PORTLAND HARBOR RI

APPENDIX G
BASELINE ECOLOGICAL RISK ASSESSMENT

ATTACHMENT 4
BERA DATA

DRAFT

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Prepared for
The Lower Willamette Group

Prepared by
Windward Environmental LLC

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1.0 INTRODUCTION

Sample-by-sample and UCL concentrations were used to represent exposure concentrations for the ecological risk assessment. These data are presented in the electronic Attachment 4. The following sections provide summary tables of the exposure concentrations used in various media for ecological receptors.

2.0 SUMMARY OF SURFACE SEDIMENT CONCENTRATIONS

Table 2-1 presents a summary of the benthic invertebrate sediment COPC exposure concentrations used in the benthic invertebrate assessment.

Table 2-1. Summary of Benthic Invertebrate Sediment COPC Exposure Concentrations

COPC	Detection Frequency	Minimum Detection (dw)	Maximum Detection (dw)	Mean Detection (dw)	DL Range	Unit (dw)	Minimum Detection (OC)	Maximum Detection (OC)	Unit (OC)
Metals									
Arsenic	1246/1370	0.7	75.6	4.5	3 - 10	mg/kg	NA	NA	mg/kg OC
Cadmium	1256/1348	0.0156 J	46.2	0.39	0.00159 - 1.1	mg/kg	NA	NA	mg/kg OC
Chromium	1352/1358	4.07 J	774	32	27.5 - 44.8	mg/kg	NA	NA	mg/kg OC
Copper	1358/1358	4.37	2,830	57	NA	mg/kg	NA	NA	mg/kg OC
Lead	1355/1358	2.2	13,400 T	43	5.3 - 10	mg/kg	NA	NA	mg/kg OC
Manganese	223/223	236 T	2,130	620	NA	mg/kg	NA	NA	mg/kg OC
Mercury	1256/1345	0.006 J	65.2 T	0.15	0.007 - 0.1	mg/kg	NA	NA	mg/kg OC
Nickel	1339/1356	4.75	594	25	13.5 - 29.6	mg/kg	NA	NA	mg/kg OC
Selenium	513/1109	0.03 J	20	3.0	0.03 - 6	mg/kg	NA	NA	mg/kg OC
Silver	1287/1346	0.014 J	14.8	0.35	0.02 - 1	mg/kg	NA	NA	mg/kg OC
Zinc	1358/1358	9.7	2,850	140	NA	mg/kg	NA	NA	mg/kg OC
PAHs									
2-Methylnaphthalene	1088/1336	0.37 J	53,000	310	0.39 - 160	µg/kg	0.0074	1,900	mg/kg OC
Acenaphthene	1212/1406	0.21 J	430,000	1,600	0.18 - 215	µg/kg	0.004	15,000	mg/kg OC
Acenaphthylene	1137/1406	0.31 J	54,000	190	0.27 - 160	µg/kg	0.0089	1,600	mg/kg OC
Anthracene	1262/1406	0.35 J	390,000	1,300	0.24 - 215	µg/kg	0.019	11,000	mg/kg OC
Benzo(a)anthracene	1371/1406	0.5 J	320,000	1,600	1.2 - 215	µg/kg	0.063	10,000	mg/kg OC
Benzo(a)pyrene	1365/1406	0.86 J	340,000	1,900	0.24 - 215	µg/kg	0.085	12,000	mg/kg OC
Benzo(g,h,i)perylene	1348/1406	0.5 J	180,000	1,300	0.75 - 215	µg/kg	0.078	7,800	mg/kg OC
Benzo(k)fluoranthene	1245/1269	0.77 J	100,000	880	0.36 - 20	µg/kg	0.035	4,600	mg/kg OC
Chrysene	1383/1406	1.4 J	370,000	1,900	0.45 - 215	µg/kg	0.11	12,000	mg/kg OC

