

North Coast Toxics Basin Summary

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State of Oregon
Department of
Environmental
Quality

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

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Executive summary

In 2015, the Oregon Department of Environmental Quality conducted water quality sampling of 10 rivers, creeks, and bays in the North Coast Basin. DEQ staff also collected samples of sediment and fish tissue from these waterways. This sampling builds on previous water quality sampling DEQ conducted in 2013 on North Coast waterways. DEQ tested for over 450 chemicals and detected 134 across all media. While most of the detected chemicals were within levels considered safe for aquatic life, wildlife and human health, others exceeded applicable state and federal water quality standards or benchmarks, including DDT in water samples; DDT, mercury, arsenic and lead in sediment; and inorganic arsenic in tissue samples. Holden Creek, which runs through Tillamook, had the highest number of chemical detections. In general, elevated levels of mercury and lead in sediment samples may indicate human influences. The Oregon Health Authority has issued a statewide fish consumption guideline for bass based on mercury concentrations (<https://go.usa.gov/xyxSb>) as well as a coastwide advisory for inorganic arsenic in softshell and gaper clams.

Introduction

In 2007, the Oregon Legislature funded the Oregon Department of Environmental Quality to begin the Statewide Water Quality Toxics Monitoring Program. To achieve the goals of the program, the DEQ Laboratory and Environmental Assessment Program developed a five-year monitoring plan. The initial phase of this plan followed a rotating basin approach to conduct reconnaissance sampling of the state's waters and was completed in 2013. DEQ made the water and tissue sampling results from this initial phase of sampling available in two separate statewide reports. The purpose of this summary is to combine the sampling results from all media types collected in the North Coast Basin during the initial phase of Toxics Monitoring Program sampling with the most recent phase, completed in 2015.

Throughout this summary, chemical concentrations are compared to media specific criteria, benchmarks or screening levels. Human health criteria for water quality are designed to protect people who consume drinking water and eat fish from these waterbodies over a lifetime. Aquatic life criteria apply to waterbodies where the protection of fish and aquatic life is a beneficial use as outlined by the Oregon Administrative Rules (<https://go.usa.gov/xyxSj>). EPA's aquatic life benchmarks apply to concentrations below which the chemical is not expected to harm aquatic life. Screening levels for chemicals in sediment estimate the likelihood that a chemical poses a threat to humans or wildlife as a result of eating fish, shellfish, or other aquatic organisms from a particular location. (DEQ 2007). In all media, the lowest screening level was used to ensure a conservative evaluation of contaminant levels.

During the second phase of sampling in the North Coast Basin, DEQ laboratory staff collected seasonal (May, August and November) water samples at 10 locations (Table 1). This is fewer sampling locations than the 2013 sampling effort. The reduction was due to lab capacity and a desire to increase sampling in other basins during 2015. DEQ laboratory staff also collected sediment and tissue samples during both years. Sediment sampling was limited to a subset of the monitoring locations in 2013 with 12 locations sampled. All 10 locations were sampled in 2015 (Figure 1). Results from these samples have not previously been reported. Tissue sampling results are presented in a short, basin specific summary of at the end of this report. For a full summary of the tissue sampling results view the Statewide Aquatic Tissue Toxics Report released in 2017 (<https://go.usa.gov/xyxSW>). Appendices A-C detail the detection results by media type.

Table 1 – North Coast Basin sampling locations.

Station	Site Code	Site Description	Matrices	Years Sampled
10521	NC01	Necanicum River at Forest Lake RV Camp (Seaside)	Water	2013
10812	NC02	Skipanon River at Hwy 101	Water and Sediment	2013, 2015
10816	NC23	Lewis and Clark River 0.5 miles upstream of Peterson Slough	Water and Sediment	2015
11005	NC03	Beaver Creek at Beaver	Water	2013
11229	NC04	Ecola CR at Cannon Beach Loop RD	Water and Sediment	2013
11849	NC05	Salmonberry River at mouth	Water	2013
12187	NC06	Youngs River at Youngs River Loop Road	Water	2013
12951	NC07	Wilson River at Hwy 6 (Lee's Camp)	Water	2013
12962	NC08	South Fork Trask River downstream of Edwards Creek	Water	2013
13297	NC20	Nehalem Bay at Brighton	Sediment	2015
13308	NC09	Tillamook Bay at Hobsonville Point	Water and Sediment	2013, 2015
13311	NC10	Netarts Bay at CNTY boat ramp	Water and Sediment	2013
13422	NC24	Wilson River at Sollie Smith Road (River Mile 3.5)	Water and Sediment	2015
13431	NC11	Trask River at Netarts Road (Hwy. 6)	Water and Sediment	2013
13440	NC12	Tillamook River at Bewley Creek Road	Water and Sediment	2013
13446	NC25	Nehalem Bay at Nehalem Bay State Park Boat Ramp	Water and Sediment	2015
13553	NC13	Youngs Bay at Old Hwy 101 bridge	Water	2013
13649	NC30	Columbia River Estuary at the south jetty	Tissue	2013
13654	NC14	Necanicum River at 12th St. approach	Water and Sediment	2013
18802	NC15	North Fork Nehalem River at Highway 53	Water and Sediment	2013

Table 1, continued – North Coast Basin sampling locations.

Station	Site Code	Site Description	Matrices	Years Sampled
22394	NC16	Nestucca River at first bridge ramp (upstream of Beaver)	Water	2013
23526	NC26	Beaver Creek at Beaver Falls Road (Tidewater, upstream of Stewart Creek)	Water and Sediment	2015
23587	NC21	Rock Creek at Keasey Road (River Mile 11) (Nehalem tributary, River Mile 90.7)	Water and Sediment	2015
24299	NC17	Nehalem River at Hwy 47 bridge, US of Vernonia	Water	2013
32980	NC18	Humbug Creek near mouth (Nehalem)	Water and Sediment	2013
34165	NC19	Clatskanie River above Fall Creek at Beaver boat ramp	Water	2013
37510	NC22	Nestucca Bay – undeveloped boat ramp off Brooten Road	Sediment	2015
37513	NC31	Tillamook Bay at Patterson Creek	Tissue	2013, 2015
37514	NC32	Nehalem Bay at RM 2.15	Tissue	2013, 2015
37609	NC33	Necanicum R. in Seaside	Tissue	2013
37610	NC34	Netarts Bay	Tissue	2013
38100	NC27	Holden Creek at Tillamook River Rd	Water and Sediment	2015
38101	NC28	Nestucca River at Pacific City boat ramp	Water	2015
38102	NC29	Big Creek at Big Creek County Park	Water and Sediment	2015
38168	NC35	Tillamook Bay – Garibaldi Flat	Tissue	2015
38170	NC36	Tillamook Bay – Bayocean	Tissue	2015

Water sample results

Seasonality

In order to capture seasonal use patterns and hydrologic differences, collection of water samples took place three times during each sampling year. Figure 2 shows the unique number of chemicals detected in each of the seasonal sampling events during both the 2013 and 2015 sampling efforts by chemical group. The analysis of PCBs, flame retardants and dioxins and furans was limited due to laboratory capacity limitations and equipment downtime in 2013, so these chemical groups were only sampled during the

spring sampling effort. This figure does not include plant and animal sterols. Detections for the four common sterols occurred during each season.

Metals made up the majority of detections in nearly all seasons during both sampling years. The only exceptions occurred during the 2013 spring sampling when a large number of flame retardants were detected and the 2013 summer sampling when consumer product constituents had the most unique chemicals detected. For comparison, more of these products were detected during that sampling event than in all of the other sampling events in the North Coast Basin combined. Detections for current use pesticides were less common although eight were detected during the fall sampling of 2015.

Priority Metals

This group includes all metals for which Oregon has existing water quality criteria. These metals occur naturally and may be enriched by human activities. Because of this, detections of these metals are common in water. Water samples contained 12 different metals in 2013 compared with 11 metals detected in 2015. Neither the Salmonberry River nor Nehalem River at Hwy 47 sites were resampled in 2015, despite having the greatest number of metals detections in 2013. Instead, the Holden Creek site had the greatest number of metals detections in 2015.

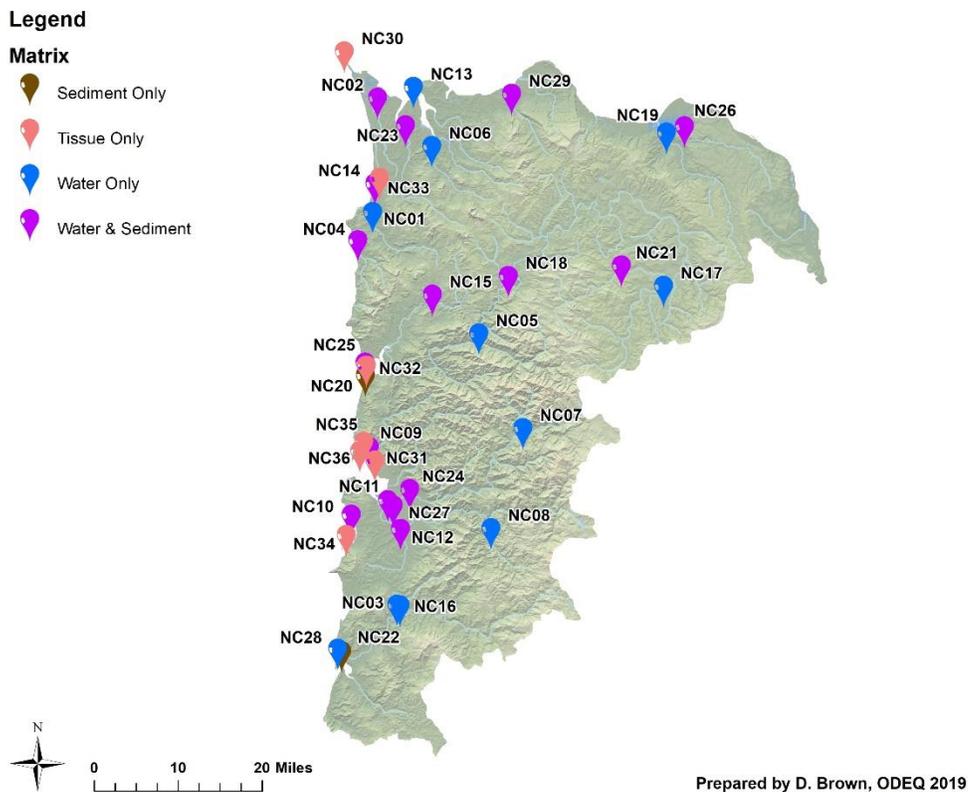


Figure 1 – Map of the study area with monitoring locations by matrix. Visit the Water Quality Toxics Monitoring Program webpage for a map of the whole state (<https://go.usa.gov/xyxSK>).

Although three iron exceedances occurred during the 2015 sampling effort, this is much lower than during the 2013 sampling effort when 11 exceedances were detected. Unlike in 2013, not all of the exceedances occurred during the same season, which may indicate a natural source of iron in the water. Copper was

detected over the biotic ligand model criterion during the 2015 sampling at the Holden Creek. Whether naturally occurring or anthropogenically enhanced the presence of these metals may affect salmon and other aquatic species.

The inorganic arsenic concentration exceeded the water quality criterion (1.0 µg/L) for the protection of human health at two estuary sites in 2013, Tillamook Bay and Netarts Bay. Similarly, in 2015, inorganic arsenic concentrations exceeded the criterion at the Tillamook Bay and Nehalem Bay sites. The Tillamook Bay site was the same in both years. Seasonally, inorganic arsenic concentrations at this location were elevated or exceeding during the spring or summer, and much lower during the fall.

Pesticides

Pesticides are a broad class of chemicals that includes insecticides, herbicides and fungicides. This study included pesticides currently in use and those no longer in use (legacy). Legacy pesticides refer to chlorinated insecticides, such as DDT, that have been banned in the United States. Despite the ban, legacy pesticides are frequently detected in water bodies across the state. Legacy pesticides are known to sequester in sediment where physical processes, such as photo-degradation by sunlight, or biological processes, like bacterial metabolism, can break parent pesticides down into different chemicals that may be more water soluble than the parent pesticide.

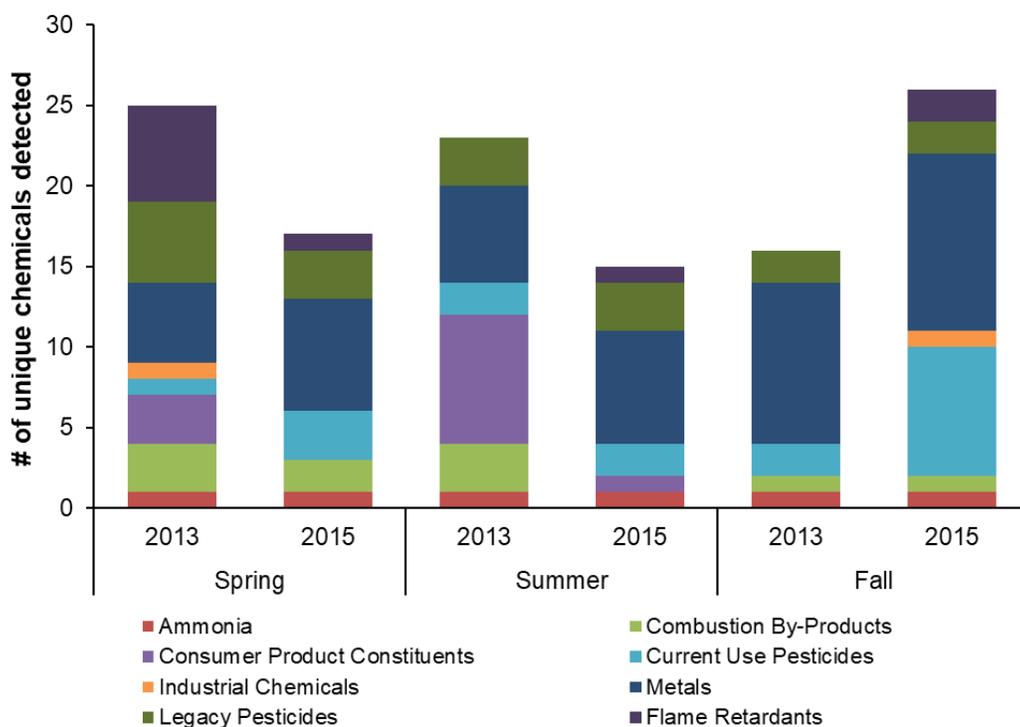


Figure 2. Seasonality of detections in the North Coast Basin by chemical group.

Two such breakdown products of DDT were detected in the Skipanon River in both 2013 and 2015. The concentrations of 4,4'-DDD and 4,4'-DDE at this location exceeded Oregon DEQ Table 40 water quality criteria for the protection of human health (Table 2). No other detections of DDT or its breakdown products occurred within the basin during either sampling effort. Alpha- and beta-BHC were detected at half of all estuary sites sampled in 2015 and all estuary sites sampled in 2013. None of these detections

exceeded applicable criteria, however, a comparison of concentrations detected at the only estuary site sampled during both sampling efforts revealed a higher concentration of alpha-BHC in 2015, while the beta-BHC concentration remained relatively constant (Table 2). In addition, isolated detections of endosulfan sulfate (2013) and gamma-BHC, or lindane, (2015) occurred at one monitoring location each. Neither detection exceeded existing water quality criteria.

Samples collected in the North Coast Basin in 2013 contained two current use herbicides and one herbicide degradate. Diuron, 2,4-D and 2,6-dichlobenzamide, a degradate or breakdown product of dichlobenil, were detected at levels below established EPA benchmarks (EPA, 2014). Nine current use herbicides or herbicide degradates were detected in 2015, including all three compounds detected during 2013. Diuron and 2,6-dichlobenil were detected at the same location in 2013 and 2015 (Table 2). The 2015 detections also included three compounds newly added to the analysis for the 2015 sampling effort (metsulfuron methyl, glyphosate and its breakdown product, aminomethylphosphonic acid). A majority of the detections, including the only detections of the new analytes, occurred in the fall sampling. This was also true for the 2013 sampling effort. The measured levels of these herbicides did not exceed any applicable EPA benchmark or DEQ criteria for the protection of aquatic life or human health.

Combustion by-products

Detections of combustion by-products occurred at two monitoring locations in 2015. This is down from four sites in 2013. A majority of these detections, across years, occurred during the spring or summer sampling events. Combustion by-products are associated with the incomplete combustion of organic matter from automobiles, fossil fuel burning, woodstoves and cigarette smoke. They may enter the water column through stormwater run-off as well as air deposition. Fluoranthene was detected at two sites in 2013 and one site in 2015. No other combustion by-product was found during both sampling efforts. In addition to fluoranthene, two other combustion by-products were detected in 2015, benzo(g,h,i)perylene and indeno(1,2,3-cd)pyrene. Each were only detected once in the spring of 2015. None of the detected levels of these compounds exceeded applicable water quality criteria.

Table 2. Concentrations (ng/L) of legacy and current use (bold italics) pesticides at two water monitoring locations sampled in 2013 and 2015. Blank cells indicate the chemical was not detected in the analysis. Red cells indicate concentrations above the water quality criteria for human health.

	Skipanon River		Tillamook Bay	
	2013	2015	2013	2015
4,4'-DDD	0.068	0.152		
4,4'-DDE	0.064	0.213		
alpha-BHC			0.158	0.385
beta-BHC			0.112	0.106
gamma-BHC (Lindane)				0.074
<i>2,6-dichlorobenzamide</i>	73.1	1570		
<i>Diuron</i>	6.76	5.69		

Consumer product constituents including pharmaceuticals

The laboratory analyzed water samples for 28 consumer product constituents including pharmaceuticals in 2015. Only one, carbamazepine, an anti-seizure medication, was detected. In 2013, DEQ analyzed for a similar suite of chemicals and detected four compounds not found in the 2015 samples. The compounds detected in 2013 included sulfamethoxazole, a common antibiotic, 17 α -ethynyl estradiol, an oral contraceptive medication, bis (2-ethylhexyl) adipate, a solvent used in plastics, and DEET, an insect repellent. While DEET was the most commonly detected analyte in 2013 with four detections from different monitoring locations, the minimum reporting limit was increased in 2015 to ensure accurate

results. This increase likely influenced the number of detections during the 2015 sampling. Regardless of year, a majority of detections occurred in the summer samples. Water quality criteria or benchmarks do not currently exist for these compounds.

Industrial chemicals and ammonia

This group of analytes includes a selection of chemical intermediates used in the production of pesticides, pharmaceuticals, rubber, consumer products, etc. Isophorone was detected at the Holden Creek monitoring location during the fall sampling event in 2015, but did not exceed the existing DEQ freshwater standard of 27 µg/L. Isophorone is primarily used as a solvent in inks and coatings, such as paints and lacquers. In 2013, 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. No water quality criteria or benchmarks exist for 2,6-dinitrotoluene.

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. As pH and temperature increase, the toxicity of ammonia increases. Detectable levels of ammonia occurred in samples from 6 of the 10 sites sampled in 2015 and 13 of the 20 sites sampled in 2013. None of the samples exceeded current aquatic life or human health water quality criteria.

