Sediment contaminant concentrations in Resident Killer Whale habitat, Salish Sea, British Columbia, in 2024

Lisa L. Loseto, Katerina Colbourne, Marie Noël

Fisheries and Oceans Canada
Institute of Ocean Sciences, Pacific Region
9860 West Saanich Road
PO Box 6000
Sidney, B.C., Canada
V8L 4B2

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Lisa L. Loseto, Katerina Colbourne, Marie Noël

Fisheries and Oceans Canada
Institute of Ocean Sciences, Pacific Region
9860 West Saanich Road
PO Box 6000
Sidney, B.C., Canada
V8L 4B2

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Acronyms/Abbreviations/Symbols	Meaning
BC	British Columbia
CH	Critical Habitat
CCGS	Canadian Coast Guard Ship
CCME	Canadian Council of Ministers of the Environment
CEPA	Canadian Environmental Protection Act
CRC ICPMS	Collision/Reaction Cell Inductively Coupled Plasma Mass Spectrometry
CSoG	Central Strait of Georgia
CVAAS	Cold Vapour Atomic Absorption Spectrometry
DAS	Disposal at Sea
DDT	Dichlorodiphenyltrichloroethane
DFO	Fisheries and Oceans Canada
DL	Detection Limit
dw	dry weight
ECCC	Environment and Climate Change Canada
FEQG	Federal Environmental Quality Guideline
GCAFS	Gas Chromatography - Atomic Fluorescence Spectrometry
GC/MS	Gas Chromatography – Mass Spectrometry
HCB	Hexachlorobenzene
HCH	Hexachlorocyclohexane
HRMS	High Resolution Mass Spectrometry
mg/kg	milligrams per kilograms
ND	Not Detected
ng/g	nanograms per gram
NRKW	Northern Resident killer whales
OH	Outer Harbour
PAHs	Polycyclic Aromatic Hydrocarbons
PBDE	Polybrominated diphenyl ether
PCB	Polychlorinated biphenyl
PCDD	Polychlorinated dibenzo-p-dioxin
PCDF	Polychlorinated dibenzo-p-furan
PFAS	Per- and polyflouroalkyl substances
PPCPs	pharmaceuticals and personal care products
SARA	Species at Risk Act
SQG	Sediment Quality Guideline
SRKW	Southern Resident killer whales
TOC	Total Organic Carbon
US EPA	United States Environmental Protection Agency

ABSTRACT

Loseto, L.L., Colbourne, K., and Noël, M. 2026. Sediment contaminant concentrations in Resident Killer Whale habitat, Salish Sea, British Columbia, in 2024. Can. Data Rep. Fish. Aquat. Sci. 1479: ix + 50 p.

Southern Resident Killer Whales (SRKW) are currently listed as Endangered under the *Species at Risk Act* (SARA) with exposure to contaminants being one of the main threats to their recovery. In order to better understand sources of contaminant exposure, it is important to evaluate contamination in their habitat. In 2024, we measured the levels of ten contaminant classes in surface sediment samples collected in the Central Strait of Georgia (CSoG) (n = 2), in SRKW Critical Habitat (CH) (n = 3) and in the Vancouver Outer Harbour (OH) portion of Burrard Inlet (n = 1). On average, levels of PCBs, PCDDs, PCDFs, ΣDDT, ΣHCH copper and lead were significantly higher in samples collected in the CSoG compared to samples collected in the CH. The sample collected in the OH had the highest levels of PCBs, PBDEs, PCDDs, PCDFs, PAHs, APs, ΣHeptachlor and ΣEndrin concentrations reported. PCB concentrations in all samples surpassed the Interim Sediment Quality Guidelines protective of Resident Killer Whales (RKW) (0.0037 ng/g dw). PBDE levels in the OH sample and two out of the three samples from the CH surpassed the Interim Sediment Quality Guidelines protective of RKW (1 ng/g dw). The OH sample exceeded sediment quality guidelines for three individual PAHs (dibenzo(a,h) anthracene (6.22 ng/g dw), acenaphthylene (5.77 ng/g dw) and 2-methylnaphthalene (20.2 ng/g dw)) while site SRKW-24-TI exceeded one individual PAH guideline (2-methyl-naphthalene). On average, levels of arsenic and copper exceeded their respective sediment quality guidelines (7.24 and 18.7 mg/kg dw, respectively) in the CSoG, CH and at the OH site. Finally, average mercury levels in samples collected in the CSoG just exceeded the sediment guideline (0.13 mg/kg dw) while the samples collected in the CH were just under the guideline. When considering individual sites, only one site collected inside CH (SRKW-24-FD22: 0.246 mg/kg) was well above the mercury guideline. This study provides current information on the contamination of RKW habitat that helps inform conservation and mitigation measures.

RÉSUMÉ

Loseto, L.L., Colbourne, K., and Noël, M. 2026. Sediment contaminant concentrations in Resident Killer Whale habitat, Salish Sea, British Columbia, in 2024. Can. Data Rep. Fish. Aquat. Sci. 1479: ix + 50 p.

Les épaulards résidents du Sud (ERS) sont actuellement classés comme *En danger* par la Loi sur les espèces en péril (LEP), avec l'exposition aux contaminants étant l'une des principales menaces à leur rétablissement. Afin de mieux comprendre les sources d'exposition aux contaminants, il est important d'évaluer la contamination dans leur habitat. En 2024, nous avons mesuré les niveaux de dix classes de contaminants dans des échantillons de sédiments de surface prélevés dans la partie centrale du Detroit de Géorgie (CSoG) (n = 2), dans l'habitat critique des ERS (CH) (n = 3) et dans la partie extérieure du Port (OH) de Vancouver au sein de l'Inlet Burrard (n = 1). En moyenne, les niveaux de PCB, PCDD, PCDF, ΣDDT, ΣHCH, cuivre et plomb étaient plus élevés dans les échantillons prélevés dans le CSoG par rapport aux échantillons prélevés dans le CH. L'échantillon prélevé dans l'OH présentait les niveaux les plus élevés de PCB, PBDE, PCDD, PCDF, HAP, AP, ΣHéptachlore et ΣEndrine comparés aux autres échantillons. Les concentrations de PCB dans tous les échantillons dépassaient les recommandations provisoires pour la qualité des sédiments protectrices des épaulards (0,0037 ng/g ms). Les niveaux de PBDE dans l'échantillon OH et deux des trois échantillons provenant du CH dépassaient les recommandations provisoires pour la qualité des sédiments protectrices des épaulards (1 ng/g ms). L'échantillon OH dépassait les recommandations pour la qualité des sédiments pour trois HAP individuels (dibenz(a,h)anthracène (6,22 ng/g ms), acénaphtylène (5,77 ng/g ms) et 2-méthylnaphtalène (20,2 ng/g ms)) tandis que le site SRKW-24-TI dépassait une seule recommandation de HAP (2-méthylnaphtalène). En moyenne, les niveaux d'arsenic et de cuivre dépassaient leurs recommandations respectives pour la qualité des sédiments (7,24 et 18,7 mg/kg ms, respectivement) dans le CSoG, le CH et sur le site OH. Enfin, les niveaux moyens de mercure dans les échantillons prélevés dans le CSoG dépassaient à peine la recommandation pour la qualité des sédiments (0,13 mg/kg ms), tandis que les échantillons collectés dans le CH étaient légèrement en dessous de cette recommandation. En considérant les sites individuellement, un seul site à l'intérieur du CH (SRKW-24-FD22 : 0,246 mg/kg) était bien au-dessus de la recommandation pour le mercure. Cette étude fournit des informations actuelles sur la contamination de l'habitat des épaulards résidents du Sud, ce qui contribue à informer les mesures de conservation et d'atténuation.

1.0 Introduction

All four populations of killer whales (*Orcinus orca*) that visit British Columbia's coastal waters have been listed under the auspices of the *Species at Risk Act* (SARA); with the Offshore, Transient and Northern Resident Killer Whales (NRKW) listed as Threatened, and the Southern Resident Killer Whales (SRKW) listed as Endangered, with exposure to contaminants being one of the main threats to recovery (DFO, 2011). Determining contaminant exposure through the measurement of contaminants in their habitat provides context and opportunity for management and mitigation of contaminants.

British Columbia's killer whale populations are amongst the most contaminated marine mammals in the world (Ross et al., 2000). The Government of Canada's Whale Initiative program seeks to put management measures in place to protect the Endangered SRKW from primary threats including contaminants (DFO, 2011). Fisheries and Oceans Canada's (DFO), Whale Contaminants Research Program, has implemented research and partnership initiatives to inform mitigation and recovery actions for SRKW, including research to investigate contaminants of greatest concern to SRKWs, their prey and habitat (e.g. Kim et al., 2022; 2023; Holbert et al., 2024; 2025).

This report provides a detailed summary of Polychlorinated biphenyls (PCBs), Polybrominated diphenyl Ethers (PBDEs), Polychlorinated dibenzo-p-dioxins/furans (PCDD/Fs), alkylphenols (APs), legacy and current-use pesticides, Per- and polyfluoroalkyl substances (PFASs), pharmaceuticals and personal care products (PPCPs), Polycyclic Aromatic Hydrocarbons (PAHs), and metals in surficial sediment samples collected by Environment and Climate Change Canada and Fisheries and Oceans Canada in 2024 from six sites, in the Salish Sea that include sites within critical habitat for SRKW. Sediment concentrations are summarized and evaluated in context with the Interim Sediment Quality Guidelines (ISQG) for the protection of aquatic biota developed by the Canadian Council of Ministers of the Environment (CCME). These data will contribute to Canada's Whales Initiative by characterizing sources to inform the implementation of measures for the protection and recovery of the Endangered SRKW as well as the threatened NRKW.

This data report represents the fifth in a series of DFO reports that summarizes surface sediment contaminant data, from a collaboration between ECCC and DFO on addressing contaminant levels in killer whale habitat including the critical habitat of SRKW and Disposal at Sea (DAS) sites (Brown et al., 2022, 2023, 2025a,b). Important to note, earlier evaluations of sediment PCBs, PBDEs, PCDDs and PCDFs within DAS sites occurred in 2010 (Ross et al. 2011), and expanded to additional sites in 2011 (Ross et al. 2012).

2.0 Methods

2.1 Sample collection

A total of six sediment samples were collected by ECCC in the Salish Sea, within habitat used by all four killer whale populations (Figure 1). Two samples were collected in the central Strait of

Georgia (CSoG). Three samples were collected within the SRKW Critical Habitat (CH), and were all taken from SRKW CH parcel near the lower mainland and near the outflow of the Fraser River tributaries and just outside of the Sands Head and Point Grey DAS sites, and is hereafter referred to as 'CH' (Figure 1). One sample was collected in the outer part of Vancouver Harbour, thereafter referred to as Outer Harbour (OH) (Figure 1). Samples were collected using a Smith-McIntyre grab sampler aboard the Canadian Coast Guard Ship (CCGS) Vector from November 1st to 3rd, 2024. Sample penetration was typically 10–15 cm.

2.2 Sample analysis

A total of 6 samples, including from the central Strait of Georgia (CSoG, n = 2), SRKW Critical Habitat (CH; n = 3) and outer Vancouver Harbour (OH; n = 1) were submitted to SGS AXYS Analytical Ltd. in Sidney, British Columbia and ALS Canada Ltd. in Burnaby, British Columbia and analyzed for PCBs, PBDEs, PCDDs, PCDFs, legacy and current-use pesticides, PFAS, pharmaceuticals and personal care products (PPCPs), PAHs, alkylphenols and metals (Table 1).

2.3 Data analysis

All data summaries and statistical analyses were conducted using RStudio version 2024.09.1. All data presented throughout the report are expressed on a dry weight basis and has been blank corrected. When congeners or analytes were undetected, 0 was used as a substitution.

To determine if there were significant differences in contaminant concentrations between samples collected in the CSoG and in the CH, T-tests were used and p values reported.

3.0 Results

3.1 Sediment properties

TOC was significantly higher in samples collected from the CSoG (3.67 ± 0.39 % ; range: 3.39 – 3.94 %) compared to those sampled in the CH (1.10 ± 0.16 %; range: 0.98 – 1.28 %; Table 3; $p < 0.005$). The sample collected in the OH had a TOC of 1.56 % similar to those reported in samples from the CH.

Percent moisture was significantly higher in samples collected from the CSoG (78.3 ± 0.28 % ; range: 78.1 – 78.5 %) compared to those sampled in the CH (46.8 ± 7.19 %; range: 41.7 – 55.0 %; Table 3; $p < 0.005$). The sample collected in the OH had a percent moisture of 58.3 % similar to those reported in samples from the CH.

Grain size was dominated by silt at all sites (61.3 ± 4.14 %; range: 54.3 – 65.2 %) with no significant differences between samples collected in the CSoG, CH or OH (Table 3; $p = 0.519$). Clay was the second dominant grain size (30.9 ± 10.5 %; range: 16.9 - 45.6 %). Even though not significant, the clay contribution in the samples collected in the CSoG (39.5 ± 8.69 %) was higher than in those collected in the CH (23.6 ± 8.32 %; Table 3; $p = 0.121$). In turn, the contribution of sand in samples collected in the CSoG (1.80 ± 2.54 %; range: 0.0 – 3.6 %) was lower than in samples collected in the CH (13.6 ± 11.3 %; range: 1.9 – 24.5 %; Table 3; $p = 0.236$).

3.2 Organics

3.2.1 PCBs

PCBs were detected in all sediment samples ($n = 6$) (Table 4). Of the 159 congeners quantified, over 127 were detected in each sample. Total PCB concentrations were significantly higher in the CSoG (2.33 ± 0.52 ng/g dw; range: 1.81 – 2.86 ng/g) compared to the CH (0.62 ± 0.21 ng/g dw; range: 0.31 – 1.01 ng/g; Figure 2; $p < 0.005$). The sample collected in the OH had the highest PCB concentration (3.66 ng/g dw). Average PCB concentrations in the CSoG, CH and OH exceeded the interim sediment quality guideline (0.0037 ng/g dw; Alava et al., 2012) for PCBs protective of RKW by 629-, 168- and 989-fold, respectively.

The top six PCB congeners only accounted for 28.8 ± 5.4%. PCB-138 was found at the highest concentrations at sites from the CSoG, CH and OH (Table 5). PCBs-110 and -153 were present in the top six of sites from CSoG, CH and OH (Table 5; Table 7).

3.2.2 PBDEs

PBDEs were detected in all sediment samples ($n = 6$) (Table 4; 8). Of the 39 congeners quantified, over 27 were detected in each sample. Total PBDE concentrations were similar between samples collected in the CSoG (0.52 ± 0.04 ng/g dw; range: 0.48 – 0.55 ng/g; $p = 0.312$; Figure 2) and those collected in the CH (2.13 ± 1.00 ng/g dw; 0.32 – 3.8 ng/g; Figure 2). The

sample collected in the OH had the highest PBDE concentration (3.2 ng/g dw). Average PBDE concentrations in the CH and in the OH exceeded the interim sediment quality guideline (1 ng/g dw; Alava et al., 2016) for PBDEs protective of killer whales by 2.1- and 3.2-fold, respectively.

The top six PBDE congeners accounted for 92.3 ±1.0 %. BDE-209 largely dominated the pattern accounting for 77.7 ± 4.3 %. BDEs-47, -99, -206, -207 were in the top six of sites from both inside and outside CH. (Table 5).