Table 2-1. Summary of Benthic Invertebrate Sediment COPC Exposure Concentrations

COPC	Detection Frequency	Minimum Detection (dw)	Maximum Detection (dw)	Mean Detection (dw)	DL Range	Unit (dw)	Minimum Detection (OC)	Maximum Detection (OC)	Unit (OC)
Dibenzo(a,h)anthracene	1199/1406	0.22 J	25,000	220	0.28 - 215	µg/kg	0.011	1,000	mg/kg OC
Fluoranthene	1392/1406	0.8 J	1,200,000	4,400	1.59 - 132	µg/kg	0.12	32,000	mg/kg OC
Fluorene	1214/1406	0.28 J	220,000	890	0.21 - 215	µg/kg	0.0055	5,400	mg/kg OC
Indeno(1,2,3-cd)pyrene	1346/1406	0.9 J	210,000	1,300	0.26 - 215	µg/kg	0.07	7,600	mg/kg OC
Naphthalene	967/1407	0.27 J	100,000 J	650	0.43 - 160	µg/kg	0.041	3,200	mg/kg OC
Phenanthrene	1366/1406	0.53 J	1,700,000	5,200	1.55 - 215	µg/kg	0.052	31,000	mg/kg OC
Pyrene	1393/1406	0.57 J	1,300,000	5,100	0.54 - 20	µg/kg	0.13	29,000	mg/kg OC
Total Benzofluoranthenes	1285/1301	1.1 JT	400,000 T	2,500	0.72 - 20	µg/kg	0.14	14,000	mg/kg OC
Total HPAHs	1404/1406	3.9 JT	4,300,000 T	20,000	10 - 10	µg/kg	0.81	120,000	mg/kg OC
Total LPAHs	1372/1406	2.3 JT	2,900,000 T	9,500	1.55 - 132	µg/kg	0.11	66,000	mg/kg OC
Total PAHs	1404/1406	6.3 JT	7,300,000 T	29,000	10 - 10	µg/kg	0.93	190,000	mg/kg OC
Phthalates									
BEHP	840/1344	7 J	440,000 J	1,200	2 - 19000	µg/kg	0.3	23,000	mg/kg OC
Butylbenzyl phthalate	429/1344	2.2 J	2,800	63	1.6 - 2150	µg/kg	0.022	130	mg/kg OC
Di-n-octyl phthalate	124/1345	3.4 J	15,400 JT	620	1.3 - 1600	µg/kg	0.12	561	mg/kg OC
SVOCs									
1,2,4-Trichlorobenzene	16/1236	3.1 J	310 J	38	0.44 - 2150	µg/kg	0.16	12	mg/kg OC
1,2-Dichlorobenzene	18/1235	0.16 J	610 J	50	0.092 - 2150	µg/kg	0.0079	24	mg/kg OC
1,4-Dichlorobenzene	30/1237	0.38 J	730 J	70	0.14 - 2150	µg/kg	0.025	83	mg/kg OC
Benzoic acid	72/1168	97 J	4,110 J	400	52 - 53000	µg/kg	4.2	574	mg/kg OC
Benzyl alcohol	165/1226	2.2 J	244 J	13	2.1 - 2150	µg/kg	0.037	15.8	mg/kg OC
Carbazole	720/1229	1.4 J	32,000 J	260	1.3 - 2150	µg/kg	0.087	340	mg/kg OC

