0.0191	nsv	
Estriol	7	—	—	—	—	—	0.0004	nsv	
Sulfamethoxazole	33	0.0267	0.0261	—	—	—	0.175	nsv	
Venlafaxine	7	—	—	—	—	—	0.0309	nsv	
Current Use Pesticides									
Atrazine	20	0	—	0.007	0.0091	—	—	1.0 9	
Deisopropylatrazine	3	0	—	—	—	—	—	2500 9	
Diuron	43	0	0.00575	0.008	—	0.015	0.0064	2.4 9	
Sulfometuron-methyl	10	0	—	—	—	—	0.0041	0.45 10	
Plant or animal sterols									
beta-Sitosterol	100	0.368	0.33	0.259	0.29	0.774	nsv		
Cholesterol	100	1	0.71	0.503	0.694	0.87	nsv		
Coprostanol	73	0.0406	0.1	—	0.0114	0.037	nsv		
Stigmastanol	100	0.0267	0.0439	0.027	0.027	0.066	nsv		
Priority Metals									
<i>Dissolved</i>									
Arsenic	80	1	0.49	0.43	0.28	0.66	0.65	nsv	
Barium	100	8.78	8.3	4.3	12.5	25.4	nsv		
Chromium	10	0	—	—	—	—	11	2	
Copper	10	0	—	—	—	2.5	*#	2	
Nickel	27	0	1.52	—	—	2.6	—	* 2	
Zinc	30	0	—	7.8	6.4	18.5	11.6	* 2	
<i>Total Inorganic</i>									
Arsenic	100	0	0.391	N/A	N/A	N/A	N/A	2.1 1	
<i>Total Recoverable</i>									
Arsenic	87	2	—	0.47	0.31	0.61	0.74	nsv	
Barium	100	0	13.5	9.5	5.1	11.9	25.8	1000 1	
Chromium	13	0	3.33	—	—	—	11 [§]	2	
Copper	20	0	1.64	—	—	1.6	1.8	* 2	
Iron	43	1	1020	250	—	—	570	1000 2	
Lead	17	0	0.25	—	—	—	0.21	*\$ 2	
Manganese	100	31.1	12.4	14.5	7.1	41.2	nsv		
Nickel	40	0	6.33	1.1	—	3.1	—	*\$ 2	
Zinc	23	0	—	8.0	6.1	12.4	8.2	*\$ 2	
Average Values									
Standard Parameters (mg/L)									
Dissolved Organic Carbon	85	1.7	5.3	3.8	5.3	7.9			
Sulfate	100	2.5	2.1	0.7	3.6	7.7			
Total Organic Carbon	100	1.3	4.7	3.7	6.2	9.8			
Total Solids	100	82.7	91.3	66.0	96.0	137.0			
Total Suspended Solids	67	6.5	2.0	1.5	1.0	5.0			
Field Parameters									
Conductivity (µmhos/cm @ 25° C)	100	103	97	63	136	179			
Dissolved Oxygen (mg/L)	100	11.2	11.0	11.4	10.6	10.0			
pH (SU)	100	8.5	8.2	8.0	8.2	8.3			
Temperature (°C)	100	15.6	13.8	9.8	13.8	14.2			
Turbidity (NTU)	100	3	4	2	1	6			



ROGUE BASIN							
Station ID and Description							
	Little Butte Creek at Agate Road (White City)	Bear Creek at Kirtland Road (Central Point)	Rogue River at Casey State Park	Illinois River downstream of Kerby	Rogue River at RM 120.76, upstream of Gold Hill PWS Intake	Screening Value (µg/L)	S.V. Reference
	10602	11051	11375	11482	34860		

Samples collected between May and November 2011 or April and October 2013

Maximum Values (µg/L)

Consumer Product Constituents							
Carbamazepine	—	—	—	—	—	<i>nsv</i>	
DEET	—	—	—	—	—	<i>nsv</i>	
Diphenhydramine	—	—	—	—	—	<i>nsv</i>	
Estriol	—	0.0019	—	—	—	<i>nsv</i>	
Sulfamethoxazole	—	0.042	—	—	0.0194	<i>nsv</i>	
Venlafaxine	—	—	—	—	—	<i>nsv</i>	
Current Use Pesticides							
Atrazine	—	—	0.0107	—	0.0087	1.0	9
Deisopropylatrazine	—	0.0053	—	—	—	2500	9
Diuron	0.008	0.0815	—	—	0.0074	2.4	9
Sulfometuron-methyl	—	0.0051	—	—	—	0.45	10
Plant or animal sterols							
beta-Sitosterol	0.722	0.731	0.32	0.244	0.481	<i>nsv</i>	
Cholesterol	1.5	1.36	0.436	0.708	0.674	<i>nsv</i>	
Coprostanol	0.046	0.0674	—	0.00818	0.136	<i>nsv</i>	
Stigmastanol	0.169	0.123	0.0248	0.015	0.0526	<i>nsv</i>	
Priority Metals							
<i>Dissolved</i>							
Arsenic	2.05	2.3	0.26	—	0.45	<i>nsv</i>	
Barium	16.2	35.9	3.5	6.8	6.9	<i>nsv</i>	
Chromium	—	—	—	1.7	—	11	2
Copper	1.5	1.9	—	—	—	*#	2
Nickel	—	1.1	—	6.3	—	*	2
Zinc	5.3	7.1	11.3	5.1	5.7	*	2
<i>Total Inorganic</i>							
Arsenic	N/A	N/A	N/A	N/A	N/A	2.1	1
<i>Total Recoverable</i>							
Arsenic	2.22	2.59	0.31	—	0.51	<i>nsv</i>	
Barium	18.9	39.5	4.3	7.0	8.7	1000	1
Chromium	—	—	—	—	—	11 ^{\$}	2
Copper	2	2.9	—	—	—	*	2
Iron	600	770	—	—	310	1000	2
Lead	—	0.43	—	0.23	—	*\$	2
Manganese	43.8	47	24.2	4	14.5	<i>nsv</i>	
Nickel	1.1	1.6	—	7.3	—	*\$	2
Zinc	—	—	8.8	7.0	—	*\$	2

Average Values

Standard Parameters (mg/L)							
Dissolved Organic Carbon	5.3	7.9	3.0	3.3	3.2		
Sulfate	1.0	12.3	0.6	1.4	1.5		
Total Organic Carbon	7.8	13.1	3.7	3.0	3.8		
Total Solids	106.3	195.3	68.7	90.7	80.0		
Total Suspended Solids	5.3	7.7	1.0		1.7		
Field Parameters							
Conductivity (µmhos/cm @ 25° C)	106	283	60	131	82		
Dissolved Oxygen (mg/L)	10.5	10.9	11.2	10.3	10.8		
pH (SU)	8.0	8.3	7.7	8.0	8.2		
Temperature (°C)	13.2	14.6	9.6	13.4	12.1		
Turbidity (NTU)	6	9	2	1	3		



State of Oregon
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Appendix N
DETECTION SUMMARY