Flame retardants

Polybrominated diphenyl ethers (PBDEs) are a group of flame retardants that were added to a variety of products such as laptops, automobiles, furniture and textiles. When these chemicals are released from products, they can enter the aquatic environment through air deposition, landfill leachate, and wastewater discharges. Five of the six PBDEs detected in 2013 samples were found at the Trask River at Netarts Road location. This is more unique PBDE detections than found in all of the 2015 samples. Four PBDEs were detected in 2015 samples. The Rock Creek at Keasey Road location had the highest number of detection with two. Seven other sites had isolated PBDE detections across both sampling years. Aquatic life or human health criteria do not currently exist for PBDEs in water.

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 also may be enriched by humans and human activities. None of the sterols detected currently have human health or aquatic life criteria. Additional work is required to evaluate this data and its implications and relationship to other chemicals fully.

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

The laboratory also measured two animal sterols, cholesterol and coprostanol (both detected at 100 percent of sites). As with the plant sterols, measured levels varied across the basin with the lowest levels detected at the Wilson River site and the highest levels detected at the Holden Creek site. While cholesterol is ubiquitous and found in a variety of different species, coprostanol is specific to fecal matter from humans and other mammals (e.g., cattle) as it is formed from cholesterol during digestion. The ratio of coprostanol to cholesterol may be used to evaluate contamination by human sewage. Ratios measured

at all sites in this study were less than one, potentially indicating a biogenic source (e.g., livestock) of coprostanol rather than an anthropogenic source.

Sediment sample results

Pesticides

No current use pesticides were included in the 2013 sediment analysis. In 2015, a short list of current use pesticides in the pyrethroid family were included in the sediment analysis due to their tendency to sequester in sediment. These pesticides are usually sold as wettable powders or granules under names like Talstar, Baygon or Temprid. Three non-pyrethroids, chlorpyrifos, oxyfluorfen and trifluralin, were also included. Typically, current use pesticides are less likely to accumulate in the environment than legacy pesticides, especially in sediment. None of the current use pesticides included in the analysis were detected in the 2015 sediment samples.

Unlike current use pesticides, the same legacy pesticides were included in the 2013 and 2015 analyses. DDT, or one of its degradates, was detected at 17 of 22 monitoring locations over the course of both sampling efforts (Figure 3) making it the most commonly detected analyte. Screening levels for the individual degradates of DDT do not exist, but there is a screening level of 0.00033 mg/kg (DEQ 2007) for the total concentration of all degradates in a sample. The highest concentration of total DDT occurred at the Lewis and Clark River site and was nearly three times the screening level. Two other sites, Skipanon River and Holden Creek, also exceeded the total DDT screening level. This indicates a potential for DDT accumulation in the northern and central parts of the basin to affect the human population consuming more than 17g of fish or shellfish from these waterways per day (DEQ 2007). Two other legacy pesticides, dieldrin and hexachlorobenzene, have screening levels, but detections did not exceed the applicable screening levels.

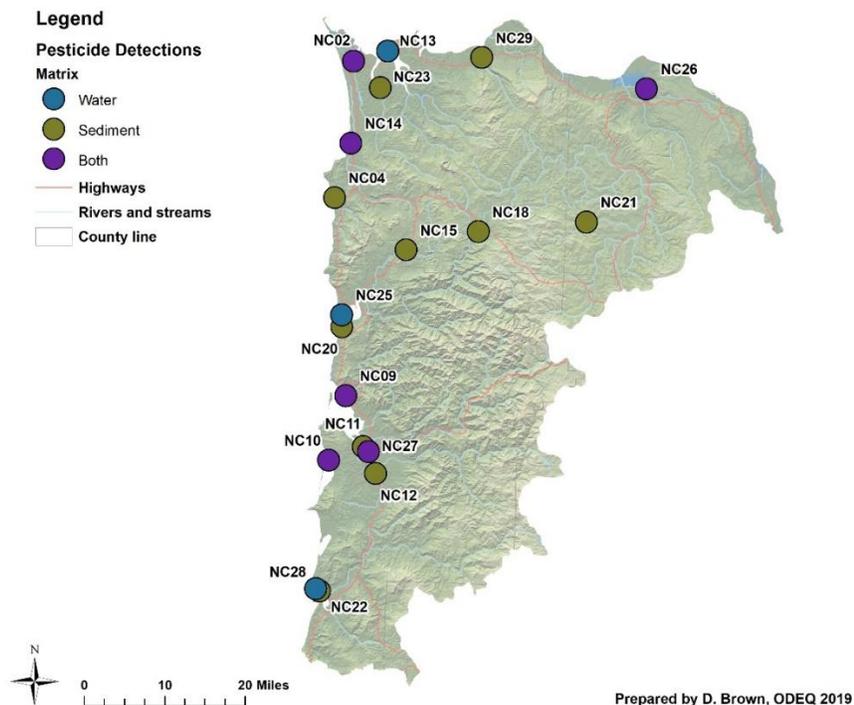


Figure 3 – Map of pesticide detections in water and sediment samples collected in the North Coast Basin.

Priority Metals

Priority metals were present in each sample collected in both the 2013 and 2015 sampling efforts (Figures 4 and 5). The highest number of unique metals detected in 2013 occurred at the Lewis and Clark River site with 12 metals detected. In 2015, the highest number of metals detected occurred at the Nehalem Bay site with 14 metals detected. No fewer than 10 of the 16 metals included in the analysis were detected at any site during either year of this study.

For inorganic chemicals, such as arsenic, there are difficulties in associating concentrations in animals and fish with sediment concentrations, so background concentrations are used instead of screening levels (DEQ 2007). These background concentrations are intended for comparison use only as they are values representing the 90th or 95th percentile of regional soil samples. Five of the detected metals have DEQ background concentrations, rather than screening levels. Detections for cadmium and selenium were below the background concentrations; however, three samples (Nehalem Bay, Netarts Bay and Lewis and Clark River) exceeded the background concentration for arsenic with the highest concentration at the Nehalem Bay site in 2013. One sample, Holden Creek, exceeded the background concentration for lead. Two samples (Holden Creek and Rock Creek) exceeded the background concentration for mercury with the highest concentration at the Rock Creek site in 2015. Despite the difficulty associating sediment concentrations of these metals with animals and fish, the fact that detections above the background concentrations occurred in both sampling efforts and in both fresh and estuarine waters could indicate a potential health risk for human and aquatic life.

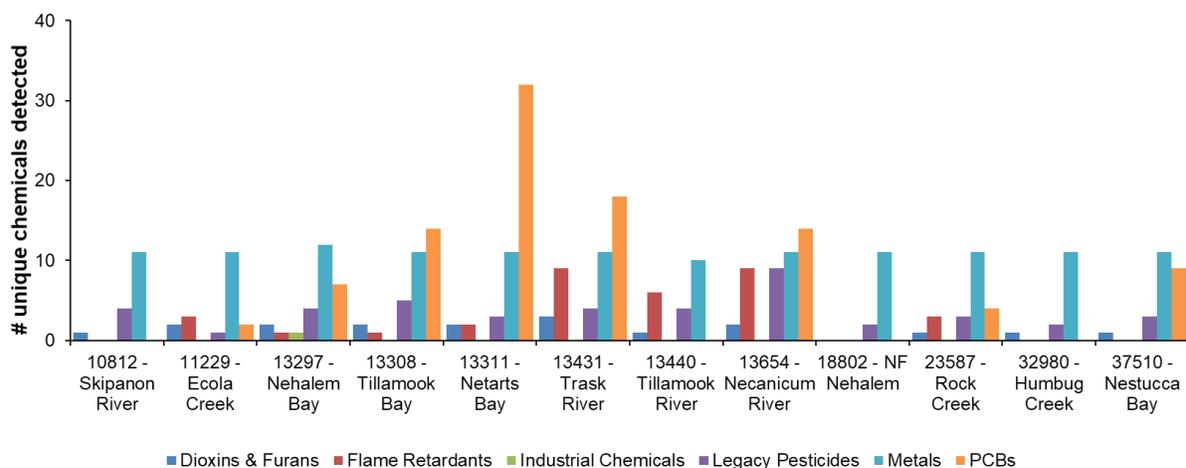


Figure 4 – Number of unique chemicals detected in 2013 sediment samples at each monitoring location by chemical group.

Dioxins and furans

This chemical group contains 17 chemicals produced as by-products of industrial activities and fossil fuel combustion as well as from sources such as wood stoves and forest fires. Dioxins and furans persist in the environment, bioaccumulate in organisms, and are toxic to humans and wildlife. Four of the 17 chemicals in this group were detected during the 2013 or 2015 sampling efforts. All four were found in samples collected at the Holden Creek site (Figure 5). While screening values exist for these compounds, none of the detections exceeded or approached the applicable concentration.

Flame retardants

Fifteen PBDEs were detected in samples collected in 2013 or 2015. Detections occurred at 12 of the 17 sediment-sampling locations over the two sampling efforts. The highest number of PBDEs occurred at the Trask River (2013) and Holden Creek (2015) sites (Figures 4 and 5). Like dioxins and furans, these chemicals persist in the environment and bioaccumulate in organisms. While DEQ does not have sediment screening levels for these compounds, the use of three PBDEs (penta-, octa-, and deca-) have been restricted by weight since 2009. The presence of these compounds indicates a potential for impacts to the aquatic system and human health.

Polychlorinated biphenyls (PCBs)

PCBs are a class of industrial chemicals historically used as electrical insulating fluid in transformers and capacitors. The manufacture and use of PCBs were banned or limited due to their ability to persist in the environment and toxicity to humans and wildlife. However, low levels (below 50ppm) in products are not regulated and PCBs can be inadvertent by-products of some manufacturing processes, such as those associated with colorants. PCBs were detected at eight monitoring locations in 2013 and six monitoring locations in 2015. Seventy-four PCBs were detected at the Holden Creek site (Figure 5). This is 43% of the congeners identifiable by the analytical method used, and double the number of congeners detected at any other site in this basin. Few PCB congeners have screening levels and despite the large number of detections at the Holden Creek site, none exceeded the existing screening levels at that location. Two exceedances occurred in the basin, both in 2013 samples and both for PCB-118. The exceedances occurred at the Netarts Bay site and at the Necanicum River site. The screening level for total PCB, the sum of all congener concentrations detected in one sample, was exceeded at four locations in 2013 (Tillamook Bay, Netarts Bay, Trask River at Netarts Road, and Necanicum River at 12th Street) and three locations in 2015 (Lewis and Clark River, Nehalem Bay, and Holden Creek). The Holden Creek location had the highest total PCB concentration.

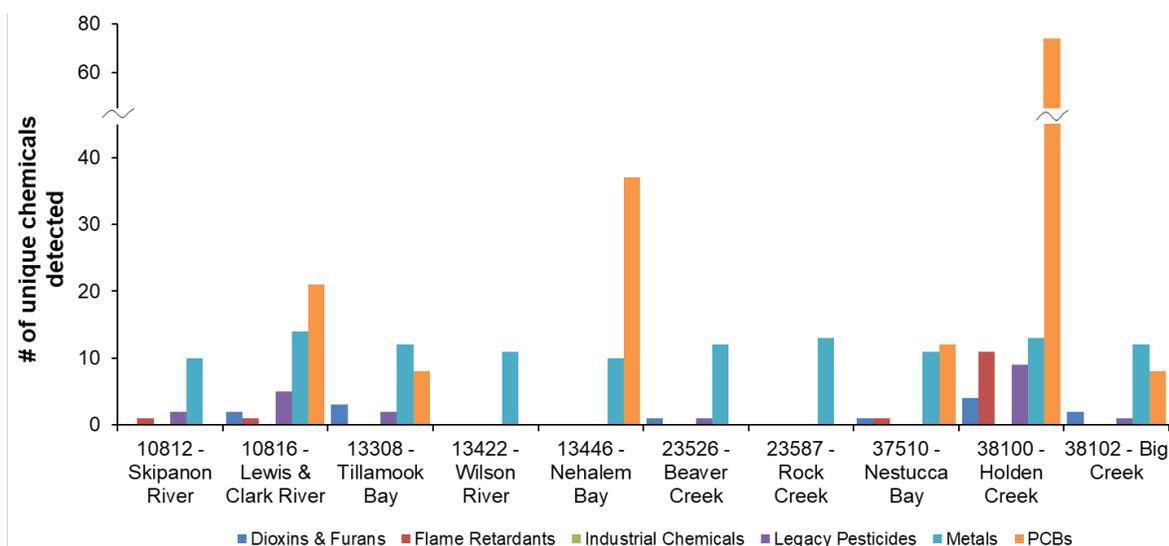


Figure 5 – Number of unique chemicals detected in 2015 sediment samples at each monitoring location by chemical group.

Tissue sample results

Tissue sample collection in the North Coast Basin occurred within a two-year period from July 2013 to July 2015. Collections occurred at seven locations and included six different shellfish species. Samples were processed in one of three ways, as whole body samples, as whole body samples with the siphon skins removed, and as siphon skins only. Less than a third of the chemicals analyzed by DEQ were detected along the North Coast. The North Coast Basin was one of only three basins where a dioxin detection occurred in tissue. Among the coastal basins, the North Coast had the highest percent detection of flame retardants and second highest percent detection of PCBs.

Most notable of the tissue sample findings, however, was the high concentration of inorganic arsenic in the siphon skins of softshell clams. Results from samples collected in 2013 showed high levels of total arsenic in whole body clam samples, so the sampling effort in 2015 focused on identifying where in the body the highest concentrations sequestered. By removing the siphon skin, inorganic arsenic concentrations in whole body samples decreased to levels below the OHA screening level, while the siphon skins themselves contained nearly 25x the inorganic arsenic considered safe for consumption by OHA. This finding prompted the OHA to issue a consumption advisory for two softshell clam species along the Oregon Coast (<https://go.usa.gov/xyxSb>). For a full summary of the tissue sampling results view the Statewide Aquatic Tissue Toxics Report released in 2017 (<https://go.usa.gov/xyxSW>).

Replicate sampling

Replicate samples were included to help identify trends within the basin. Two monitoring locations, Skipanon River at Highway 101 (station #10812) and Tillamook Bay at Hobsonville Point (station #13308), were selected for replicate water and sediment samples and an additional two monitoring locations, Rock Creek at Keasey Road (station #23587) and Nestucca Bay off Brooten Road (station #37510), were used for replicate sediment samples only (Figure 6). These locations represented both the freshwater and estuary systems present in the North Coast Basin.

Table 2 highlights the notable increases in legacy and current use pesticide concentrations detected in water samples at both locations. Other than the increases shown in Table 2, analyte concentrations from the other chemical groups at the Tillamook Bay site remained relatively the same, however, a number of substantial increases occurred at the Skipanon River site (Appendix A). For instance, the concentration of 2,6-dichlorobenzamide, a current use pesticide degradate, increased from 73.1 ng/L to 1570 ng/L. Similar increases also occurred in iron and manganese concentrations. While 2,6-dichlorobenzamide and manganese do not have established benchmarks or criteria, iron's aquatic life criteria is 1000 µg/L which was exceeded during both sampling efforts.

In replicate sediment samples, concentrations generally decreased between the two sampling efforts for the analytes detected in both years (Figure 6). In addition, fewer analytes were detected at three of the four replicate sites in 2015 than in 2013. This is despite the addition of new, more efficient analytical methods that lowered the minimum detection limit for some analytes and allowed for more detections.

Data summary and gaps

Basinwide, 126 unique chemicals were detected in 2013, while 134 unique chemicals were detected in 2015. Along with the increase in chemicals detected, a number of exceedances occurred. In some cases, like arsenic, exceedances occurred in more than one medium and was not restricted solely to freshwater or estuary monitoring locations. In other cases, like DDT, exceedances have persisted through time.

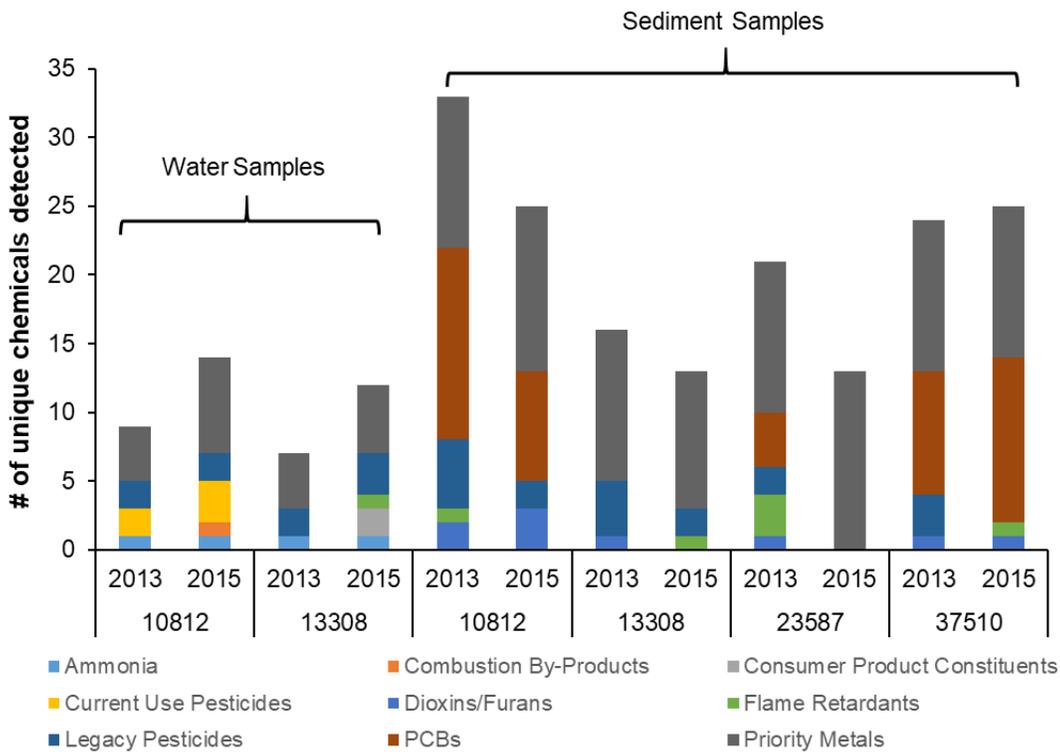


Figure 6 – Number of unique chemicals detected during 2013 and 2015 at sites selected as replicate monitoring locations.

BHC, a chemical of interest from 2013, was again curiously only detected in estuary sites, which may indicate air deposition from a source outside of Oregon. Sediment samples at certain sites contained elevated levels of mercury and lead. Screening benchmarks indicate that these levels may cause a risk for consumption of fish. However, during our study only the sample from the Holden Creek site contained lead over the benchmark. Mercury continues to be an issue in freshwater resident fish, especially smallmouth bass. OHA issued a statewide advisory for smallmouth bass in 2016 (<https://go.usa.gov/xyxSb>).

The results of this sampling effort have identified areas of interest based on the number of unique chemicals detected in certain areas. Holden Creek had the highest number of detections and exceedances, regardless of media or year. None of the exceeded criteria pose a direct risk to human health. Instead, the criteria exceeded pose risks to aquatic life and wildlife. However, the location, number of detections and exceedances indicate that this location should remain a part of the Toxics Monitoring Program and warrants additional sampling to identify pollution sources.

Additional methods included in 2015 did not result in a higher number of unique chemical detections in water samples. Reducing the number of monitoring locations sampled from 20 to 10 could potentially explain this, but a similar drop in unique detections did not occur in sediment samples, which were collected at 12 monitoring locations in 2013 and only 10 monitoring locations in 2015. Media type may be a factor, as well, since analyte concentrations are likely more variable in water than in sediment. Future monitoring in the basin should consider continued monitoring of locations, including Holden Creek, and analytes when developing a sampling plan. The North Coast Basin detection table details the detection data from this basin.