Table 2-1. Summary of Benthic Invertebrate Sediment COPC Exposure Concentrations

COPC	Detection Frequency	Minimum Detection (dw)	Maximum Detection (dw)	Mean Detection (dw)	DL Range	Unit (dw)	Minimum Detection (OC)	Maximum Detection (OC)	Unit (OC)
Dibenzofuran	1042/1324	0.25 J	31,000	120	0.19 - 2150	µg/kg	0.0044	710	mg/kg OC
Hexachlorobenzene	416/1251	0.0122 J	338 J	3.1	0.0151 - 1200	µg/kg	0.00143	13.4	mg/kg OC
Hexachlorobutadiene	74/1259	0.065 J	230 T	6.1	0.00175 - 280	µg/kg	0.0024	12	mg/kg OC
N-Nitrosodiphenylamine	16/1229	2 J	310	34	1.6 - 2150	µg/kg	0.11	120	mg/kg OC
Phenols									
2,4-Dimethylphenol	3/1217	18.4 J	300	140	5.5 - 2800	µg/kg	1.01	21	mg/kg OC
2-Methylphenol	5/1284	2.6 J	290	110	1.5 - 2150	µg/kg	0.13	24.5	mg/kg OC
4-Methylphenol	646/1285	2 J	2,500	120	1.5 - 4310	µg/kg	0.044	100	mg/kg OC
Pentachlorophenol	248/1297	0.27 J	8,410 J	63	0.167 - 2150	µg/kg	0.035	684	mg/kg OC
Phenol	398/1284	2.2 J	680	17	2 - 2150	µg/kg	0.11	19	mg/kg OC
PCBs									
Aroclor 1248	255/1100	2.59 J	22,300 J	170	1.3 - 2000	µg/kg	0.07	360	mg/kg OC
Aroclor 1254	494/1100	0.851 J	2,100	75	0.64 - 2200	µg/kg	0.091	360	mg/kg OC
Aroclor 1260	770/1100	1.3 J	5,070 J	68	0.82 - 2000	µg/kg	0.041	1,300	mg/kg OC
Total PCBs	840/1100	5.1 JT	30,800 JT	190	1.3 - 4000	µg/kg	0.096	1,700	mg/kg OC
Dioxins/Furans									
2,3,7,8-TCDD	41/219	0.04 J	111.091	3.74	0.00405 - 1	pg/g	0.00000183	0.00579	mg/kg OC
Pesticides									
4,4'-DDD	951/1128	0.051 NJ	2,780 NJ	26	0.041 - 130	µg/kg	0.00722	163	mg/kg OC
4,4'-DDE	928/1125	0.052 J	2,240 J	13	0.027 - 200	µg/kg	0.0021	350	mg/kg OC
Aldrin	252/1034	0.00333 J	691 J	5.2	0.0156 - 99	µg/kg	0.00071	27.4	mg/kg OC
Chlordane (cis & trans)	1/188	26	26	26	1.6 - 86.9	µg/kg	0.94	0.94	mg/kg OC

Table 2-1. Summary of Benthic Invertebrate Sediment COPC Exposure Concentrations

COPC	Detection Frequency	Minimum Detection (dw)	Maximum Detection (dw)	Mean Detection (dw)	DL Range	Unit (dw)	Minimum Detection (OC)	Maximum Detection (OC)	Unit (OC)
Dieldrin	246/1078	0.00834 J	356 J	2.6	0.03 - 270	µg/kg	0.0014	4.78	mg/kg OC
Endrin	75/835	0.00198 JT	32 J	4.6	0.0125 - 200	µg/kg	0.000125	6.9	mg/kg OC
gamma-Hexachlorocyclohexane	182/1083	0.0031 J	430	4.7	0.0047 - 99	µg/kg	0.00027	27	mg/kg OC
Heptachlor epoxide	87/1082	0.00161 JT	17 J	1.4	0.00191 - 99	µg/kg	0.0001	0.9	mg/kg OC
Sum DDD	968/1128	0.067 NJT	3,040 NJT	34	0.041 - 130	µg/kg	0.00733	235	mg/kg OC
Sum DDE	933/1125	0.075 JT	2,530 NJT	15	0.0384 - 200	µg/kg	0.0045	360	mg/kg OC
Sum DDT	856/1127	0.0770 JT	13,000 NJT	100	0.0441 - 280	µg/kg	0.002	2,200	mg/kg OC
Total Chlordane	734/1083	0.063 JT	669 NJT	6.3	0.0351 - 700	µg/kg	0.0011	26.5	mg/kg OC
Total DDx	1021/1128	0.13 NJA	16,000 NJT	130	0.054 - 200	µg/kg	0.0257	2,300	mg/kg OC
Petroleum									
Diesel Range Hydrocarbons	689/710	3.07	20,000 J	290	2.7 - 23	mg/kg	340	380,000	mg/kg OC
Gasoline Range Hydrocarbons	59/428	1.2 J	260 J	21	0.75 - 14	mg/kg	20	3,800	mg/kg OC
Residual Range Hydrocarbons	586/605	7.7 J	18,000 J	700	13 - 290	mg/kg	450	670,000	mg/kg OC

BEHP – bis(2-ethylhexyl) phthalate
COPC – chemical of potential concern
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethylene
DDT – dichlorodiphenyltrichloroethane
DL – detection limit
dw – dry weight
LPAH – low-molecular-weight polycyclic aromatic hydrocarbon
HPAH – high-molecular-weight polycyclic aromatic hydrocarbon
NA – not applicable
OC – organic carbon
PAH – polycyclic aromatic hydrocarbon
SVOC – semivolatile organic compound
Total DDx – sum of all six DDT isomers (2,4′-DDD; 4,4′-DDD; 2,4′-DDE; 4,4′-DDE; 2,4′-DDT; and 4,4′-DDT)
TCDD - tetrachlorodibenzo-p-dioxin

3.0 SUMMARY OF INVERTEBRATE TISSUE EXPOSURE CONCENTRATIONS

Tables 3-1 though 3-7 present a summary of the invertebrate tissue COPC exposure concentrations used in the benthic invertebrate tissue LOE.