Samples collected between
May and November 2012

SANDY BASIN
Station ID and Description

	Percent Detection	Number of samples over screening value	Station ID and Description					Screening Value (µg/L)	S.V. Reference
			Sandy River at Troutdale Bridge 10674	Gordon Creek 11025	Camp Creek at campground ds. of Bruin Run Creek 26419	Beaver Creek at river mile 0.9 north of Otto Park (Sandy) 34102	Kelly Creek at Kane Rd Gresham upstream of Mt. Hood Community College Pond 37091		
Maximum Values (µg/L)									
Ammonia									
Ammonia as N	40	0	—	—	—	30.0	67.0	† 2	
Combustion By-Products									
Naphthalene	10	—	—	—	0.0572	—	—	nsv	
Phenanthrene	7	—	—	—	—	0.00314	—	nsv	
Current Use Pesticides									
2,3,5,6-Tetrachlorophenol	7	—	—	—	—	—	0.0635	nsv	
Chlorpropham	7	—	—	—	—	0.578	—	nsv	
Deisopropylatrazine	27	0	—	—	—	0.00726	0.0056	1000 9	
Diuron	40	0	—	—	—	0.0174	0.0293	2.4 9	
Fenvalerate+Esfenvalerate	7	1	—	—	0.235	—	—	0.017 8	
Imidacloprid	7	0	—	—	—	—	0.0223	1.05 8	
Metolachlor	13	0	—	—	—	0.05	—	1 8	
Metribuzin	7	0	—	—	—	0.00553	—	8.7 9	
Napropamide	13	0	—	—	—	0.0302	—	1100 6	
Pendimethalin	7	0	—	—	—	—	0.0347	5.2 9	
Prometon	20	0	—	—	—	—	0.00769	98 9	
Pyraclostrobin	7	0	—	—	—	0.00444	—	1.5 9	
Simazine	40	0	—	—	—	0.0331	0.0207	36 9	
Trifluralin	13	0	—	—	—	0.00049	0.0012	1.14 6	
Flame retardants									
PBDE-209	33	—	—	—	—	—	0.00128	nsv	
PBDE-99	100	—	0.00287	—	—	—	—	nsv	
Industrial Chemicals or Intermediates									
2,4-Dimethylphenol	36	—	0.00632	—	—	0.00988	0.0129	nsv	
Legacy Pesticides									
Aldrin	3	5	—	—	—	0.000109	—	0.000005 1	
BHC-technical (HCH)	2	0	—	—	—	0.0000622	—	0.0014 1	
BHC-gamma (Lindane)	3	0	—	—	—	0.0000622	—	0.08 2	
Chlordane	17	5	—	—	—	0.000575	0.000295	0.000081 1	
alpha-Chlordane	17	—	—	—	—	0.000239	0.000128	nsv	
gamma-Chlordane+trans-Nonachlor	17	—	—	—	—	0.000336	0.000192	nsv	
Dieldrin	23	2	0.000063	—	—	0.00723	0.0058	0.0053 1	
Endosulfan (I + II)	2	0	0.000187	—	—	0.001717	0.000155	0.056 2	
Endosulfan I	19	0	0.000187	—	—	0.000197	0.000139	0.056 2	
Endosulfan II	14	0	—	—	—	0.00152	0.000155	0.056 2	
Endosulfan sulfate	30	0	0.353	—	0.0000697	0.0162	0.001	8.5 1	
Endrin+cis-Nonachlor	20	—	—	—	—	0.000216	—	nsv	
Heptachlor epoxide	20	6	—	—	—	0.000459	0.000254	0.0000039 1	
Total DDT	20	5	—	—	—	0.003709	0.0025584	0.001 2	
2,4'-DDD	33	—	—	—	—	0.000238	0.000111	nsv	
2,4'-DDT	27	—	—	—	—	0.000162	0.0000863	nsv	
4,4'-DDD	20	6	—	—	—	0.000829	0.000317	0.000031 1	
4,4'-DDE	20	6	—	—	—	0.00184	0.00168	0.000022 1	
4,4'-DDT	20	6	—	—	—	0.000929	0.000496	0.000022 1	
Plant or animal sterols									
beta-Sitosterol	100	—	0.436	0.386	0.303	0.648	1.24	nsv	
Cholesterol	100	—	0.543	0.181	0.195	1.16	1.98	nsv	
Coprostanol	93	—	0.0228	0.00297	0.0286	0.126	0.0297	nsv	
Stigmastanol	100	—	0.0363	0.0399	0.0372	0.0925	0.174	nsv	
Priority Metals									
<i>Dissolved</i>									
Arsenic	21	0	—	—	—	0.4	0.33	nsv	
Barium	50	—	2.23	—	2.16	25.6	24.8	nsv	
Iron	7	0	—	—	—	—	175	1000# 2	
Manganese	43	—	2.7	—	—	50.2	59.4	nsv	
Zinc	21	0	6.37	—	—	—	11.2	* 2	
<i>Total Inorganic</i>									
Arsenic	80	0	0.07	—	0.05	0.15	0.19	2.1 1	
<i>Total Recoverable</i>									
Arsenic	33	0	—	—	—	0.51	0.42	nsv	
Barium	73	0	2.91	2.07	2.25	28.3	26.9	1000 1	
Chromium	7	0	—	2.3	—	—	—	11\$ 2	
Copper	13	0	—	—	—	—	5.27	* 2	
Iron	60	1	213	354	153	561	1140	1000 2	
Lead	7	0	—	—	—	—	0.35	*\$ 2	
Manganese	100	—	5.63	7.42	2.71	58	90.4	nsv	
Nickel	7	0	—	1.4	—	—	—	*\$ 2	
Zinc	15	—	—	—	—	—	12.7	*\$ 2	
Average Values									
Standard Parameters (mg/L)									
Dissolved Organic Carbon	80	—	1.4	—	1.7	2.4	3.2		
Sulfate	100	—	2.6	0.3	1.1	7.3	6.0		
Total Organic Carbon	80	—	1.5	1.2	1.4	2.8	3.5		
Total Solids	100	—	49.7	35.3	54.3	132.0	121.3		
Total Suspended Solids	80	—	6.7	2.5	2.0	5.0	7.0		
Field Parameters									
Conductivity (µmhos/cm @ 25° C)	100	—	44	31	40	159	159		
Dissolved Oxygen (mg/L)	100	—	10.5	10.8	10.9	9.6	9.9		
pH (SU)	100	—	7.5	7.8	7.6	7.6	7.7		
Temperature (°C)	100	—	13.2	13.0	9.8	14.3	15.0		
Turbidity (NTU)	94	—	3	4	2	5	7		