3.2.3 PCDDs and PCDFs

PCDDs and PCDFs were detected in all sediment samples (n = 6) (Table 4; 14). Of the seven PCDD congeners quantified, all were detected at all sites, and of the ten PCDF quantified, over eight were detected in each sample. Total PCDD concentrations were higher in the CSoG (0.40 ± 0.01 ng/g dw; range: 0.39 – 0.41 ng/g) compared to CH (0.13 ± 0.01 ng/g dw; range: 0.11 – 0.15 ng/g; Figure 2; $p < 0.05$). The sample collected in the OH had the highest PCDD concentration (0.46 ng/g dw).

Total PCDF concentrations were higher in the CSoG (0.055 ± 0.002 ng/g dw; range: 0.053 – 0.057 ng/g) compared to CH (0.010 ± 0.002 ng/g dw; range: 0.005 – 0.013 ng/g; Figure 2; $p < 0.005$). The sample collected in the OH had the highest PCDF concentration (0.094 ng/g dw). The CCME has an interim sediment quality guideline based on 2,3,7,8 TCDD toxic equivalencies (850 ng/g TEQ; CCME, 2001). Samples collected in the CSoG (8.05 ± 0.25 ng/g TEQ), the CH (0.63 ± 0.19 ng/g TEQ) and the OH (1.39 ng/g TEQ) were all bellow the guideline.

Overall, OCDD and OCDF were the dominant PCDD and PCDF congener accounting for 79.1 ± 12.4 % and 46.9 ± 14.8 % of total PCDD and PCDF concentrations, respectively.

3.2.4 PAHs

PAHs were detected in all sediment samples (n = 6) (Table 4; 10). Of the 79 compounds quantified, over 75 were detected in each sample. Total PAH concentrations were not significantly different between sediment samples collected in the CSoG (1012 ± 273 ng/g dw; range: 739 – 1286 ng/g) and those collected in the CH (631 ± 25.8 ng/g dw; 592 – 680 ng/g; Figure 2; $p = 0.355$). The sample collected in the OH had the highest PAH concentration (1907 ng/g dw). C4 Phenanthrenes/Anthracenes and C2 Naphthalenes were in the top six dominant PAH compounds at sites from the CSoG, CH and OH. While C3 Naphthalenes and C1 Phenanthrenes/Anthracenes were also dominant at sites from both the CSoG and CH, the OH site had pyrene, fluoranthene and chrysene present in the top six (Table 5). The CCME has sediment quality guidelines for individual PAHs (CCME, 1999a): naphthalene (34.6 ng/g dw), acenaphthene (6.71 ng/g dw), acenaphthylene (5.87 ng/g dw), fluorene (21.2 ng/g dw), phenanthrene (86.7 ng/g dw), anthracene (46.9 ng/g dw), fluoranthene (113 ng/g dw), pyrene (153 ng/g dw), benz(a)anthracene (74.8 ng/g dw), benzo(a)pyrene (88.8 ng/g dw), chrysene (108 ng/g dw), dibenzo(a,h)anthracene (6.22 ng/g dw), 2-methyl-naphthalene (20.2 ng/g dw) (CCME, 1999). None of our samples exceeded these guidelines except the one collected in the OH that

exceeded the dibenzo(a,h) anthracene guideline by 1.5 fold (9.46 ng/g dw), the acenaphthylene guideline by 1.4 fold (8.01 ng/g dw) and the 2-methylnaphthalene guideline by 1.7 fold (33.8 ng/g dw). Finally, the OH sample also exceeded the 2-methyl-naphthalene guideline by 1.3 fold (26.3 ng/g dw).

3.2.5 PFAS

PFAS were detected in four (SRKW-24-SC, -TI, -PEI and -FD3) out of the six samples collected (Table 4; 11). Of the 40 PFAS compounds quantified, only up to eight were detected at individual sites. Total PFAS concentrations were similar between samples collected in the CSoG (1.23 ± 0.12 ng/g dw; range: 1.12 – 1.35 ng/g) and those from the CH (0.50 ± 0.50 ng/g dw; range: 0 – 1.51 ng/g; Figure 2; $p = 0.246$). The sample collected in the OH had the lowest PFAS concentration (0.058 ng/g dw). Among the three sites samples in the CH, PFAS were only detected at one site (SRKW-24-FD3), and 6:2-fluorotelomersulfonic acid (6:2-FTS) was the only PFAS detected (Table 5). 6:2-FTS is used in firefighting foams, metal plating and industrial processes and some consumer products such as textile, fabric and paper and food packaging (Yang et al., 2023). For samples collected in the CSoG, perfluorooctane sulfonate (PFOS) was the dominant PFAS accounting for 25.4 ± 3.9%. In Canada, PFOS was added to Schedule 1 of the manufacture, use, sale, offer for sale and import of PFOS and products that contain them are prohibited under the *Prohibition of Certain Toxic Substances Regulations, 2012* (ECCC, 2021). At the OH site, only one PFAS was detected: Perfluoroundecanoic acid (PFUnA) which is mainly a break down product of stain-resistant and grease proof coatings. There are currently no guidelines for sediment.

3.2.6 PPCPs

PPCPs were detected in all sediment samples ($n = 6$) (Table 4; 12). Of the 104 PPCP compounds quantified, only up to eight were detected in each sample. Total PPCP concentrations were similar between CSoG (4.26 ± 1.81 ng/g dw; range: 2.44 – 6.06 ng/g) and CH (6.40 ± 2.57 ng/g dw; 2.27 – 11.13 ng/g; Figure 2; $p = 0.645$). The sample collected in the OH had a PPCP concentration in the same range as those reported at the other sites (6.52 ng/g dw). Dominant PPCPs in sediment from the CSoG, CH and OH included diphenhydramine (27.7 ± 2.3, 55.6 ± 26.6 and 39.1 % of total PPCP, respectively) and triclocarban (42.9 ± 8.9, 20.1 ± 17.8 and 42.5 %, respectively; Table 5). Diphenhydramine is an anti-histamine widely available over the counter in Canada while triclocarban is an antimicrobial compound used mainly in bar soaps, deodorants, cleansing lotions, wipes, shampoos, creams and toothpastes (ECCC, 2024). Average triclocarban concentrations normalized to 1% organic carbon in samples collected in the CSoG (0.116 ± 0.01 ng/g dw), in those collected in CH (0.177 ± 0.164 ng/g dw) and at the OH site (0.272 ng/g dw) were below the sediment FEQG (90 ng/g dw; ECCC, 2024).

3.2.7 Alkylphenols

ΣAlkylphenols were detected in all sediment samples ($n = 6$) (Table 4; 15) with 4 nonylphenols (44.8 ± 8.3, 72.3 ± 14.8 and 69.9 % of ΣAlkylphenols, respectively) and 4 nonylphenols monoethoxylates (49.7 ± 7.9, 43.0 ± 12.8 and 29.8 % of ΣAlkylphenols, respectively) dominating at sites collected in the CSoG, CH and OH. ΣAlkylphenol concentrations were

similar between sediment samples collected in the CSoG (12.28 ± 0.75 ng/g dw; range: 11.5 – 13.0 ng/g) and those collected in the CH (28.7 ± 26.5 ng/g dw; 3.94 – 56.7 ng/g; p = 0.644).). The sample collected in the OH had the highest ΣAlkylphenol concentration (67.55 ng/g dw). The CCME has an interim sediment quality guidelines for nonylphenol and its ethoxylates (1000 ng/g TEQ dw) expressed in nonylphenol toxic equivalent (TEQ) unit normalized to 1% TOC (CCME, 2002). The average nonylphenol TEQ normalized to 1% TOC for samples collected in the CSoG (2.55 ± 0.62 ng/g TEQ), in the CH (21.3 ± 19.7 ng/g TEQ) and in the OH sample (36.85 ng/g TEQ) did not exceed the guideline.

3.2.8. Pesticides

Pesticides were detected in all sediment samples (*n* = 6) (Table 4; 9). Of the 76 pesticides quantified, only up to 17 were detected in each sample. Total pesticide concentrations were similar between samples collected in the CSoG (0.658 ± 0.05 ng/g dw; range: 0.607 – 0.708 ng/g) compared to those sampled in the CH (0.703 ± 0.336 ng/g dw; 0.262 – 1.36 ng/g; Figure 3; p = 0.769). The sample collected in the OH had a total pesticide concentration in the same range as those reported at the other sites (1.02 ng/g dw).

DDT and its metabolites were present in the top six of pesticides detected with the highest concentrations in samples collected in the CSoG, CH and OH (see below for discussion on legacy pesticides). With regards to current used pesticides, permethrin was detected in the top six of samples collected in the CH and OH, while atrazine and cypermethrin were only in the top six of samples collected in the CH (Table 5). There are currently no sediment quality guidelines for these current use pesticides.

Hexachlorobenzen (HCB) was detected in all sediment samples (*n* = 6). HCB concentrations were similar between samples collected in the CSoG (0.042 ± 0.008 ng/g dw; range: 0.034 – 0.050 ng/g) and those collected in the CH (0.027 ± 0.002 ng/g dw; 0.025 – 0.030 ng/g; Figure 3; p = 0.260). The sample collected in the OH had an HCB concentration in the same range as those reported at the other sites (0.028 ng/g dw). There is currently no sediment quality guideline for HCB in Canada.

ΣHexachlorcyclohexane (HCH) was detected in all sediment samples (*n* = 6) with alpha (33.1 ± 7.0 % of ΣHCH) and beta (64.5 ± 10.1 % of ΣHCH) isomers being dominant. ΣHCH concentrations were higher in sediment samples collected in the CSoG (0.078 ± 0.006 ng/g dw; range: 0.07 – 0.084 ng/g) compared to those collected in the CH (0.024 ± 0.003 ng/g dw; 0.024 – 0.025 ng/g; Figure 3; p < 0.05). The sample collected in the OH had a ΣHCH concentration similar to those reported in the samples collected in the CH (0.029 ng/g dw).The CCME only has a sediment quality guideline for the gamma- isomer (0.32 ng/g; CCME, 199b) that none of the sediment samples exceeded.

Σ Dichlorodiphenyltrichloroethane (DDT) was detected in all sediment samples (*n* = 6) collected with 4,4’ DDE being dominant and accounting for 59.3 ± 14.7 % of ΣDDT. ΣDDT concentrations were higher in the samples collected in the CSoG (0.27 ± 0.007 ng/g dw; range: 0.266 – 0.280 ng/g) compared to those sampled in the CH (0.119 ± 0.027 ng/g dw; 0.072 – 0.167

ng/g; Figure 3; $p < 0.05$). The sample collected in the OH had a ΣDDT concentration similar to those reported in the samples collected in the CSoG (0.291 ng/g dw). The CCME has sediment quality guidelines for DDT (1.19 ng/g dw; CCME, 1999c), DDE (2.07 ng/g dw; CCME, 1999c) and DDD (1.22 ng/g dw; CCME, 1999c) that none of the samples exceeded.

ΣChlordane was detected in all sediment samples ($n = 6$) with oxychordane being dominant and accounting for 74.7 ± 26.0 % of ΣChlordane. ΣChlordane concentrations were similar between samples collected in the CSoG (0.032 ± 0.006 ng/g dw; range: 0.026 – 0.037 ng/g) and those collected in the CH (0.014 ± 0.005 ng/g dw; 0.004 – 0.020 ng/g; Figure 3; $p = 0.174$). The sample collected in the OH had a ΣChlordane concentration in the same range as those reported at the other sites (0.031 ng/g dw). The CCME has a sediment quality guideline for total chlordane (2.26 ng/g dw; CCME, 1999d) that none of the samples exceeded.

ΣHeptachlor was detected in four (SRKW-24-SC, -PEI, -FD3, -GRVD4) out of six samples collected with heptachlor epoxide contributing to 100% of ΣHeptachlor at sites where detection occurred. ΣHeptachlor concentrations were similar between samples collected in the CSoG (0.005 ± 0.005 ng/g dw; range: 0 – 0.009 ng/g) and those collected in the CH (0.007 ± 0.004 ng/g dw; 0 – 0.014 ng/g; Figure 3; $p = 0.679$). The sample collected in the OH had the highest ΣHeptachlor concentration (0.024 ng/g dw). The CCME has a sediment quality guideline for heptachlor epoxide (0.60 ng/g dw; CCME, 1999e) that none of the samples exceeded.

ΣEndosulphan was detected in four (SRKW-24-SC, -TI, -FD22, -GRVD4) out of six samples collected with β-endosulphan contributing to 100% of ΣEndosulphan at sites where detection occurred. ΣEndosulphan concentrations were similar between samples collected in the CSoG (0.159 ± 0.069 ng/g dw; range: 0.09 – 0.228 ng/g) and those collected in the CH (0.037 ± 0.019 ng/g dw; 0 – 0.062 ng/g; Figure 3; $p = 0.298$). ΣEndosulphan was not detected in the sample collected in the OH. There is currently no sediment quality guideline for β-endosulphan in Canada.

ΣEndrin was detected in three (SRKW-24-SC, -PEI, -FD3) out of six samples collected with endrin contributing to 100% of ΣEndrin at sites where detection occurred. ΣEndrin concentrations were similar between samples collected in the CSoG (0.095 ± 0.095 ng/g dw; range: 0 – 0.019 ng/g) and those collected in the CH (0.002 ± 0.002 ng/g dw; 0 – 0.007 ng/g; Figure 3; $p = 0.587$). The sample collected in the OH had the highest ΣHeptachlor concentration (0.033 ng/g dw). The CCME has a sediment quality guideline for endrin (2.67 ng/g dw; CCME, 1999f) that none of the samples exceeded.

3.3 Metals

Here we summarized only the metals that have a sediment quality guideline. Significant differences between samples collected in the CSoG and those collected in the SRKW CH for all individual metals can be found in Table 6 and 13.

Arsenic was detected in all sediment samples (n = 6) collected in the Salish Sea. Average arsenic concentrations were similar between samples collected in the CSoG (8.46 ± 0.29 mg/kg dw; range: 8.18 – 8.75 mg/kg) compared to those collected in the CH (8.33 ± 0.32 mg/kg dw; 7.80 – 890 mg/kg; Figure 4 and Table 6; p = 0.767). The sample collected in the OH had an arsenic concentration (8.73 mg/kg dw) similar to the other sites. Average arsenic concentrations in the CSoG, CH and at the OH site exceeded the interim sediment quality guideline (7.24 mg/kg dw; CCME, 1999g) for arsenic by 1.2- . 1.2- and 1.2-fold, respectively.

Cadmium was detected in all sediment samples (n = 6) with average cadmium concentrations similar between samples collected in the CSoG (0.41 ± 0.02 mg/kg dw; range: 0.38 – 0.42 mg/kg) compared to those sampled in the CH (0.34 ± 0.12 mg/kg dw; 0.20 – 0.57 mg/kg; Figure 4 and Table 6; p = 0.467). The sample collected in the OH had one of the lowest cadmium concentration (0.24 mg/kg dw). Average cadmium concentrations in the CSoG, CH and at the OH site were well below the interim sediment quality guideline (0.70 mg/kg dw; CCME, 1999h) for cadmium.

Chromium was detected in all sediment samples (n = 6) collected. Average chromium concentrations were lower in samples collected in the CSoG (33.8 ± 0.65 mg/kg dw; range: 33.2 – 34.5 mg/kg) compared to those sampled in the CH (47.7 ± 1.78 mg/kg dw; 44.9 – 51.0 mg/kg; Figure 4 and Table 6; p < 0.05). The sample collected in the OH had a cadmium concentration (50.3 mg/kg dw) similar to those reported in samples from the CH. Average chromium concentrations in the CSoG, CH and at the OH site were below the interim sediment quality guideline (52.3 mg/kg dw; CCME, 1999i) for chromium.