Table 3-1. Summary of Field Clam Tissue COPC Concentrations

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Metals						
Cadmium	mg/kg	38/38	0.04 J	0.218	0.088	NA
Copper	mg/kg	38/38	5.99	13.5	9.2	NA
Zinc	mg/kg	38/38	19.6	54	34	NA
Butyltins						
Tributyltin ion	µg/kg	22/34	2.5	530	34	1.8 – 4.2
Phthalates						
Dibutyl phthalate	µg/kg	1/38	1,300	1,300	1,300	16 – 500
PCBs						
Total PCBs	µg/kg	41/41	50.1 JT	2,660 JT	230	NA
Pesticides						
4,4'-DDD	µg/kg	41/41	1.34	160 T	18	NA
Total DDx	µg/kg	41/41	7.44 JT	460 JT	51	NA

COPC – chemical of potential concern
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethylene
DDT – dichlorodiphenyltrichloroethane
DL – detection limit
J – estimated concentration
NA – not applicable
PCB – polychlorinated biphenyl
T – value calculated or selected from multiple results
Total DDx – sum of all six DDT isomers (2,4′-DDD; 4,4′-DDD; 2,4′-DDE; 4,4′-DDE; 2,4′-DDT; and 4,4′-DDT)

Table 3-2. Summary of Field Mussel Tissue COPC Concentrations

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Metals						
Cadmium	mg/kg	7/7	0.0905	0.188	0.12	NA
Zinc	mg/kg	7/7	15.7	41.5	27.0	NA

COPC – chemical of potential concern
DL – detection limit
NA – not applicable

Table 3-3. Summary of Crayfish Tissue COPC Concentrations

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Metals						
Copper	mg/kg	32/32	10.4	20.2 T	15	NA
PCBs						
Total PCBs	µg/kg	17/32	10.1 JT	1,190 JT	130	1.4 – 8.5

COPC – chemical of potential concern
DL – detection limit
J – estimated concentration
NA – not applicable
PCB – polychlorinated biphenyl
T – value calculated or selected from multiple results

Table 3-4. Summary of Epibenthic Invertebrate Tissue COPC Concentrations

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Metals						
Copper	mg/kg	2/2	3.01 J	6 J	4.5	NA

COPC – chemical of potential concern
DL – detection limit
J – estimated concentration
NA – not applicable

Table 3-5. Summary of Lab Clam Tissue COPC Concentrations

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Metals						
Copper	mg/kg	35/35	2.64 T	5.94 J	3.8	NA
Butyltins						
Tributyltin ion	µg/kg	9/35	1.1	680	84	0.89 – 2.9
Phthalates						
BEHP	µg/kg	27/35	53 J	8,600	410	53
Pesticides						
4,4'-DDD[a]	µg/kg	35/35	0.753	1,410	48	NA
Total DDx[a]	µg/kg	35/35	2.7 JT	2,150 T	75	NA

[a] Values for neutral organic compounds are based on concentrations that have been adjusted to represent steady-state conditions (see Attachment 3). All other values are based on empirical laboratory measured concentrations.

BEHP – bis(2-ethylhexyl) phthalate
COPC – chemical of potential concern
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethylene
DDT – dichlorodiphenyltrichloroethane
DL – detection limit
J – estimated concentration
NA – not applicable
T – value calculated or selected from multiple results
Total DDx – sum of all six DDT isomers (2,4′-DDD; 4,4′-DDD; 2,4′-DDE; 4,4′-DDE; 2,4′-DDT; and 4,4′-DDT)