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		Appendix O DETECTION SUMMARY		SOUTH COAST BASIN Station ID and Description						
		Percent Detection	Number of samples over screening value	North Fork Coquille River at Cooper Bridge 11571	Tenmile Creek at Lakeside Marina (off Park Street) 12607	West Fork Milliloma River at Allegany 13569	South Fork Coquille River, River Mile 1.0, Myrtle Point boat ramp 25754	Elk Creek at ODFW Hatchery 28303	Screening Value (µg/L)	S.V. Reference
Maximum Values (µg/L)										
Ammonia										
Ammonia as N	35	0	—	61.0	—	—	—	—	†	2
Combustion By-Products										
Acenaphthylene	4	—	—	0.0097	—	—	—	—	nsv	
Benzo(a)anthracene	2	1	—	—	0.00283	—	—	—	0.0013	1
Fluoranthene	19	0	—	0.00341	0.00272	—	—	—	14	1
Phenanthrene	6	—	—	—	—	—	—	—	nsv	
Consumer Product Constituents										
Caffeine	4	—	—	0.122	—	—	—	0.389	nsv	
Estrone	4	—	—	—	—	—	—	—	nsv	
Current Use Pesticides										
2,6-Dichlorobenzamide	22	—	—	—	—	—	—	—	nsv	
Atrazine	11	0	—	—	—	—	0.0141	—	1.0	9
Desethylatrazine	2	0	—	—	—	—	—	—	1000	9
Norflurazon	15	0	—	—	—	—	—	—	9.7	9
Flame retardants										
PBDE-100	6	—	0.000598	—	—	—	—	—	nsv	
PBDE-138	6	—	0.000155	—	—	—	—	—	nsv	
PBDE-139	6	—	0.000122	—	—	—	—	—	nsv	
PBDE-153	6	—	0.00021	—	—	—	—	—	nsv	
PBDE-209	22	—	—	0.00148	—	—	—	—	nsv	
PBDE-47	6	—	0.00238	—	—	—	—	—	nsv	
PBDE-99	6	—	0.00313	—	—	—	—	—	nsv	
Industrial Chemicals or Intermediates										
1,2,4-Trichlorobenzene	2	—	—	—	—	—	0.0083	—	nsv	
Legacy Pesticides										
BHC-technical (HCH)	6	0	—	—	—	—	—	—	0.0014	1
BHC-alpha	13	0	—	—	—	—	—	—	0.00045	1
BHC-beta	8	0	—	—	—	—	—	—	0.0016	1
Dieldrin	5	5	—	—	—	—	—	—	0.0000053	1
Plant or animal sterols										
beta-Sitosterol	100	—	0.432	4.53	0.471	0.503	0.126	—	nsv	
Cholesterol	100	—	0.826	2.95	1.02	0.578	0.2	—	nsv	
Coprostanol	91	—	0.0313	0.0247	0.0196	0.0527	0.00383	—	nsv	
Stigmastanol	96	—	0.0668	0.157	0.0513	0.0548	0.0106	—	nsv	
Priority Metals										
<i>Dissolved</i>										
Arsenic	65	14	0.47	0.99	0.3	0.6	—	—	nsv	
Barium	70	—	11.9	6.67	6.68	14.5	6.2	—	nsv	
Copper	4	2	—	—	—	—	—	—	#	2
Iron	26	0	270	—	—	—	—	—	1000 [#]	2
Manganese	85	—	21.9	127	11.1	34.7	—	—	nsv	
Nickel	28	0	—	—	—	2.12	—	—	*	2
Zinc	11	0	—	—	8.61	—	—	—	*	2
<i>Total Inorganic</i>										
Arsenic	100	6	0.381	0.881	0.16	0.369	0.12	—	2.1	1
<i>Total Recoverable</i>										
Arsenic	72	13	0.61	1.08	0.32	0.65	—	—	nsv	
Barium	72	0	12.8	7.25	6.85	15.3	6.28	—	1000	1
Chromium	20	0	—	—	—	2.04	—	—	11 [§]	2
Copper	4	0	—	—	—	—	—	—	*	2
Iron	44	4	511	239	—	481	—	—	1000	2
Lead	6	0	—	—	—	—	—	—	*§	2
Manganese	89	—	25.5	103	12.0	42.6	—	—	nsv	
Nickel	37	0	—	—	—	3.59	1	—	*§	2
Zinc	7	0	—	—	7.23	—	—	—	*§	2
Average Values										
Standard Parameters (mg/L)										
Dissolved Organic Carbon	88	—	2.2	3.1	2.0	1.7	—	—		
Sulfate	100	—	2.8	1.5	1.3	5.6	4.2	—		
Total Organic Carbon	80	—	1.8	3.3	1.7	1.6	—	—		
Total Solids	100	—	62.0	58.3	39.7	82.7	51.7	—		
Total Suspended Solids	76	—	4.0	3.5	—	3.7	—	—		
Field Parameters										
Conductivity (µmhos/cm @ 25° C)	100	—	72	69	46	112	74	—		
Dissolved Oxygen (mg/L)	100	—	9.7	7.9	10.0	9.6	10.8	—		
pH (SU)	100	—	7.2	6.8	7.1	7.3	7.8	—		
Temperature (°C)	100	—	15.0	17.1	16.0	15.5	14.0	—		
Turbidity (NTU)	93	—	3	3	1	4	2	—		



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	SOUTH COAST BASIN				Screening Value (µg/L)	S.V. Reference
	Station ID and Description					
	Ferry Creek Downstream of ODFW Hatchery 28803	Chetco River below Jack Creek 30670	New River near Storm Ranch Boat Ramp 36638	Johnson Creek upstream of golf course (Bandon) 37405		
Maximum Values (µg/L)						
Ammonia						
Ammonia as N	91.0	—	12.0	24.0	‡	2
Combustion By-Products						
Acenaphthylene	—	—	0.0124	—	<i>nsv</i>	
Benzo(a)anthracene	—	—	—	—	0.0013	1
Fluoranthene	—	—	—	—	14	1
Phenanthrene	—	—	—	—	<i>nsv</i>	
Consumer Product Constituents						
Caffeine	—	—	—	—	<i>nsv</i>	
Estrone	—	—	—	—	<i>nsv</i>	
Current Use Pesticides						
2,6-Dichlorobenzamide	0.752	—	0.165	1.73	<i>nsv</i>	
Atrazine	—	—	0.009	—	1.0	9
Desethylatrazine	—	—	—	—	1000	9
Norflurazon	0.0492	—	0.0296	0.0357	9.7	9
Flame retardants						
PBDE-100	—	—	—	—	<i>nsv</i>	
PBDE-138	—	—	—	—	<i>nsv</i>	
PBDE-139	—	—	—	—	<i>nsv</i>	
PBDE-153	—	—	—	—	<i>nsv</i>	
PBDE-209	—	0.00102	—	—	<i>nsv</i>	
PBDE-47	—	—	—	—	<i>nsv</i>	
PBDE-99	—	—	—	—	<i>nsv</i>	
Industrial Chemicals or Intermediates						
1,2,4-Trichlorobenzene	—	—	—	—	<i>nsv</i>	
Legacy Pesticides						
BHC-technical (HCH)	—	—	—	—	0.0014	1
BHC-alpha	—	—	—	—	0.00045	1
BHC-beta	—	—	—	—	0.0016	1
Dieldrin	0.00013	—	—	0.000185	0.0000053	1
Plant or animal sterols						
beta-Sitosterol	1.11	0.134	1.33	1.54	<i>nsv</i>	
Cholesterol	4.24	0.188	1.92	1.05	<i>nsv</i>	
Coprostanol	0.0575	—	0.0241	0.167	<i>nsv</i>	
Stigmastanol	0.223	0.0089	0.135	0.295	<i>nsv</i>	
Priority Metals						
<i>Dissolved</i>						
Arsenic	0.27	0.26	1.16	0.45	<i>nsv</i>	
Barium	11.2	21.5	19.0	18.9	<i>nsv</i>	
Copper	—	51.9	—	—	‡	2
Iron	403	—	517	788	1000 [#]	2
Manganese	21.4	—	50.7	107	<i>nsv</i>	
Nickel	1.07	—	2.95	1.07	*	2
Zinc	—	—	—	—	*	2
<i>Total Inorganic</i>						
Arsenic	0.23	0.2	0.639	0.469	2.1	1
<i>Total Recoverable</i>						
Arsenic	0.31	0.27	1.22	0.69	<i>nsv</i>	
Barium	12.1	21.8	24.3	22	1000	1
Chromium	—	—	3.93	2.31	11 [§]	2
Copper	—	—	—	1.61	*	2
Iron	818	—	1500	2440	1000	2
Lead	—	—	0.28	0.45	* [§]	2
Manganese	22.7	2.23	63.6	124	<i>nsv</i>	
Nickel	1.14	1.02	6.14	2.2	* [§]	2
Zinc	—	—	—	—	* [§]	2
Average Values						
Standard Parameters (mg/L)						
Dissolved Organic Carbon	2.7		4.0	3.8		
Sulfate	2.0	3.4	3.6	4.4		
Total Organic Carbon	2.6		3.9	3.7		
Total Solids	71.7	54.0	81.0	89.7		
Total Suspended Solids	1.3		5.0	9.7		
Field Parameters						
Conductivity (µmhos/cm @ 25° C)	94	83	123	108		
Dissolved Oxygen (mg/L)	10.3	8.4	11.1	9.7		
pH (SU)	7.2	7.7	8.0	6.9		
Temperature (°C)	11.2	14.6	16.4	12.2		
Turbidity (NTU)	4	1	4	14		