References

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

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

Appendices

Screening Value Reference Key

nsv: No screening value has been assigned

1. Human Health Criteria: Water + Organism (Organism only in Saltwater)

2. Freshwater Chronic Criteria (CCC)

3. Saltwater Chronic Criteria (CCC)

4. Saltwater Acute Criteria (CMC)

5. Freshwater Fish Acute Criteria

6. Freshwater Fish Chronic Criteria

7. Freshwater Invertebrates Acute Criteria

8. Freshwater Invertebrates Chronic Criteria

9. Freshwater Nonvascular Plants Acute Criteria

10. Freshwater Vascular Plants Acute Criteria

<https://www.oregon.gov/deq/Rulemaking%20Docs/tables303140.pdf>

<https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/aquatic-life-benchmarks-and-ecological-risk>

11. Sediment Bioaccumulation Screening Level Value

<https://www.oregon.gov/deq/FilterDocs/GuidanceAssessingBioaccumulative.pdf>

12. OHA Fish Advisory Program Screening Level

<https://www.oregon.gov/oha/PH/HEALTHYENVIRONMENTS/RECREATION/FISHCONSUMPTION/Documents/fishscreeninglevels.pdf>

13. Human Health Criteria: Organism Only

<https://www.oregon.gov/deq/Rulemaking%20Docs/tables303140.pdf>

14. Acceptable Tissue Levels for Chemicals in Fish/Shellfish Consumed by Wildlife

<https://www.oregon.gov/deq/FilterDocs/GuidanceAssessingBioaccumulative.pdf>

* Hardness dependent criteria

‡ pH and temperature dependent criteria

This criteria applies to the total recoverable metal

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

† This criteria applies to freshwater organisms

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

 State of Oregon Department of Environmental Quality	Appendix A Water Sample Results		NORTH COAST BASIN Station ID and Description							Screening Value (µg/L)	S.V. Reference
	Samples collected in and 2015	Percent Detection	Number of samples over screening value	NC01 - Necanicum R at Forest Lake RV Camp (Seaside) - 2013	NC03 - Beaver Creek at Beaver - 2013	NC05 - Salmonberry River at mouth - 2013	NC07 - Wilson River at Hwy 6 (Lee's Camp) - 2013	NC08 - South Fork Trask River DS of Edwards Creek - 2013			
				10521	11005	11849	12951	12962			
Maximum Values (µg/L)											
Ammonia											
Ammonia as N	37	0	11	13	—	—	—	—	‡	2	
Combustion By-Products											
Acenaphthene	1	0	—	—	—	—	—	—	99	1	
Benzo(g,h,i)perylene	1	0	—	—	—	—	—	—	<i>nsv</i>		
Fluoranthene	6	0	—	—	—	—	—	—	14	1	
Indeno(1,2,3-cd)pyrene	1	0	—	—	—	—	—	—	0.0013	1	
Phenanthrene	5	0	—	—	—	—	—	—	<i>nsv</i>		
Pyrene	1	0	—	—	—	—	—	—	400	1	
Consumer Product Constituents											
17a-Ethynyl estradiol	1	0	—	—	—	—	—	—	<i>nsv</i>		
bis(2-ethylhexyl)adipate	1	0	—	—	—	0.443	—	—	<i>nsv</i>		
Carbamazepine	1	0	—	—	—	—	—	—	<i>nsv</i>		
DEET	5	0	—	—	—	—	—	—	<i>nsv</i>		
Sulfamethoxazole	2	0	—	—	—	—	—	—	<i>nsv</i>		
Current Use Pesticides											
2,4-D	2	0	—	—	—	—	—	—	100	1	
2,6-Dichlorobenzamide	7	0	—	—	—	—	—	—	<i>nsv</i>		
Aminomethylphosphonic acid (AMPA)	4	0	—	—	—	—	—	—	249500	5	
Dichlobenil	1	0	—	—	—	—	—	—	30	10	
Diuron	7	0	—	—	—	—	—	—	2.4	9	
Glyphosate	3	0	—	—	—	—	—	—	11900	10	
Imazapyr	2	0	—	—	—	—	—	—	24	10	
Metsulfuron Methyl	3	0	—	—	—	—	—	—	0.36	10	
Sulfometuron-methyl	1	0	—	—	—	—	—	—	0.45	10	
Flame-retardants											
PBDE-100	3	0	—	—	—	—	—	—	<i>nsv</i>		
PBDE-138	3	0	—	—	—	—	—	—	<i>nsv</i>		
PBDE-139	3	0	—	—	—	—	—	—	<i>nsv</i>		
PBDE-140	3	0	—	—	—	—	—	—	<i>nsv</i>		
PBDE-183	3	0	—	—	—	—	—	—	<i>nsv</i>		
PBDE-209	16	0	0.00274	—	—	—	—	—	<i>nsv</i>		
PBDE-47	3	0	—	—	—	—	—	—	<i>nsv</i>		
PBDE-99	5	0	—	—	—	—	—	—	<i>nsv</i>		
Industrial Chemicals or Intermediates											
2,6-Dinitrotoluene	1	0	—	—	—	—	—	—	<i>nsv</i>		
Isophorone	1	0	—	—	—	—	—	—	12900	4	
Legacy Pesticides											
BHC-technical (HCH)	13	0	—	—	—	—	—	—	0.0014	1	
BHC-alpha	7	0	—	—	—	—	—	—	0.00045	1	
BHC-beta	7	0	—	—	—	—	—	—	0.0016	1	
BHC-gamma (Lindane)	1	0	—	—	—	—	—	—	0.17	1	
Endosulfan sulfate	1	0	—	—	—	—	—	—	8.5	1	
Total DDT	2	0	—	—	—	—	—	—	0.001	2	
4,4'-DDD	1	2	—	—	—	—	—	—	0.000031	1	
4,4'-DDE	2	3	—	—	—	—	—	—	0.000022	1	
Plant or animal sterols											
beta-Sitosterol	100	0	0.378	0.529	0.962	0.372	0.301	—	<i>nsv</i>		
Cholesterol	100	0	0.371	0.542	0.198	0.302	0.178	—	<i>nsv</i>		
Coprostanol	99	0	0.0171	0.0342	0.00828	0.00781	0.00722	—	<i>nsv</i>		
Stigmastanol	100	0	0.043	0.0666	0.0746	0.0356	0.0604	—	<i>nsv</i>		
Priority Metals											
<i>Dissolved</i>											
Aluminum	37	0	—	—	—	—	—	—	<i>nsv</i>		
Arsenic	39	0	—	—	—	—	—	—	<i>nsv</i>		
Barium	64	0	6.27	3.69	—	—	—	—	<i>nsv</i>		
Cadmium	2	0	—	—	—	—	—	—	*	2	
Copper	2	1	—	—	—	—	—	—	*	2	
Iron	28	3	—	—	—	—	—	—	1000 [#]	2	
Manganese	80	0	18.9	3.24	3.19	—	—	—	<i>nsv</i>		
Nickel	2	0	—	—	—	—	—	—	<i>nsv</i>		
Thallium	2	0	—	—	—	—	—	—	<i>nsv</i>		
Zinc	6	0	—	—	—	—	—	—	*	2	
<i>Total Inorganic</i>											
Arsenic	87	6	0.099	0.098	0.044	0.046	0.064	—	2.1	1	
<i>Total Recoverable</i>											
Aluminum	87	0	—	—	—	—	—	—	<i>nsv</i>		
Arsenic	47	0	—	—	—	—	—	—	<i>nsv</i>		
Barium	74	0	7.84	—	17.8	6.11	6.89	—	1000	1	
Beryllium	2	0	—	—	0.12	—	—	—	<i>nsv</i>		

 State of Oregon Department of Environmental Quality	Appendix A Water Sample Results		NORTH COAST BASIN Station ID and Description						Screening Value (µg/L)	S.V. Reference
	Samples collected in and 2015	Percent Detection	Number of samples over screening value	NC01 - Necanicum R at Forest Lake RV Camp (Seaside) - 2013	NC03 - Beaver Creek at Beaver - 2013	NC05 - Salmonberry River at mouth - 2013	NC07 - Wilson River at Hwy 6 (Lee's Camp) - 2013	NC08 - South Fork Trask River DS of Edwards Creek - 2013		
				10521	11005	11849	12951	12962		
Maximum Values (µg/L)										
Priority Metals, continued										
<i>Total Recoverable</i>										
Cadmium	3	0	—	—	—	—	—	—	*	2
Chromium	10	0	—	1.65	1.94	1.31	2.92	11 ^s	*s	2
Copper	10	7	—	—	4.53	—	2.09	*s	*s	2
Iron	64	18	569	940	5650	1020	2130	1000	*s	2
Lead	11	0	—	—	0.23	—	—	—	*s	2
Manganese	87	—	20.2	16.7	81.7	11.9	27.3	nsv	—	—
Nickel	15	0	—	1.78	3.34	1.12	3.29	*s	*s	2
Zinc	6	0	—	—	8.5	—	—	*s	*s	2
Average Values										
Standard Parameters (mg/L)										
DOC	75	—	1.6	1.3	1.3	1.3	—	—	—	—
Sulfate	100	—	2.7	2.2	0.8	2.3	3.7	—	—	—
TOC (Total Organic Carbon)	88	—	1.4	1.2	1.6	1.5	—	—	—	—
Total Solids	100	—	51.7	63.0	95.7	57.7	76.7	—	—	—
Total Suspended Solids	81	—	4.5	14.0	134.0	24.0	37.0	—	—	—
Field Parameters										
Conductivity (µmhos/cm @ 25° C)	100	—	53	75	59	54	83	—	—	—
Dissolved Oxygen (mg/L)	100	—	10.5	11.1	11.1	11.0	11.4	—	—	—
pH (SU)	100	—	7.3	7.4	7.8	7.6	7.7	—	—	—
Temperature (°C)	100	—	13.0	11.3	12.9	11.4	10.5	—	—	—
Turbidity (NTU)	92	—	3	4	50	21	14	—	—	—

 State of Oregon Department of Environmental Quality	Appendix A Water Sample Results		NORTH COAST BASIN Station ID and Description					Screening Value (µg/L)	S.V. Reference
	Samples collected in 2013 and 2015		NC24 - Wilson River at Solite Smith Road (River Mile 3.5) - 2015 13422	NC12 - Tillamook River at Bewley Creek Road - 2013 13440	NC15 - North Fork Nehalem River at Highway 53 - 2013 18802	NC16 - Nestucca River at first bridge ramp - 2013 22394	NC26 - Beaver Creek at Beaver Falls Road - 2015 23526		
Maximum Values (µg/L)									
Ammonia									
Ammonia as N	—	20	12	33	23	—	‡	2	
Combustion By-Products									
Acenaphthene	—	—	—	—	—	—	99	1	
Benzo(g,h,i)perylene	—	—	—	—	—	—	<i>nsv</i>		
Fluoranthene	—	—	—	—	—	—	14	1	
Indeno(1,2,3-cd)pyrene	—	—	—	—	—	—	0.0013	1	
Phenanthrene	—	—	—	—	—	—	<i>nsv</i>		
Pyrene	—	—	—	—	—	—	400	1	
Consumer Product Constituents									
17a-Ethynyl estradiol	—	—	—	—	—	—	<i>nsv</i>		
bis(2-ethylhexyl)adipate	—	—	—	—	—	—	<i>nsv</i>		
Carbamazepine	—	—	—	—	—	—	<i>nsv</i>		
DEET	—	—	—	0.0087	—	—	<i>nsv</i>		
Sulfamethoxazole	—	—	—	—	—	—	<i>nsv</i>		
Current Use Pesticides									
2,4-D	—	—	—	—	—	—	100	1	
2,6-Dichlorobenzamide	—	—	—	—	—	—	<i>nsv</i>		
Aminomethylphosphonic acid (AMPA)	—	—	—	—	—	—	249500	5	
Dichlobenil	—	—	—	—	—	—	30	10	
Diuron	—	—	—	—	0.302	—	2.4	9	
Glyphosate	—	—	—	—	—	—	11900	10	
Imazapyr	—	—	—	—	0.102	—	24	10	
Metsulfuron Methyl	—	—	—	—	0.00584	—	0.36	10	
Sulfometuron-methyl	—	—	—	—	0.016	—	0.45	10	
Flame-retardants									
PBDE-100	—	—	—	—	—	—	<i>nsv</i>		
PBDE-138	—	—	—	—	—	—	<i>nsv</i>		
PBDE-139	—	—	—	—	—	—	<i>nsv</i>		
PBDE-140	—	—	—	—	—	—	<i>nsv</i>		
PBDE-183	—	—	—	—	—	0.00026	<i>nsv</i>		
PBDE-209	—	—	0.00386	—	0.00123	—	<i>nsv</i>		
PBDE-47	—	—	—	—	—	—	<i>nsv</i>		
PBDE-99	—	—	—	—	—	0.00156	<i>nsv</i>		
Industrial Chemicals or Intermediates									
2,6-Dinitrotoluene	—	—	—	—	—	—	<i>nsv</i>		
Isophorone	—	—	—	—	—	—	12900	4	
Legacy Pesticides									
BHC-technical (HCH)	—	—	—	—	—	—	0.0014	1	
BHC-alpha	—	—	—	—	—	—	0.00045	1	
BHC-beta	—	—	—	—	—	—	0.0016	1	
BHC-gamma (Lindane)	—	—	—	—	—	—	0.17	1	
Endosulfan sulfate	—	—	—	—	—	—	8.5	1	
Total DDT	—	—	—	—	—	—	0.001	2	
4,4'-DDD	—	—	—	—	—	—	0.000031	1	
4,4'-DDE	—	—	—	—	—	—	0.000022	1	
Plant or animal sterols									
beta-Sitosterol	0.353	1.21	0.64	0.485	1.91	0.736	<i>nsv</i>		
Cholesterol	0.213	0.994	0.545	0.973	1.69	0.492	<i>nsv</i>		
Coprostanol	0.0105	0.356	0.0119	0.0552	0.127	0.0288	<i>nsv</i>		
Stigmastanol	0.0374	0.771	0.0908	0.0776	0.321	0.137	<i>nsv</i>		
Priority Metals									
<i>Dissolved</i>									
Aluminum	23.2	—	—	—	94.1	29.2	<i>nsv</i>		
Arsenic	—	—	—	—	0.32	—	<i>nsv</i>		
Barium	—	5.99	5.89	2.2	31.6	4.01	<i>nsv</i>		
Cadmium	—	—	—	—	—	—	*	2	
Copper	—	—	—	—	—	—	*	2	
Iron	—	—	—	—	930	121	1000 [#]	2	
Manganese	4.4	7.13	5.23	3.97	99.3	3.59	<i>nsv</i>		
Nickel	—	—	—	—	—	—	<i>nsv</i>		
Thallium	—	—	—	—	—	—	<i>nsv</i>		
Zinc	—	—	—	—	—	—	*	2	
<i>Total Inorganic</i>									
Arsenic	—	0.089	0.09	0.07	—	—	2.1	1	
<i>Total Recoverable</i>									
Aluminum	763	—	—	—	279	97.6	<i>nsv</i>		
Arsenic	—	—	—	—	0.41	0.25	<i>nsv</i>		
Barium	8.09	7.83	12	9.66	35.7	4.49	1000	1	
Beryllium	—	—	—	—	—	—	<i>nsv</i>		

 State of Oregon Department of Environmental Quality	Appendix A Water Sample Results	NORTH COAST BASIN Station ID and Description						Screening Value (µg/L)	S.V. Reference
	Samples collected in 2013 and 2015	NC24 - Wilson River at Solite Smith Road (River Mile 3.5) - 2015 13422	NC12 - Tillamook River at Bewley Creek Road - 2013 13440	NC15 - North Fork Nehalem River at Highway 53 - 2013 18802	NC16 - Nestucca River at first bridge ramp - 2013 22394	NC26 - Beaver Creek at Beaver Falls Road - 2015 23526	NC21 - Rock Creek at Keasey Road (River Mile 11) - 2015 23587		
Maximum Values (µg/L)									
Priority Metals, continued									
<i>Total Recoverable</i>									
Cadmium	—	—	—	—	—	—	*	2	
Chromium	—	—	—	2.87	—	—	11 [§]	2	
Copper	—	—	—	2.86	—	—	* [§]	2	
Iron	933	530	1040	2210	1500	232	1000	2	
Lead	—	—	—	0.2	—	—	* [§]	2	
Manganese	12.6	19	22.8	34.4	112.0	7.84	nsv		
Nickel	—	—	—	2.95	—	—	* [§]	2	
Zinc	—	11.1	—	—	—	—	* [§]	2	
Average Values									
Standard Parameters (mg/L)									
DOC	1.3	1.3	1.3	1.1	2.5	—			
Sulfate	3.4	2.6	3.1	3.4	3.1	2.4			
TOC (Total Organic Carbon)	1.4	1.5	2.0	1.3	2.5	—			
Total Solids	64.0	56.3	62.3	82.7	98.0	61.3			
Total Suspended Solids	13.0	4.3	15.0	19.7	1.7	2.0			
Field Parameters									
Conductivity (µmhos/cm @ 25° C)	79	126	57	85	107	73			
Dissolved Oxygen (mg/L)	10.6	10.9	11.1	10.9	9.1	10.7			
pH (SU)	7.4	7.1	7.5	7.5	7.2	7.8			
Temperature (°C)	14.7	13.2	11.4	12.2	16.0	13.4			
Turbidity (NTU)	15	4	25	11	6	2			