Copper was detected in all sediment samples (n = 6) collected. Average copper concentrations were higher in samples collected in the CSoG (78.9 ± 10.5 mg/kg dw; range: 68.5 – 89.4 mg/kg) compared to those samples in the CH (39.5 ± 2.0 mg/kg dw; 36.9 – 43.4 mg/kg; Figure 4 and Table 6; p < 0.005). The sample collected in the OH had a copper concentration (73.1 mg/kg dw) similar to the sites sampled in the CSoG. Average copper concentrations in the CSoG, CH and at the OH site were well below the interim sediment quality guideline (18.7 mg/kg dw; CCME, 1999j).

Lead was detected in all sediment samples (n = 6) collected. Average lead concentrations were higher in samples collected in the CSoG (17.8 ± 1.35 mg/kg dw; range: 16.4 – 19.1 mg/kg) compared to those sampled in the CH (9.18 ± 0.89 mg/kg dw; 7.63 – 10.7 mg/kg; Figure 4 and Table 6; p < 0.005). The sample collected in the OH had a copper concentration (73.1 mg/kg dw) in the same range as those reported at the other sites. Average lead concentrations in the CSoG, CH and at the OH site were well below the interim sediment quality guideline (30.2 mg/kg dw; CCME, 1999k) for lead.

Mercury was detected in all sediment samples (n = 6) collected. Average mercury concentrations were similar between samples collected in the CSoG (0.132 ± 0.01 mg/kg dw; range: 0.13 – 0.14 mg/kg) compared to those sampled in the CH (0.126 ± 0.06 mg/kg dw; 0.05 – 0.25 mg/kg; Figure 4 and Table 6; p = 0.622). The sample collected in the OH had a mercury concentration (0.11 mg/kg dw) in the same range as those reported at the other sites. Average mercury concentrations at sites collected in the CSoG was just above the interim sediment quality

guideline (0.13 mg/kg dw; CCME, 1999l) for mercury. When considering individual sites, one site from the CSoG (SRKW-24-TI: 0.135 mg/kg) was just above the guideline and one site from the CH (SRKW-24-FD22: 0.246 mg/kg) was well above the guideline.

Zinc was detected in all sediment samples (n = 6) collected. Average zinc concentrations were similar between samples collected in the CSoG (116 ± 6.0 mg/kg dw; range: 110 – 122 mg/kg) compared to those sampled in the CH (96.5 ± 4.6 mg/kg dw; 87.7 – 103 mg/kg; Figure 4 and Table 6; p = 0.094m). The sample collected in the OH had a zinc concentration (115 mg/kg dw; CCME, 1999l) in the same range as those reported at the other sites. Average zinc concentrations in the CSoG, CH and at the OH site were below the interim sediment quality guideline (124 mg/kg dw) for zinc.

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References

Alava, J.J., Ross, P.S., Lachmuth, C.L., Ford, J.K.B., Hickie, B.E., and Gobas, F.A.P.C. 2012. Habitat-based PCB environmental quality criteria for the protection of endangered killer whales (*Orcinus orca*). Environ. Sci. Technol. 46: 12655-12663.

Alava, J.J., Ross, P.S., Gobas, F.A.P.C. 2016. Food web bioaccumulation model for resident killer whales from the Northeastern Pacific Ocean as a tool for the derivation of PBDE-sediment quality guidelines. Arch. Environ. Contam. Toxicol. 70: 155-168.

Brown, T.M., Holbert, S., Gallilee, C.A., Colbourne, K. 2022. Sediment contaminant concentrations from Disposal at Sea sites at Point Grey and Sand Heads and inside and outside Southern Resident Killer Whale Critical Habitat, British Columbia in 2019. Can. Data Rep. Fish. Aquat. Sci. 1346: ix + 100 p.

Brown, T.M., Holbert, S., Gallilee, C.A., Colbourne, K. 2023. Sediment contaminant concentrations from outside Southern and Northern Resident Killer Whale Critical Habitat, British Columbia in 2020. Can. Data Rep. Fish. Aquat. Sci. 1372: ix + 42 p.

Brown, T.M., Holbert, S., Gallilee, C.A., Colbourne, K. 2025a. Sediment contaminant concentrations from Disposal at Sea Sites at Point Grey and Sand Heads and inside and outside Resident Killer Whale Critical Habitat, British Columbia in 2021 Can. Data Rep. Fish. Aquat. Sci. 1410: ix + 63 p.

Brown, T.M., Holbert, S., Gallilee, C.A., Colbourne, K. 2025b. Sediment contaminant concentrations from Disposal at Sea sites at Point Grey and Sand Heads and inside and outside Southern Resident Killer Whale Critical Habitat, British Columbia in 2022. Can. Data Rep. Fish. Aquat. Sci. 1409: ix + 48

Canadian Council of Ministers of the Environment (CCME), 1999a. Canadian Sediment Quality Guidelines for the Protection of Aquatic life – Polycyclic Aromatic Hydrocarbons (PAHs).

CCME, 1999b. Canadian Sediment Quality Guidelines for the Protection of Aquatic life – Lindane.

CCME, 1999c. Canadian Sediment Quality Guidelines for the Protection of Aquatic life – DDT, DDE and DDD.

CCME, 1999d. Canadian Sediment Quality Guidelines for the Protection of Aquatic life – Chlordane.

CCME, 1999e. Canadian Sediment Quality Guidelines for the Protection of Aquatic life – Heptachlor Epoxide.

CCME, 1999f. Canadian Sediment Quality Guidelines for the Protection of Aquatic life – Endrin.

CCME, 1999g. Canadian Sediment Quality Guidelines for the Protection of Aquatic life – Arsenic.

CCME, 1999h. Canadian Sediment Quality Guidelines for the Protection of Aquatic life – Cadmium.

CCME, 1999i. Canadian Sediment Quality Guidelines for the Protection of Aquatic life – Chromium.

CCME, 1999j. Canadian Sediment Quality Guidelines for the Protection of Aquatic life – Copper.

CCME, 1999k. Canadian Sediment Quality Guidelines for the Protection of Aquatic life – Lead.

CCME, 1999l. Canadian Sediment Quality Guidelines for the Protection of Aquatic life – Mercury.

CCME, 1999m. Canadian Sediment Quality Guidelines for the Protection of Aquatic life – Zinc.

CCME, 2001. Canadian Sediment Quality Guidelines for the Protection of Aquatic life – Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo-p- furans (PCDD/Fs).

CCME, 2002. Canadian Sediment Quality Guidelines for the Protection of Aquatic life – Nonylphenol and its ethoxylates

Canadian Environmental Protection Act (CEPA) 2001. Disposal at Sea regulations and regulations respecting applications for permits for Disposal at Sea. SOR/2001-275 and 276.

Environment and Climate Change Canada (ECCC), 2024. Federal Environmental Quality Guidelines – Triclocarban.

DFO, 2011. Recovery strategy for the northern and southern resident killer whales (*Orcinus orca*) in Canada.

Holbert, S., Colbourne, K., Fisk, A. T., Ross, P. S., MacDuffee, M., Gobas, F. A. P. C., & Brown, T. M. 2024. Polychlorinated biphenyl and polybrominated diphenyl ether profiles vary with feeding ecology and marine rearing distribution among 10 Chinook salmon (*Oncorhynchus tshawytscha*) stocks in the North Pacific Ocean. *Environmental Research, 241*, 117476. https://doi.org/https://doi.org/10.1016/j.envres.2023.117476

Holbert, S., Colbourne, K., Gobas, F.A. and Brown, T.M., 2025. Legacy and current-use contaminants in pacific chinook salmon (*Oncorhynchus tshawytscha*) stocks and their contribution to Resident killer whale (O*rcinus orca*) contaminant burdens. *Environmental Toxicology and Chemistry*, p.vgaf166.

Kim, J. J., Delisle, K., Brown, T. M., Bishay, F., Ross, P. S., & Noël, M. 2022. Characterization and interpolation of sediment polychlorinated biphenyls and polybrominated diphenyl

ethers in resident killer whale habitat along the coast of British Columbia, Canada. *Environmental Toxicology and Chemistry*, *41*(9), 2139-2151.

Kim, J.J., Delisle, K., Brown, T.M., Ross, P.S., Noël, M. 2023. Sediment Spatial Distribution and Quality Assessment of Metals in Chinook Salmon and Resident Killer Whale Marine Habitat in British Columbia, Canada. Arch. Environ. Toxicol. Chem. doi.org/10.1007/s00244-023-01013-1

Ross, P. S., Harris, K. A., Dangerfield, N. J., Crewe, N. F., Dubetz, C., Fischer, M. B., Fraser, T. L., and Ross, A. R. S. 2011. Sediment concentrations of PCBs, PBDEs, PCDDs and PCDFs from Disposal at Sea sites at Point Grey and Sand Heads, British Columbia in 2010. Fisheries and Oceans Canada, Ottawa, Canada. Can. Data Rep. Fish. Aquat. Sci. 1239: vii + 115 p.

Ross, P.S., Frouin, H., Dangerfield, N.J., Crewe, N.F., Dubetz, C., Fischer, M.B., Fraser, T.L., Ross, A.R.S. 2012. Sediment concentrations of PCBs, PBDEs, PCDDs and PCDFs from Disposal at Sea Sites at Brown Passage and Douglas Channel, British Columbia in 2011. Fisheries and Oceans Canada, Ottawa, Canada. Can. Data Rep. Fish. Aquat. Sci. 1243: vii + 113 p.

Yang SH, Shan L, Chu KH. Fate and Transformation of 6:2 Fluorotelomer Sulfonic Acid Affected by Plant, Nutrient, Bioaugmentation, and Soil Microbiome Interactions. Environ Sci Technol. 2022 Aug 2;56(15):10721-10731. doi: 10.1021/acs.est.2c01867. Epub 2022 Jul 13. PMID: 35830472; PMCID: PMC10134682.

Figure 1. Locations and ID's of sediment samples collected in the Salish Sea in the Resident Killer Whale habitat in coastal British Columbia, Canada.

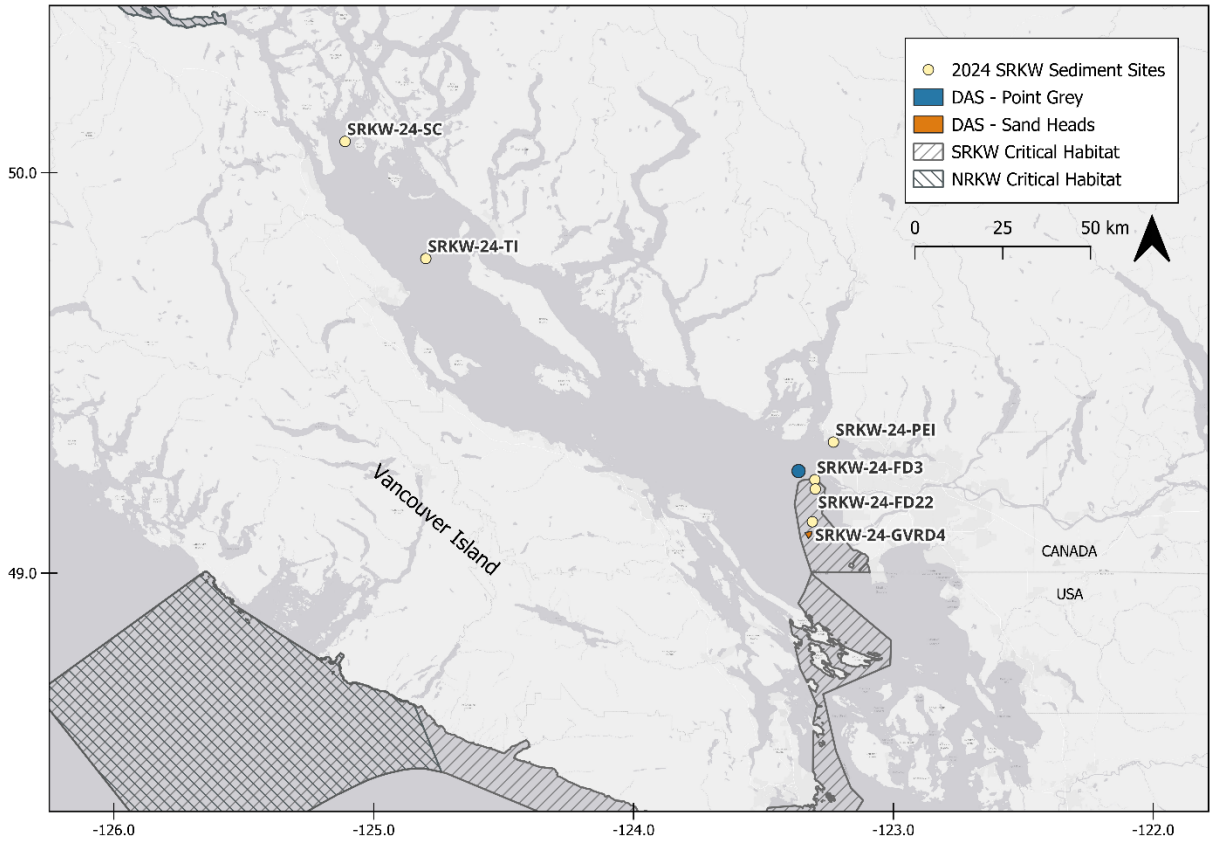

Figure 2. Average PCBs, PBDEs, PCDDs, PCDFs, PAHs, PFAS, PPCP and AP concentrations in sediment samples collected from sites located in Resident Killer Whale habitat. Interim Sediment Quality Guideline for PCBs and PBDEs protective of killer whales is denoted by horizontal lines (0.0037 and 1 ng/g for PCBs and PBDEs, respectively). * indicates significant differences between SRKW Critical Habitat (CH) and Central Strait of Georgia (CSoG).