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Samples collected between April and October 2013	SOUTH COAST BASIN Station ID and Description					Screening Value (µg/L)	S.V. Reference
	Joe Ney Slough at east end of dock	Coquille River at Riverton Boat Ramp	South Fork Coos River at Anson Rogers Bridge	North Slough at mouth (Causeway Bridge)	Coquille Bay at Bandon Boat Launch-Conc. Pier		
	13400	13405	13574	13587	13680		
	Maximum Values (µg/L)						
Ammonia							
Ammonia as N	96.0	—	—	80.0	—	†	3
Combustion By-Products							
Acenaphthylene	—	—	—	—	—	nsv	
Benzo(a)anthracene	—	—	—	—	—	0.0018	1
Fluoranthene	—	—	—	0.00404	0.00512	14	1
Phenanthrene	—	—	—	0.0149	—	nsv	
Consumer Product Constituents							
Caffeine	—	—	—	—	—	nsv	
Estrone	—	—	—	0.00247	—	nsv	
Current Use Pesticides							
2,6-Dichlorobenzamide	—	—	—	—	—	nsv	
Atrazine	—	0.0106	0.0131	—	0.00823	1.0	9 [†]
Desethylatrazine	—	—	0.00481	—	—	1000	9 [†]
Norflurazon	—	—	—	—	—	9.7	9 [†]
Flame retardants							
PBDE-100	—	—	—	—	—	nsv	
PBDE-138	—	—	—	—	—	nsv	
PBDE-139	—	—	—	—	—	nsv	
PBDE-153	—	—	—	—	—	nsv	
PBDE-209	—	0.00161	—	0.00193	—	nsv	
PBDE-47	—	—	—	—	—	nsv	
PBDE-99	—	—	—	—	—	nsv	
Industrial Chemicals or Intermediates							
1,2,4-Trichlorobenzene	—	—	—	—	—	nsv	
Legacy Pesticides							
BHC-technical (HCH)	0.000312	—	—	0.000244	0.00021	0.0014	1
BHC-alpha	0.000179	—	—	0.000137	0.000173	0.00049	1
BHC-beta	0.000133	—	—	0.000108	0.00009	0.0017	1
Dieldrin	—	—	—	—	—	0.0000054	1
Plant or animal sterols							
beta-Sitosterol	0.325	0.322	0.259	0.231	0.157	nsv	
Cholesterol	2.39	0.435	0.713	0.924	1.1	nsv	
Coprostanol	0.00857	0.089	0.0145	0.008	0.0294	nsv	
Stigmastanol	0.0483	0.0696	0.0606	0.0502	0.041	nsv	
Priority Metals							
<i>Dissolved</i>							
Arsenic	1.92	0.65	0.36	1.56	2.04	nsv	
Barium	—	12.5	42.4	—	—	nsv	
Copper	3.94	—	—	—	—	3.1	3
Iron	—	233	178	—	—	nsv	
Manganese	9.48	28.2	30.2	14.5	16.3	nsv	
Nickel	—	1.93	—	—	2.2	8.2	3
Zinc	—	—	18.8	14.4	—	81	3
<i>Total Inorganic</i>							
Arsenic	1.25	0.565	0.312	1.05	1.35	1.0	1
<i>Total Recoverable</i>							
Arsenic	2.16	0.79	0.51	1.8	2.04	nsv	
Barium	—	14.6	41.4	—	—	nsv	1
Chromium	—	1.59	—	—	1.36	50 [§]	3
Copper	—	1.6	—	—	—	3.1 [§]	3
Iron	—	634	344	—	—	nsv	
Lead	—	—	—	—	—	8.1 [§]	3
Manganese	11.1	32.9	37.0	18.6	18.9	nsv	
Nickel	—	3.09	—	—	2.66	8.2 [§]	3
Zinc	—	—	8.63	11.2	—	81 [§]	3
	Average Values						
Standard Parameters (mg/L)							
Dissolved Organic Carbon	2.0	2.1	2.2	2.0	1.6		
Sulfate	2126.7	6.6	66.9	2036.7	1842.3		
Total Organic Carbon	1.9	2.0	2.0	1.9	1.8		
Total Solids	28700.0	96.0	1026.0	27533.3	25600.0		
Total Suspended Solids	17.3	7.3	5.3	31.7	10.7		
Field Parameters							
Conductivity (µmhos/cm @ 25° C)	42967	135	1629	41467	36233		
Dissolved Oxygen (mg/L)	8.5	8.8	8.9	9.8	9.7		
pH (SU)	7.9	7.3	7.1	7.9	7.8		
Temperature (°C)	14.1	16.0	16.0	14.8	11.2		
Turbidity (NTU)	3	6	4	9	3		



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	SOUTH COAST BASIN				Screening Value (µg/L)	S. V. Reference
	Station ID and Description					
	Coos Bay at City Dock	Sixes River at RM 1.1	Winchuck R Estuary at Hwy 101 Bridge	Coos Bay at North Spit BLM Boat Ramp		
Samples collected between April and October 2013		33476	34309	36750	37415	
Maximum Values (µg/L)						
Ammonia						
Ammonia as N	87.0	—	—	62.0	‡	3
Combustion By-Products						
Acenaphthylene	—	—	—	—	<i>nsv</i>	
Benzo(a)anthracene	—	—	—	—	0.0018	1
Fluoranthene	0.00375	—	—	0.00324	14	1
Phenanthrene	0.00588	—	—	—	<i>nsv</i>	
Consumer Product Constituents						
Caffeine	—	—	—	—	<i>nsv</i>	
Estrone	—	—	—	0.00268	<i>nsv</i>	
Current Use Pesticides						
2,6-Dichlorobenzamide	—	0.0388	—	—	<i>nsv</i>	
Atrazine	0.00462	—	—	—	1.0	9 [†]
Desethylatrazine	—	—	—	—	1000	9 [†]
Norflurazon	—	—	—	—	9.7	9 [†]
Flame retardants						
PBDE-100	—	—	—	—	<i>nsv</i>	
PBDE-138	—	—	—	—	<i>nsv</i>	
PBDE-139	—	—	—	—	<i>nsv</i>	
PBDE-153	—	—	—	—	<i>nsv</i>	
PBDE-209	—	—	—	—	<i>nsv</i>	
PBDE-47	—	—	—	—	<i>nsv</i>	
PBDE-99	—	—	—	—	<i>nsv</i>	
Industrial Chemicals or Intermediates						
1,2,4-Trichlorobenzene	—	—	—	—	<i>nsv</i>	
Legacy Pesticides						
BHC-technical (HCH)	0.0002016	—	—	0.000255	0.0014	1
BHC-alpha	0.000112	—	—	0.000198	0.00049	1
BHC-beta	0.0000896	—	—	0.000111	0.0017	1
Dieldrin	—	—	—	—	0.0000054	1
Plant or animal sterols						
beta-Sitosterol	0.118	0.305	0.292	0.142	<i>nsv</i>	
Cholesterol	0.417	0.555	0.755	1.2	<i>nsv</i>	
Coprostanol	0.0206	0.0121	0.01	0.00849	<i>nsv</i>	
Stigmastanol	0.0313	0.0367	0.0324	0.02	<i>nsv</i>	
Priority Metals						
<i>Dissolved</i>						
Arsenic	1.18	0.3	—	1.82	<i>nsv</i>	
Barium	—	19.2	22.1	—	<i>nsv</i>	
Copper	—	—	—	—	3.1	3
Iron	—	—	—	—	<i>nsv</i>	
Manganese	30.9	10.5	3.89	10.2	<i>nsv</i>	
Nickel	—	1.4	—	—	8.2	3
Zinc	16.0	—	8.63	11.6	81	3
<i>Total Inorganic</i>						
Arsenic	0.737	0.217	0.255	1.08	1.0	1
<i>Total Recoverable</i>						
Arsenic	1.32	0.41	—	1.9	<i>nsv</i>	
Barium	—	34.4	22.2	—	<i>nsv</i>	1
Chromium	—	2.1	—	—	50 [§]	3
Copper	—	—	—	—	3.1 [§]	3
Iron	—	524	—	—	<i>nsv</i>	
Lead	—	—	—	—	8.1 [§]	3
Manganese	32.7	16.3	5.04	14.1	<i>nsv</i>	
Nickel	—	3.78	—	—	8.2 [§]	3
Zinc	11.7	—	—	—	81 [§]	3
Average Values						
Standard Parameters (mg/L)						
Dissolved Organic Carbon	1.9	1.3	2.0	1.8		
Sulfate	1703.3	57.4	7.4	2216.7		
Total Organic Carbon	1.9	1.2	—	1.6		
Total Solids	24266.7	1039.0	—	28766.7		
Total Suspended Solids	11.7	5.3	2.0	16.0		
Field Parameters						
Conductivity (µmhos/cm @ 25° C)	35133	2162	217	44767		
Dissolved Oxygen (mg/L)	8.4	10.1	10.3	9.5		
pH (SU)	7.7	7.5	7.2	7.8		
Temperature (°C)	15.5	15.5	11.9	13.4		
Turbidity (NTU)	4	4	2	3		