 State of Oregon Department of Environmental Quality	Appendix A	NORTH COAST BASIN				Screening Value (µg/L)	S.V. Reference
	Water Sample Results	Station ID and Description					
Samples collected in 2013 and 2015	NC17 - Nehalem River at Hwy 47 bridge US of Vernonia - 2013	NC18 - Humbug Creek near mouth (Nehalem) - 2013	NC19 - Clatskanie R above Fall Cr at Beaver boat ramp - 2013	NC27 - Holden Creek at Tillamook River Road - 2015			
	24299	32980	34165	38100			
Maximum Values (µg/L)							
Ammonia							
Ammonia as N	19	13	66	929	‡	2	
Combustion By-Products							
Acenaphthene	—	—	—	—	99	1	
Benzo(g,h,i)perylene	—	—	—	—	<i>nsv</i>		
Fluoranthene	—	—	—	0.00285	14	1	
Indeno(1,2,3-cd)pyrene	—	—	—	—	0.0013	1	
Phenanthrene	—	0.00775	—	—	<i>nsv</i>		
Pyrene	—	—	—	—	400	1	
Consumer Product Constituents							
17a-Ethynyl estradiol	—	—	—	—	<i>nsv</i>		
bis(2-ethylhexyl)adipate	—	—	—	—	<i>nsv</i>		
Carbamazepine	—	—	—	—	<i>nsv</i>		
DEET	—	—	0.00534	—	<i>nsv</i>		
Sulfamethoxazole	—	—	—	—	<i>nsv</i>		
Current Use Pesticides							
2,4-D	—	—	—	0.5	100	1	
2,6-Dichlorobenzamide	—	—	—	—	<i>nsv</i>		
Aminomethylphosphonic acid (AMPA)	—	—	—	0.09	249500	5	
Dichlobenil	—	—	—	—	30	10	
Diuron	—	—	—	—	2.4	9	
Glyphosate	—	—	—	0.0911	11900	10	
Imazapyr	—	—	—	0.0452	24	10	
Metsulfuron Methyl	—	—	—	—	0.36	10	
Sulfometuron-methyl	—	—	—	—	0.45	10	
Flame-retardants							
PBDE-100	—	—	—	—	<i>nsv</i>		
PBDE-138	—	—	—	—	<i>nsv</i>		
PBDE-139	—	—	—	—	<i>nsv</i>		
PBDE-140	—	—	—	—	<i>nsv</i>		
PBDE-183	—	—	—	—	<i>nsv</i>		
PBDE-209	—	—	0.00317	—	<i>nsv</i>		
PBDE-47	—	—	—	0.00218	<i>nsv</i>		
PBDE-99	—	—	—	—	<i>nsv</i>		
Industrial Chemicals or Intermediates							
2,6-Dinitrotoluene	—	—	—	—	<i>nsv</i>		
Isophorone	—	—	—	0.064	12900	4	
Legacy Pesticides							
BHC-technical (HCH)	—	—	—	—	0.0014	1	
BHC-alpha	—	—	—	—	0.00045	1	
BHC-beta	—	—	—	—	0.0016	1	
BHC-gamma (Lindane)	—	—	—	—	0.17	1	
Endosulfan sulfate	—	—	—	—	8.5	1	
Total DDT	—	—	—	—	0.001	2	
4,4'-DDD	—	—	—	—	0.000031	1	
4,4'-DDE	—	—	—	—	0.000022	1	
Plant or animal sterols							
beta-Sitosterol	3.92	1.05	2.44	11	<i>nsv</i>		
Cholesterol	1.1	0.861	0.826	21.1	<i>nsv</i>		
Coprostanol	0.0621	0.0268	0.0621	2.17	<i>nsv</i>		
Stigmastanol	0.416	0.155	0.27	3.13	<i>nsv</i>		
Priority Metals							
<i>Dissolved</i>							
Aluminum	—	—	—	85.2	<i>nsv</i>		
Arsenic	0.44	0.34	0.53	—	<i>nsv</i>		
Barium	3.88	6.23	21.3	24.1	<i>nsv</i>		
Cadmium	—	—	—	—	*	2	
Copper	—	—	—	5.67	*	2	
Iron	353	220	366	471	1000 [#]	2	
Manganese	17.2	9.32	39.4	182	<i>nsv</i>		
Nickel	—	—	—	—	<i>nsv</i>		
Thallium	—	0.05	—	—	<i>nsv</i>		
Zinc	—	—	—	11.3	*	2	
<i>Total Inorganic</i>							
Arsenic	0.481	0.282	0.487	—	2.1	1	
<i>Total Recoverable</i>							
Aluminum	—	—	—	503	<i>nsv</i>		
Arsenic	0.97	0.55	0.62	0.31	<i>nsv</i>		
Barium	19.7	21.4	26.1	27.2	1000	1	
Beryllium	0.12	—	—	—	<i>nsv</i>		

 State of Oregon Department of Environmental Quality	Appendix A Water Sample Results	NORTH COAST BASIN Station ID and Description				Screening Value (µg/L)	S.V. Reference
	Samples collected in 2013 and 2015	NC17 - Nehalem River at Hwy 47 bridge US of Vernonia - 2013 24299	NC18 - Humbug Creek near mouth (Nehalem) - 2013 32980	NC19 - Clatskanie R above Fall Cr at Beaver boat ramp - 2013 34165	NC27 - Holden Creek at Tillamook River Road - 2015 38100		
Maximum Values (µg/L)							
Priority Metals, continued							
<i>Total Recoverable</i>							
Cadmium	—	—	—	—	*	2	
Chromium	3.04	1.42	—	—	11 [§]	2	
Copper	4.07	1.67	—	7.02	* [§]	2	
Iron	4300	1990	1680	1250	1000	2	
Lead	0.98	0.59	0.41	0.24	* [§]	2	
Manganese	89.6	38.4	53.8	190.0	<i>nsv</i>		
Nickel	2.87	1.53	—	1.28	* [§]	2	
Zinc	11.4	7.05	—	12	* [§]	2	
Average Values							
Standard Parameters (mg/L)							
DOC	3	1.6	2.65	8.4			
Sulfate	4.6	3.1	2.9	23.5			
TOC (Total Organic Carbon)	4.15	2.25	3.25	9.9			
Total Solids	108.3	65.3	91.0	404.3			
Total Suspended Solids	41.7	72.0	11.0	3.3			
Field Parameters							
Conductivity (µmhos/cm @ 25° C)	70	47	74	636			
Dissolved Oxygen (mg/L)	9.7	10.7	9.7	7.0			
pH (SU)	7.0	7.1	7.1	6.8			
Temperature (°C)	12.8	12.6	13.8	16.0			
Turbidity (NTU)	27	10	9	6			

 State of Oregon Department of Environmental Quality	Appendix A	NORTH COAST BASIN					Screening Value (µg/L)	S.V. Reference
	Water Sample Results	Station ID and Description						
	Samples collected in 2013 and 2015	NC02 - Skipanon River at Hwy 101 - 2013	NC02 - Skipanon River at Hwy 101 - 2015	NC23 - Lewis & Clark River 0.5 miles US of Peterson Slough - 2015	NC04 - Ecola CR at Cannon Beach Loop RD - 2013	NC06 - Youngs River at Youngs River Loop Road - 2013		
Estuary Sites	10812	10812	10816	11229	12187			
Maximum Values (µg/L)								
Ammonia								
Ammonia as N	5	126	50	—	17	+	3	
Combustion By-Products								
Acenaphthene	—	—	—	0.00715	—	99	1	
Benzo(g,h,i)perylene	—	—	—	—	—	nsv		
Fluoranthene	—	—	—	0.00721	—	16	4	
Indeno(1,2,3-cd)pyrene	—	—	—	—	—	0.0013	3	
Phenanthrene	—	—	—	0.0128	—	nsv		
Pyrene	—	—	—	—	—	400	1	
Consumer Product Constituents								
17a-Ethynyl estradiol	—	—	—	—	0.00436	nsv		
bis(2-ethylhexyl)adipate	—	—	—	—	—	nsv		
Carbamazepine	—	0.0159	—	—	—	nsv		
DEET	—	—	—	—	—	nsv		
Sulfamethoxazole	—	—	—	0.0128	—	nsv		
Current Use Pesticides								
2,4-D	—	—	—	—	—	100	1	
2,6-Dichlorobenzamide	0.0731	1.57	—	—	—	nsv		
Aminomethylphosphonic acid (AMPA)	—	—	—	—	—	249500 [†]	5	
Dichlobenil	—	0.0394	—	—	—	30 [†]	10	
Diuron	0.00676	0.00569	—	—	—	2.4 [†]	9	
Glyphosate	—	—	—	—	—	11900 [†]	10	
Imazapyr	—	—	—	—	—	24 [†]	10	
Metsulfuron Methyl	—	—	—	—	—	0.36 [†]	10	
Sulfometuron-methyl	—	—	—	—	—	0.45 [†]	10	
Flame-retardants								
PBDE-100	—	—	—	—	—	nsv		
PBDE-138	—	—	—	—	—	nsv		
PBDE-139	—	—	—	—	—	nsv		
PBDE-140	—	—	—	—	—	nsv		
PBDE-183	—	—	—	—	—	nsv		
PBDE-209	—	—	—	0.00291	—	nsv		
PBDE-47	—	—	—	—	—	nsv		
PBDE-99	—	—	—	—	—	nsv		
Industrial Chemicals or Intermediates								
2,6-Dinitrotoluene	—	—	—	—	—	nsv		
Isophorone	—	—	—	—	—	nsv		
Legacy Pesticides								
BHC-technical (HCH)	—	—	—	—	—	0.0014	1	
BHC-alpha	—	—	—	—	—	0.00045	1	
BHC-beta	—	—	—	—	—	0.0016	1	
BHC-gamma (Lindane)	—	—	—	—	—	0.17	1	
Endosulfan sulfate	—	—	—	—	—	8.5	1	
Total DDT	0.000132	0.000365	—	—	—	0.001	3	
4,4'-DDD	0.000068	0.000152	—	—	—	0.000031	1	
4,4'-DDE	6.39E-05	0.000213	—	—	—	0.000022	1	
Plant or animal sterols								
beta-Sitosterol	1.01	1.68	0.592	0.324	0.694	nsv		
Cholesterol	1.32	1.8	1.14	0.26	0.466	nsv		
Coprostanol	0.0632	0.0581	0.0424	0.0101	0.0176	nsv		
Stigmastanol	0.241	0.245	0.136	0.058	0.118	nsv		
Priority Metals								
<i>Dissolved</i>								
Aluminum	—	56	49.6	—	—	nsv		
Arsenic	0.65	0.54	0.39	0.27	—	nsv		
Barium	32.1	18.6	81.2	6.96	7.75	nsv		
Cadmium	—	—	—	—	—	8.8	3	
Copper	—	—	—	—	—	3.1	3	
Iron	1580	1430	312	—	—	nsv		
Manganese	53.4	214	145	36.5	8.12	nsv		
Nickel	—	1.04	1.24	—	—	8.2	3	
Thallium	—	—	—	0.05	—	nsv		
Zinc	—	5.04	—	—	—	81	3	
<i>Total Inorganic</i>								
Arsenic	0.5	0.551	0.5	0.156	0.139	1.0	1	
<i>Total Recoverable</i>								
Aluminum	—	370	278	—	—	nsv		
Arsenic	0.86	0.82	0.56	0.29	0.33	nsv		
Barium	32.6	20.5	83.4	7.26	14	nsv		
Beryllium	—	—	—	—	—	nsv		

 State of Oregon Department of Environmental Quality	Appendix A Water Sample Results	NORTH COAST BASIN Station ID and Description					Screening Value (µg/L)	S.V. Reference
	Samples collected in 2013 and 2015	NC02 - Skipanon River at Hwy 101 - 2013	NC02 - Skipanon River at Hwy 101 - 2015	NC23 - Lewis & Clark River 0.5 miles US of Peterson Slough - 2015	NC04 - Ecola CR at Cannon Beach Loop RD - 2013	NC06 - Youngs River at Youngs River Loop Road - 2013		
	Estuary Sites	10812	10812	10816	11229	12187		
		Maximum Values (µg/L)						
	Priority Metals, continued							
	<i>Total Recoverable</i>							
	Cadmium	—	—	—	—	—	8.8 [§]	3
	Chromium	—	—	—	—	—	50 [§]	3
	Copper	—	—	—	—	—	3.1 [§]	3
	Iron	2750	4870	760	436	1330	nsv	
	Lead	—	—	—	—	0.35	8.1 [§]	3
	Manganese	56	230	150	40	27.6	nsv	
	Nickel	—	1.1	1.4	—	—	8.2 [§]	3
	Zinc	—	—	—	—	—	81 [§]	3
		Average Values						
	Standard Parameters (mg/L)							
	DOC	4.4	7.6	2.6	2.0	2.1		
	Sulfate	237.0	32.0	96.9	138.6	2.4		
	TOC (Total Organic Carbon)	4.5	8.0	2.7	2.0	2.2		
	Total Solids	3033.7	501.3	1302.0	2008.7	61.0		
	Total Suspended Solids	4.0	2.7	14.3	3.0	13.0		
	Field Parameters							
	Conductivity (µmhos/cm @ 25° C)	5049	906	2217	3189	54		
	Dissolved Oxygen (mg/L)	8.5	7.6	9.0	10.3	11.0		
	pH (SU)	6.9	6.7	6.8	7.4	7.3		
	Temperature (°C)	15.2	15.1	15.5	12.7	13.0		
	Turbidity (NTU)	7	20	9	3	8		

 State of Oregon Department of Environmental Quality	Appendix A	NORTH COAST BASIN					Screening Value (µg/L)	S.V. Reference
	Water Sample Results	Station ID and Description						
	Samples collected in 2013 and 2015	NC09 - Tillamook Bay at Hobsonville Point - 2013	NC09 - Tillamook Bay at Hobsonville Point - 2015	NC10 - Netarts Bay at county boat ramp - 2013	NC11 - Trask River at Netarts Road (Hwy. 6) - 2013	NC25 - Nehalem Bay at Nehalem Bay State Park Boat Ramp - 2015		
Estuary Sites	13308	13308	13311	13431	13446			
Maximum Values (µg/L)								
Ammonia								
Ammonia as N	62	61	—	21	—	+	3	
Combustion By-Products								
Acenaphthene	—	—	—	—	—	99	1	
Benzo(g,h,i)perylene	—	0.00346	—	—	—	nsv		
Fluoranthene	—	—	—	—	—	16	4	
Indeno(1,2,3-cd)pyrene	—	0.00331	—	—	—	0.0013	3	
Phenanthrene	—	—	—	—	—	nsv		
Pyrene	—	—	—	—	—	400	1	
Consumer Product Constituents								
17a-Ethynyl estradiol	—	—	—	—	—	nsv		
bis(2-ethylhexyl)adipate	—	—	—	—	—	nsv		
Carbamazepine	—	—	—	—	—	nsv		
DEET	—	—	—	0.0115	—	nsv		
Sulfamethoxazole	—	—	—	—	—	nsv		
Current Use Pesticides								
2,4-D	—	—	—	—	—	100	1	
2,6-Dichlorobenzamide	—	—	—	—	—	nsv		
Aminomethylphosphonic acid (AMPA)	—	—	—	—	—	249500 [†]	5	
Dichlobenil	—	—	—	—	—	30 [†]	10	
Diuron	—	—	—	—	—	2.4 ^T	9	
Glyphosate	—	—	—	—	—	11900 [†]	10	
Imazapyr	—	—	—	—	—	24 [†]	10	
Metsulfuron Methyl	—	—	—	—	—	0.36 ^T	10	
Sulfometuron-methyl	—	—	—	—	—	0.45 [†]	10	
Flame-retardants								
PBDE-100	—	—	—	0.000453	—	nsv		
PBDE-138	—	—	—	0.000621	—	nsv		
PBDE-139	—	—	—	0.000358	—	nsv		
PBDE-140	—	—	—	0.000113	—	nsv		
PBDE-183	—	—	—	—	—	nsv		
PBDE-209	—	0.00214	—	—	—	nsv		
PBDE-47	—	—	—	—	—	nsv		
PBDE-99	—	—	—	0.00262	—	nsv		
Industrial Chemicals or Intermediates								
2,6-Dinitrotoluene	—	—	—	—	—	nsv		
Isophorone	—	—	—	—	—	nsv		
Legacy Pesticides								
BHC-technical (HCH)	0.00027	0.000565	0.000285	—	0.000398	0.0014	1	
BHC-alpha	0.000158	0.000385	0.000173	—	0.000293	0.00045	1	
BHC-beta	0.000112	0.000106	0.000118	—	0.000105	0.0016	1	
BHC-gamma (Lindane)	—	7.39E-05	—	—	—	0.17	1	
Endosulfan sulfate	—	—	—	—	—	8.5	1	
Total DDT	—	—	—	—	—	0.001	3	
4,4'-DDD	—	—	—	—	—	0.000031	1	
4,4'-DDE	—	—	—	—	—	0.000022	1	
Plant or animal sterols								
beta-Sitosterol	0.362	0.24	0.128	0.385	0.683	nsv		
Cholesterol	1.12	0.443	0.838	0.914	1.1	nsv		
Coprostanol	0.0205	0.0134	0.00473	0.0642	0.0289	nsv		
Stigmastanol	0.0737	0.0488	0.0222	0.108	0.167	nsv		
Priority Metals								
<i>Dissolved</i>								
Aluminum	—	—	—	—	21.4	nsv		
Arsenic	1.56	1.95	2.12	0.36	1.94	nsv		
Barium	13.9	—	—	19.4	5.1	nsv		
Cadmium	0.13	—	0.12	—	—	8.8	3	
Copper	—	—	—	—	—	3.1	3	
Iron	—	—	—	—	—	nsv		
Manganese	27.9	9.45	2.6	33.2	9.99	nsv		
Nickel	—	—	—	—	—	8.2	3	
Thallium	—	—	—	—	—	nsv		
Zinc	—	—	—	—	—	81	3	
<i>Total Inorganic</i>								
Arsenic	1.75	1.15	1.28	0.207	1.21	1.0	1	
<i>Total Recoverable</i>								
Aluminum	—	602	—	—	433	nsv		
Arsenic	1.8	1.75	2.15	0.43	1.94	nsv		
Barium	14.7	—	—	20	—	nsv		
Beryllium	—	—	—	—	—	nsv		

 State of Oregon Department of Environmental Quality	Appendix A Water Sample Results	NORTH COAST BASIN Station ID and Description					Screening Value (µg/L)	S.V. Reference
	Samples collected in 2013 and 2015	NC09 - Tillamook Bay at Hobsonville Point - 2013	NC09 - Tillamook Bay at Hobsonville Point - 2015	NC10 - Netarts Bay at county boat ramp - 2013	NC11 - Trask River at Netarts Road (Hwy. 6) - 2013	NC25 - Nehalem Bay at Nehalem Bay State Park Boat Ramp - 2015		
Estuary Sites	13308	13308	13311	13431	13446			
		Maximum Values (µg/L)						
Priority Metals, continued								
<i>Total Recoverable</i>								
Cadmium	0.11	0.13	0.14	—	—	8.8 [§]	3	
Chromium	—	—	—	2.34	—	50 [§]	3	
Copper	—	—	—	3.73	—	3.1 [§]	3	
Iron	—	834	—	2570	550	<i>nsv</i>		
Lead	—	—	—	0.2	—	8.1 [§]	3	
Manganese	32.8	16.3	4.26	44.8	16.3	<i>nsv</i>		
Nickel	—	—	—	2.56	—	8.2 [§]	3	
Zinc	—	—	—	—	—	81 [§]	3	
		Average Values						
Standard Parameters (mg/L)								
DOC	1.2	1.3	1.2	1.3	1.1			
Sulfate	1538.0	1828.0	2500.0	205.1	1735.0			
TOC (Total Organic Carbon)	1.6	1.3	1.4	1.5	1.5			
Total Solids	20730.0	21776.7	33633.3	2807.7	20376.7			
Total Suspended Solids	99.0	20.0	12.7	16.3	14.3			
Field Parameters								
Conductivity (µmhos/cm @ 25° C)	31250	34150	47400	4587	32233			
Dissolved Oxygen (mg/L)	8.8	9.9	9.6	10.2	10.3			
pH (SU)	7.8	7.9	8.1	7.3	7.9			
Temperature (°C)	13.2	13.7	12.7	14.1	14.1			
Turbidity (NTU)	23	5	3	14	4			