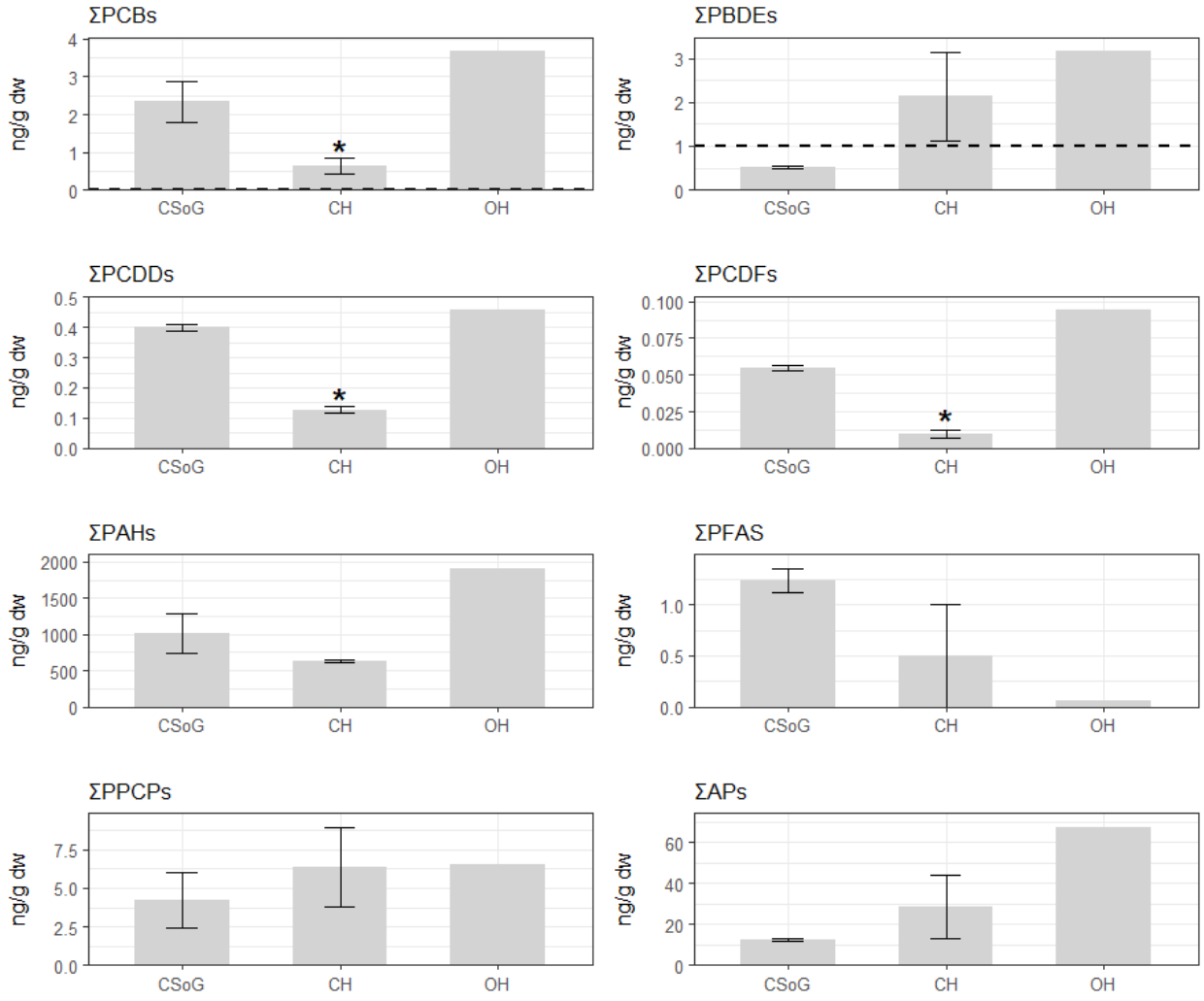

Figure 3. Average total pesticide, HCB, ∑HCH (α-HCH, β- HCH, γ-HCH, δ-HCH), ∑DDT (2,4'-DDD, 4,4'-DDD, 2,4'-DDT, 4,4'-DDT, 2,4'-DDE, 4,4'-DDE*),* ∑Chlordane (α-cis chlordane, γ-trans chlordane, oxychlordane, trans-nonachlor, cis-nonachlor), ∑Heptachlor (Heptachlor, Heptachlor epoxyde), ∑Endosulphan (α-Endosulphan, β,-Endosulphan, Endosulphan sulphate), ∑Endrin (Endrin, Endrin ketone) concentrations in sediment samples collected from Resident Killer Whale habitat. * indicates significant differences between SRKW Critical Habitat (CH) and Central Strait of Georgia (CSoG).

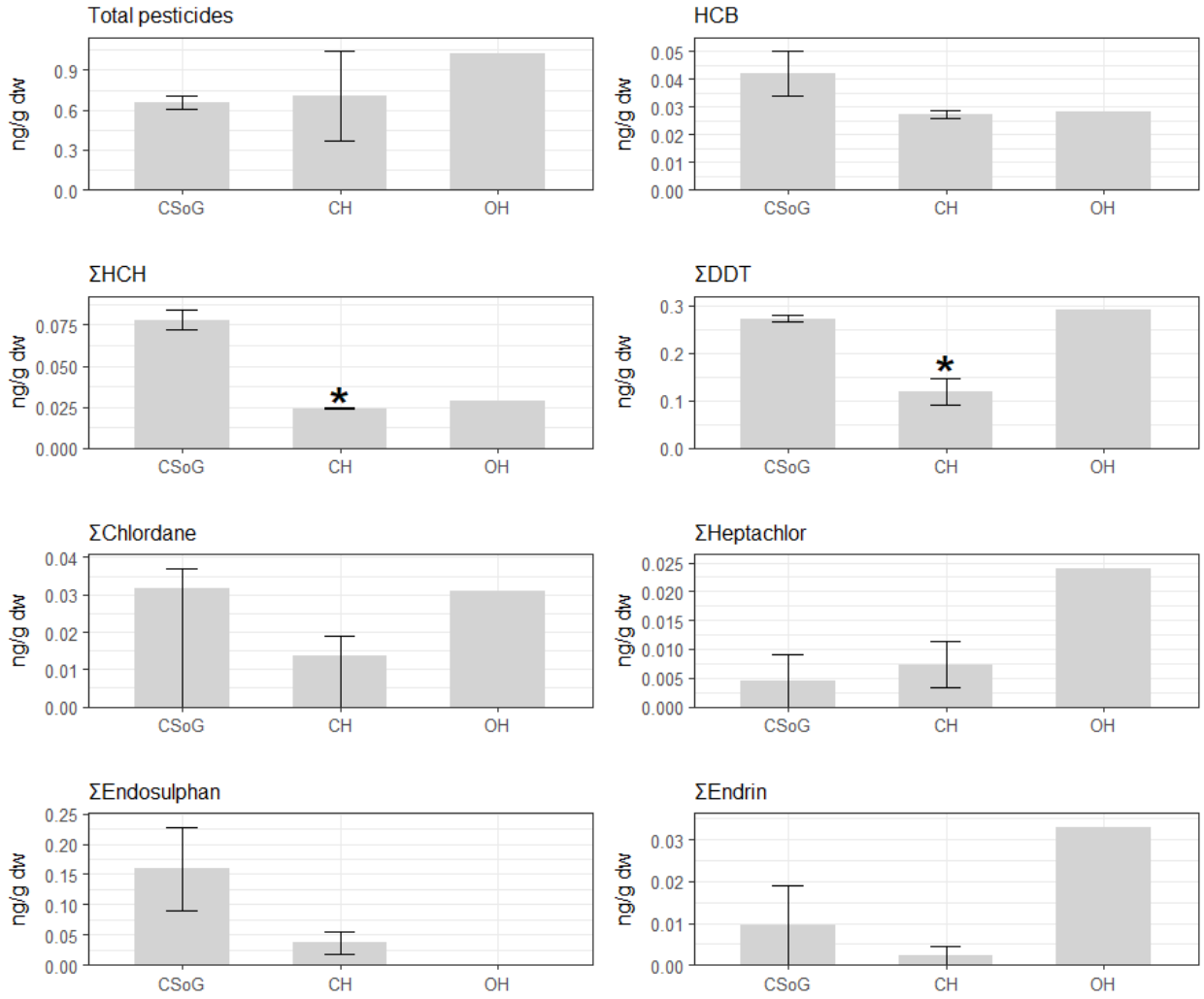

Figure 4. Metal (Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Zinc) concentrations in sediment samples collected from sites located in the Resident Killer Whale habitat. CCME Interim Sediment Quality Guideline for each of these metals is indicated by the horizontal line. * indicates significant differences between SRKW Critical Habitat (CH) and Central Strait of Georgia (CSoG).

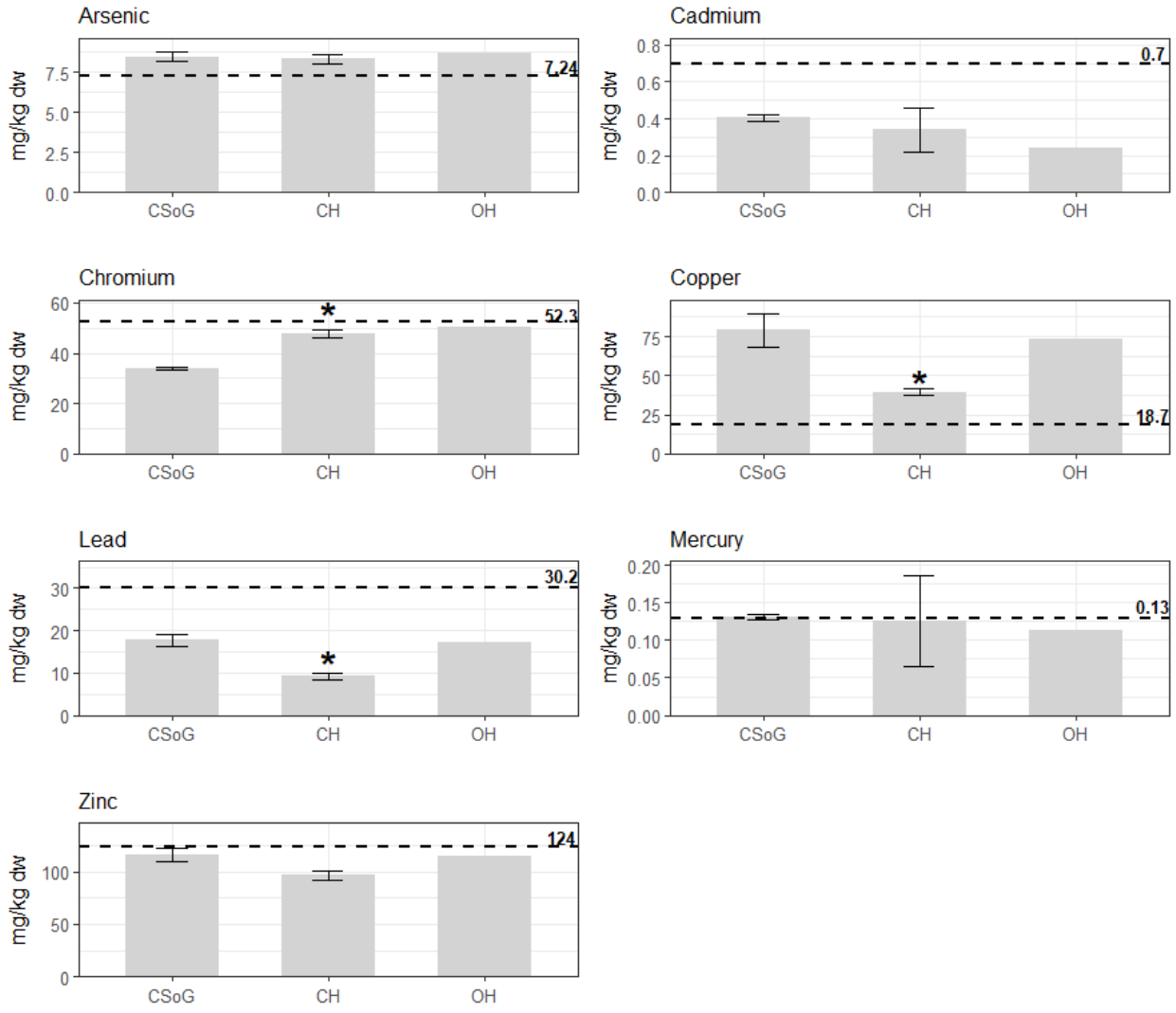

Table 1. Analyte group, method, and laboratory used for contaminant analyses in sediment samples.

Analyte Group (where applicable published reference method indicated)	Laboratory
Legacy and Current Use Pesticides by HRMS (EPA 1699)	SGS AXYS Analytical Ltd.
209 PCB Congeners by HRMS (EPA 1668C or Equivalent)	SGS AXYS Analytical Ltd.
PBDE Congeners by HRMS (EPA 1614A)	SGS AXYS Analytical Ltd.
Dioxins and Furans by HRMS (EPA 1613B)	SGS AXYS Analytical Ltd.
PFAS by LC MS/MS Isotope Dilution (40 compound minimum)	SGS AXYS Analytical Ltd.
PAHs, Alkylated PAHs, Alkylated PAH Groups by Isotope Dilution GC/MS (8270D modified by EPA 1625)	SGS AXYS Analytical Ltd.
PPCPs by LC MS/MS (Modified EPA 1694)	SGS AXYS Analytical Ltd.
Alkylphenols by Isotope dilution GC/MS	SGS AXYS Analytical Ltd.
Mercury by CVAAS, methylmercury by GCAFS and metals by CRC ICPMS	ALS Canada Ltd.

Table 2. Surficial sediment samples collected by Smith-McIntyre at sites located in the central Strait of Georgia (CSoG), outer Vancouver Harbour (OH) and Southern Resident Killer Whale (SRKW) Critical Habitat (CH) on November 1st and 3rd, 2024.

Sample ID	Date	Latitude	Longitude	Depth (m)	Area	Collection Method
SRKW-24-SC	1 Nov 24	50.07695	-125.1101667	253	CSoG	GRB-(Smith-McIntyre)
SRKW-24-TI	1 Nov 24	49.78708333	-124.7995333	356	CSoG	GRB-(Smith-McIntyre)
SRWK-24-PEI	3 Nov 24	49.329317	-123.230783	65	OH	GRB-(Smith-McIntyre)
SRKW-24-FD3	3 Nov 24	49.23487	-123.30229	128	CH	GRB-(Smith-McIntyre)
SRWK-24-FD22	3 Nov 24	49.21144	-123.30042	102	CH	GRB-(Smith-McIntyre)
SRKW-24-GVRD4	3 Nov 24	49.12932	-123.31185	86	CH	GRB-(Smith-McIntyre)

Table 3. Surficial sediment properties for samples collected in Resident Killer Whale habitat. Parameters included % total organic carbon (TOC), % moisture, and percentages of sand, silt, clay, and gravel.

Sample ID	% TOC	% moisture	% sand	% silt	% clay	% gravel
SRKW-24-SC	3.94	79.9	3.6	63.1	33.3	<1.0
SRKW-24-TI	3.39	79.9	<1.0	54.3	45.6	<1.0
SRWK-24-PEI	1.56	58.5	2.0	61.8	36.2	<1.0
SRKW-24-FD3	1.28	55.9	1.9	65.2	32.9	<1.0
SRWK-24-FD22	1.04	42.0	24.5	58.6	16.9	<1.0
SRKW-24-GVRD4	0.984	43.5	14.5	64.6	20.9	<1.0

Table 4. Number of analytes detected per site for each organic contaminant classes.

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
PCBs (out of 159)	183	139	137	132	138	127
PBDEs (out of 39)	27	27	30	30	37	29
PAHs (out of 79)	75	76	76	76	76	76
Pesticides (out of 76)	16	16	17	15	14	11
PFAS (out of 40)	7	8	1	1	0	0
PPCPs (out of 104)	3	4	5	6	8	2
PCDD (out of 7)	7	7	7	7	7	7
PCDF (out of 10)	9	9	9	8	8	8
Alkylphenols (out of 4)	3	3	3	3	4	3

Table 5. Top six PCB, PBDE, PAH, pesticides, PPCP and PFAS analytes by concentration in samples collected in the Resident Killer Whale habitat. Average ± standard deviation (ng/g dw).