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**Appendix P
DETECTION SUMMARY**

**UMATILLA AND WALLA WALLA BASINS
Station ID and Description**

Samples collected
between June and
November 2011

Percent Detection	Number of samples over screening value	Maximum Values (µg/L)				Screening Value (µg/L)	S.V. Reference
		Umatilla River at Yoakum Bridge 10404	Umatilla River at Hwy 11 (Pendleton) 10406	Willow Creek at Heppner Junction 10708	Umatilla River at Westland Road (Hermiston) 11489		

Combustion By-Products

Fluorene	4	0	0.023	—	—	—	390	1
Phenanthrene	4		0.044	—	—	—	<i>nsv</i>	

Consumer Product Constituents

17a-Estradiol	4		—	—	—	—	<i>nsv</i>	
Sulfamethoxazole	17		0.0531	—	—	0.0287	<i>nsv</i>	

Current Use Pesticides

Atrazine	39	0	0.0106	—	—	0.0072	1.0	9
Bromacil	22	0	0.036	—	0.087	—	6.8	9
Desethylatrazine	48	0	0.0063	—	0.0084	0.0359	1000	9
Diuron	22	0	0.0043	—	0.011	—	2.4	9
Fluridone	13	0	—	—	0.036	0.028	480	6
Hexazinone	4	0	—	—	—	—	7	9
Imazapyr	13	0	—	—	—	—	24	10
Norflurazon	9	0	—	—	0.026	—	9.7	6
Propiconazole	4	0	—	—	—	—	21	6
Sulfometuron-methyl	4	0	—	—	—	—	0.45	10

Plant or animal sterols

beta-Sitosterol	100		0.55	0.698	2.74	0.634	<i>nsv</i>	
Cholesterol	100		1.34	1.4	2.5	1.47	<i>nsv</i>	
Coprostanol	91		0.091	0.017	0.251	0.597	<i>nsv</i>	
Stigmastanol	100		0.061	0.047	0.558	0.112	<i>nsv</i>	

Metals

Dissolved

Arsenic	70	3	0.4	—	2.53	1.45	<i>nsv</i>	
Barium	100		17.9	11.5	56.2	48.2	<i>nsv</i>	
Manganese	91		6.0	2.8	15.2	8.1	<i>nsv</i>	

Total Recoverable

Arsenic	78	5	0.4	—	3.1	1.47	<i>nsv</i>	
Barium	100	0	22.2	11.4	146	50	1000	1
Beryllium	13		—	—	0.4	0.1	<i>nsv</i>	
Cadmium	4	0	—	—	0.1	—	*	2
Chromium	22	0	—	—	10.7	1.6	11 [§]	2
Copper	26	1	1.6	—	15.3	3.3	*	2
Iron	57	8	1790	470	18700	4300	1000	2
Lead	35	2	0.34	—	5.15	0.94	* [§]	2
Manganese	100		29.1	7.7	353	76.6	<i>nsv</i>	
Nickel	17	0	—	—	9.3	1.5	* [§]	2
Thallium	4	1	—	—	0.1	—	0.043	1
Zinc	17	0	—	—	34.3	8.0	* [§]	2

Average Values

Standard Parameters (mg/L)

Dissolved Organic Carbon	100		3.0	2.0	5.6	4.9		
Sulfate	100		3.7	1.6	28.4	12.3		
Total Organic Carbon	95		3.3	2.1	5.9	2.9		
Total Solids	100		127.0	80.0	473.3	245.3		
Total Suspended Solids	100		23.3	3.3	183.0	55.0		

Field Parameters

Conductivity (µmhos/cm @ 25° C)	100		123	88	427	263		
Dissolved Oxygen (mg/L)	100		12.0	10.9	11.3	11.1		
pH (SU)	100		8.6	8.9	8.4	8.2		
Temperature (°C)	100		13.5	15.1	14.3	14.2		
Turbidity (NTU)	100		14	4	193	26		



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UMATILLA AND WALLA WALLA BASINS
Station ID and Description

Samples collected
between June and
November 2011

Mckay Creek at Kirk Road (Pendleton)	Butter Creek at Old Stanfield Road (Bucks Corner)	Walla Walla River at OR/WA state line	Wildhorse Creek at McCormach Rd	Screening Value (µg/L)	S. V. Reference
12005	12015	23497	36445		

Maximum Values (µg/L)

Combustion By-Products

Fluorene	—	—	—	—	390	1
Phenanthrene	—	—	—	—	<i>nsv</i>	

Consumer Product Constituents

17a-Estradiol	—	0.01	—	—	<i>nsv</i>	
Sulfamethoxazole	—	0.0197	—	—	<i>nsv</i>	

Current Use Pesticides

Atrazine	0.0176	0.0097	—	0.0068	1.0	9
Bromacil	0.044	0.032	—	0.029	6.8	9
Desethylatrazine	0.0079	0.0057	—	0.0209	1000	9
Diuron	0.0041	0.0059	—	—	2.4	9
Fluridone	—	0.026	—	—	480	6
Hexazinone	—	0.027	—	—	7	9
Imazapyr	0.047	—	—	0.044	24	10
Norflurazon	—	0.025	—	—	9.7	6
Propiconazole	—	—	—	0.02	21	6
Sulfometuron-methyl	—	—	—	0.0044	0.45	10

Plant or animal sterols

beta-Sitosterol	0.396	1.45	0.494	0.718	<i>nsv</i>	
Cholesterol	0.58	2.8	0.46	1.53	<i>nsv</i>	
Coprostanol	0.0266	0.254	0.007	0.063	<i>nsv</i>	
Stigmastanol	0.0938	0.432	0.0464	0.14	<i>nsv</i>	

Metals

Dissolved

Arsenic	0.29	0.96	0.26	5.47	<i>nsv</i>	
Barium	16.4	34.3	14.9	91.3	<i>nsv</i>	
Manganese	10.8	2.5	4.8	20.2	<i>nsv</i>	

Total Recoverable

Arsenic	0.33	1.78	0.27	5.46	<i>nsv</i>	
Barium	22.6	98.5	15.2	91.1	1000	1
Beryllium	—	0.22	—	—	<i>nsv</i>	
Cadmium	—	—	—	—	*	2
Chromium	1.1	5.0	—	2.1	11 [§]	2
Copper	1.9	8.1	—	3	*	2
Iron	2330	10100	740	3030	1000	2
Lead	0.31	2.3	—	0.94	* [§]	2
Manganese	38.9	184	13.3	84.6	<i>nsv</i>	
Nickel	—	4.4	—	1.9	* [§]	2
Thallium	—	—	—	—	0.043	1
Zinc	—	18	—	9.5	* [§]	2

Average Values

Standard Parameters (mg/L)

Dissolved Organic Carbon	3.3	5.1	1.3	4.2
Sulfate	1.8	5.9	1.4	36.5
Total Organic Carbon	4.0	5.5	3.9	5.5
Total Solids	111.7	304.0	94.0	305.3
Total Suspended Solids	6.7	146.5	6.3	24.0