 State of Oregon Department of Environmental Quality	Appendix A	NORTH COAST BASIN				Screening Value (µg/L)	S.V. Reference
	Water Sample Results	Station ID and Description					
Samples collected in 2013 and 2015	NC13 - Young's Bay at Old Hwy 101 Bridge - 2013	NC14 - Necanicum R at 12th Street approach - 2013	NC28 - Nestucca River at Pacific City Boat Ramp - 2015	NC29 - Big Creek at Big Creek County Park - 2015			
Estuary Sites	13553	13654	38101	38102			
Ammonia							
Ammonia as N	—	149	—	14	‡	3	
Combustion By-Products							
Acenaphthene	—	—	—	—	99	1	
Benzo(g,h,i)perylene	—	—	—	—	<i>nsv</i>		
Fluoranthene	0.012	—	—	—	16	4	
Indeno(1,2,3-cd)pyrene	—	—	—	—	0.0013	3	
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>		
Carbamazepine	—	—	—	—	<i>nsv</i>		
DEET	—	0.0156	—	—	<i>nsv</i>		
Sulfamethoxazole	—	0.0156	—	—	<i>nsv</i>		
Current Use Pesticides							
2,4-D	—	0.09	—	—	100	1	
2,6-Dichlorobenzamide	—	—	—	—	<i>nsv</i>		
Aminomethylphosphonic acid (AMPA)	—	—	—	—	249500 [†]	5	
Dichlobenil	—	—	—	—	30 [†]	10	
Diuron	0.00818	—	—	—	2.4 [†]	9	
Glyphosate	—	—	—	—	11900 [†]	10	
Imazapyr	—	—	—	—	24 [†]	10	
Metsulfuron Methyl	—	—	—	—	0.36 [†]	10	
Sulfometuron-methyl	—	—	—	—	0.45 [†]	10	
Flame-retardants							
PBDE-100	—	—	—	—	<i>nsv</i>		
PBDE-138	—	—	—	—	<i>nsv</i>		
PBDE-139	—	—	—	—	<i>nsv</i>		
PBDE-140	—	—	—	—	<i>nsv</i>		
PBDE-183	—	—	—	—	<i>nsv</i>		
PBDE-209	—	—	—	—	<i>nsv</i>		
PBDE-47	—	—	—	—	<i>nsv</i>		
PBDE-99	—	—	—	—	<i>nsv</i>		
Industrial Chemicals or Intermediates							
2,6-Dinitrotoluene	—	0.641	—	—	<i>nsv</i>		
Isophorone	—	—	—	—	<i>nsv</i>		
Legacy Pesticides							
BHC-technical (HCH)	—	0.000194	0.000292	—	0.0014	1	
BHC-alpha	—	0.000113	0.000212	—	0.00045	1	
BHC-beta	—	8.08E-05	8.02E-05	—	0.0016	1	
BHC-gamma (Lindane)	—	—	—	—	0.17	1	
Endosulfan sulfate	0.00011	—	—	—	8.5	1	
Total DDT	—	—	—	—	0.001	3	
4,4'-DDD	—	—	—	—	0.000031	1	
4,4'-DDE	—	—	—	—	0.000022	1	
Plant or animal sterols							
beta-Sitosterol	0.32	0.482	0.571	0.711	<i>nsv</i>		
Cholesterol	0.653	1.06	0.559	0.735	<i>nsv</i>		
Coprostanol	0.0341	0.0497	0.0576	0.0272	<i>nsv</i>		
Stigmastanol	0.0542	0.0882	0.154	0.143	<i>nsv</i>		
Priority Metals							
<i>Dissolved</i>							
Aluminum	—	—	22	23	<i>nsv</i>		
Arsenic	0.79	1.34	0.97	—	<i>nsv</i>		
Barium	27.5	11.7	5.2	7.18	<i>nsv</i>		
Cadmium	—	—	—	—	8.8	3	
Copper	—	—	—	—	3.1	3	
Iron	—	—	51.5	190	<i>nsv</i>		
Manganese	20.4	51.5	16.2	11.6	<i>nsv</i>		
Nickel	—	—	—	—	8.2	3	
Thallium	—	—	—	—	<i>nsv</i>		
Zinc	—	—	—	—	81	3	
<i>Total Inorganic</i>							
Arsenic	0.688	0.997	0.48	—	1.0	1	
<i>Total Recoverable</i>							
Aluminum	—	—	717	99.1	<i>nsv</i>		
Arsenic	0.94	1.66	1.08	—	<i>nsv</i>		
Barium	29.3	12.2	8.54	7.72	<i>nsv</i>		
Beryllium	—	—	—	—	<i>nsv</i>		

 State of Oregon Department of Environmental Quality	Appendix A Water Sample Results	NORTH COAST BASIN Station ID and Description				Screening Value (µg/L)	S.V. Reference
	Samples collected in 2013 and 2015	NC13 - Young's Bay at Old Hwy 101 Bridge - 2013	NC14 - Necanicum R at 12th Street approach - 2013	NC28 - Nestucca River at Pacific City Boat Ramp - 2015	NC29 - Big Creek at Big Creek County Park - 2015		
Estuary Sites	13553	13654	38101	38102			
Priority Metals, continued							
<i>Total Recoverable</i>							
Cadmium	—	—	—	—	8.8 ^s	3	
Chromium	—	—	1.4	—	50 ^s	3	
Copper	—	—	1.68	—	3.1 ^s	3	
Iron	—	542	1040	276	<i>nsv</i>		
Lead	0.23	—	—	—	8.1 ^s	3	
Manganese	26.7	52.5	23.7	13.1	<i>nsv</i>		
Nickel	1.45	—	1.56	—	8.2 ^s	3	
Zinc	—	—	—	—	81 ^s	3	
Average Values							
Standard Parameters (mg/L)							
DOC	1.7	2.1	1.6	—			
Sulfate	234.3	695.6	579.1	4.7			
TOC (Total Organic Carbon)	1.8	2.3	1.8	—			
Total Solids	3220.0	15079.3	6887.7	74.0			
Total Suspended Solids	8.0	8.3	8.0	2.7			
Field Parameters							
Conductivity (µmhos/cm @ 25° C)	5413	22060	12006	80			
Dissolved Oxygen (mg/L)	10.3	10.0	10.4	10.6			
pH (SU)	7.7	7.7	7.5	7.5			
Temperature (°C)	14.9	14.2	14.3	12.7			
Turbidity (NTU)	5	4	4	3			

 State of Oregon Department of Environmental Quality	Appendix B Sediment Sample Results		NORTH COAST BASIN Station ID and Description					Screening Value	S.V. Reference
	Samples collected in July of 2013 and 2015	Percent Detection	Number of samples over screening value	NC24 - Wilson River at Sollie Smith Road (River Mile 3.5) - 2015	NC12 - Tillamook River at Bewley Creek Road - 2013	NC26 - Beaver Creek at Beaver Falls Road - 2015	NC21 - Rock Creek at Keasey Road (River Mile 11) - 2013		
				13422	13440	23526	23587		
Maximum Values (ng/kg)									
Dioxins and Furans									
1,2,3,4,6,7,8-HpCDD	45	0	—	—	—	—	—	690	11
1,2,3,4,6,7,8-HpCDF	5	0	—	—	—	—	—	690	11
OCDD	77	0	—	46.4	—	—	1440	23000	11
OCDF	18	0	—	—	—	—	—	23000	11
Flame-retardants									
PBDE-17	9	—	—	—	—	—	—	<i>nsv</i>	
PBDE-100	21	—	—	83.2	—	—	—	<i>nsv</i>	
PBDE-153	17	—	—	54.9	—	—	—	<i>nsv</i>	
PBDE-154	13	—	—	45.8	—	—	—	<i>nsv</i>	
PBDE-196	4	—	—	—	—	—	—	<i>nsv</i>	
PBDE-203	4	—	—	—	—	—	—	<i>nsv</i>	
PBDE-206	13	—	—	—	—	—	129	<i>nsv</i>	
PBDE-207	4	—	—	—	—	—	—	<i>nsv</i>	
PBDE-209	40	—	—	—	—	—	3080	<i>nsv</i>	
PBDE-28	4	—	—	—	—	—	—	<i>nsv</i>	
PBDE-47	26	—	—	283	—	—	381	<i>nsv</i>	
PBDE-49	13	—	—	—	—	—	—	<i>nsv</i>	
PBDE-66	4	—	—	—	—	—	—	<i>nsv</i>	
PBDE-85	13	—	—	21.3	—	—	—	<i>nsv</i>	
PBDE-99	25	—	—	432	—	—	—	<i>nsv</i>	
Industrial Chemicals or Intermediates									
Tri-n-butyltin	8	0	—	—	—	—	—	2300	11
Legacy Pesticides									
BHC-technical (HCH)	4	—	—	—	—	—	—	<i>nsv</i>	
BHC-alpha	11	—	—	—	—	—	—	<i>nsv</i>	
BHC-beta	6	—	—	—	—	—	—	<i>nsv</i>	
Chlordane	4	—	—	—	—	—	—	<i>nsv</i>	
alpha-Chlordane	13	—	—	—	—	—	—	<i>nsv</i>	
cis-Nonachlor	3	—	—	—	—	—	—	<i>nsv</i>	
Endrin+cis-Nonachlor	4	—	—	—	—	—	—	<i>nsv</i>	
gamma-Chlordane+trans-Nonachlor	8	—	—	—	—	—	—	<i>nsv</i>	
Dieldrin	6	1	—	—	—	—	—	8.1	11
Heptachlor	3	—	—	—	—	—	17.2	<i>nsv</i>	
Hexachlorobenzene	21	0	—	1500	—	—	—	19000	11
Total DDT	20	1	—	95.6	24.5	17.7	—	330	11
2,4'-DDD	8	—	—	—	—	—	—	<i>nsv</i>	
2,4'-DDT	3	—	—	—	—	—	—	<i>nsv</i>	
4,4'-DDD	31	—	—	13	—	—	—	<i>nsv</i>	
4,4'-DDT	26	—	—	51.5	—	—	—	<i>nsv</i>	
4,4'-DDE	54	—	—	31.1	24.5	17.7	—	<i>nsv</i>	
PCBs									
Total PCBs	—	—	—	—	—	—	77.5	48	11
PCB-101+113	29	—	—	—	—	—	—	<i>nsv</i>	
PCB-105	21	0	—	—	—	—	—	170	11
PCB-110	54	—	—	—	—	—	20.2	<i>nsv</i>	
PCB-118	50	2	—	—	—	—	—	120	11
PCB-128	8	—	—	—	—	—	—	<i>nsv</i>	
PCB-130	8	—	—	—	—	—	—	<i>nsv</i>	
PCB-132+153	58	—	—	—	—	—	39	<i>nsv</i>	
PCB-134	4	—	—	—	—	—	—	<i>nsv</i>	
PCB-135	8	—	—	—	—	—	—	<i>nsv</i>	
PCB-137	4	—	—	—	—	—	—	<i>nsv</i>	
PCB-138+163	42	—	—	—	—	—	—	<i>nsv</i>	
PCB-141	13	—	—	—	—	—	—	<i>nsv</i>	
PCB-144	4	—	—	—	—	—	—	<i>nsv</i>	
PCB-146	4	—	—	—	—	—	—	<i>nsv</i>	
PCB-148	8	—	—	—	—	—	—	<i>nsv</i>	
PCB-149	50	—	—	—	—	—	18.3	<i>nsv</i>	
PCB-151	13	—	—	—	—	—	—	<i>nsv</i>	
PCB-156	8	0	—	—	—	—	—	210	11
PCB-158+160	4	—	—	—	—	—	—	<i>nsv</i>	
PCB-16+32	8	—	—	—	—	—	—	<i>nsv</i>	
PCB-164	4	—	—	—	—	—	—	<i>nsv</i>	
PCB-165	4	—	—	—	—	—	—	<i>nsv</i>	
PCB-167	4	0	—	—	—	—	—	210	11
PCB-17	8	—	—	—	—	—	—	<i>nsv</i>	
PCB-170	13	—	—	—	—	—	—	<i>nsv</i>	
PCB-171	4	—	—	—	—	—	—	<i>nsv</i>	
PCB-172	4	—	—	—	—	—	—	<i>nsv</i>	



**Appendix B
Sediment Sample Results**

Samples collected in
July of 2013 and 2015

**NORTH COAST BASIN
Station ID and Description**

Percent Detection

Number of samples over
screening value

NC24 - Wilson River at
Sollie Smith Road
(River Mile 3.5) - 2015
13422

NC12 - Tillamook River
at Bewley Creek Road -
2013
13440

NC26 - Beaver Creek at
Beaver Falls Road -
2015
23526

NC21 - Rock Creek at
Keasey Road (River Mile
11) - 2013
23587

Screening Value

S.V. Reference

Maximum Values (ng/kg)

PCBs, continued

PCB-174	13		—	—	—	—	nsv	
PCB-175-182	4		—	—	—	—	nsv	
PCB-176	4		—	—	—	—	nsv	
PCB-177	4		—	—	—	—	nsv	
PCB-178	4		—	—	—	—	nsv	
PCB-179	4		—	—	—	—	nsv	
PCB-18	21		—	—	—	—	nsv	
PCB-180+193	21		—	—	—	—	nsv	
PCB-183	4		—	—	—	—	nsv	
PCB-185	4		—	—	—	—	nsv	
PCB-187	4		—	—	—	—	nsv	
PCB-190	4		—	—	—	—	nsv	
PCB-194	4		—	—	—	—	nsv	
PCB-196	4		—	—	—	—	nsv	
PCB-199	4		—	—	—	—	nsv	
PCB-20+21+33	8		—	—	—	—	nsv	
PCB-203	4		—	—	—	—	nsv	
PCB-206	8		—	—	—	—	nsv	
PCB-209	8		—	—	—	—	nsv	
PCB-22	8		—	—	—	—	nsv	
PCB-25	8		—	—	—	—	nsv	
PCB-26	13		—	—	—	—	nsv	
PCB-28	25		—	—	—	—	nsv	
PCB-31	50		—	—	—	—	nsv	
PCB-37	17		—	—	—	—	nsv	
PCB-40	4		—	—	—	—	nsv	
PCB-42	8		—	—	—	—	nsv	
PCB-43+52	38		—	—	—	—	nsv	
PCB-44	38		—	—	—	—	nsv	
PCB-45	4		—	—	—	—	nsv	
PCB-48	4		—	—	—	—	nsv	
PCB-49	38		—	—	—	—	nsv	
PCB-56	13		—	—	—	—	nsv	
PCB-60	8		—	—	—	—	nsv	
PCB-64+68	13		—	—	—	—	nsv	
PCB-65+75	4		—	—	—	—	nsv	
PCB-66	38		—	—	—	—	nsv	
PCB-70	42		—	—	—	—	nsv	
PCB-71	8		—	—	—	—	nsv	
PCB-74+76	8		—	—	—	—	nsv	
PCB-77	4	0	—	—	—	—	52	11
PCB-82	4		—	—	—	—	nsv	
PCB-84	13		—	—	—	—	nsv	
PCB-85	8		—	—	—	—	nsv	
PCB-87+111+116+117	4		—	—	—	—	nsv	
PCB-89	8		—	—	—	—	nsv	
PCB-91	8		—	—	—	—	nsv	
PCB-95+121	21		—	—	—	—	nsv	
PCB-97	21		—	—	—	—	nsv	
PCB-99	29		—	—	—	—	nsv	

Priority Metals (Total)

Maximum Values (mg/kg)

Aluminum	100		31600	48700	30200	63600	nsv	
Arsenic	100	3	1.61	3.01	4.48	4.39	7	11
Barium	100		67.1	163	221	259	nsv	
Cadmium	21	0	0.13	—	0.1	—	1	11
Chromium	100		51.1	82.3	22.5	62	nsv	
Cobalt	100		26.5	33.5	12.4	27	nsv	
Copper	100		63.2	48.3	10.4	41.3	nsv	
Lead	100	1	4.84	6.01	5.4	12.09	17	11
Manganese	100		680	781	586	931	nsv	
Mercury	63	4	—	—	—	0.043	0.07	11
Nickel	100		69.8	111	10.6	41.8	nsv	
Selenium	4	0	—	—	—	—	2	11
Silver	8		—	—	—	—	nsv	
Thallium	21		—	—	0.1	—	nsv	
Zinc	100		104	127	70.5	88	nsv	

 State of Oregon Department of Environmental Quality	Appendix B Sediment Sample Results	NORTH COAST BASIN Station ID and Description			Screening Value	S.V. Reference
	Samples collected in July of 2013 and 2015	NC21 - Rock Creek at Keasey Road (River Mile 11) - 2015 23587	NC18 - Humbug Creek near mouth (Nehalem) - 2013 32980	NC27 - Holden Creek at Tillamook River Rd - 2015 38100		
Maximum Values (ng/kg)						
Dioxins and Furans						
1,2,3,4,6,7,8-HpCDD	—	—	184	690	11	
1,2,3,4,6,7,8-HpCDF	—	—	44.1	690	11	
OCDD	—	52.2	1510	23000	11	
OCDF	—	—	200	23000	11	
Flame-retardants						
PBDE-17	—	—	—	<i>nsv</i>		
PBDE-100	—	—	106	<i>nsv</i>		
PBDE-153	—	—	59.2	<i>nsv</i>		
PBDE-154	—	—	58.6	<i>nsv</i>		
PBDE-196	—	—	—	<i>nsv</i>		
PBDE-203	—	—	—	<i>nsv</i>		
PBDE-206	—	—	106	<i>nsv</i>		
PBDE-207	—	—	57.4	<i>nsv</i>		
PBDE-209	—	—	2310	<i>nsv</i>		
PBDE-28	—	—	—	<i>nsv</i>		
PBDE-47	—	—	359	<i>nsv</i>		
PBDE-49	—	—	18	<i>nsv</i>		
PBDE-66	—	—	14.4	<i>nsv</i>		
PBDE-85	—	—	19.5	<i>nsv</i>		
PBDE-99	—	—	287	<i>nsv</i>		
Industrial Chemicals or Intermediates						
Tri-n-butyltin	—	—	—	2300	11	
Legacy Pesticides						
BHC-technical (HCH)	—	—	—	<i>nsv</i>		
BHC-alpha	—	—	—	<i>nsv</i>		
BHC-beta	—	—	—	<i>nsv</i>		
Chlordane	—	—	—	<i>nsv</i>		
alpha-Chlordane	—	—	102	<i>nsv</i>		
cis-Nonachlor	—	—	47.6	<i>nsv</i>		
Endrin+cis-Nonachlor	—	—	70.6	<i>nsv</i>		
gamma-Chlordane+trans-Nonachlor	—	—	192	<i>nsv</i>		
Dieldrin	—	—	38.5	8.1	11	
Heptachlor	—	—	—	<i>nsv</i>		
Hexachlorobenzene	—	—	—	19000	11	
Total DDT	—	54.6	396.6	330	11	
2,4'-DDD	—	—	26	<i>nsv</i>		
2,4'-DDT	—	—	—	<i>nsv</i>		
4,4'-DDD	—	22.9	74.6	<i>nsv</i>		
4,4'-DDT	—	—	166	<i>nsv</i>		
4,4'-DDE	—	31.7	130	<i>nsv</i>		
PCBs						
Total PCBs	—	—	5390	48	11	
PCB-101+113	—	—	184	<i>nsv</i>		
PCB-105	—	—	90	170	11	
PCB-110	—	—	223	<i>nsv</i>		
PCB-118	—	—	—	120	11	
PCB-128	—	—	66.4	<i>nsv</i>		
PCB-130	—	—	24.9	<i>nsv</i>		
PCB-132+153	—	—	583	<i>nsv</i>		
PCB-134	—	—	18.9	<i>nsv</i>		
PCB-135	—	—	48.8	<i>nsv</i>		
PCB-137	—	—	17.9	<i>nsv</i>		
PCB-138+163	—	—	422	<i>nsv</i>		
PCB-141	—	—	72.3	<i>nsv</i>		
PCB-144	—	—	15	<i>nsv</i>		
PCB-146	—	—	—	<i>nsv</i>		
PCB-148	—	—	31	<i>nsv</i>		
PCB-149	—	—	340	<i>nsv</i>		
PCB-151	—	—	96.2	<i>nsv</i>		
PCB-156	—	—	37.5	210	11	
PCB-158+160	—	—	42.4	<i>nsv</i>		
PCB-16+32	—	—	29.5	<i>nsv</i>		
PCB-164	—	—	30.8	<i>nsv</i>		
PCB-165	—	—	56.6	<i>nsv</i>		
PCB-167	—	—	20.9	210	11	
PCB-17	—	—	20.9	<i>nsv</i>		
PCB-170	—	—	80.2	<i>nsv</i>		
PCB-171	—	—	30.1	<i>nsv</i>		
PCB-172	—	—	22.7	<i>nsv</i>		