Table 3-6. Summary of Lab Worm Tissue COPC Concentrations

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Metals						
Arsenic	mg/kg	35/35	0.285	3.04	1.2	NA
Cadmium	mg/kg	35/35	0.0364	0.254	0.069	NA
Copper	mg/kg	35/35	1.83 T	20.2	2.9	NA
Zinc	mg/kg	35/35	18.2 T	31.5	26	NA
Butyltins						
Tributyltin ion	µg/kg	15/35	2.1	1,700	120	0.44 – 15
Phthalates						
Dibutyl phthalate	µg/kg	4/35	46	470 J	180	16 – 350
PCBs						
Total PCBs	µg/kg	35/35	111 JT	9,900 JT	1,450	NA
Pesticides						
4,4'-DDD[a]	µg/kg	35/35	8.2	2,130	140	NA
Total DDx[a]	µg/kg	35/35	36 JT	3,110 T	260	NA

[a] Values for neutral organic compounds are based on concentrations that have been adjusted to represent steady-state conditions (see Attachment 3). All other values are based on empirical laboratory measured concentrations.

COPC – chemical of potential concern
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethylene
DDT – dichlorodiphenyltrichloroethane
DL – detection limit
J – estimated concentration
NA – not applicable
PCB – polychlorinated biphenyl
T – value calculated or selected from multiple results
Total DDx – sum of all six DDT isomers (2,4′-DDD; 4,4′-DDD; 2,4′-DDE; 4,4′-DDE; 2,4′-DDT; and 4,4′-DDT)

Table 3-7. Summary of Predicted Invertebrate COPC Concentrations

COPC	Clams Average (Range)	Crayfish Average (Range)	Worms Average (Range)
Butyltins (µg/kg ww)			
Tributyltin ion	NA	NA	119 (0.117 – 22,405)
PCBs (µg/kg ww)			
Total PCBs	99.2 (9.16 – 15,249)	175 (15.6 – 26,956)	158 (9.51 – 25,086)
Pesticides (µg/kg ww)			
Total DDx	56.5 (2.61 – 6,480)	77.2 (3.72 –8,837)	83.1 (2.10 – 9,746)

COPC – chemical of potential concern
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethylene
DDT – dichlorodiphenyltrichloroethane
NA – not applicable
PCB – polychlorinated biphenyl
Total DDx – sum of all six DDT isomers (2,4′-DDD; 4,4′-DDD; 2,4′-DDE; 4,4′-DDE; 2,4′-DDT; and 4,4′-DDT)
ww – wet weight

4.0 SUMMARY OF FISH TISSUE EXPOSURE CONCENTRATIONS

Tables 4-1 though 4-9 present a summary of the empirical fish tissue COPC exposure concentrations used in the fish tissue LOE. Table 3-10 presents a summary of the predicted sculpin tissue COPC exposure concentrations also used in the fish tissue LOE.

Table 4-1. Summary of Largescale Sucker Tissue COPC Concentrations

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Aluminum	mg/kg	6/6	76.9 J	154 J	130	NA
Chromium	mg/kg	6/6	0.38	2.77 T	1.1	NA
BEHP	µg/kg	2/6	800 T	3,000 JT	1,900	78 – 99
Total PCBs	µg/kg	6/6	96 T	2,000 JT	880	NA
4,4'-DDD	µg/kg	6/6	20	150 T	54	NA
Total DDx	µg/kg	6/6	150 NJT	670 T	270	NA

BEHP – bis(2-ethylhexyl) phthalate
COPC – chemical of potential concern
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethylene
DDT – dichlorodiphenyltrichloroethane
DL – detection limit
J – estimated concentration
NA – not applicable
PCB – polychlorinated biphenyl
T – value calculated or selected from multiple results
Total DDx – sum of all six DDT isomers (2,4′-DDD; 4,4′-DDD; 2,4′-DDE; 4,4′-DDE; 2,4′-DDT; and 4,4′-DDT)

Table 4-2. Summary of Juvenile White Sturgeon Tissue COPC Concentrations

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Aluminum	mg/kg	15/15	0.76 J	51.8 J	4.8	NA
Chromium	mg/kg	2/15	0.2 J	40.2	20	0.1 – 0.2

COPC – chemical of potential concern
DL – detection limit
J – estimated concentration
NA – not applicable

Table 4-3. Summary of Juvenile Chinook Salmon Tissue COPC Concentrations

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Zinc	mg/kg	15/15	24.038	33.3	29.5	NA
4,4'-DDD	µg/kg	15/15	1 J	130	27	NA