CSoG (n=2)		CH (n=3)		OH (n=1)	
PCBs					
138	0.145 ± 0.028	138	0.029 ± 0.011	138	0.28
110	0.141 ± 0.049	70	0.028 ± 0.01	110	0.253
118	0.129 ± 0.037	110	0.026 ± 0.01	153	0.212
153	0.121 ± 0.016	153	0.026 ± 0.009	101	0.19
101	0.108 ± 0.035	11	0.023 ± 0.005	118	0.183
70	0.101 ± 0.027	20	0.023 ± 0.008	149	0.158
PBDEs					
209	0.377 ± 0.026	209	1.727 ± 0.828	209	2.372
206	0.027 ± 0.002	47	0.089 ± 0.038	183	0.234
47	0.024 ± 0.004	99	0.063 ± 0.027	47	0.091
207	0.022 ± 0.002	206	0.042 ± 0.021	207	0.079
208	0.012 ± 0	207	0.039 ± 0.017	99	0.069
99	0.01 ± 0.001	49	0.03 ± 0.017	206	0.069
100	0.007 ± 0	17+25	0.024 ± 0.015	153	0.039
PAHs					
C3 Naphthalenes	86.3 ± 27.6	C4 Phenanthrenes Anthracenes	65 ± 22.1	Pyrene	98.4
C2 Naphthalenes	83.4 ± 27.8	Retene	47.7 ± 23.7	C4 Phenanthrenes Anthracenes	97.6
C4 Phenanthrenes Anthracenes	55.7 ± 16.9	C2 Naphthalenes	43.4 ± 6.4	C2 Naphthalenes	88.8
C1 Phenanthrenes Anthracenes	47 ± 14.8	C3 Naphthalenes	30.9 ± 5.5	Fluoranthene	85.8
C4 Naphthalenes	45.8 ± 12.9	C1 Phenanthrenes Anthracenes	25.4 ± 3.2	C1 Fluoranthenes Pyrenes	76.5
C2 Phenanthrenes Anthracenes	39.9 ± 13.8	C1 Naphthalenes	22.8 ± 2.9	Chrysene	65.7
Pesticides					
4,4' DDE	0.195 ± 0.006	Permethrin	0.36 ± 0.256	Cyanazine	0.413
β Endosulphan	0.159 ± 0.069	4,4' DDE	0.072 ± 0.015	Permethrin	0.144
4,4'DDD	0.042 ± 0	Alachlor	0.046 ± 0.035	4,4'DDT	0.099
Hexachlorobenzene	0.042 ± 0.008	β Endosulphan	0.037 ± 0.019	4,4' DDE	0.082
B HCH	0.04 ± 0.001	Atrazine	0.033 ± 0.033	4,4'DDD	0.065
α HCH	0.032 ± 0.001	Cypermethrin	0.029 ± 0.029	Endrin	0.033
PPCP					
Triclocarban	1.71 ± 0.51	Diphenhydramine	2.808 ± 0.501	Triclocarban	2.77
Diphenhydramine	1.148 ± 0.433	Triclocarban	1.762 ± 1.087	Diphenhydramine	2.55
Azithromycin	0.82 ± 0.82	Miconazole	0.646 ± 0.36	Miconazole	0.651
Metformin	0.578 ± 0.051	Lomefloxacin	0.37 ± 0.37	Metformin	0.392
		Sertraline	0.355 ± 0.179		

CSoG (n=2)		CH (n=3)		OH (n=1)	
		Fluoxetine	0.156 ± 0.084		
PFAS					
PFOS	0.31 ± 0.005	6.2 FTS	0.503 ± 0.503	PFUnA	0.058
PFUnA	0.266 ± 0.021				
PFNA	0.167 ± 0.015				
PFDA	0.147 ± 0.002				
PFDS	0.132 ± 0.008				
PFTrDA	0.092 ± 0.019				

Table 6. Average ± standard deviation (range, mg/kg dw) for metals in samples collected in the Resident Killer Whale habitat. * indicates significant differences between SRKW Critical Habitat (CH) and Central Strait of Georgia (CSoG).

	CSoG (n=2)	CH (n=3)	OH
Aluminum	20950 ± 50 (20900 - 21000)	20366.67 ± 1650.59 (17900 - 23500)	23600
Antimony	0.86 ± 0.16 (0.71 - 1.02)	0.56 ± 0.02 (0.53 - 0.59)	0.64
Arsenic	8.46 ± 0.29 (8.18 - 8.75)	8.33 ± 0.32 (7.8 - 8.9)	8.73
Barium	78 ± 9.7 (68.3 - 87.7)	68.03 ± 4.37 (59.3 - 72.8)	72.7
Beryllium	0.44 ± 0.04 (0.41 - 0.48)	0.43 ± 0.04 (0.37 - 0.5)	0.49
Bismuth	0.24 ± 0.04 (0.2 - 0.29)	0.21 ± 0.11 (0 - 0.35)	0.32
Boron	71 ± 5.3 (65.7 - 76.3)	**21.37 ± 2.57* (18.5 - 26.5)**	28.6
Cadmium	0.41 ± 0.02 (0.38 - 0.42)	0.34 ± 0.12 (0.2 - 0.57)	0.24
Calcium	10170 ± 230 (9940 - 10400)	**8903.33 ± 273.58* (8610 - 9450)**	13000
Chromium	33.85 ± 0.65 (33.2 - 34.5)	**47.7 ± 1.78* (44.9 - 51)**	50.3
Cobalt	20.7 ± 2.4 (18.3 - 23.1)	14.3 ± 0.21 (14 - 14.7)	14.4
Copper	78.95 ± 10.45 (68.5 - 89.4)	**39.47 ± 2* (36.9 - 43.4)**	73.1
Iron	29500 ± 1300 (28200 - 30800)	34000 ± 2088.06 (30200 - 37400)	37100
Lead	17.75 ± 1.35 (16.4 - 19.1)	**9.18 ± 0.89* (7.63 - 10.7)**	17.1
Lithium	21.85 ± 1.05 (20.8 - 22.9)	21.2 ± 1.92 (18.8 - 25)	25.4
Magnesium	14700 ± 200 (14500 - 14900)	13233.33 ± 731.06 (12100 - 14600)	14700

	CSoG (n=2)	CH (n=3)	OH
Manganese	720.5 ± 230.5 (490 - 951)	419.67 ± 27.87 (364 - 450)	462
Mercury	0.13 ± 0 (0.13 - 0.14)	0.13 ± 0.06 (0.05 - 0.25)	0.11
Molybdenum	1.44 ± 0.19 (1.25 - 1.63)	1.06 ± 0.09 (0.87 - 1.16)	1.84
Nickel	36.3 ± 2.4 (33.9 - 38.7)	**51.47 ± 1.63* (48.5 - 54.1)**	51.9
Phosphorus	887 ± 74 (813 - 961)	924.33 ± 47.24 (847 - 1010)	1030
Potassium	5415 ± 265 (5150 - 5680)	**2726.67 ± 325.39* (2320 - 3370)**	3640
Selenium	1.81 ± 0.15 (1.66 - 1.96)	**0.47 ± 0.04* (0.43 - 0.55)**	0.62
Silver	0.3 ± 0.04 (0.26 - 0.34)	0.2 ± 0.02 (0.16 - 0.22)	0.35
Sodium	41200 ± 1300 (39900 - 42500)	**11080 ± 1907.15* (8490 - 14800)**	16300
Strontium	82.8 ± 2.6 (80.2 - 85.4)	61.47 ± 3.85 (54 - 66.8)	82.8
Sulfur	6700 ± 1300 (5400 - 8000)	1166.67 ± 584.05 (0 - 1800)	2800
Thallium	0.1 ± 0 (0.1 - 0.1)	0.16 ± 0.05 (0.1 - 0.26)	0.13
Tin	0 ± 0 (0 - 0)	0 ± 0 (0 - 0)	0
Titanium	1043.5 ± 146.5 (897 - 1190)	1173.33 ± 34.8 (1110 - 1230)	1180
Tungsten	0 ± 0 (0 - 0)	0 ± 0 (0 - 0)	0
Uranium	2.18 ± 0.06 (2.12 - 2.25)	**1.02 ± 0.07* (0.92 - 1.14)**	1.42
Vanadium	75.8 ± 0.4 (75.4 - 76.2)	67.9 ± 2.87 (63.5 - 73.3)	74.9
Zinc	116 ± 6 (110 - 122)	96.47 ± 4.56 (87.7 - 103)	115

	CSoG (n=2)	**CH (n=3)**	**OH**
Zirconium	6.1 ± 0.2 (5.9 - 6.3)	**8.07 ± 0.39*** **(7.3 - 8.6)**	8.6

Table 7. Sediment samples from Resident Killer Whale habitat were analyzed for 159 polychlorinated biphenyls (PCBs). All values are blank corrected and reported in pg/g dry weight. < = values below reporting limit (RL). The dominant congeners are in bold for coeluting congeners. Blanks = data not quantifiable.

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
PCB-1	6.454	8.944	7.444	2.604	4.209	2.144
PCB-2	8.074	7.924	3.404	2.654	2.104	1.164
PCB-3	4.444	5.084	3.954	1.664	2.329	0.894
PCB-4	12.664	16.764	8.284	3.254	4.789	3.214
PCB-5	0.574	1.302	1.072	1.292	0.78	0.512
PCB-6	4.392	5.742	5.162	2.052	3.142	1.192
PCB-7	1.337	1.667	1.547	0.872	1.001	0.399
PCB-8	23.473	27.673	32.273	11.373	16.773	6.043
PCB-9	1.354	1.614	1.234	0.613	0.8275	0.304
PCB-10	0.501	0.782	0.279	0.105	0.1745	0.107
PCB-11	16.77	28.17	26.67	32.97	20.97	15.17
PCB-12 + 13	5.866	6.626	3.016	1.646	2.001	0.796
PCB-14	0.767	0.957	0.427	0.468	0.3015	0.171
PCB-15	20.144	27.144	18.144	8.124	11.794	3.914
PCB-16	5.743	7.523	8.593	2.883	5.683	1.703
PCB-17	8.164	10.194	11.394	3.524	7.469	2.404
PCB-**18** + 30	16.247	21.447	24.347	8.447	15.597	5.247
PCB-19	2.377	3.027	2.177	0.814	1.245	0.671
PCB-**20** + 28	50.162	64.862	59.362	20.462	36.662	10.562
PCB-21 + **33**	25.078	31.078	29.878	10.078	17.928	5.148
PCB-22	11.835	16.135	19.435	7.075	12.1	3.315
PCB-23	0.09	0.132	<0.0291	0.09	0.044	<0.0197
PCB-24	0.181	0.214	0.292	0.119	0.214	0.069
PCB-25	4.328	5.578	5.728	2.278	3.318	1.168

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
PCB-**26** + 29	5.062	7.062	7.872	3.062	5.107	1.792
PCB-27	1.868	2.518	1.888	0.625	1.24	0.47
PCB-31	33.974	45.074	45.574	16.174	28.974	8.374
PCB-32	10.436	13.236	8.816	2.806	5.526	1.706
PCB-34	0.436	0.545	0.38	0.174	0.1625	0.032
PCB-35	2.947	3.877	1.707	1.087	1.217	0.528
PCB-36	0.58	0.95	0.52	0.452	0.4285	0.31
PCB-37	17.318	24.818	15.518	5.288	10.873	2.688
PCB-38	0.38	0.57	0.257	0.313	0.29	0.486
PCB-39	0.344	0.6	<0.0455	0.074	0.1485	<0.0229
PCB-**40** + 41 + 71	18.133	26.533	20.433	6.353	13.183	3.563
PCB-42	12.828	18.228	13.128	3.988	8.263	2.338
PCB-43	0.788	1.03	1.1	0.378	0.769	0.231
PCB-**44** + 47 + 65	51.18	83.98	67.88	18.58	32.28	11.58
PCB-**45** + 51	5.693	7.883	6.033	2.383	3.838	1.403
PCB-46	1.62	2.06	1.75	0.526	1.024	0.311
PCB-48	4.958	6.478	6.878	2.238	4.668	1.288
PCB-**49** + 69	34.636	51.336	36.936	9.166	18.286	5.776
PCB-50 + **53**	4.405	6.275	4.915	1.345	2.44	0.763
PCB-52	52.145	103.645	100.645	14.745	25.995	9.055
PCB-54	0.089	0.089	0.128	0.039	0.062	0.037
PCB-55	0.783	0.978	1.17	0.347	0.681	0.157
PCB-56	20.373	31.073	22.673	6.873	13.573	3.753
PCB-57	0.214	0.294	0.304	0.099	0.1735	0.043
PCB-58	0.275	0.38	0.322	0.075	0.159	0.049
PCB-**59** + 62 + 75	3.615	4.795	3.695	1.155	2.42	0.676

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
PCB-60	12.706	18.306	12.806	4.256	8.301	2.246
PCB-61 + **70** + 74 + 76	74.436	128.536	109.536	23.336	46.086	13.536
PCB-63	2.151	2.981	2.381	0.701	1.306	0.382
PCB-64	14.454	23.054	23.654	6.174	12.154	3.644
PCB-66	65.65	99.75	64.45	17.45	34.05	9.45
PCB-67	1.12	1.47	1.41	0.485	0.919	0.243
PCB-68	1.092	1.542	1.062	0.685	0.7035	0.402
PCB-72	0.794	1.08	0.683	0.194	0.308	0.138
PCB-73	<0.0363	<0.0372	<0.0195	<0.0189	<0.0195	<0.0197
PCB-77	9.902	12.802	5.312	1.692	3.587	1.082
PCB-78	<0.0612	<0.0778	<0.0414	<0.0279	<0.027	<0.0234
PCB-79	0.364	0.605	0.22	<0.0297	<0.0288	<0.025
PCB-80	<0.0492	<0.0625	<0.0332	<0.0225	<0.0222	<0.0197
PCB-81	0.389	0.456	0.344	0.041	0.223	<0.0225
PCB-82	11.047	20.547	23.647	2.457	5.552	1.357
PCB-83 + **99**	54.039	93.039	89.439	10.539	21.539	5.919
PCB-84	13.328	31.128	43.128	3.158	6.948	1.848
PCB-**85** + 116 + 117	21.527	37.327	34.527	4.427	9.557	2.567
PCB-86 + **87** + 97 + 109 + 119 + 125	52.368	113.768	142.768	12.368	27.468	6.968
PCB-88 + **91**	9.08	18.64	21.04	2.23	4.92	1.43
PCB-89	0.971	1.5	1.21	0.237	0.5895	0.179
PCB-90 + **101** + 113	73.336	142.736	189.736	15.836	33.286	9.336
PCB-92	13.84	27.04	38.14	3.18	6.535	1.9

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
PCB-93 + **95** + 98 + 100 + 102	47.763	101.763	140.763	10.163	22.513	5.943
PCB-94	0.334	0.608	0.528	0.094	0.1935	0.057
PCB-96	0.44	0.79	0.906	0.139	0.2775	0.107
PCB-103	0.861	1.23	1.34	0.199	0.4525	0.098
PCB-104	0.049	0.039	0.045	0.03	0.0555	<0.0197
PCB-105	39.167	69.467	73.667	8.227	16.817	4.707
PCB-106	<0.117	<0.141	<0.069	<0.0528	<0.0564	<0.0371
PCB-107	6.746	11.256	12.056	1.616	2.786	0.879
PCB-108 + **124**	2.77	5.76	7.79	0.724	1.365	0.342
PCB-**110** + 115	91.933	189.633	252.633	21.033	45.783	12.233
PCB-111	0.237	0.256	0.164	0.072	0.109	0.073
PCB-112	<0.0363	<0.0372	<0.0195	<0.0189	<0.0195	<0.0197
PCB-114	1.56	3.11	3.84	0.421	0.902	0.364
PCB-118	91.368	165.768	182.768	17.368	35.768	9.768
PCB-120	0.641	0.802	0.408	0.095	0.1855	<0.0291
PCB-121	<0.0363	<0.0374	<0.0195	<0.0189	0.04	<0.02
PCB-122	1.23	2.57	2.93	0.361	0.714	0.268
PCB-123	1.677	2.897	2.857	0.434	0.837	0.251
PCB-126	0.523	0.551	<0.0981	<0.0756	0.377	<0.0515
PCB-127	<0.182	<0.219	<0.107	<0.0822	<0.0811	<0.0533
PCB-**128** + 166	20.649	29.549	35.549	2.759	6.144	1.789
PCB-129 + **138** + 160 + 163	116.749	172.749	279.749	24.649	49.949	13.449
PCB-130	6.286	10.056	17.456	1.866	3.156	1.006
PCB-131	0.754	1.668	3.788	0.271	0.5375	0.16
PCB-132	23.907	41.407	91.107	6.397	13.557	3.397