 State of Oregon Department of Environmental Quality	Appendix B Sediment Sample Results		NORTH COAST BASIN Station ID and Description			Screening Value	S.V. Reference
	Samples collected in July of 2013 and 2015			NC21 - Rock Creek at Keasey Road (River Mile 11) - 2015 23587	NC18 - Humbug Creek near mouth (Nehalem) - 2013 32980		
Maximum Values (ng/kg)							
PCBs, continued							
PCB-174	—	—	135	<i>nsv</i>			
PCB-175-182	—	—	—	<i>nsv</i>			
PCB-176	—	—	15.1	<i>nsv</i>			
PCB-177	—	—	82.2	<i>nsv</i>			
PCB-178	—	—	35.9	<i>nsv</i>			
PCB-179	—	—	72.5	<i>nsv</i>			
PCB-18	—	—	50.8	<i>nsv</i>			
PCB-180+193	—	—	288	<i>nsv</i>			
PCB-183	—	—	60	<i>nsv</i>			
PCB-185	—	—	15.9	<i>nsv</i>			
PCB-187	—	—	208	<i>nsv</i>			
PCB-190	—	—	27.4	<i>nsv</i>			
PCB-194	—	—	37.1	<i>nsv</i>			
PCB-196	—	—	29.5	<i>nsv</i>			
PCB-199	—	—	90.7	<i>nsv</i>			
PCB-20+21+33	—	—	45.4	<i>nsv</i>			
PCB-203	—	—	60.3	<i>nsv</i>			
PCB-206	—	—	37.6	<i>nsv</i>			
PCB-209	—	—	47.1	<i>nsv</i>			
PCB-22	—	—	27.4	<i>nsv</i>			
PCB-25	—	—	5.61	<i>nsv</i>			
PCB-26	—	—	11.8	<i>nsv</i>			
PCB-28	—	—	82.9	<i>nsv</i>			
PCB-31	—	—	70.1	<i>nsv</i>			
PCB-37	—	—	37.1	<i>nsv</i>			
PCB-40	—	—	12.9	<i>nsv</i>			
PCB-42	—	—	26.7	<i>nsv</i>			
PCB-43+52	—	—	124	<i>nsv</i>			
PCB-44	—	—	78.2	<i>nsv</i>			
PCB-45	—	—	10.7	<i>nsv</i>			
PCB-48	—	—	13.7	<i>nsv</i>			
PCB-49	—	—	68.2	<i>nsv</i>			
PCB-56	—	—	35.3	<i>nsv</i>			
PCB-60	—	—	23.1	<i>nsv</i>			
PCB-64+68	—	—	44.5	<i>nsv</i>			
PCB-65+75	—	—	—	<i>nsv</i>			
PCB-66	—	—	84.1	<i>nsv</i>			
PCB-70	—	—	135	<i>nsv</i>			
PCB-71	—	—	20	<i>nsv</i>			
PCB-74+76	—	—	50	<i>nsv</i>			
PCB-77	—	—	11.6	52	11		
PCB-82	—	—	16.3	<i>nsv</i>			
PCB-84	—	—	32.3	<i>nsv</i>			
PCB-85	—	—	29.9	<i>nsv</i>			
PCB-87+111+116+117	—	—	66.6	<i>nsv</i>			
PCB-89	—	—	34.4	<i>nsv</i>			
PCB-91	—	—	26.6	<i>nsv</i>			
PCB-95+121	—	—	122	<i>nsv</i>			
PCB-97	—	—	54.3	<i>nsv</i>			
PCB-99	—	—	90.9	<i>nsv</i>			
Priority Metals (Total)							
Maximum Values (mg/kg)							
Aluminum	27100	37600	32200	<i>nsv</i>			
Arsenic	3.17	5.78	4.56	7	11		
Barium	123	245	147	<i>nsv</i>			
Cadmium	0.15	—	0.35	1	11		
Chromium	26.5	34	45.9	<i>nsv</i>			
Cobalt	10.4	10.3	30	<i>nsv</i>			
Copper	22.7	21.5	72.3	<i>nsv</i>			
Lead	5.26	9.57	25.4	17	11		
Manganese	430	319	1680	<i>nsv</i>			
Mercury	0.103	0.042	0.076	0.07	11		
Nickel	17.1	17.1	47.5	<i>nsv</i>			
Selenium	—	—	—	2	11		
Silver	—	—	0.1	<i>nsv</i>			
Thallium	0.11	—	—	<i>nsv</i>			
Zinc	70.5	95.1	155	<i>nsv</i>			

 State of Oregon Department of Environmental Quality	Appendix B	NORTH COAST BASIN					Screening Value	S.V. Reference
	Sediment Sample Results	Station ID and Description						
	Samples collected in July of 2013 and 2015	NC02 - Skipanon River at Hwy 101 - 2013	NC02 - Skipanon River at Hwy 101 - 2015	NC23 - Lewis & Clark River 0.5 miles upstream of Peterson Slough - 2015	NC04 - Ecola CR at Canon Beach Loop RD - 2013	NC20 - Nehalem Bay at Brighton - 2013		
Estuary Sites	10812	10812	10816	11229	13297			
Maximum Values (ng/kg)								
Dioxins and Furans								
1,2,3,4,6,7,8-HpCDD	—	—	76.7	11.1	15.2	690	11	
1,2,3,4,6,7,8-HpCDF	—	—	—	—	—	690	11	
OCDD	66.1	—	657	118	108	23000	11	
OCDF	—	—	—	—	—	23000	11	
Flame-retardants								
PBDE-17	—	—	—	—	—	<i>nsv</i>		
PBDE-100	—	—	—	76.6	—	<i>nsv</i>		
PBDE-153	—	—	—	—	—	<i>nsv</i>		
PBDE-154	—	—	—	—	—	<i>nsv</i>		
PBDE-196	—	—	—	—	—	<i>nsv</i>		
PBDE-203	—	—	—	—	—	<i>nsv</i>		
PBDE-206	—	—	—	—	—	<i>nsv</i>		
PBDE-207	—	—	—	—	—	<i>nsv</i>		
PBDE-209	—	415	352	—	1870	<i>nsv</i>		
PBDE-28	—	—	—	—	—	<i>nsv</i>		
PBDE-47	—	—	—	436	—	<i>nsv</i>		
PBDE-49	—	—	—	—	—	<i>nsv</i>		
PBDE-66	—	—	—	—	—	<i>nsv</i>		
PBDE-85	—	—	—	—	—	<i>nsv</i>		
PBDE-99	—	—	—	369	—	<i>nsv</i>		
Industrial Chemicals or Intermediates								
Tri-n-butyltin	—	—	—	—	2.2	370	11	
Legacy Pesticides								
BHC-technical (HCH)	—	—	—	—	15.1	<i>nsv</i>		
BHC-alpha	—	—	—	—	15.1	<i>nsv</i>		
BHC-beta	—	—	—	—	—	<i>nsv</i>		
Chlordane	—	—	—	—	—	<i>nsv</i>		
alpha-Chlordane	—	—	—	—	—	<i>nsv</i>		
cis-Nonachlor	—	—	—	—	—	<i>nsv</i>		
Endrin+cis-Nonachlor	—	—	—	—	—	<i>nsv</i>		
gamma-Chlordane+trans-Nonachlor	—	—	—	—	—	<i>nsv</i>		
Dieldrin	—	—	—	—	—	8.1	11	
Heptachlor	—	—	—	—	—	<i>nsv</i>		
Hexachlorobenzene	—	—	—	—	211	19000	11	
Total DDT	702.6	72.9	1182.8	29.7	39.5	330	11	
2,4'-DDD	41	—	36.8	—	—	<i>nsv</i>		
2,4'-DDT	—	—	—	—	—	<i>nsv</i>		
4,4'-DDD	265	26.9	180	—	—	<i>nsv</i>		
4,4'-DDT	17.6	—	777	—	12.3	<i>nsv</i>		
4,4'-DDE	379	46	189	29.7	27.2	<i>nsv</i>		
PCBs								
Total PCBs	—	—	628	87.2	186	48	11	
PCB-101+113	—	—	39.6	—	—	<i>nsv</i>		
PCB-105	—	—	18.4	—	—	170	11	
PCB-110	—	—	53.8	—	20.5	<i>nsv</i>		
PCB-118	—	—	46	—	—	120	11	
PCB-128	—	—	—	—	—	<i>nsv</i>		
PCB-130	—	—	—	—	—	<i>nsv</i>		
PCB-132+153	—	—	60.5	56.5	45.9	<i>nsv</i>		
PCB-134	—	—	—	—	—	<i>nsv</i>		
PCB-135	—	—	—	—	—	<i>nsv</i>		
PCB-137	—	—	—	—	—	<i>nsv</i>		
PCB-138+163	—	—	49.4	—	—	<i>nsv</i>		
PCB-141	—	—	—	—	—	<i>nsv</i>		
PCB-144	—	—	—	—	—	<i>nsv</i>		
PCB-146	—	—	—	—	—	<i>nsv</i>		
PCB-148	—	—	—	—	—	<i>nsv</i>		
PCB-149	—	—	31.8	30.7	21.8	<i>nsv</i>		
PCB-151	—	—	—	—	—	<i>nsv</i>		
PCB-156	—	—	—	—	—	210	11	
PCB-158+160	—	—	—	—	—	<i>nsv</i>		
PCB-16+32	—	—	—	—	—	<i>nsv</i>		
PCB-164	—	—	—	—	—	<i>nsv</i>		
PCB-165	—	—	—	—	—	<i>nsv</i>		
PCB-167	—	—	—	—	—	210	11	
PCB-17	—	—	—	—	—	<i>nsv</i>		
PCB-170	—	—	—	—	—	<i>nsv</i>		
PCB-171	—	—	—	—	—	<i>nsv</i>		
PCB-172	—	—	—	—	—	<i>nsv</i>		



State of Oregon
Department of
Environmental
Quality

**Appendix B
Sediment Sample Results**

**NORTH COAST BASIN
Station ID and Description**

Samples collected in July of
2013 and 2015

Estuary Sites

NC02 - Skipanon River
at Hwy 101 - 2013

NC02 - Skipanon River
at Hwy 101 - 2015

NC23 - Lewis & Clark
River 0.5 miles
upstream of Peterson
Slough - 2015

NC04 - Ecola CR at
Canon Beach Loop RD
- 2013

NC20 - Nehalem Bay at
Brighton - 2013

Screening Value

S.V. Reference

10812

10812

10816

11229

13297

Maximum Values (ng/kg)

PCBs, continued

PCB-174	—	—	—	—	—	nsv
PCB-175-182	—	—	—	—	—	nsv
PCB-176	—	—	—	—	—	nsv
PCB-177	—	—	—	—	—	nsv
PCB-178	—	—	—	—	—	nsv
PCB-179	—	—	—	—	—	nsv
PCB-18	—	—	7.45	—	—	nsv
PCB-180+193	—	—	23.3	—	—	nsv
PCB-183	—	—	—	—	—	nsv
PCB-185	—	—	—	—	—	nsv
PCB-187	—	—	—	—	—	nsv
PCB-190	—	—	—	—	—	nsv
PCB-194	—	—	—	—	—	nsv
PCB-196	—	—	—	—	—	nsv
PCB-199	—	—	—	—	—	nsv
PCB-20+21+33	—	—	—	—	—	nsv
PCB-203	—	—	—	—	—	nsv
PCB-206	—	—	—	—	—	nsv
PCB-209	—	—	—	—	—	nsv
PCB-22	—	—	—	—	—	nsv
PCB-25	—	—	—	—	—	nsv
PCB-26	—	—	—	—	—	nsv
PCB-28	—	—	26.3	—	—	nsv
PCB-31	—	—	17.5	—	13.6	nsv
PCB-37	—	—	11	—	—	nsv
PCB-40	—	—	—	—	—	nsv
PCB-42	—	—	—	—	—	nsv
PCB-43+52	—	—	33.4	—	37.9	nsv
PCB-44	—	—	20.9	—	21.3	nsv
PCB-45	—	—	—	—	—	nsv
PCB-48	—	—	—	—	—	nsv
PCB-49	—	—	23.3	—	24.5	nsv
PCB-56	—	—	12.6	—	—	nsv
PCB-60	—	—	—	—	—	nsv
PCB-64+68	—	—	—	—	—	nsv
PCB-65+75	—	—	—	—	—	nsv
PCB-66	—	—	42.3	—	—	nsv
PCB-70	—	—	41.8	—	—	nsv
PCB-71	—	—	—	—	—	nsv
PCB-74+76	—	—	—	—	—	nsv
PCB-77	—	—	—	—	—	52
PCB-82	—	—	—	—	—	nsv
PCB-84	—	—	—	—	—	nsv
PCB-85	—	—	—	—	—	nsv
PCB-87+111+116+117	—	—	—	—	—	nsv
PCB-89	—	—	—	—	—	nsv
PCB-91	—	—	—	—	—	nsv
PCB-95+121	—	—	24.3	—	—	nsv
PCB-97	—	—	15.4	—	—	nsv
PCB-99	—	—	28.6	—	—	nsv

Priority Metals (Total)

Maximum Values (mg/kg)

Aluminum	9450	7780	29400	34000	48800	nsv
Arsenic	3.84	2.9	7.46	3.32	12.2	7
Barium	47.4	37.2	112	104	73.8	nsv
Cadmium	—	—	0.33	—	—	1
Chromium	14.9	14.6	34.2	21.1	38.6	nsv
Cobalt	6.5	4.56	10.6	14.6	14.1	nsv
Copper	5.43	3.47	19.4	8.8	28.5	nsv
Lead	2.97	2.08	8.69	5.86	13.7	17
Manganese	508	211	258	426	399	nsv
Mercury	0.011	—	0.052	0.03	0.059	0.07
Nickel	9.3	7.6	17.1	13.8	18	nsv
Selenium	—	—	—	—	1.22	2
Silver	—	—	0.11	—	—	nsv
Thallium	—	—	0.16	—	—	nsv
Zinc	40.7	31.8	88.3	87.8	86.1	nsv

 State of Oregon Department of Environmental Quality	Appendix B	NORTH COAST BASIN					Screening Value	S.V. Reference
	Sediment Sample Results	Station ID and Description						
	Samples collected in July of 2013 and 2015	NC09 - Tillamook Bay at Hobsonville Point - 2013	NC09 - Tillamook Bay at Hobsonville Point - 2015	NC10 - Netarts Bay at CNTY boat ramp - 2013	NC11 - Trask River at Netarts Road (Hwy. 6) - 2013	NC25 - Nehalem Bay at Nehalem Bay State Park Boat Ramp - 2015		
Estuary Sites	13308	13308	13311	13431	13446			
Maximum Values (ng/kg)								
Dioxins and Furans								
1,2,3,4,6,7,8-HpCDD	103	16.3	43.7	17.1	—	690	11	
1,2,3,4,6,7,8-HpCDF	—	—	—	—	—	690	11	
OCDD	1440	217	485	219	—	23000	11	
OCDF	—	—	—	—	—	23000	11	
Flame-retardants								
PBDE-17	16.2	—	—	—	—	<i>nsv</i>		
PBDE-100	—	—	—	95.4	—	<i>nsv</i>		
PBDE-153	—	—	47	54.7	—	<i>nsv</i>		
PBDE-154	—	—	—	48.8	—	<i>nsv</i>		
PBDE-196	—	—	—	—	—	<i>nsv</i>		
PBDE-203	—	—	—	—	—	<i>nsv</i>		
PBDE-206	—	—	—	58.6	—	<i>nsv</i>		
PBDE-207	—	—	—	—	—	<i>nsv</i>		
PBDE-209	—	—	—	1120	—	<i>nsv</i>		
PBDE-28	—	—	—	—	—	<i>nsv</i>		
PBDE-47	—	—	—	297	—	<i>nsv</i>		
PBDE-49	—	—	—	19.2	—	<i>nsv</i>		
PBDE-66	—	—	—	—	—	<i>nsv</i>		
PBDE-85	—	—	—	15.2	—	<i>nsv</i>		
PBDE-99	—	—	237	451	—	<i>nsv</i>		
Industrial Chemicals or Intermediates								
Tri-n-butyltin	—	—	—	—	—	370	11	
Legacy Pesticides								
BHC-technical (HCH)	47.8	24.7	—	—	—	<i>nsv</i>		
BHC-alpha	27.7	24.7	—	—	—	<i>nsv</i>		
BHC-beta	20.1	—	—	—	—	<i>nsv</i>		
Chlordane	—	—	—	12	—	<i>nsv</i>		
alpha-Chlordane	—	—	—	12	—	<i>nsv</i>		
cis-Nonachlor	—	—	—	—	—	<i>nsv</i>		
Endrin+cis-Nonachlor	—	—	—	—	—	<i>nsv</i>		
gamma-Chlordane+trans-Nonachlor	—	—	—	—	—	<i>nsv</i>		
Dieldrin	—	—	—	—	—	8.1	11	
Heptachlor	—	—	—	—	—	<i>nsv</i>		
Hexachlorobenzene	185	—	8270	—	—	19000	11	
Total DDT	116.4	42.6	104.8	251.5	—	330	11	
2,4'-DDD	—	—	—	—	—	<i>nsv</i>		
2,4'-DDT	—	—	—	—	—	<i>nsv</i>		
4,4'-DDD	43.5	—	34	49.1	—	<i>nsv</i>		
4,4'-DDT	—	—	—	46.4	—	<i>nsv</i>		
4,4'-DDE	72.9	42.6	70.8	156	—	<i>nsv</i>		
PCBs								
Total PCBs	771	141	2727	1047	1225	48	11	
PCB-101+113	67.6	—	235	71.9	51.7	<i>nsv</i>		
PCB-105	—	—	74.2	—	23.9	170	11	
PCB-110	79.4	20.5	234	59.8	59.9	<i>nsv</i>		
PCB-118	92.3	21.2	229	55.7	52.4	120	11	
PCB-128	—	—	48.3	—	—	<i>nsv</i>		
PCB-130	—	—	20.7	—	—	<i>nsv</i>		
PCB-132+153	129	31.5	305	93.7	77.5	<i>nsv</i>		
PCB-134	—	—	—	—	—	<i>nsv</i>		
PCB-135	—	—	20.7	—	—	<i>nsv</i>		
PCB-137	—	—	—	—	—	<i>nsv</i>		
PCB-138+163	97	26.2	236	59.3	59	<i>nsv</i>		
PCB-141	—	—	21.3	—	11.9	<i>nsv</i>		
PCB-144	—	—	—	—	—	<i>nsv</i>		
PCB-146	—	—	35.7	—	—	<i>nsv</i>		
PCB-148	—	—	21.4	—	—	<i>nsv</i>		
PCB-149	58.9	14.1	144	49.7	—	<i>nsv</i>		
PCB-151	—	—	31	12.1	—	<i>nsv</i>		
PCB-156	—	—	25.7	—	—	210	11	
PCB-158+160	—	—	—	—	—	<i>nsv</i>		
PCB-16+32	—	—	—	—	21.2	<i>nsv</i>		
PCB-164	—	—	—	—	—	<i>nsv</i>		
PCB-165	—	—	—	—	—	<i>nsv</i>		
PCB-167	—	—	—	—	—	210	11	
PCB-17	—	—	—	—	13.5	<i>nsv</i>		
PCB-170	—	—	23.9	—	12.8	<i>nsv</i>		
PCB-171	—	—	—	—	—	<i>nsv</i>		
PCB-172	—	—	—	—	—	<i>nsv</i>		