Field Parameters

Conductivity (µmhos/cm @ 25° C)	97	192	83	577
Dissolved Oxygen (mg/L)	11.1	9.8	10.4	11.5
pH (SU)	8.1	8.6	7.6	8.6
Temperature (°C)	11.3	19.1	11.3	14.3
Turbidity (NTU)	18	111	6	3



**Appendix Q
DETECTION SUMMARY**

Samples collected
between May and
November 2011 or April
and November 2013

**UMPQUA BASIN
Station ID and Description**

**Estuary
Site**

	Percent Detection	Number of samples over screening value	South Umpqua at Melrose Road 10442	North Umpqua at Garden Valley Road (Roseburg) 10451	Cow Creek at mouth 10997	South Umpqua at Days Creek Cutoff Road (Canyonville) 11484	Screening Value (µg/L)	S.V. Reference	Umpqua River at Discovery Center Docks 37399	Screening Value (µg/L)	S.V. Reference
Maximum Values (µg/L)											
Combustion By-Products											
Fluoranthene	7	0	—	—	—	—	14	1	0.00347	14	1
Consumer Product Constituents											
DEET	7		—	—	—	0.0307	<i>nsv</i>		—	<i>nsv</i>	
Sulfamethoxazole	13		0.0484	—	—	—	<i>nsv</i>		—	<i>nsv</i>	
Current Use Pesticides											
Atrazine	7	0	—	—	—	—	1.0	9	0.00484	1.0	9 [†]
Diuron	13	0	0.005	—	0.006	—	2.4	9	—	2.4	9 [†]
Sulfometuron-methyl	7	0	0.005	—	—	—	0.45	10	—	0.45	10 [†]
Plant or animal sterols											
beta-Sitosterol	100		0.662	0.36	0.458	0.504	<i>nsv</i>		0.214	<i>nsv</i>	
Cholesterol	100		1.15	0.635	0.909	0.892	<i>nsv</i>		0.524	<i>nsv</i>	
Coprostanol	87		0.271	0.006	0.0741	0.00859	<i>nsv</i>		0.0311	<i>nsv</i>	
Stigmastanol	100		0.0506	0.025	0.0562	0.04	<i>nsv</i>		0.0271	<i>nsv</i>	
Priority Metals											
<i>Dissolved</i>											
Arsenic	80	0	0.53	1.03	—	0.56	<i>nsv</i>		1.08	<i>nsv</i>	
Barium	87		17.6	3.7	19.7	13.7	<i>nsv</i>		5.34	<i>nsv</i>	
Manganese	87		4.3	3.1	5.6	3.0	<i>nsv</i>		10.5	<i>nsv</i>	
Nickel	27	0	1.0	—	1.7	—	*		—	8.2	3
Thallium	7		—	—	—	—	<i>nsv</i>		0.04	<i>nsv</i>	
Zinc	13	0	—	6.7	—	—	*		9.03	81	3
<i>Total Inorganic</i>											
Arsenic	100	0	N/A	N/A	N/A	N/A	2.1	1	0.475	1.0	1
<i>Total Recoverable</i>											
Arsenic	87	1	0.55	1.01	0.26	0.61	<i>nsv</i>		1.14	<i>nsv</i>	
Barium	87	0	18	4.0	20.1	13.7	1000	1	6.7	<i>nsv</i>	
Chromium	7	0	—	—	1.1	—	11 [§]		—	50 [§]	3
Iron	27	0	240	160	—	310	1000	2	317	<i>nsv</i>	
Manganese	100		16	7.7	7.1	8.1	<i>nsv</i>		21.6	<i>nsv</i>	
Nickel	33	0	1.0	—	2.2	—	* [§]		—	8.2 [§]	3
Average Values											
Standard Parameters (mg/L)											
Dissolved Organic Carbon	92		3.4	2.4	3.9	2.7			2.0		
Sulfate	100		5.9	1.5	3.7	5.4			272.6		
Total Organic Carbon	100		2.6	1.6	2.6	2.1			2.0		
Total Solids	100		98.3	61.0	90.7	82.3			3945.3		
Total Suspended Solids	73		2.0	2.0	1.5	2.0			5.0		
Field Parameters											
Conductivity (µmhos/cm @ 25° C)	100		153	64	126	111			7918		
Dissolved Oxygen (mg/L)	100		11.0	11.1	11.4	11.3			9.3		
pH (SU)	100		8.2	7.8	8.3	8.3			7.4		
Temperature (°C)	100		14.9	11.9	14.1	13.1			15.4		
Turbidity (NTU)	100		3	2	2	2			4		



**Appendix R
DETECTION SUMMARY**

**UPPER WILLAMETTE BASIN
Station ID and Description**

Samples collected
between April 2008 and
December 2009 or during
February and May 2010

Percent Detection

Number of samples over
screening value

Willamette River at
Albany (eastbound Hwy
20 bridge)

Willamette River at Old
Hwy 34 bridge
(Corvallis)

Willamette River at Hwy
99E (Harrisburg)

South Santiam River
Hwy 226 (Crabtree)

Mary's River at 99W
(Corvallis)

Screening Value (µg/L)

S.V. Reference

Maximum Values (µg/L)

Consumer Product Constituents

Carbamazepine	2	—	—	—	—	—	<i>nsv</i>	
Diethylphthalate	5	0	—	—	—	—	3800	1
Estrilol	5	—	—	—	0.0024	—	<i>nsv</i>	
Sulfamethoxazole	24	0.019	0.016	0.0123	0.0144	—	<i>nsv</i>	

Current Use Pesticides

2,4-D	3	0	—	—	—	—	100	1
Atrazine	32	0	0.019	0.0589	—	—	0.0126	9
Dicamba	2	0	—	—	—	—	0.061	9
Diuron	52	0	0.116	0.0454	0.14	0.007	0.058	9
Hexazinone	2	0	—	0.148	—	—	7	9
Metolachlor	7	0	—	0.0179	—	—	1	8
Metribuzin	12	0	—	0.0053	—	—	0.0374	9
Oxamyl	4	0	—	—	—	—	0.0113	8
Pentachlorophenol	14	1	—	0.135	—	—	0.15	1
Propiconazole	8	0	—	—	—	—	21	9
Simazine	12	0	0.015	0.047	—	—	0.0073	9

Flame retardants

PBDE-138	5	—	—	—	0.006	—	<i>nsv</i>	
PBDE-153	5	—	—	—	0.006	—	<i>nsv</i>	
PBDE-154	5	—	—	—	0.007	—	<i>nsv</i>	

Plant or animal sterols

Cholesterol	100	1.256	0.749	0.745	1.253	0.831	<i>nsv</i>	
Coprostanol	95	0.112	0.072	0.067	0.053	0.046	<i>nsv</i>	

Priority Metals

Total Recoverable

Barium	100	0	16.5	23.1	20.2	5.4	39.4	1000	1
Chromium	23	1	3.5	2.3	1.6	—	13.8	11 ^{\$}	2
Cobalt	36	—	0.96	1.37	1.12	0.26	4.3	<i>nsv</i>	
Copper	64	10	3.7	4.7	4.2	5.1	12.5	*	2
Iron	91	27	2110	2870	2360	520	6460	1000	2
Lead	75	24	0.87	1.27	0.85	0.58	1.34	* ^{\$}	2
Nickel	25	0	1.8	2.9	2.0	—	7.2	* ^{\$}	2
Uranium	1	—	—	—	—	—	—	<i>nsv</i>	
Vanadium	38	—	6.4	8.8	7.2	—	20.9	<i>nsv</i>	
Zinc	84	0	11.1	13.7	11.6	8.8	19.7	* ^{\$}	2

Average Values

Standard Parameters (mg/L)

Dissolved Organic Carbon	92	1.9	2.8	1.4	1.6	2.9	
Sulfate	100	2.5	2.5	2.0	1.2	2.5	
Total Organic Carbon	98	1.6	1.9	1.3	1.5	2.5	
Total Solids	100	62.8	68.3	53.8	40.7	81.5	
Total Suspended Solids	88	7.5	7.3	3.4	8.2	6.2	