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
PCB-133	1.745	2.445	3.655	0.721	0.94	0.384
PCB-**134** + 143	3.84	6.31	13.5	1	2.04	0.518
PCB-135 + **151** + 154	24.795	32.795	64.195	6.235	13.295	3.585
PCB-136	8.231	12.771	27.471	2.121	4.441	1.171
PCB-137	2.62	6.15	12.5	0.779	1.63	0.432
PCB-**139** + 140	1.06	2.16	3.83	0.324	0.7015	0.184
PCB-141	6.203	12.263	35.863	2.263	4.678	1.243
PCB-142	<0.0363	<0.0444	0.05	<0.0205	<0.0215	<0.0197
PCB-144	2.28	3.93	9.85	0.775	1.75	0.443
PCB-145	<0.0363	0.04	0.072	<0.0189	<0.0195	<0.0197
PCB-146	14.312	18.912	30.512	3.802	6.532	2.092
PCB-147 + **149**	57.336	82.436	157.836	13.636	29.536	7.706
PCB-148	0.219	0.283	0.312	0.061	0.1235	0.038
PCB-150	0.153	0.217	0.316	0.071	0.0945	0.022
PCB-152	0.205	0.263	0.47	0.144	0.085	0.089
PCB-**153** + 168	104.772	136.772	211.772	22.272	43.972	11.872
PCB-155	0.086	0.1	0.203	0.185	0.339	0.067
PCB-**156** + 157	8.148	15.728	32.028	2.208	4.833	1.228
PCB-158	4.557	10.267	25.467	1.577	3.337	0.882
PCB-159	<0.038	<0.0513	<0.0205	<0.0237	<0.0246	<0.0217
PCB-161	<0.0363	<0.045	<0.0195	<0.0208	<0.0217	<0.0197
PCB-162	0.466	0.648	0.936	0.25	0.2695	0.12
PCB-164	4.514	7.284	14.474	1.214	2.619	0.7
PCB-165	0.221	0.22	0.116	<0.0217	<0.0227	<0.0199
PCB-167	3.698	5.648	9.928	0.902	1.808	0.495
PCB-169	0.057	0.085	0.038	<0.0261	0.0355	<0.0242

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
PCB-170	7.24	10.54	40.94	3.74	7.805	2.08
PCB-**171** + 173	3	4.13	11.7	1.25	2.655	0.765
PCB-172	1.35	1.9	7.09	0.787	1.475	0.461
PCB-174	9.942	10.872	37.872	4.052	7.957	2.052
PCB-175	0.494	0.638	1.94	0.252	0.4735	0.133
PCB-176	1.94	2.18	5.39	0.64	1.3	0.361
PCB-177	13.2	13.8	28	3.81	6.88	1.87
PCB-178	5.871	6.071	9.461	1.671	2.791	0.86
PCB-179	7.319	7.519	16.379	2.299	4.514	1.139
PCB-**180** + 193	19.708	24.708	97.808	9.908	20.358	5.728
PCB-181	0.161	0.289	0.544	<0.0295	0.089	0.108
PCB-182	0.148	0.143	0.296	0.027	0.0955	<0.0205
PCB-**183** + 185	6	8.22	27.57	3.35	6.67	1.83
PCB-184	0.095	0.084	0.363	0.267	0.5555	0.08
PCB-186	<0.0373	<0.0447	<0.02	<0.0256	<0.0207	<0.0207
PCB-187	32.033	32.333	52.833	8.063	14.833	4.143
PCB-188	0.087	0.121	0.109	<0.0263	0.084	<0.022
PCB-189	0.409	0.636	1.93	0.211	0.4185	0.057
PCB-190	2.843	3.243	8.523	1.043	2.003	0.513
PCB-191	0.256	0.415	1.75	0.13	0.311	0.097
PCB-192	<0.0451	<0.0541	<0.0242	<0.031	<0.0314	<0.0314
PCB-194	4.005	4.375	19.325	2.345	4.36	1.165
PCB-195	2.58	1.45	6.75	1.05	1.925	0.494
PCB-196	2.16	2.49	9.44	1.28	2.4	0.64
PCB-197 + **200**	1.15	1.23	2.89	0.475	0.9305	0.288
PCB-198 + **199**	8.43	7.66	15.8	2.67	4.915	1.28
PCB-201	1.05	1.12	2.58	0.483	0.894	0.255

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
PCB-202	2.891	2.921	4.061	0.874	1.541	0.429
PCB-203	5.35	5.61	13.3	2.15	3.955	1.02
PCB-204	<0.0449	<0.0545	0	0	0	0
PCB-205	0.383	0.462	0.973	0.176	0.2675	0.089
PCB-206	5.89	5.95	11.4	1.98	3.28	1.01
PCB-207	0.755	0.686	1.38	0.258	0.4565	0.185
PCB-208	2.01	2	3.54	0.649	1.086	0.411
PCB-209	4.999	5.569	9.909	1.799	2.329	1.489

Table 8. Sediment samples from Resident Killer Whale habitat were analyzed for 40 polybrominated diphenyl ethers (PBDEs). All values are blank corrected and reported in pg/g dry weight. < = values below reporting limit (RL).

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
BDE-7	1.68	2.09	5.54	6.37	27.4	0.596
BDE-8 + 11	1.61	2.3	8.21	5.41	10.37	0.674
BDE-10	<0.182	<0.186	<0.097	<0.095	<0.098	<0.098
BDE-12 + 13	0	0.281	0	0	0.511	0.133
BDE-15	1.71	2.74	2.4	1.67	1.775	0.517
BDE-17 + 25	4.8	5.89	24.5	16.8	52.3	3.03
BDE-28 + 33	2.02	2.8	5.91	4.22	6.2	1.25
BDE-30	0.232	<0.186	<0.097	<0.095	0.6695	<0.098
BDE-32	0.266	0.203	0.198	0.113	0.222	<0.098
BDE-35	<0.182	0.321	<0.097	<0.095	<0.098	<0.098
BDE-37	0.148	0.272	0.186	0.153	0.1155	0.047
BDE-47	20.28	28.48	91.08	82.28	158.98	26.98
BDE-49	5.1	6.06	36	21.8	61.7	5.62
BDE-51	2.39	2.39	5.66	3.31	7.25	0.673
BDE-66	1.04	1.44	3.2	2.7	5.235	1.02
BDE-71	0.324	0.296	1.41	1.01	3.43	0.412
BDE-75	<0.182	<0.186	<0.097	0.103	0.245	<0.098
BDE-77	<0.182	<0.186	<0.097	<0.095	<0.098	<0.098
BDE-79	0	0	0.513	0.51	0.413	0.245
BDE-85	0.313	0.382	2.49	2.38	4.15	0.724
BDE-99	8.325	10.795	69.295	56.995	113.395	19.795
BDE-100	6.229	7.029	21.049	18.549	31.949	6.019
BDE-105	<0.182	<0.186	<0.097	<0.117	<0.098	<0.098
BDE-116	<0.182	<0.186	<0.124	<0.152	0.4405	0.136
BDE-119 + 120	0.235	0	0.339	0.22	0.3835	0.118

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
BDE-126	<0.182	<0.186	0.158	0.131	0.1995	<0.098
BDE-128	<0.326	<0.4	0.566	<0.782	0.5975	<0.114
BDE-138 + 166	0.247	0.298	2.82	1.37	1.96	0.467
BDE-140	<0.182	<0.186	1.05	0.439	1.039	0.19
BDE-153	1.39	1.6	39.28	7.55	13.48	2.55
BDE-154	3.41	3.41	14.4	9.26	13.25	3.28
BDE-155	2.35	2.16	5.27	3.52	5.945	0.745
BDE-181	<0.227	<0.22	<0.185	<0.252	<0.129	<0.098
BDE-183	1.34	1.88	233.84	22.14	11.035	1.51
BDE-190	<0.556	<0.538	<0.451	<0.616	0.2715	<0.144
BDE-203	2.003	1.593	26.073	19.973	6.903	1.153
BDE-206	25.41	28.71	69.21	38.41	80.21	8.11
BDE-207	20.58	24.28	78.98	41.68	67.68	8.58
BDE-208	12.18	11.88	36.88	20.28	35.63	4.09
BDE-209	350.9	402.9	2371.9	1881.9	3076.9	222.9

Table 9. Sediment samples from Resident Killer Whale habitat were analyzed for legacy and current-use pesticides. All values are blank corrected and reported in ng/g dry weight. < = values below reporting limit (RL). NDR = peak detected but did not meet quantification criteria, Blanks = data not quantifiable, MAX = result reported represents the estimated maximum possible concentration.

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
Tecnazene	<0.0186	<0.0243	<0.0206	<0.0188	<0.0181	<0.0202
Hexachlorobenzene	0.034	0.05	0.028	0.025	0.03	0.027
Quintozene	<0.0186	<0.0243	<0.0206	<0.0188	<0.0181	<0.0202
Heptachlor	<0.0036	<0.0034	<0.0027	<0.0048	<0.0038	<0.002
HCH, alpha	0.031	0.032	0.009	0.006	0.009	0.006
HCH, gamma	<0.0102	0.012	<0.0054	<0.0048	<0.0084	<0.006
HCH, beta	0.041	0.04	0.02	0.018	0.015	0.019
HCH, delta	<0.007	<0.0079	<0.0046	<0.0075	<0.0073	<0.0054
Chlorothalonil	<0.0186	<0.0243	<0.0206	<0.0188	<0.0181	<0.0202
Aldrin	0.005NDR	0.003NDR	<0.003	0.004NDR	<0.0035	<0.0026
Dacthal	<0.0186	<0.0243	<0.0206	<0.0188	<0.0181	<0.0202
Octachlorostyrene	<0.0075	<0.0133	<0.0056	<0.0052	<0.0044	<0.0049
Chlordane, oxy-	0.022NDR	0.013NDR	0.012NDR	0.015NDR	<0.0169	0.022NDR
Heptachlor Epoxide	0.009	<0.0108	0.024	0.014NDR	<0.0137	0.008NDR
Chlordane, gamma (trans)	<0.0082	<0.0129	0.011NDR	<0.0081	<0.0192	<0.0071
Chlordane, alpha (cis)	<0.007	<0.011	0.008NDR	<0.0069	<0.0161	<0.006
Nonachlor, trans-	<0.0078	<0.0126	<0.0066	<0.0081	<0.0165	<0.0068
Nonachlor, cis-	0.015NDR	0.013NDR	<0.0074	<0.0081	<0.0124	<0.0066
alpha-Endosulphan	<0.0135	<0.0215	<0.0107	<0.0131	<0.0272	<0.0106
beta-Endosulphan	0.228NDR	0.09NDR	<0.0639	<0.0985	0.0615	0.05
Dieldrin	0.014NDR	0.008	0.011	0.00099NDR	0.003	0NDR
2,4'-DDD	0.018MAX	0.017MAX	0.029MAX	0.015MAX	0.027MAX	0.005NDR
4,4'-DDD	0.042MAX	0.043MAX	0.065MAX	0.019MAX	0.026MAX	0.013MAX
2,4'-DDE	0.003NDR	0.004NDR	<0.0021	<0.0019	<0.0023	<0.002
4,4'-DDE	0.189MAX	0.201MAX	0.082MAX	0.074MAX	0.097MAX	0.046MAX
2,4'-DDT	<0.0083	<0.0084	0.016	<0.0041	<0.0085	<0.0055

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
4,4'-DDT	0.014NDR	0.015NDR	0.099	0.01NDR	0.017	0.008
Captan	<0.301	<0.605	<0.29	<0.248	<0.4	<0.271
Perthane	<0.0488	<0.0798	<0.137	<0.0698	<0.0914	<0.0872
Endrin	0.019NDR	<0.0099	0.033NDR	0.007NDR	<0.0102	<0.0048
Endosulphan Sulphate	<0.0697	<0.12	<0.0681	<0.105	<0.057	<0.126
Mirex	<0.0059	<0.0111	<0.0049	<0.0032	<0.0081	<0.004
Methoxychlor	<0.0472	<0.0376	<0.0546	<0.0318	<0.0553	<0.0442
Endrin Ketone	<0.0662	<0.0692	<0.0558	<0.0365	<0.059	<0.0512
Desethylatrazine	<0.0186	<0.0243	<0.0206	<0.0188	<0.0181	<0.0202
Simazine	<0.0289	<0.0378	<0.0206	<0.0222	<0.0287	<0.0202
Atrazine	<0.0698	<0.0695	<0.0767	0.098NDR	<0.0849	<0.0515
Ametryn						
Metribuzin	<0.0257	<0.0355	<0.0335	<0.0296	<0.0214	<0.0268
Cyanazine	<0.267	<0.395	0.413NDR	<0.353	<0.295	<0.339
Hexazinone	<0.0186	<0.0256	<0.0235	<0.0188	<0.0182	<0.0329
Phorate						
Terbufos	<0.0374	<0.0544	<0.0393	<0.0188	<0.0341	<0.0203
Diazinon-Oxon						
Diazinon	<0.041	<0.0587	<0.0339	<0.0334	<0.0511	<0.0498
Disulfoton	<0.0241	<0.0243	<0.0299	<0.0188	<0.022	<0.0202
Fonofos	<0.0186	<0.0243	<0.0206	<0.0188	<0.0181	<0.0202
Dimethoate	<0.0827	<0.225	<0.0989	<0.0957	<0.0988	<0.0945
Chlorpyriphos-Methyl	<0.0186	<0.0243	<0.0206	<0.0188	<0.0181	<0.0202
Parathion-Methyl	<0.17	<0.221	<0.263	<0.164	<0.136	<0.17
Pirimiphos-Methyl	<0.0186	<0.0243	<0.0206	<0.0188	<0.0181	<0.0202
Chlorpyriphos	<0.0186	<0.0243	<0.0206	<0.0188	<0.0205	<0.0202
Fenitrothion	<0.0186	<0.0243	<0.0206	<0.0188	<0.0181	<0.0202
Malathion	<0.0191	<0.0372	<0.0206	<0.0222	<0.0333	<0.0209
Parathion-Ethyl	<0.0343	<0.0243	<0.0287	<0.0344	<0.0258	<0.0286
Chlorpyriphos-Oxon	<0.0186	<0.0243	<0.0206	<0.0188	<0.0181	<0.0202
Disulfoton Sulfone	<0.0186	<0.0243	<0.0206	<0.0188	<0.0181	<0.0202

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
Ethion	<0.0418	<0.0766	<0.0543	<0.0366	<0.0526	<0.0483
Phosmet	<0.0186	<0.0243	<0.0206	<0.0188	<0.0181	<0.0202
Azinphos-Methyl	<0.141	<0.0978	<0.113	<0.0855	<0.12	<0.0907
Permethrin	<0.0262	0.032NDR	0.144	0.153	0.8695	0.058NDR
Cypermethrin	<0.122	<0.113	<0.0732	<0.0493	0.0875NDR	<0.0617
Butylate	<0.0186	<0.0243	<0.0206	<0.0188	<0.0181	<0.0202
Ethalfluralin	<0.0186	<0.0243	<0.0206	<0.0188	<0.0181	<0.0248
Trifluralin	<0.0186	<0.0243	<0.0206	<0.0188	<0.0181	<0.0202
Triallate	<0.0186	<0.0243	<0.0206	<0.0188	<0.0181	<0.0202
Dimethenamid	<0.0186	<0.0243	<0.0206	<0.0188	<0.0181	<0.0202
Alachlor	0.024NDR	0.034	0.018	0.025	0.1145NDR	<0.276
Methoprene	<2.64	<13.8	<4.4	<29.4	<1.27	<2.1
Butralin	<0.0186	<0.0619	<0.0485	<0.0518	<0.0394	<0.0602
Flufenacet	<0.0741	<0.112	<0.109	<0.0962	<0.111	<0.13
Metolachlor	<0.0579	<0.139	<0.138	<0.0763	<0.116	<0.142
Linuron	<0.129	<0.0963	<0.0787	<0.0768	<0.0855	<0.189
Pendimethalin	<0.0261	<0.122	<0.167	<0.376	<0.0669	<0.072
Flutriafol						
Tebuconazol						

Table 10. Sediment samples from Resident Killer Whale habitat were analyzed for polyaromatic hydrocarbons (PAH). All values are blank corrected and reported in ng/g dry weight. < = values below reporting limit (RL). NDR = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration. Blanks = data not quantifiable.