 State of Oregon Department of Environmental Quality	Appendix B	NORTH COAST BASIN					Screening Value	S.V. Reference
	Sediment Sample Results	Station ID and Description						
	Samples collected in July of 2013 and 2015	NC09 - Tillamook Bay at Hobsonville Point - 2013	NC09 - Tillamook Bay at Hobsonville Point - 2015	NC10 - Netarts Bay at CNTY boat ramp - 2013	NC11 - Trask River at Netarts Road (Hwy. 6) - 2013	NC25 - Nehalem Bay at Nehalem Bay State Park Boat Ramp - 2015		
Estuary Sites	13308	13308	13311	13431	13446			
	Maximum Values (ng/kg)							
PCBs, continued								
PCB-174	—	—	—	—	14.5	nsv		
PCB-175-182	—	—	—	—	22.4	nsv		
PCB-176	—	—	—	—	—	nsv		
PCB-177	—	—	—	—	—	nsv		
PCB-178	—	—	—	—	—	nsv		
PCB-179	—	—	—	—	—	nsv		
PCB-18	—	—	—	20	30.6	nsv		
PCB-180+193	—	—	29.3	—	37.2	nsv		
PCB-183	—	—	—	—	—	nsv		
PCB-185	—	—	—	—	—	nsv		
PCB-187	—	—	—	—	—	nsv		
PCB-190	—	—	—	—	—	nsv		
PCB-194	—	—	—	—	—	nsv		
PCB-196	—	—	—	—	—	nsv		
PCB-199	—	—	—	—	—	nsv		
PCB-20+21+33	—	—	—	—	30.7	nsv		
PCB-203	—	—	—	—	—	nsv		
PCB-206	—	—	51.7	—	—	nsv		
PCB-209	—	—	67	—	—	nsv		
PCB-22	—	—	—	—	20.5	nsv		
PCB-25	—	—	—	—	6.69	nsv		
PCB-26	—	—	—	16	12	nsv		
PCB-28	—	8.44	—	—	71.8	nsv		
PCB-31	20	5.76	17.6	36.3	63.3	nsv		
PCB-37	—	—	—	—	27.2	nsv		
PCB-40	—	—	—	—	—	nsv		
PCB-42	—	—	—	—	17.8	nsv		
PCB-43+52	53	—	136	121	62.9	nsv		
PCB-44	25.9	—	50.1	59	46.6	nsv		
PCB-45	—	—	—	—	—	nsv		
PCB-48	—	—	—	—	—	nsv		
PCB-49	23.6	—	67.7	86.1	36.7	nsv		
PCB-56	—	—	—	—	27.2	nsv		
PCB-60	—	—	—	—	15.4	nsv		
PCB-64+68	—	—	—	48.4	26.2	nsv		
PCB-65+75	—	—	—	68	—	nsv		
PCB-66	30.5	—	59.3	60.7	59.8	nsv		
PCB-70	38.2	12.9	76.2	41	73.6	nsv		
PCB-71	—	—	—	—	14.9	nsv		
PCB-74+76	—	—	—	—	32.9	nsv		
PCB-77	—	—	—	—	—	52	11	
PCB-82	—	—	—	—	—	nsv		
PCB-84	—	—	45.9	—	12.4	nsv		
PCB-85	—	—	34.4	—	—	nsv		
PCB-87+111+116+117	—	—	—	—	—	nsv		
PCB-89	—	—	47.4	—	—	nsv		
PCB-91	—	—	27.7	—	—	nsv		
PCB-95+121	—	—	120	50	31	nsv		
PCB-97	23.1	—	77.3	—	20.9	nsv		
PCB-99	32.6	—	113	37.8	26.3	nsv		
Priority Metals (Total)	Maximum Values (mg/kg)							
Aluminum	36500	26700	16600	47300	4840	nsv		
Arsenic	4.71	5.3	7.14	3.19	2.72	7	11 [†]	
Barium	42.9	38.2	28.1	85.8	10.6	nsv		
Cadmium	—	0.16	—	—	—	1	11 [†]	
Chromium	45	39.7	29.9	58.1	10.3	nsv		
Cobalt	21.5	17.3	6.3	29.6	2.4	nsv		
Copper	49.2	33.7	10.4	76	2.66	nsv		
Lead	6.2	4.62	5.17	6.4	1.02	17	11 [†]	
Manganese	355	314	145	992	97.8	nsv		
Mercury	0.033	—	0.027	0.04	—	0.07	11 [†]	
Nickel	45.2	35.2	16.5	64	4.84	nsv		
Selenium	—	—	—	—	—	2	11 [†]	
Silver	—	—	—	—	—	nsv		
Thallium	—	0.14	—	—	—	nsv		
Zinc	107	89.4	50.6	115	14.5	nsv		

 State of Oregon Department of Environmental Quality	Appendix B	NORTH COAST BASIN					Screening Value	S.V. Reference
	Sediment Sample Results	Station ID and Description						
	Samples collected in July of 2013 and 2015	NC14 - Necanicum R at 12th Street approach - 2013	NC15 - North Fork Nehalem River at Highway 53 - 2013	NC22 - Nestucca Bay - undeveloped boat ramp - 2013	NC22 - Nestucca Bay - undeveloped boat ramp - 2015	NC29 - Big Creek at Big Creek County Park - 2015		
Estuary Sites	13654	18802	37510	37510	38102			
Maximum Values (ng/kg)								
Dioxins and Furans								
1,2,3,4,6,7,8-HpCDD	64.2	—	—	—	7.43	690	11	
1,2,3,4,6,7,8-HpCDF	—	—	—	—	—	690	11	
OCDD	457	—	103	23	38.2	23000	11	
OCDF	—	—	—	—	—	23000	11	
Flame-retardants								
PBDE-17	63.6	—	—	—	—	<i>nsv</i>		
PBDE-100	126	—	—	—	—	<i>nsv</i>		
PBDE-153	—	—	—	—	—	<i>nsv</i>		
PBDE-154	—	—	—	—	—	<i>nsv</i>		
PBDE-196	99.8	—	—	—	—	<i>nsv</i>		
PBDE-203	115	—	—	—	—	<i>nsv</i>		
PBDE-206	—	—	—	—	—	<i>nsv</i>		
PBDE-207	—	—	—	—	—	<i>nsv</i>		
PBDE-209	5020	—	—	161	—	<i>nsv</i>		
PBDE-28	48.2	—	—	—	—	<i>nsv</i>		
PBDE-47	738	—	—	—	—	<i>nsv</i>		
PBDE-49	123	—	—	—	—	<i>nsv</i>		
PBDE-66	—	—	—	—	—	<i>nsv</i>		
PBDE-85	—	—	—	—	—	<i>nsv</i>		
PBDE-99	517	—	—	—	—	<i>nsv</i>		
Industrial Chemicals or Intermediates								
Tri-n-butyltin	—	—	—	—	—	370	11	
Legacy Pesticides								
BHC-technical (HCH)	43.7	—	—	—	—	<i>nsv</i>		
BHC-alpha	21.9	—	—	—	—	<i>nsv</i>		
BHC-beta	21.8	—	—	—	—	<i>nsv</i>		
Chlordane	84.6	—	—	—	—	<i>nsv</i>		
alpha-Chlordane	33.2	—	—	—	—	<i>nsv</i>		
cis-Nonachlor	—	—	—	—	—	<i>nsv</i>		
Endrin+cis-Nonachlor	—	—	—	—	—	<i>nsv</i>		
gamma-Chlordane+trans-Nonachlor	51.4	—	—	—	—	<i>nsv</i>		
Dieldrin	38.3	—	—	—	—	8.1	11	
Heptachlor	—	—	—	—	—	<i>nsv</i>		
Hexachlorobenzene	—	—	155	—	—	19000	11	
Total DDT	267	42.7	82.5	—	72.8	330	11	
2,4'-DDD	21	—	—	—	—	<i>nsv</i>		
2,4'-DDT	—	—	—	—	—	<i>nsv</i>		
4,4'-DDD	74	—	24.2	—	—	<i>nsv</i>		
4,4'-DDT	38	18.6	—	—	—	<i>nsv</i>		
4,4'-DDE	134	24.1	58.3	—	72.8	<i>nsv</i>		
PCBs								
Total PCBs	1194	—	238	258	141	48	11	
PCB-101+113	106	—	—	—	—	<i>nsv</i>		
PCB-105	—	—	—	10.8	—	170	11	
PCB-110	126	—	27.8	24.4	15.8	<i>nsv</i>		
PCB-118	146	—	28.5	22.7	20.2	120	11	
PCB-128	—	—	—	—	—	<i>nsv</i>		
PCB-130	—	—	—	—	—	<i>nsv</i>		
PCB-132+153	184	—	40.2	55.7	31.1	<i>nsv</i>		
PCB-134	—	—	—	—	—	<i>nsv</i>		
PCB-135	—	—	—	—	—	<i>nsv</i>		
PCB-137	—	—	—	—	—	<i>nsv</i>		
PCB-138+163	141	—	—	43.1	21.7	<i>nsv</i>		
PCB-141	—	—	—	—	—	<i>nsv</i>		
PCB-144	—	—	—	—	—	<i>nsv</i>		
PCB-146	—	—	—	—	—	<i>nsv</i>		
PCB-148	—	—	—	—	—	<i>nsv</i>		
PCB-149	86.4	—	18.2	27	—	<i>nsv</i>		
PCB-151	—	—	—	—	—	<i>nsv</i>		
PCB-156	—	—	—	—	—	210	11	
PCB-158+160	—	—	—	—	—	<i>nsv</i>		
PCB-16+32	—	—	—	—	—	<i>nsv</i>		
PCB-164	—	—	—	—	—	<i>nsv</i>		
PCB-165	—	—	—	—	—	<i>nsv</i>		
PCB-167	—	—	—	—	—	210	11	
PCB-17	—	—	—	—	—	<i>nsv</i>		
PCB-170	—	—	—	—	—	<i>nsv</i>		
PCB-171	—	—	—	—	—	<i>nsv</i>		
PCB-172	—	—	—	—	—	<i>nsv</i>		



**Appendix B
Sediment Sample Results**

**NORTH COAST BASIN
Station ID and Description**

Samples collected in July of
2013 and 2015

State of Oregon
Department of
Environmental
Quality

Estuary Sites

NC14 - Necanicum R at
12th Street approach -
2013

NC15 - North Fork
Nehalem River at
Highway 53 - 2013

NC22 - Nestucca Bay -
undeveloped boat ramp
- 2013

NC22 - Nestucca Bay -
undeveloped boat ramp
- 2015

NC29 - Big Creek at Big
Creek County Park -
2015

Screening Value

S.V. Reference

13654 18802 37510 37510 38102

Maximum Values (ng/kg)

PCBs, continued

PCB-174	—	—	—	11.7	—	nsv	
PCB-175-182	—	—	—	—	—	nsv	
PCB-176	—	—	—	—	—	nsv	
PCB-177	—	—	—	—	—	nsv	
PCB-178	—	—	—	—	—	nsv	
PCB-179	—	—	—	—	—	nsv	
PCB-18	—	—	—	5.49	—	nsv	
PCB-180+193	—	—	—	25.9	—	nsv	
PCB-183	—	—	—	—	—	nsv	
PCB-185	—	—	—	—	—	nsv	
PCB-187	—	—	—	—	—	nsv	
PCB-190	—	—	—	—	—	nsv	
PCB-194	—	—	—	—	—	nsv	
PCB-196	—	—	—	—	—	nsv	
PCB-199	—	—	—	—	—	nsv	
PCB-20+21+33	—	—	—	—	—	nsv	
PCB-203	—	—	—	—	—	nsv	
PCB-206	—	—	—	—	—	nsv	
PCB-209	—	—	—	—	—	nsv	
PCB-22	—	—	—	—	—	nsv	
PCB-25	—	—	—	—	—	nsv	
PCB-26	—	—	—	—	—	nsv	
PCB-28	—	—	—	9.61	7.53	nsv	
PCB-31	36.3	—	12.4	7.42	6.07	nsv	
PCB-37	19.7	—	—	—	—	nsv	
PCB-40	—	—	—	—	—	nsv	
PCB-42	—	—	—	—	—	nsv	
PCB-43+52	82.8	—	42.9	—	—	nsv	
PCB-44	40	—	22.2	—	—	nsv	
PCB-45	—	—	—	—	—	nsv	
PCB-48	—	—	—	—	—	nsv	
PCB-49	39.8	—	26.1	—	—	nsv	
PCB-56	—	—	—	—	—	nsv	
PCB-60	—	—	—	—	—	nsv	
PCB-64+68	—	—	—	—	—	nsv	
PCB-65+75	—	—	—	—	—	nsv	
PCB-66	62.8	—	20.1	—	17.6	nsv	
PCB-70	69.7	—	—	14.1	20.7	nsv	
PCB-71	—	—	—	—	—	nsv	
PCB-74+76	—	—	—	—	—	nsv	
PCB-77	—	—	—	—	—	52	11
PCB-82	—	—	—	—	—	nsv	
PCB-84	—	—	—	—	—	nsv	
PCB-85	—	—	—	—	—	nsv	
PCB-87+111+116+117	—	—	—	—	—	nsv	
PCB-89	—	—	—	—	—	nsv	
PCB-91	—	—	—	—	—	nsv	
PCB-95+121	—	—	—	—	—	nsv	
PCB-97	—	—	—	—	—	nsv	
PCB-99	53.4	—	—	—	—	nsv	

Priority Metals (Total)

Maximum Values (mg/kg)

Aluminum	17900	50400	33900	21300	22700	nsv	
Arsenic	6.4	3.6	3.33	3.04	3.42	7	11 [†]
Barium	43.5	270	41.4	34	136	nsv	
Cadmium	—	—	—	0.12	0.15	1	11 [†]
Chromium	22.1	48	56.9	49.1	19.7	nsv	
Cobalt	8.75	30	21.3	14.9	8.14	nsv	
Copper	9.82	83.3	35.5	24.7	9.75	nsv	
Lead	6.76	5.53	5.66	3.51	6.32	17	11 [†]
Manganese	181	959	435	326	303	nsv	
Mercury	0.027	0.03	0.018	—	—	0.07	11 [†]
Nickel	12.3	50.6	58.1	43	9.77	nsv	
Selenium	—	—	—	—	—	2	11 [†]
Silver	—	—	—	—	—	nsv	
Thallium	—	—	—	—	0.12	nsv	
Zinc	68.9	137	101	65.8	61.1	nsv	

 State of Oregon Department of Environmental Quality	Appendix C Tissue Sample Results		NORTH COAST BASIN Station ID and Description				Screening Value	S.V. Reference	
	Samples collected in July of 2013 and 2015	Percent Detection	Number of samples over screening value	NC30 - Columbia River Estuary at the south jetty (Mussel) - 2013	NC31 - Tillamook Bay at Patterson Creek (Clam, whole body) - 2013	NC31 - Tillamook Bay at Patterson Creek (Clam, whole body) - 2015			NC31 - Tillamook Bay at Patterson Creek (Clam, siphon skin) - 2015
				13649	37513	37513			37513
Maximum Values (mg/kg)									
Flame-retardants									
PBDE-100	80		—	0.0000499	—	—	nsv		
PBDE-15	20		—	—	—	—	nsv		
PBDE-153	60	0	1.15E-05	—	—	—	0.2	12	
PBDE-154	60		1.48E-05	—	—	—	nsv		
PBDE-17	80		—	0.0000137	—	—	nsv		
PBDE-209	75	0	0.000309	—	—	—	16.3	12	
PBDE-28	100		3.57E-05	0.0000388	—	—	nsv		
PBDE-47	100		0.000568	0.000656	—	—	nsv		
PBDE-49	100	0	3.51E-05	0.0000276	—	—	0.2	12	
PBDE-66	80		—	0.0000142	—	—	nsv		
PBDE-71	20		—	—	—	—	nsv		
PBDE-99	80	0	—	0.000189	—	—	0.2	12	
Industrial Chemicals or Intermediates									
n-Butyltin	20	0	—	—	—	—	0.7	12	
Legacy Pesticides									
BHC-technical (HCH)			0.000252	0.0000152	—	—	nsv		
BHC-alpha	100		0.000116	—	—	—	nsv		
BHC-beta	100		0.000113	0.0000152	—	—	nsv		
BHC-gamma (Lindane)	25	0	2.33E-05	—	—	—	0.7	12	
Chlordane		0	0.000156	—	—	—	1.2	12	
alpha-Chlordane	60		5.16E-05	—	—	—	nsv		
cis-Nonachlor	20		0.000008	—	—	—	nsv		
Endrin+cis-Nonachlor	20		3.62E-05	—	—	—	nsv		
gamma-Chlordane+trans-Nonachlor	60		6.03E-05	—	—	—	nsv		
Dieldrin	100	0	0.000297	0.0000103	—	—	0.1	12	
Endosulfan		0	4.37E-05	0.0000186	—	—	14	12	
Endosulfan I	80		4.37E-05	0.0000186	—	—	nsv		
Endosulfan sulfate	20		0.000105	—	—	—	nsv		
Heptachlor epoxide	20	0	3.04E-05	—	—	—	0.03	12	
Total DDT		0	0.000567	0.00009959	—	—	1.2	12	
2,4'-DDD	80		2.47E-05	0.00000949	—	—	nsv		
2,4'-DDE	40		9.15E-06	—	—	—	nsv		
2,4'-DDT	20		7.1E-06	—	—	—	nsv		
4,4'-DDD	100		0.000113	0.0000279	—	—	nsv		
4,4'-DDE	100		0.00039	0.0000622	—	—	nsv		
4,4'-DDT	40		2.32E-05	—	—	—	nsv		
PCBs									
Total PCBs		0	0.000446	0.00024358	—	—	0.05	12	
PCB-101+113	80		2.82E-05	0.000023	—	—	nsv		
PCB-105	60		1.01E-05	—	—	—	nsv		
PCB-110	80		2.35E-05	0.0000174	—	—	nsv		
PCB-118	80		3.24E-05	0.0000159	—	—	nsv		
PCB-128	20		7.25E-06	—	—	—	nsv		
PCB-132+153	80		8.82E-05	0.0000358	—	—	nsv		
PCB-135	20		—	—	—	—	nsv		
PCB-138+163	80		4.82E-05	0.0000182	—	—	nsv		
PCB-146	80		0.000011	0.00000681	—	—	nsv		
PCB-148	20		—	—	—	—	nsv		
PCB-149	80		0.000029	0.0000194	—	—	nsv		
PCB-151	60		8.16E-06	—	—	—	nsv		
PCB-16+32	40		—	—	—	—	nsv		
PCB-165	20		1.06E-05	—	—	—	nsv		
PCB-17	40		—	—	—	—	nsv		
PCB-177	20		0.000008	—	—	—	nsv		
PCB-18	80		4.47E-06	—	—	—	nsv		
PCB-183	40		8.34E-06	—	—	—	nsv		
PCB-187	80		2.35E-05	0.0000106	—	—	nsv		
PCB-20+21+33	40		—	—	—	—	nsv		
PCB-22	40		—	—	—	—	nsv		
PCB-26	40		—	—	—	—	nsv		
PCB-28	100		7.34E-06	0.00000726	—	—	nsv		
PCB-31	100		6.53E-06	0.00000756	—	—	nsv		
PCB-37	40		—	—	—	—	nsv		
PCB-40	20		—	—	—	—	nsv		
PCB-42	20		—	—	—	—	nsv		
PCB-43+52	80		1.75E-05	0.0000182	—	—	nsv		
PCB-44	80		7.46E-06	0.00000716	—	—	nsv		
PCB-48	20		—	—	—	—	nsv		
PCB-49	80		7.58E-06	0.00000755	—	—	nsv		