COPC – chemical of potential concern
DL – detection limit
NA – not applicable

Table 4-4. Summary of Peamouth Tissue COPC Concentrations

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Aluminum	mg/kg	4/4	15.1 J	185	109	NA
Lead	mg/kg	4/4	0.031	10.6	2.7	NA

COPC – chemical of potential concern
DL – detection limit
J – estimated concentration
NA – not applicable

Table 4-5. Summary of Sculpin Tissue COPC Concentrations

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Aluminum	mg/kg	35/38	10.1 J	79.8 J	25	14.1 – 46.5
Copper	mg/kg	38/38	0.929	7.16	1.6	NA
BEHP	µg/kg	7/38	73 J	28,000 JT	5,400	66 – 810
Total PCBs	µg/kg	38/38	91.5 JT	8,770 JT	690	NA
4,4'-DDD	µg/kg	31/38	1.58	305 T	24	4 – 9.6
4,4'-DDT	µg/kg	33/38	2.06	1,700 T	82	6.3
beta-HCH	µg/kg	16/38	0.00782 J	6.2 NJ	2.9	0.00228 – 9.6
Total DDx	µg/kg	38/38	13 JT	3,100 T	160	NA

BEHP – bis(2-ethylhexyl) phthalate
COPC – chemical of potential concern
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethylene
DDT – dichlorodiphenyltrichloroethane
DL – detection limit
HCH – hexachlorocyclohexane
J – estimated concentration
N – presumptive evidence of a compound
NA – not applicable
T – value calculated or selected from multiple results
Total DDx – sum of all six DDT isomers (2,4′-DDD; 4,4′-DDD; 2,4′-DDE; 4,4′-DDE; 2,4′-DDT; and 4,4′-DDT)

Table 4-6. Summary of Smallmouth Bass Tissue COPC Concentrations

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Antimony	mg/kg	5/32	0.001 J	5.9 JT	1.2	0.001 – 0.014
Cadmium	mg/kg	26/32	0.002 J	0.2 T	0.014	0.002 – 0.003
Lead	mg/kg	32/32	0.0048 J	1,100 JT	35	NA
BEHP	µg/kg	6/32	44 JT	87,000 JT	21,000	66 – 1300
Total PCBs	µg/kg	32/32	110 JT	6,600 JT	1,100	NA
4,4'-DDD	µg/kg	32/32	3.64 T	385 T	42	NA
Total DDx	µg/kg	32/32	35 JT	1,460 T	210	NA

BEHP – bis(2-ethylhexyl) phthalate
COPC – chemical of potential concern
DL – detection limit
J – estimated concentration
NA – not applicable
T – value calculated or selected from multiple results
Total DDx – sum of all six DDT isomers (2,4′-DDD; 4,4′-DDD; 2,4′-DDE; 4,4′-DDE; 2,4′-DDT; and 4,4′-DDT)

Table 4-7. Summary of Northern Pikeminnow Tissue COPC Concentrations

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Mercury	mg/kg	6/6	0.146 T	0.494	0.28	NA
Total PCBs	µg/kg	6/6	370 T	1,900 T	870	NA
Total DDx	µg/kg	6/6	160 T	760 T	330	NA

COPC – chemical of potential concern
DL – detection limit
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethylene
DDT – dichlorodiphenyltrichloroethane
NA – not applicable
PCB – polychlorinated biphenyl
T– value calculated or selected from multiple results
Total DDx – sum of all six DDT isomers (2,4′-DDD; 4,4′-DDD; 2,4′-DDE; 4,4′-DDE; 2,4′-DDT; and 4,4′-DDT)

Table 4-8. Summary of Pacific Lamprey Ammocoete Tissue COPC Concentrations

COPC/Receptor	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Aluminum	mg/kg	4/4	2.3	281	120	NA
Copper	mg/kg	4/4	3.08	6.2	4.3	NA
4,4'-DDD	µg/kg	6/6	12.7	54.7	30.7	NA