Field Parameters

Conductivity (µmhos/cm @ 25° C)	100	69	73	56	42	107	
Dissolved Oxygen (mg/L)	100	10.2	10.4	10.9	11.2	10.1	
pH (SU)	100	7.5	7.6	7.7	7.4	7.6	
Temperature (°C)	100	12.8	13.4	12.1	12.0	13.8	
Turbidity (NTU)	100	6	11	7	7	7	



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Samples collected between April 2008 and December 2009 or during February and May 2010	UPPER WILLAMETTE BASIN Station ID and Description					Screening Value (µg/L)	S.V. Reference
	McKenzie River at Coburg Road	Middle Fork Willamette River at Jasper Bridge	Long Tom River at Sto Pit Road (Monroe)	Calapooia River at Queen Road	Coast Fork Willamette at Mt. Pisgah Park		
	10376	10386	11140	11180	11275		

Maximum Values (µg/L)

Consumer Product Constituents							
Carbamazepine	—	—	—	—	0.011	<i>nsv</i>	
Diethylphthalate	0.04998	0.0464	—	—	0.04726	3800	1
Estriol	—	—	—	—	—	<i>nsv</i>	
Sulfamethoxazole	—	—	—	—	0.012	<i>nsv</i>	
Current Use Pesticides							
2,4-D	—	—	0.14	0.63	—	100	1
Atrazine	—	—	0.0509	0.0734	0.0157	1.0	9
Dicamba	—	—	—	0.36	—	0.061	9
Diuron	—	—	0.62	2.13	0.16	2.4	9
Hexazinone	—	—	—	—	—	7	9
Metolachlor	—	—	0.0169	0.0345	—	1	8
Metribuzin	—	—	0.013	0.0639	—	8.7	9
Oxamyl	—	—	0.106	—	—	27	8
Pentachlorophenol	0.13499	0.115	0.159	0.138	0.112	0.15	1
Propiconazole	—	—	0.059	0.032	—	21	9
Simazine	—	—	0.0132	0.0615	—	36	9
Flame retardants							
PBDE-138	—	—	—	—	—	<i>nsv</i>	
PBDE-153	—	—	—	—	—	<i>nsv</i>	
PBDE-154	—	—	—	—	—	<i>nsv</i>	
Plant or animal sterols							
Cholesterol	0.706	0.724	2.59	2.196	1.477	<i>nsv</i>	
Coprostanol	0.015	0.0074	0.13	0.054	0.077	<i>nsv</i>	
Priority Metals							
<i>Total Recoverable</i>							
Barium	4.0	4.8	29.6	35.1	15.6	1000	1
Chromium	1.1	1.1	2.3	3.2	2.2	11 [§]	2
Cobalt	—	—	0.88	1.71	0.95	<i>nsv</i>	
Copper	2.1	2.7	4.9	6.4	5.0	*	2
Iron	314	520	2770	3370	2120	1000	2
Lead	8.66	0.49	0.9	1.56	0.71	* [§]	2
Nickel	1.2	1.1	1.8	5.0	1.3	* [§]	2
Uranium	—	—	—	0.12	—	<i>nsv</i>	
Vanadium	8.2	—	6.3	8.3	5.6	<i>nsv</i>	
Zinc	9.0	8.7	11.7	17.2	11	* [§]	2

Average Values

Standard Parameters (mg/L)							
Dissolved Organic Carbon	1.2	1.2	4.1	2.7	2.7		
Sulfate	2.7	1.4	3.0	3.0	1.9		
Total Organic Carbon	1.5	1.3	3.9	2.3	2.7		
Total Solids	57.3	54.5	98.5	74.3	65.2		
Total Suspended Solids	3.2	1.8	16.2	15.8	4.5		
Field Parameters							
Conductivity (µmhos/cm @ 25° C)	59	49	92	82	64		
Dissolved Oxygen (mg/L)	11.5	10.6	10.1	10.3	10.2		
pH (SU)	7.6	7.5	7.5	7.6	7.5		
Temperature (°C)	10.4	11.3	15.2	13.5	12.4		
Turbidity (NTU)	5	5	33	14	9		



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**Appendix S
DETECTION SUMMARY**

Samples collected
between April 2008 and
December 2009 or during
February and May 2010

**MID WILLAMETTE BASIN
Station ID and Description**

	Percent Detection	Number of samples over Screening Value	MID WILLAMETTE BASIN Station ID and Description				Screening Value (µg/L)	S.V. Reference
			Willamette River at Canby Ferry 10339	Willamette River at Wheatland Ferry 10344	Yamhill River at Dayton 10363	Willamette River at Marion Street (Salem) 10555		
Maximum Values (µg/L)								
Combustion By-Products								
Benzo(b)fluoranthene	3	1	0.033	—	—	—	0.0013	1
Benzo(g,h,i)perylene	3		—	0.021	—	—	<i>nsv</i>	
Chrysene	3	1	0.026	—	—	—	0.0013	1
Fluoranthene	3	0	0.034	—	—	—	14	1
Indeno(1,2,3-cd)pyrene	3	1	—	0.02	—	—	0.0013	1
Pyrene	3	0	0.028	—	—	—	290	1
Consumer Product Constituents								
bis(2-ethylhexyl)phthalate	3	1	—	—	—	—	0.2	1
Carbamazepine	16		0.01	—	0.045	—	<i>nsv</i>	
DEET	3		—	—	—	—	<i>nsv</i>	
Diethylphthalate	11	0	0.042	—	—	—	3800	1
Sulfamethoxazole	53		0.0285	0.028	0.337	0.019	<i>nsv</i>	
Venlafaxine	11		—	—	0.042	—	<i>nsv</i>	
Current Use Pesticides								
2,4-D	3	0	—	—	—	—	100	1
Atrazine	32	0	0.0279	0.0076	0.0211	0.0086	1.0	9
Carbaryl	5	0	—	—	0.0204	—	0.5	8
Chloroneb	8		—	0.068	0.028	0.056	<i>nsv</i>	
Diuron	68	1	0.329	0.221	3.06	0.272	2.4	9
Hexazinone	3	0	—	—	—	—	7	9
Metolachlor	13	0	0.0241	—	—	—	1	8
Metribuzin	16	0	0.0059	0.0043	0.0235	—	8.7	9
Norflurazon	5	0	—	—	—	—	9.7	9
Oxamyl	9	0	—	—	—	0.0519	27	8
Pentachlorophenol	16	1	0.145	—	0.15	—	0.15	1
Propiconazole	5	0	—	—	0.026	—	21	9
Simazine	32	0	0.102	0.03	0.124	0.0254	36	9
Terbutylazine	3	0	—	—	0.0035	—	1700	5
Plant or animal sterols								
Cholesterol	100		0.885	1.155	1.09	0.835	<i>nsv</i>	
Coprostanol	100		0.154	0.241	0.231	0.086	<i>nsv</i>	
Priority Metals								
<i>Total Recoverable</i>								
Arsenic	3	0	0.35	—	0.36	—	<i>nsv</i>	
Barium	99	0	25.4	8.1	61	19.6	1000	1
Chromium	19	1	3.8	4.2	12.1	2.9	11 [§]	2
Cobalt	42		1.55	0.25	5.55	1.1	<i>nsv</i>	
Copper	55	7	5.9	3.5	18.3	4.2	*	2
Iron	92	13	3420	507	13300	2580	1000	2
Lead	54	14	0.9	0.39	2.65	1.0	* [§]	2
Nickel	25	0	2.7	3.3	8.4	2.3	* [§]	2
Uranium	1		—	—	0.17	—	<i>nsv</i>	
Vanadium	21		10.6	4.4	34.0	7.7	<i>nsv</i>	
Zinc	79	1	9.1	6.9	28.6	14.8	* [§]	2
Average Values								
Standard Parameters (mg/L)								
Dissolved Organic Carbon	95		2.0	1.8	2.8	1.4		
Sulfate	100		2.9	2.7	6.1	2.7		
Total Organic Carbon	89		1.4	2.0	2.4	1.2		
Total Solids	100		59.0	56.8	113.0	56.8		
Total Suspended Solids	87		4.3	3.0	21.2	5.4		
Field Parameters								
Conductivity (µmhos/cm @ 25° C)	100		73	69	145	62		
Dissolved Oxygen (mg/L)	100		9.9	12.0	9.3	10.2		
pH (SU)	100		7.5	7.9	7.6	7.6		
Temperature (°C)	100		13.5	14.9	13.9	13.5		
Turbidity (NTU)	100		6	4	13	5		