 State of Oregon Department of Environmental Quality		Appendix C Tissue Sample Results		NORTH COAST BASIN Station ID and Description				Screening Value	S.V. Reference
		Samples collected in July of 2013 and 2015	Percent Detection	Number of samples over screening value	NC30 - Columbia River Estuary at the south jetty (Mussel) - 2013	NC31 - Tillamook Bay at Patterson Creek (Clam, whole body) - 2013	NC31 - Tillamook Bay at Patterson Creek (Clam, whole body) - 2015		
Estuary Samples				13649	37513	37513	37513		
Maximum Values (mg/kg)									
PCBs, continued									
PCB-56	20	—	—	—	—	—	—	<i>nsv</i>	
PCB-60	20	—	—	—	—	—	—	<i>nsv</i>	
PCB-64+68	20	—	—	—	—	—	—	<i>nsv</i>	
PCB-65+75	20	—	—	—	—	—	—	<i>nsv</i>	
PCB-66	80	1.13E-05	0.00000768	—	—	—	—	<i>nsv</i>	
PCB-70	80	9.24E-06	0.00000931	—	—	—	—	<i>nsv</i>	
PCB-71	20	—	—	—	—	—	—	<i>nsv</i>	
PCB-74+76	40	—	—	—	—	—	—	<i>nsv</i>	
PCB-84	40	—	—	—	—	—	—	<i>nsv</i>	
PCB-85	20	—	—	—	—	—	—	<i>nsv</i>	
PCB-89	60	—	0.00000655	—	—	—	—	<i>nsv</i>	
PCB-91	20	—	—	—	—	—	—	<i>nsv</i>	
PCB-95+121	80	0.000014	0.000014	—	—	—	—	<i>nsv</i>	
PCB-97	60	6.51E-06	—	—	—	—	—	<i>nsv</i>	
PCB-99	80	1.77E-05	0.0000112	—	—	—	—	<i>nsv</i>	
Priority Metals									
<i>Total Inorganic</i>									
Arsenic	100	8	0.016	6	2.75	27	0.7	12	
<i>Total</i>									
Arsenic	100		1.4	6.69	3.87	N/A	<i>nsv</i>		
Cadmium	100	0	0.65	0.11	—	—	2.3	12	
Mercury	100	0	0.006	0.026	—	—	0.04	13	
Selenium	60	0	0.3	0.39	—	—	11.7	12	

 State of Oregon Department of Environmental Quality	Appendix C	NORTH COAST BASIN					Screening Value	S.V. Reference
	Tissue Sample Results	Station ID and Description						
	Samples collected in July of 2013 and 2015	NC31 - Tillamook Bay at Patterson Creek (Clam, w/o siphon skin) - 2015	NC32 - Nehalem Bay at RM 2.15 (Clam, whole body) - 2013	NC32 - Nehalem Bay at RM 2.15 (Clam, whole body) - 2015	NC32 - Nehalem Bay at RM 2.15 (Clam, siphon skin) - 2015	NC32 - Nehalem Bay at RM 2.15 (Clam, w/o siphon skin) - 2015		
Estuary Samples	37513	37514	37514	37514	37514	37609		
Maximum Values (mg/kg)								
Flame-retardants								
PBDE-100	—	5.76E-05	—	—	—	0.000196	<i>nsv</i>	
PBDE-15	—	—	—	—	—	—	<i>nsv</i>	
PBDE-153	—	—	—	—	—	1.54E-05	0.2	12
PBDE-154	—	—	—	—	—	2.31E-05	<i>nsv</i>	
PBDE-17	—	1.66E-05	—	—	—	6.26E-05	<i>nsv</i>	
PBDE-209	—	—	—	—	—	0.000951	16.3	12
PBDE-28	—	5.62E-05	—	—	—	0.000177	<i>nsv</i>	
PBDE-47	—	0.00086	—	—	—	0.00279	<i>nsv</i>	
PBDE-49	—	2.85E-05	—	—	—	0.000104	0.2	12
PBDE-66	—	2.25E-05	—	—	—	7.53E-05	<i>nsv</i>	
PBDE-71	—	—	—	—	—	—	<i>nsv</i>	
PBDE-99	—	0.00023	—	—	—	0.000755	0.2	12
Industrial Chemicals or Intermediates								
n-Butyltin	—	—	—	—	—	0.0065	0.7	12
Legacy Pesticides								
BHC-technical (HCH)	—	2.07E-05	—	—	—	0.000028	<i>nsv</i>	
BHC-alpha	—	—	—	—	—	—	<i>nsv</i>	
BHC-beta	—	2.07E-05	—	—	—	0.000028	<i>nsv</i>	
BHC-gamma (Lindane)	—	—	—	—	—	—	0.7	12
Chlordane	—	—	—	—	—	6.34E-05	1.2	12
alpha-Chlordane	—	—	—	—	—	2.52E-05	<i>nsv</i>	
cis-Nonachlor	—	—	—	—	—	—	<i>nsv</i>	
Endrin+cis-Nonachlor	—	—	—	—	—	—	<i>nsv</i>	
gamma-Chlordane+trans-Nonachlor	—	—	—	—	—	3.82E-05	<i>nsv</i>	
Dieldrin	—	1.15E-05	—	—	—	3.01E-05	0.1	12
Endosulfan	—	—	—	—	—	2.06E-05	14	12
Endosulfan I	—	—	—	—	—	2.06E-05	<i>nsv</i>	
Endosulfan sulfate	—	—	—	—	—	—	<i>nsv</i>	
Heptachlor epoxide	—	—	—	—	—	—	0.03	12
Total DDT	—	5.98E-05	—	—	—	0.000279	1.2	12
2,4'-DDD	—	—	—	—	—	1.59E-05	<i>nsv</i>	
2,4'-DDE	—	—	—	—	—	—	<i>nsv</i>	
2,4'-DDT	—	—	—	—	—	—	<i>nsv</i>	
4,4'-DDD	—	8.78E-06	—	—	—	6.21E-05	<i>nsv</i>	
4,4'-DDE	—	0.000051	—	—	—	0.000181	<i>nsv</i>	
4,4'-DDT	—	—	—	—	—	1.99E-05	<i>nsv</i>	
PCBs								
Total PCBs	—	1.75E-05	—	—	—	0.000646	0.05	12
PCB-101+113	—	—	—	—	—	5.04E-05	<i>nsv</i>	
PCB-105	—	—	—	—	—	9.51E-06	<i>nsv</i>	
PCB-110	—	—	—	—	—	3.32E-05	<i>nsv</i>	
PCB-118	—	—	—	—	—	0.000024	<i>nsv</i>	
PCB-128	—	—	—	—	—	—	<i>nsv</i>	
PCB-132+153	—	—	—	—	—	4.96E-05	<i>nsv</i>	
PCB-135	—	—	—	—	—	—	<i>nsv</i>	
PCB-138+163	—	—	—	—	—	2.49E-05	<i>nsv</i>	
PCB-146	—	—	—	—	—	8.09E-06	<i>nsv</i>	
PCB-148	—	—	—	—	—	—	<i>nsv</i>	
PCB-149	—	—	—	—	—	2.74E-05	<i>nsv</i>	
PCB-151	—	—	—	—	—	0.000011	<i>nsv</i>	
PCB-16+32	—	—	—	—	—	0.00001	<i>nsv</i>	
PCB-165	—	—	—	—	—	—	<i>nsv</i>	
PCB-17	—	—	—	—	—	7.01E-06	<i>nsv</i>	
PCB-177	—	—	—	—	—	—	<i>nsv</i>	
PCB-18	—	4.46E-06	—	—	—	1.38E-05	<i>nsv</i>	
PCB-183	—	—	—	—	—	—	<i>nsv</i>	
PCB-187	—	—	—	—	—	1.29E-05	<i>nsv</i>	
PCB-20+21+33	—	—	—	—	—	1.53E-05	<i>nsv</i>	
PCB-22	—	—	—	—	—	0.000011	<i>nsv</i>	
PCB-26	—	—	—	—	—	4.21E-06	<i>nsv</i>	
PCB-28	—	6.65E-06	—	—	—	3.14E-05	<i>nsv</i>	
PCB-31	—	6.42E-06	—	—	—	0.000024	<i>nsv</i>	
PCB-37	—	—	—	—	—	8.49E-06	<i>nsv</i>	
PCB-40	—	—	—	—	—	—	<i>nsv</i>	
PCB-42	—	—	—	—	—	—	<i>nsv</i>	
PCB-43+52	—	—	—	—	—	6.26E-05	<i>nsv</i>	
PCB-44	—	—	—	—	—	2.56E-05	<i>nsv</i>	
PCB-48	—	—	—	—	—	—	<i>nsv</i>	
PCB-49	—	—	—	—	—	2.29E-05	<i>nsv</i>	

 State of Oregon Department of Environmental Quality		Appendix C Tissue Sample Results		NORTH COAST BASIN Station ID and Description				Screening Value	S.V. Reference
		Samples collected in July of 2013 and 2015		NC31 - Tillamook Bay at Patterson Creek (Clam, w/o siphon skin) - 2015	NC32 - Nehalem Bay at RM 2.15 (Clam, whole body) - 2013	NC32 - Nehalem Bay at RM 2.15 (Clam, whole body) - 2015	NC32 - Nehalem Bay at RM 2.15 (Clam, siphon skin) - 2015		
Estuary Samples		37513	37514	37514	37514	37514	37609		
Maximum Values (mg/kg)									
PCBs, continued									
PCB-56		—	—	—	—	—	—	<i>nsv</i>	
PCB-60		—	—	—	—	—	—	<i>nsv</i>	
PCB-64+68		—	—	—	—	—	—	<i>nsv</i>	
PCB-65+75		—	—	—	—	—	—	<i>nsv</i>	
PCB-66		—	—	—	—	—	2.24E-05	<i>nsv</i>	
PCB-70		—	—	—	—	—	2.56E-05	<i>nsv</i>	
PCB-71		—	—	—	—	—	—	<i>nsv</i>	
PCB-74+76		—	—	—	—	—	1.54E-05	<i>nsv</i>	
PCB-84		—	—	—	—	—	1.04E-05	<i>nsv</i>	
PCB-85		—	—	—	—	—	—	<i>nsv</i>	
PCB-89		—	—	—	—	—	0.000011	<i>nsv</i>	
PCB-91		—	—	—	—	—	—	<i>nsv</i>	
PCB-95+121		—	—	—	—	—	4.22E-05	<i>nsv</i>	
PCB-97		—	—	—	—	—	1.03E-05	<i>nsv</i>	
PCB-99		—	—	—	—	—	2.17E-05	<i>nsv</i>	
Priority Metals									
<i>Total Inorganic</i>									
Arsenic		0.333	5.87	8.3	46.8	0.118	0.54	0.7	12
<i>Total</i>									
Arsenic		1.45	50.5	9.64	50.5	1.33	1.38	<i>nsv</i>	
Cadmium		—	0.14	—	—	—	0.18	2.3	12
Mercury		—	0.012	—	—	—	0.009	0.04	13
Selenium		—	—	—	—	—	—	11.7	12

 State of Oregon Department of Environmental Quality	Appendix C Tissue Sample Results	NORTH COAST BASIN Station ID and Description					Screening Value	S.V. Reference
	Samples collected in July of 2013 and 2015	NC34 - Netarts Bay (Oyster) - 2013	NC35 - Tillamook Bay - Garibaldi Flat (Clam) - 2015	NC35 - Tillamook Bay - Garibaldi Flat (Cockle) - 2015	NC36 - Tillamook Bay, Bayocean (Clam, whole body) - 2015	NC36 - Tillamook Bay, Bayocean (Clam, w/o siphon skin) - 2015		
Estuary Samples	37610	38168	38168	38170	38170			
Maximum Values (mg/kg)								
Flame-retardants								
PBDE-100	0.000282	—	—	—	—	nsv		
PBDE-15	8.14E-06	—	—	—	—	nsv		
PBDE-153	1.36E-05	—	—	—	—	0.2	12	
PBDE-154	2.46E-05	—	—	—	—	nsv		
PBDE-17	0.000168	—	—	—	—	nsv		
PBDE-209	0.000506	—	—	—	—	16.3	12	
PBDE-28	0.000435	—	—	—	—	nsv		
PBDE-47	0.00617	—	—	—	—	nsv		
PBDE-49	0.000237	—	—	—	—	0.2	12	
PBDE-66	0.000156	—	—	—	—	nsv		
PBDE-71	2.46E-05	—	—	—	—	nsv		
PBDE-99	0.00109	—	—	—	—	0.2	12	
Industrial Chemicals or Intermediates								
n-Butyltin	—	—	—	—	—	0.7	12	
Legacy Pesticides								
BHC-technical (HCH)	6.72E-05	—	—	—	—	nsv		
BHC-alpha	3.25E-05	—	—	—	—	nsv		
BHC-beta	3.47E-05	—	—	—	—	nsv		
BHC-gamma (Lindane)	—	—	—	—	—	0.7	12	
Chlordane	5.05E-05	—	—	—	—	1.2	12	
alpha-Chlordane	1.91E-05	—	—	—	—	nsv		
cis-Nonachlor	—	—	—	—	—	nsv		
Endrin+cis-Nonachlor	—	—	—	—	—	nsv		
gamma-Chlordane+trans-Nonachlor	3.14E-05	—	—	—	—	nsv		
Dieldrin	0.000036	—	—	—	—	0.1	12	
Endosulfan	1.69E-05	—	—	—	—	14	12	
Endosulfan I	1.69E-05	—	—	—	—	nsv		
Endosulfan sulfate	—	—	—	—	—	nsv		
Heptachlor epoxide	—	—	—	—	—	0.03	12	
Total DDT	0.000428	—	—	—	—	1.2	12	
2,4'-DDD	1.46E-05	—	—	—	—	nsv		
2,4'-DDE	0.00001	—	—	—	—	nsv		
2,4'-DDT	—	—	—	—	—	nsv		
4,4'-DDD	4.83E-05	—	—	—	—	nsv		
4,4'-DDE	0.000355	—	—	—	—	nsv		
4,4'-DDT	—	—	—	—	—	nsv		
PCBs								
Total PCBs	0.001292	—	—	—	—	0.05	12	
PCB-101+113	0.000105	—	—	—	—	nsv		
PCB-105	8.87E-06	—	—	—	—	nsv		
PCB-110	4.52E-05	—	—	—	—	nsv		
PCB-118	3.23E-05	—	—	—	—	nsv		
PCB-128	—	—	—	—	—	nsv		
PCB-132+153	7.64E-05	—	—	—	—	nsv		
PCB-135	7.43E-06	—	—	—	—	nsv		
PCB-138+163	3.25E-05	—	—	—	—	nsv		
PCB-146	9.64E-06	—	—	—	—	nsv		
PCB-148	1.06E-05	—	—	—	—	nsv		
PCB-149	4.24E-05	—	—	—	—	nsv		
PCB-151	1.61E-05	—	—	—	—	nsv		
PCB-16+32	1.18E-05	—	—	—	—	nsv		
PCB-165	—	—	—	—	—	nsv		
PCB-17	7.31E-06	—	—	—	—	nsv		
PCB-177	—	—	—	—	—	nsv		
PCB-18	1.63E-05	—	—	—	—	nsv		
PCB-183	6.83E-06	—	—	—	—	nsv		
PCB-187	1.84E-05	—	—	—	—	nsv		
PCB-20+21+33	2.31E-05	—	—	—	—	nsv		
PCB-22	1.35E-05	—	—	—	—	nsv		
PCB-26	5.74E-06	—	—	—	—	nsv		
PCB-28	3.59E-05	—	—	—	—	nsv		
PCB-31	3.52E-05	—	—	—	—	nsv		
PCB-37	8.25E-06	—	—	—	—	nsv		
PCB-40	7.66E-06	—	—	—	—	nsv		
PCB-42	1.08E-05	—	—	—	—	nsv		
PCB-43+52	0.000152	—	—	—	—	nsv		
PCB-44	6.36E-05	—	—	—	—	nsv		
PCB-48	8.84E-06	—	—	—	—	nsv		
PCB-49	5.08E-05	—	—	—	—	nsv		



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Appendix C Tissue Sample Results		NORTH COAST BASIN Station ID and Description					Screening Value	S.V. Reference
Samples collected in July of 2013 and 2015		NC34 - Netarts Bay (Oyster) - 2013	NC35 - Tillamook Bay - Garibaldi Flat (Clam) - 2015	NC35 - Tillamook Bay - Garibaldi Flat (Cockle) - 2015	NC36 - Tillamook Bay, Bayocean (Clam, whole body) - 2015	NC36 - Tillamook Bay, Bayocean (Clam, w/o siphon skin) - 2015		
Estuary Samples		37610	38168	38168	38170	38170		
Maximum Values (mg/kg)								
PCBs, continued								
PCB-56	1.01E-05	—	—	—	—	<i>nsv</i>		
PCB-60	8.77E-06	—	—	—	—	<i>nsv</i>		
PCB-64+68	2.59E-05	—	—	—	—	<i>nsv</i>		
PCB-65+75	2.84E-05	—	—	—	—	<i>nsv</i>		
PCB-66	4.01E-05	—	—	—	—	<i>nsv</i>		
PCB-70	5.31E-05	—	—	—	—	<i>nsv</i>		
PCB-71	0.000009	—	—	—	—	<i>nsv</i>		
PCB-74+76	2.92E-05	—	—	—	—	<i>nsv</i>		
PCB-84	0.000024	—	—	—	—	<i>nsv</i>		
PCB-85	1.13E-05	—	—	—	—	<i>nsv</i>		
PCB-89	0.000018	—	—	—	—	<i>nsv</i>		
PCB-91	1.37E-05	—	—	—	—	<i>nsv</i>		
PCB-95+121	0.000102	—	—	—	—	<i>nsv</i>		
PCB-97	1.54E-05	—	—	—	—	<i>nsv</i>		
PCB-99	4.01E-05	—	—	—	—	<i>nsv</i>		
Priority Metals								
<i>Total Inorganic</i>								
Arsenic	0.042	0.053	0.035	0.85	0.108	0.7	12	
<i>Total</i>								
Arsenic	1.3	3.16	1.41	2.77	2.09	<i>nsv</i>		
Cadmium	0.39	—	—	—	—	2.3	12	
Mercury	0.014	—	—	—	—	0.04	13	
Selenium	0.36	—	—	—	—	11.7	12	