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
Naphthalene	13.546	21.146	27.546	9.516	12.546	6.806
Acenaphthylene	2.11	2.38	8.01	0.959	1.33	0.481
Acenaphthene	1.22	1.73	5.61	1.37	2.2	1.08
2-Methylfluorene	1.65	3.42	6.02	2.76	2.01	1.86
C2 Phenanthrenes/Anthracenes	26.059	53.759	55.159	23.959	20.159	15.259
Fluorene	2.2	4.17	8.67	3.34	3.66	2.35
Phenanthrene	20.036	32.436	56.536	19.336	20.436	12.536
Anthracene	3.07	3.14	16.9	2.13	3.18	1.07
C1 Phenanthrenes/Anthracenes	32.3	61.8	65.3	31.2	25.1	20
Fluoranthene	24.729	27.529	85.829	14.829	22.929	8.889
Pyrene	22.25	25.95	98.45	14.35	22.05	7.63
Benz[a]anthracene	9.61	12.3	46.8	5.98	8.66	2.54
Chrysene	13.046	16.146	65.746	11.246	12.346	5.076
Benzo[b]fluoranthene	11.7	14.1	46	7.4	9.38	3.36
Benzo[j,k]fluoranthenes	10.2	12.3	46.5	5.63	8.12	2.23
Benzo[e]pyrene	11.2	13.6	46	6.47	8.93	2.91
Benzo[a]pyrene	9.97	12.2	55.6	6.72	9.43	2.23
Perylene	13.9	18.4	27.3	16.2	18.2	14.9
Dibenz[a,h]anthracene	2.42	2.89	9.46	1.4	1.92	0.613
Indeno[1,2,3-cd]pyrene	9.91	12.5	37	5.09	7	1.96
Benzo[ghi]perylene	11.8	14.7	40.7	7.01	9.31	3.07
2-Methylnaphthalene	12.539	26.339	33.839	17.039	12.439	12.339
1-Methylnaphthalene	11.7	23.9	18.8	11.6	7.67	7.44
C1-Naphthalenes	24.239	50.239	52.639	28.639	20.139	19.739
Biphenyl	3.31	6.27	10.9	5.68	4.72	4.48
C1-Biphenyls	4.958	8.288	15.278	9.348	5.638	6.398
C2-Biphenyls	7.18	8.27	11.61	8.69	4.58	5.74

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
C2-Naphthalenes	55.605	111.205	88.805	56.205	37.205	36.805
1,2-Dimethylnaphthalene	4.29	7.73	3.8	2.83	1.99	1.94
2,6-Dimethylnaphthalene	10.5	20.7	23.9	14.8	10.1	9.73
C3-Naphthalenes	58.7	114	56	41.8	25	25.9
2,3,6-Trimethylnaphthalene	13.5	25.7	16.1	11.2	6.25	6.86
2,3,5-Trimethylnaphthalene	14	26.5	11.1	9.23	5.21	5.32
C4-Naphthalenes	32.9	58.7	23.7	19.1	12.2	12.2
C1-Acenaphthenes	0.143	0.295	0.229	0.112	0.088	0.062
C1-Fluorenes	4.83	9.93	12.6	7.41	5.46	4.89
1,7-Dimethylfluorene	0.753	1.53	1.91	1.01	0.691	0.836
C2-Fluorenes	6.77	14.3	16.2	9.83	7.41	6.22
C3-Fluorenes	7.535	14.175	16.375	7.955	10.275	5.325
Dibenzothiophene	1.76	3.21	4.63	1.79	2.04	1.11
C1-Dibenzothiophenes	2.69	5.38	6.08	2.56	2.41	1.64
2/3-Methyldibenzothiophenes	0.881	1.91	2.46	0.876	0.89	0.602
C2-Dibenzothiophenes	5.04	8.96	11.9	3.71	3.88	2.34
2,4-Dimethyldibenzothiophene	0.518	0.75	1.12	0.387	0.451	0.277
4,6-Dimethyldibenzothiophene	0.488	1.01	1.43	0.556	0.649	0.305
C3-Dibenzothiophenes	2.67	5.4	9.11	2.94	3.21	1.88
C4-Dibenzothiophenes	0.853	1.84	4.64	1.8	2.62	0.917
3-Methylphenanthrene	6.46	11.7	14	7.43	5.62	4.66
2-Methylphenanthrene	8.42	16.3	18.7	10.2	9.15	6.5
2-Methylanthracene	1.35	2.58	6.73	0.901	1.04	0.547
9/4-Methylphenanthrene	6.97	13.6	14.6	6.62	5.13	4.38
1-Methylphenanthrene	9.12	17.6	11.2	6.07	4.19	3.95
3,6-Dimethylphenanthrene	1.861(NDR)	3.621(NDR)	3.631(NDR)	1.891(NDR)	1.541(NDR)	1.101(NDR)
2,6-Dimethylphenanthrene	1.95	3.75	4.75	2.31	1.77	1.51
1,7-Dimethylphenanthrene	6.15	12.9	9.12	4.42	3.23	3.2
1,8-Dimethylphenanthrene	0.87	1.8	1.4	0.686	0.492	0.318
C3-Phenanthrenes/Anthracenes	15.7	31.1	30.7	14.2	12.3	8.52

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
1,2,6-Trimethylphenanthrene	1.26	2.25	2.1	0.878	0.695	0.577
Retene	14.3	29	20.9	22.3	25.8	95.1
C4-Phenanthrenes/Anthracenes	38.8	72.6	97.6	38.8	47.2	109
C1-Fluoranthenes/Pyrenes	17.9	28.1	76.5	16.2	15.3	10.2
3-Methylfluoranthene/Benzo[a]fluorene	7.74	12.7	33.7	7.29	6.63	4.98
C2-Fluoranthenes/Pyrenes	12.7	23	46.1	13	11.8	8.33
C3-Fluoranthenes/Pyrenes	6.4	11.6	20.2	8.16	5.68	5.01
C4-Fluoranthenes/Pyrenes	1.01	1.93	5.66	2.46	1.36	1.38
C1-Benzo[a]anthracenes/Chrysenes	12.258	20.258	52.158	11.558	11.658	6.668
5/6-Methylchrysene	1.03	1.71	3.94	0.881	0.919	0.484
1-Methylchrysene	1.52	2.49	5.6	1.26	1.28	0.715
C2-Benzo[a]anthracenes/Chrysenes	5.81	11	28.4	8.81	6.87	4.33
5,9-Dimethylchrysene	1.54	2.46	4.88	1.68	1.52	0.96
C3-Benzo[a]anthracenes/Chrysenes	0.952	1.75	3.79	1.05	1.08	0.907
C4-Benzo[a]anthracenes/Chrysenes	<0.185	0.717	2.33	0.904	0.999	0.243
C1-Benzofluoranthenes/Benzopyrenes	9.76	14.9	62.2	9.77	12.7	6.4
7-Methylbenzo[a]pyrene	0.407	0.575	2.31	0.446	0.622	0.332
C2-Benzofluoranthenes/Benzopyrenes	2.85	4.75	11.2	3.74	2.86	2
1,4,6,7-Tetramethylnaphthalene	3.24	5.82	2.43	1.99	1.18	1.21

Table 11. Sediment samples from Resident Killer Whale habitat were analyzed for per- and polyfluoroalkyl substances (PFAS). All values are blank corrected and reported in ng/g dry weight. < = values below reporting limit (RL).

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
PFBA	<0.289	<0.282	<0.168	<0.159	<0.153	<0.158
PFPeA	<0.144	<0.141	<0.0842	<0.0793	<0.0763	<0.079
PFHxA	<0.0722	<0.0706	<0.0421	<0.0397	<0.0382	<0.0395
PFHpA	<0.0722	<0.0706	<0.0421	<0.0397	<0.0382	<0.0395
PFOA	<0.0722	0.111	<0.0421	<0.0397	<0.0382	<0.0395
PFNA	0.152	0.183	<0.0421	<0.0397	<0.0382	<0.0395
PFDA	0.145	0.149	<0.0421	<0.0397	<0.0382	<0.0395
PFUnA	0.245	0.288	0.058	<0.0397	<0.0382	<0.0395
PFDoA	0.061	0.065	<0.0337	<0.0317	<0.0305	<0.0316
PFTrDA	0.073	0.11	<0.0421	<0.0397	<0.0382	<0.0395
PFTeDA	<0.0722	<0.0706	<0.0421	<0.0397	<0.0382	<0.0395
PFBS	<0.0722	<0.0706	<0.0421	<0.0397	<0.0382	<0.0395
PFPeS	<0.0725	<0.0709	<0.0423	<0.0399	<0.0383	<0.0397
PFHxS	<0.083	<0.0812	<0.0484	<0.0456	<0.0439	<0.0454
PFHpS	<0.0722	<0.0706	<0.0421	<0.0397	<0.0382	<0.0395
PFOS	0.315	0.306	<0.0421	<0.0397	<0.0382	<0.0395
PFNS	<0.0722	<0.0706	<0.0421	<0.0397	<0.0382	<0.0395
PFDS	0.125	0.14	<0.0421	<0.0397	<0.0382	<0.0395
PFDoS	<0.0722	<0.0706	<0.0421	<0.0397	<0.0382	<0.0395
4:2 FTS	<0.289	<0.282	<0.168	<0.159	<0.153	<0.158
6:2 FTS	<0.26	<0.254	<0.152	1.51	<0.138	<0.142
8:2 FTS	<0.245	<0.24	<0.143	<0.135	<0.13	<0.134
PFOSA	<0.0722	<0.0706	<0.0421	<0.0397	<0.0382	<0.0395
NMeFOSA	<0.0722	<0.0706	<0.0421	<0.0397	<0.0382	<0.0395
NEtFOSA	<0.202	<0.198	<0.118	<0.111	<0.107	<0.111
NMeFOSAA	<0.0722	<0.0706	<0.0421	<0.0397	<0.0382	<0.0395
NEtFOSAA	<0.0722	<0.0706	<0.0421	<0.0397	<0.0382	<0.0395
NMeFOSE	<0.722	<0.706	<0.421	<0.397	<0.382	<0.395

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
NEtFOSE	<0.722	<0.706	<0.421	<0.397	<0.382	<0.395
HFPO-DA	<0.289	<0.282	<0.168	<0.159	<0.153	<0.158
ADONA	<0.289	<0.282	<0.168	<0.159	<0.153	<0.158
9Cl-PF3ONS	<0.289	<0.283	<0.169	<0.159	<0.153	<0.158
11Cl-PF3OUdS	<0.289	<0.283	<0.169	<0.159	<0.153	<0.158
3:3 FTCA	<0.289	<0.282	<0.168	<0.159	<0.153	<0.158
5:3 FTCA	<1.8	<1.76	<1.05	<0.992	<0.954	<0.988
7:3 FTCA	<1.8	<1.76	<1.05	<0.992	<0.954	<0.988
PFEESA	<0.0722	<0.0706	<0.0421	<0.0397	<0.0382	<0.0395
PFMPA	<0.144	<0.141	<0.0842	<0.0793	<0.0763	<0.079
PFMBA	<0.0722	<0.0706	<0.0421	<0.0397	<0.0382	<0.0395
NFDHA	<0.144	<0.141	<0.0842	<0.0793	<0.0763	<0.079

Table 12. Sediment samples from Resident Killer Whale habitat were analyzed for pharmaceutical and personal care products (PPCPs). All values are blank corrected and reported in ng/g dry weight. < = values below reporting limit (RL). Blanks = data not quantifiable.