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	MID WILLAMETTE BASIN Station ID and Description			Screening Value (µg/L)	S.V. Reference
	Molalla River at Knights Bridge Road (Canby) 10637	Pudding River at Hwy 211 (Woodburn) 10640	North Santiam River at Greens Bridge 10792		
Samples collected between April 2008 and December 2009 or during February and May 2010					
Maximum Values (µg/L)					
Combustion By-Products					
Benzo(b)fluoranthene	—	—	—	0.0013	1
Benzo(g,h,i)perylene	—	—	—	<i>nsv</i>	
Chrysene	—	—	—	0.0013	1
Fluoranthene	—	—	—	14	1
Indeno(1,2,3-cd)pyrene	—	—	—	0.0013	1
Pyrene	—	—	—	290	1
Consumer Product Constituents					
bis(2-ethylhexyl)phthalate	—	2.61	—	0.2	1
Carbamazepine	—	0.066	—	<i>nsv</i>	
DEET	—	0.0893	—	<i>nsv</i>	
Diethylphthalate	0.049	0.04	0.04026	3800	1
Sulfamethoxazole	—	0.308	—	<i>nsv</i>	
Venlafaxine	—	0.048	—	<i>nsv</i>	
Current Use Pesticides					
2,4-D	—	0.25	—	100	1
Atrazine	0.0158	0.0865	—	1.0	9
Carbaryl	—	0.0126	—	0.5	8
Chloroneb	—	—	—	<i>nsv</i>	
Diuron	0.0335	1.41	0.0772	2.4	9
Hexazinone	—	0.058	—	7	9
Metolachlor	—	0.036	—	1	8
Metribuzin	—	0.0141	—	8.7	9
Norflurazon	—	0.0377	—	9.7	9
Oxamyl	—	0.0157	0.0316	27	8
Pentachlorophenol	0.128	0.13	—	0.15	1
Propiconazole	—	—	—	21	9
Simazine	0.0346	0.159	—	36	9
Terbutylazine	—	—	—	1700	5
Plant or animal sterols					
Cholesterol	0.568	1.06	1.124	<i>nsv</i>	
Coprostanol	0.026	0.141	0.033	<i>nsv</i>	
Priority Metals					
<i>Total Recoverable</i>					
Arsenic	—	0.54	—	<i>nsv</i>	
Barium	13.9	33.6	19.0	1000	1
Chromium	2.5	1.5	2.1	11 ^{\$}	2
Cobalt	0.73	1.05	1.16	<i>nsv</i>	
Copper	26.8	3.2	3.5	*	2
Iron	990	2350	2160	1000	2
Lead	1.4	0.96	0.94	* ^{\$}	2
Nickel	2.5	1.2	2.4	* ^{\$}	2
Uranium	—	—	—	<i>nsv</i>	
Vanadium	—	7.5	5.1	<i>nsv</i>	
Zinc	19.7	131	9.5	* ^{\$}	2
Average Values					
Standard Parameters (mg/L)					
Dissolved Organic Carbon	1.6	3.0	1.2		
Sulfate	1.4	6.7	1.1		
Total Organic Carbon	1.8	2.8	1.0		
Total Solids	49.7	109.8	42.0		
Total Suspended Solids	6.0	10.0	8.6		
Field Parameters					
Conductivity (µmhos/cm @ 25° C)	57	142	42		
Dissolved Oxygen (mg/L)	11.2	9.3	11.2		
pH (SU)	7.7	7.4	7.5		
Temperature (°C)	12.5	14.3	11.7		
Turbidity (NTU)	3	7	5		



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Appendix T
DETECTION SUMMARY

Samples collected
between April 2008 and
December 2009 or during
February and May 2010

LOWER WILLAMETTE BASIN
Station ID and Description

	Percent Detection	Number of samples over screening value	Station ID and Description			Screening Value (µg/L)	S.V. Reference
			Clackamas River at Hwy 99E (Gladstone)	Tualatin River at Boones Ferry Road	Willamette River at Hawthorne Bridge		
			10360	10456	10611		
Maximum Values (µg/L)							
Consumer Product Constituents							
Caffeine	6		—	0.26	—	<i>nsv</i>	
Carbamazepine	29		—	0.15	0.016	<i>nsv</i>	
DEET	6		—	0.0313	—	<i>nsv</i>	
Diethylphthalate	12	0	—	0.049	0.05	3800	1
Diphenhydramine	13		—	0.034	—	<i>nsv</i>	
Sulfamethoxazole	53		—	0.28	0.0382	<i>nsv</i>	
Venlafaxine	18		—	0.091	—	<i>nsv</i>	
Current Use Pesticides							
2,4-D	6	0	—	0.22	—	100	1
Atrazine	41	0	—	0.0196	0.0104	1.0	9
Baygon (Propoxur)	12	0	—	0.0027	—	5.5	7
Carbaryl	18	0	—	0.0577	—	0.5	8
Carbofuran	12	0	—	0.0041	0.0026	0.75	8
Diuron	82	0	0.046	0.406	0.173	2.4	9
Imidacloprid	13	0	—	0.03	—	1.05	8
Metolachlor	29	0	—	0.141	—	1.0	8
Metribuzin	12	0	—	0.0125	0.0062	8.7	9
Oxamyl	7	0	—	0.0045	—	27	8
Pentachlorophenol	29	3	0.197	0.166	0.33	0.15	1
Prometon	13	0	—	0.0046	—	98	9
Propiconazole	6	0	—	0.014	—	21	9
Pyraclostrobin	6	0	—	0.0141	—	1.5	9
Simazine	47	0	—	0.0469	0.0266	36	9
Triclopyr	6	0	—	0.34	—	29800	9
Industrial Chemicals or Intermediates							
Chloroform	17	0	—	1.5	—	260	1
Dichlorobromomethane	17	0	—	0.5	—	310000	1
Plant or animal sterols							
Cholesterol	100		0.769	4.03	1.18	<i>nsv</i>	
Coprostanol	100		0.026	1.06	0.357	<i>nsv</i>	
Priority Metals							
<i>Total Recoverable</i>							
Arsenic	7	0	0.59	0.71	0.38	<i>nsv</i>	
Barium	100	0	32.6	39.3	31.5	1000	1
Chromium	22	0	3.6	3.7	3.5	11 [§]	2
Cobalt	47		2.73	1.58	1.8	<i>nsv</i>	
Copper	69	3	6.2	5.8	64.3	*	2
Iron	89	8	3560	4020	4470	1000	2
Lead	71	9	2.94	2.65	1.62	* [§]	2
Molybdenum	2		—	4.2	—	<i>nsv</i>	
Nickel	40	0	3.4	2.5	3.5	* [§]	2
Silver	2	0	—	0.16	—	* [§]	2
Uranium	2		0.16	—	—	<i>nsv</i>	
Vanadium	27		8.9	10.4	12.1	<i>nsv</i>	
Zinc	87	0	14.8	25.1	37.6	* [§]	2
Average Values							
Standard Parameters (mg/L)							
Dissolved Organic Carbon	88		1.3	4.6	1.9		
Sulfate	100		0.9	19.9	3.2		
Total Organic Carbon	82		1.3	4.2	2.6		
Total Solids	100		54.2	162.0	62.2		
Total Suspended Solids	94		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		