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
List 1 - Acid Extraction in Positive Ionization						
Acetaminophen	<2.96	<2.91	<2.96	<3	<3.01	<2.93
Azithromycin	<1.48	1.64	<3.95	<3.04		<1.47
Caffeine	<5.93	<5.82	<5.92	<5.99	<6.01	<5.87
Carbadox	<0.593	<0.582	<0.592	<0.599	<0.601	<0.587
Carbamazepine	<0.296	<0.291	<0.296	<0.3	<0.301	<0.293
Cefotaxime	<5.87	<5.76	<5.86	<5.93	<5.95	<5.81
Ciprofloxacin	<1.48	<15.1	<3.51			<1.47
Clarithromycin	<0.296	<0.291	<0.296	<0.3	<0.301	0.344
Clinafloxacin	<10.9	<38.8	<9.01	<25.9	<3.46	<6.33
Cloxacillin	<2.96	<2.91	<2.96	<3	<3.01	<2.93
Dehydronifedipine	<0.296	<0.291	<0.296	<0.3	<0.301	<0.293
Digoxigenin	<1.48	<1.45	<1.48	<1.5	<1.5	<1.47
Digoxin	<5.93	<5.82	<5.92	<5.99	<6.01	<5.87
Diltiazem	<0.148	<0.145	<0.148	<0.15	<0.15	<0.147
1,7-Dimethylxanthine	<5.93	<5.82	<5.92	<5.99	<6.01	<5.87
Diphenhydramine	0.715	1.58	2.55	2.83	3.665	1.93
Enrofloxacin	<0.869					
Erythromycin-H2O	<1.48	<1.45	<1.48	<1.5	<1.5	<1.47
Flumequine	<0.296	<0.291	<0.296	<0.3	<0.301	<0.293
Fluoxetine	<0.148	<0.145	0.153	0.183	0.286	<0.147
Lincomycin	<0.593	<0.582	<0.592	<0.599	<0.601	<0.587
Lomefloxacin	<0.593	<1.01	<0.592	<0.599	1.11	<0.587
Miconazole	<0.296	<0.291	0.651	0.693	1.245	<0.293
Norfloxacin	<6.41		<25.5	<44.6		<21.7
Norgestimate	<1.48	<1.45	<1.48	<1.5	<1.5	<1.47

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
Ofloxacin	<0.593	<0.582	<0.592	<0.599		<0.587
Ormetoprim	<0.148	<0.145	<0.148	<0.15	<0.15	<0.147
Oxacillin	<1.48	<1.45	<1.48	<1.5	<1.5	<1.47
Oxolinic Acid	<0.593	<0.582	<0.592	<0.599	<0.601	<0.587
Penicillin G	<2.96	<2.91	<4.09	<3	<3.01	<2.93
Penicillin V	<1.48	<1.45	<1.48	<1.5	<1.5	<1.47
Roxithromycin	<0.148	<0.145	<0.148	<0.15	<0.15	<0.147
Sarafloxacin	<2.96	<6.81	<2.96	<4.65	0	<3.56
Sulfachloropyridazine	<0.593	<0.582	<0.592	<0.599	<0.601	<0.587
Sulfadiazine	<0.593	<0.582	<0.592	<0.599	<0.601	<0.587
Sulfadimethoxine	<0.296	<0.291	<0.296	<0.3	<0.301	<0.293
Sulfamerazine	<0.593	<0.582	<0.592	<0.599	<0.601	<0.587
Sulfamethazine	<0.593	<0.582	<0.592	<0.599	<0.601	<0.587
Sulfamethizole	<0.593	<0.582	<0.592	<0.599	<0.601	<0.587
Sulfamethoxazole	<0.593	<0.582	<0.592	<0.599	<0.601	<0.587
Sulfanilamide	<5.93	<5.82	<5.92	<5.99	<6.01	<5.87
Sulfathiazole	<1.48	<1.45	<1.48	<1.5	<1.5	<1.47
Thiabendazole	<0.296	<0.291	<0.296	<0.3	<0.301	<0.293
Trimethoprim	<0.296	<0.291	<0.296	<0.3	<0.301	<0.293
Tylosin	<0.593	<0.582	<0.592	<0.599	<0.601	<0.587
Virginiamycin M1	<0.593	<0.582	<0.592	<0.656	<0.601	<0.587
List 2 - Acid Extraction in Negative Ionization						
Bisphenol A	<5.93	<5.82	<5.92	<5.99	<6.01	<5.87
Furosemide	<3.95	<3.88	<3.95	<3.99	<4.01	<3.91
Gemfibrozil	<0.79	<0.775	<0.789	<0.799	<0.802	<0.783
Glipizide	<0.79	<0.775	<0.789	<0.799	<0.802	<0.783
Glyburide	<0.79	<0.775	<0.789	<0.799	<0.802	<0.783
Hydrochlorothiazide	<3.95	<3.88	<3.95	<3.99	<4.01	<3.91
2-Hydroxy-ibuprofen	<3.95	<3.88	<3.95	<3.99	<4.01	<3.91

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
Ibuprofen	<3.95	<3.88	<3.95	<3.99	<4.01	<3.91
Naproxen	<1.98	<1.94	<1.97	<2	<2	<1.96
Triclocarban	1.2	2.22	2.77	1.54	3.745	<0.391
Triclosan	<5.93	<5.82	<5.92	<5.99	<6.01	<5.87
Warfarin	<0.395	<0.388	<0.395	<0.399	<0.401	<0.391
List 3 - Basic Extraction in Positive Ionization						
Albuterol	<0.296	<0.291	<0.294	<0.296	<0.295	<0.296
Amphetamine	<0.296	<0.291	<0.294	<0.296	<0.295	<0.296
Atenolol	<0.296	<0.291	<0.294	<0.296	<0.295	<0.296
Atorvastatin						
Cimetidine	0	0	<0.589	<0.593	<0.59	<0.592
Clonidine	<1.18	<1.17	<1.18	<1.19	<1.18	<1.18
Codeine	<1.18	<1.17	<1.18	<1.19	<1.18	<1.18
Cotinine	<0.296	<0.291	<0.294	<0.296	<0.295	<0.296
Enalapril	<0.296	<0.291	<0.294	<0.296	<0.295	<0.296
Hydrocodone	<1.18	<1.17	<1.18	<1.19	<1.18	<1.18
Metformin	0.526	0.629	0.392	<0.296	0.4615	<0.296
Oxycodone	<0.592	<0.583	<0.589	<0.593	<0.59	<0.592
Ranitidine	<0.592	<0.583	<0.589	<0.593	<0.59	<0.592
Triamterene	<0.296	<0.291	<0.294	<0.296	<0.295	<0.296
List 4 - Acid Extraction in Positive Ionization						
Alprazolam	<0.296	<0.291	<0.296	<0.3	<0.301	<0.293
Amitriptyline	<0.296	<0.291	<0.296	<0.3	<0.417	<0.293
Amlodipine	<0.994	<0.975	<0.993	<1	<1.01	<0.984
Benzoylecgonine	<0.148	<0.145	<0.148	<0.15	<0.15	<0.147
Benztropine	<0.692	<0.678	<0.691	<0.699	<0.702	<0.685
Betamethasone	<1.48	<1.45	<1.48	<1.5	<1.5	<1.47

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
Cocaine	<0.148	<0.145	<0.148	<0.15	<0.15	<0.147
DEET	0	0	0	0.04	0.045	0
Desmethyldiltiazem	<0.148	<0.145	<0.148	<0.15	<0.15	<0.147
Diazepam	<0.496	<0.487	<0.495	<0.501	<0.503	<0.491
Fluocinonide	<1.99	<1.95	<1.98	<2.01	<2.01	<1.97
Fluticasone propionate	<1.99	<1.95	<1.98	<2.01	<2.01	<1.97
Hydrocortisone	<5.93	<5.82	<5.92	<5.99	<6.01	<5.87
10-hydroxy-amitriptyline	<0.148	<0.153	<0.148	<0.15		<0.147
Meprobamate	<1.48	<1.45	<1.48	<1.5	<1.5	<1.47
Methylprednisolone	<3.95	<3.88	<3.95	<3.99	<4.01	<3.91
Metoprolol	<0.496	<0.487	<0.495	<0.501	<0.503	<0.491
Norfluoxetine	<0.496	<0.487	<0.495	<0.501	<0.503	<0.491
Norverapamil	<0.148	<0.145	<0.148	<0.15	<0.15	<0.147
Paroxetine	<0.994	<0.975	<0.993	<1	<1.01	<0.984
Prednisolone	<3.95	<3.88	<3.95	<3.99	<4.01	<3.91
Prednisone	<5.93	<5.82	<5.92	<5.99	<6.01	<5.87
Promethazine	<0.296	<0.291	<0.296	<0.3	<0.301	<0.293
Propoxyphene	<0.296	<0.291	<0.296	<0.3	<0.301	<0.293
Propranolol	<0.296	<0.291	<0.296	<0.3	<0.301	<0.293
Sertraline	<0.296	<0.291	<0.296	0.496	0.57	<0.293
Simvastatin	<1.99	<1.95	<1.98	<2.01	<2.01	<1.97
Theophylline	<5.93	<5.82	<5.92	<5.99	<6.01	<5.87
Trenbolone	<1.99	<1.95	<1.98	<2.01	<2.01	<1.97
Trenbolone acetate	<0.296	<0.291	<0.296	<0.3	<0.301	<0.293
Valsartan	<3.95	<3.88	<3.95	<3.99	<4.01	<3.91
Verapamil	<0.148	<0.145	<0.148	<0.15		<0.147

Table 13. Sediment samples from Resident Killer Whale habitat were analyzed for metals. < = values below reporting limit (RL).

	Units	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
Physical Tests							
Moisture	%	79.9	79.9	58.5	55.9	42.0	43.5
pH (1:2 soil:water)	pH units	7.63	7.60	7.76	7.74	8.07	7.91
Organic / Inorganic Carbon							
Carbon, inorganic [IC]	%	0.211	0.243	0.237	0.206	0.185	0.206
Carbon, total [TC]	%	4.15	3.63	1.80	1.49	1.22	1.19
Carbon, total organic [TOC]	%	3.94	3.39	1.56	1.28	1.04	0.984
Carbon, inorganic [IC], (as CaCO3 equivalent)	%	1.76	2.03	1.98	1.72	1.54	1.72
Organic matter	%	6.79	5.84	2.69	2.21	1.79	1.70
Inorganics							
Sulfides, acid volatile	mg/kg	56.5	9.5	172	108	206	<5.0
Sulfides, acid volatile	µmol/g	1.77	0.30	5.38	3.38	6.44	<0.20
Metals							
Aluminum	mg/kg	21000	20900	23600	23500	17900	19700
Antimony	mg/kg	0.71	1.02	0.64	0.59	0.53	0.56
Arsenic	mg/kg	8.75	8.18	8.73	8.90	8.30	7.80
Barium	mg/kg	87.7	68.3	72.7	72.0	59.3	72.8
Beryllium	mg/kg	0.41	0.48	0.49	0.50	0.37	0.43
Bismuth	mg/kg	0.20	0.29	0.32	0.29	0.35	<0.20

	Units	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
Boron	mg/kg	76.3	65.7	28.6	26.5	18.5	19.1
Cadmium	mg/kg	0.425	0.385	0.239	0.242	0.572	0.203
Calcium	mg/kg	10400	9940	13000	8610	8650	9450
Chromium	mg/kg	33.2	34.5	50.3	51.0	44.9	47.2
Cobalt	mg/kg	18.3	23.1	14.4	14.7	14.2	14.0
Copper	mg/kg	68.5	89.4	73.1	43.4	38.1	36.9
Iron	mg/kg	28200	30800	37100	37400	30200	34400
Lead	mg/kg	16.4	19.1	17.1	10.7	9.20	7.63
Lithium	mg/kg	20.8	22.9	25.4	25.0	18.8	19.8
Magnesium	mg/kg	14500	14900	14700	14600	12100	13000
Manganese	mg/kg	490	951	462	450	364	445
Mercury	mg/kg	0.128	0.135	0.113	0.0772	0.246	0.0542
Molybdenum	mg/kg	1.63	1.25	1.84	1.16	1.14	0.87
Nickel	mg/kg	33.9	38.7	51.9	54.1	48.5	51.8
Phosphorus	mg/kg	961	813	1030	1010	847	916
Potassium	mg/kg	5680	5150	3640	3370	2320	2490
Selenium	mg/kg	1.96	1.66	0.62	0.55	0.43	0.43
Silver	mg/kg	0.34	0.26	0.35	0.21	0.22	0.16
Sodium	mg/kg	42500	39900	16300	14800	8490	9950
Strontium	mg/kg	85.4	80.2	82.8	66.8	54.0	63.6
Sulfur	mg/kg	8000	5400	2800	1700	1800	<1000
Thallium	mg/kg	0.104	0.098	0.129	0.125	0.258	0.100
Tin	mg/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Titanium	mg/kg	1190	897	1180	1180	1110	1230
Tungsten	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Uranium	mg/kg	2.25	2.12	1.42	1.14	0.997	0.916
Vanadium	mg/kg	76.2	75.4	74.9	73.3	63.5	66.9
Zinc	mg/kg	110	122	115	103	98.7	87.7
Zirconium	mg/kg	6.3	5.9	8.6	8.3	7.3	8.6

	Units	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
Extractable Metals							
Mercury	mg/kg	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Mercury	µmol/g	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Zinc	mg/kg	38.5	47.4	31.5	27.3	30.7	13.3
Zinc	µmol/g	0.589	0.725	0.482	0.418	0.470	0.203
Nickel	mg/kg	8.6	10.8	8.3	9.1	7.6	6.0
Nickel	µmol/g	0.146	0.184	0.141	0.155	0.129	0.102
Lead	mg/kg	12.4	15.4	10.8	6.8	5.0	<4.0
Lead	µmol/g	0.060	0.074	0.052	0.033	0.024	<0.020
Copper	mg/kg	21.6	37.9	14.0	12.4	7.50	6.07
Copper	µmol/g	0.340	0.596	0.220	0.195	0.118	0.096
Cadmium	mg/kg	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Cadmium	µmol/g	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Speciated Metals							
Methylmercury (as MeHg)	µg/kg	1.50	0.927	0.487	0.449	0.805	0.504

Table 14. Sediment samples from Resident Killer Whale habitat were analyzed for dioxins (PCDD) and furans (PCDF). All values are blank corrected and reported in pg/g dry weight. < = values below reporting limit (RL). NDR = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration. (225) is the data that should be used for 1,2,3,7,8,9 HxCDD and 2,3,7,8 TCDF as isomers co-elute with these two targets, they are re-run on a different column when they are detected to ensure specific isolation.

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
2,3,7,8-TCDD	0.374NDR	0.405	0.094	0.085	0.083	0.0555
1,2,3,7,8-PECDD	4.01	3.88	0.434	0.281	0.328	0.167
1,2,3,4,7,8-HXCDD	1.46	1.56	0.439	0.307	0.288	0.2065
1,2,3,6,7,8-HXCDD	51.8	47.4	4.17	1.43	1.82	0.6685
1,2,3,7,8,9-HXCDD (225)	25.4	21	1.65	0.992	1.17	0.6395
1,2,3,7,8,9-HXCDD	26.8	23.7	2.16	1.39	1.65	0.885
1,2,3,4,6,7,8-HPCDD	68.539	67.139	51.739	16.139	15.532	10.089
OCDD	237.929	269.929	397.929	128.929	108.935	95.029
2,3,7,8-TCDF (225)	17.6	15.2	1.08	0.583	0.587	0.2585
2,3,7,8-TCDF	20.5	17.8	1.54	0.766	0.814	0.3365
1,2,3,7,8-PECDF	0.884	0.807	0.258	0.082	0.075	0.035
2,3,4,7,8-PECDF	1.99	1.79	0.37	0.129	0.131	0.0555
1,2,3,4,7,8-HXCDF	1.3	1.3	0.802	0.249	0.203	0.0825
1,2,3,6,7,8-HXCDF	0.588	0.589	0.608	0.153	0.16	0.0635
1,2,3,7,8,9-HXCDF	0.093NDR	0.106NDR	0.052NDR	<0.0191	0	0
2,3,4,6,7,8-HXCDF	1.23	1.17	0.613	0.139	0.157	0.0495
1,2,3,4,6,7,8-HPCDF	14.668	17.468	32.668	3.778	4.839	1.448
1,2,3,4,7,8,9-HPCDF	0.677	0.746	1.21	0.185	0.205	0.081
OCDF	13.6	17.5	56.5	5.93	6.949	3.075

Table 15. Sediment samples from Resident Killer Whale habitat were analyzed for alkylphenols. All values are blank corrected and reported in ng/g dry weight. < = values below reporting limit (RL). NDR = peak detected but did not meet quantification criteria, result reported represents the estimated maximum possible concentration.

	SRKW-24-SC	SRKW-24-TI	SRKW-24-PEI	SRKW-24-FD3	SRKW-24-FD22	SRKW-24-GVRD4
4-Nonylphenols	4.49	6.60	47.62	19.16	31.86	3.37
4-Nonylphenol monoethoxylates	6.37	5.75	20.1	6.20	18.2	0.531
4-Nonylphenol diethoxylates	< 0.488	<0.45	<0.522	<0.244	6.71	<0.517
4-n-Octylphenol	0.672NDR	0.683NDR	0.188NDR	0.087NDR	0.126NDR	0.046NDR