COPC – chemical of potential concern
DL – detection limit
NA – not applicable

Table 4-9. Summary of Brown Bullhead and Carp COPC Concentrations

COPC/Receptor	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Black Crappie						
Aluminum	mg/kg	4/4	5.8 J	68.9	22	NA
Brown Bullhead						
BEHP	µg/kg	1/6	2,700 T	2,700 T	2,700	98 – 100
Total PCBs	µg/kg	6/6	68 T	1,700 T	420	NA
Carp						
Aluminum	mg/kg	15/15	34 T	134	77	NA
Cadmium	mg/kg	15/15	0.034 T	0.108	0.060	NA
Zinc	mg/kg	15/15	71.2 T	113 T	92	NA
Total PCBs	µg/kg	15/15	230 T	25,100 JT	2,700	NA
4,4'-DDD	µg/kg	15/15	14.5 T	206 T	55	NA
Total DDx	µg/kg	15/15	73 JT	620 JT	210	NA

COPC – chemical of potential concern
DL – detection limit
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethylene
DDT – dichlorodiphenyltrichloroethane
J – estimated concentration
NA – not applicable
PCB – polychlorinated biphenyl
T – value calculated or selected from multiple results
Total DDx – sum of all six DDT isomers (2,4′-DDD; 4,4′-DDD; 2,4′-DDE; 4,4′-DDE; 2,4′-DDT; and 4,4′-DDT)

Table 4-10. Summary of Predicted Sculpin COPC Concentrations

COPC	Sculpin Average (Range)
PCBs (µg/kg ww)	
Total PCBs	664 (51.7 – 103,605)
Pesticides (µg/kg ww)	
Total DDx	290 (11.3 – 33,477)

BEHP - bis(2-ethylhexyl) phthalate
COPC – chemical of potential concern
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethylene
DDT – dichlorodiphenyltrichloroethane
PCB – polychlorinated biphenyl
Total DDx – sum of all six DDT isomers (2,4′-DDD; 4,4′-DDD; 2,4′-DDE; 4,4′-DDE; 2,4′-DDT; and 4,4′-DDT)
ww – wet weight

5.0 FISH PREY TISSUE AND SEDIMENT EXPOSURE CONCENTRATIONS

Tables 5-1 through 5-3 present a summary of the prey tissue, stomach contents tissue, and sediment COPC exposure concentrations used in the fish dietary assessment LOE.

Table 5-1. Summary of Prey Tissue Concentrations for All Fish Diet COPCs

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Clam						
Cadmium	mg/kg	38/38	0.04 J	0.218	0.088	NA
Copper	mg/kg	38/38	5.99	13.5	9.2	NA
Mercury	mg/kg	35/35	0.005 JT	0.0263 J	0.011	NA
Tributyltin ion	µg/kg	22/34	2.5	530	34	1.8 – 4.2
Benzo(a)pyrene	µg/kg	34/39	0.78 J	490	36	0.17 – 34
Total PAHs	µg/kg	39/39	25 JT	5,000 T	530	NA
Crayfish						
Cadmium	mg/kg	32/32	0.007 J	0.036 J	0.017	NA
Copper	mg/kg	32/32	10.4	20.2 T	15	NA
Mercury	mg/kg	32/32	0.02	0.041	0.029	NA
Tributyltin ion	µg/kg	3/5	0.56 J	2.3	1.2	0.35
Acenaphthene	µg/kg	5/32	0.15 JT	4.2	1.2	33 – 83
Benzo(a)pyrene	µg/kg	5/32	0.22 JT	7.5	1.8	17 – 37
Total PAHs	µg/kg	8/32	2.6 JT	730 JT	210	33 – 100
Lab Clam (SS adjusted)[a]						
Cadmium	mg/kg	35/35	0.0383 T	0.0666	0.051	NA
Copper	mg/kg	35/35	2.64 T	5.94 J	3.8	NA
Mercury	mg/kg	35/35	0.00705 T	0.0162	0.010	NA
Tributyltin ion	µg/kg	9/35	1.1	680	84	0.89 – 2.9
Benzo(a)pyrene	µg/kg	33/35	0.92 J	66	4.7	0.12
Total PAHs	µg/kg	35/35	21 JT	1,600 T	160	NA
Lab Worm (SS adjusted)[a]						
Cadmium	mg/kg	35/35	0.0364	0.254	0.069	NA
Copper	mg/kg	35/35	1.83 T	20.2	2.9	NA
Mercury	mg/kg	34/34	0.003 J	0.0105	0.0054	NA
Tributyltin ion	µg/kg	15/35	2.1	1,700	120	0.44 – 15
Benzo(a)pyrene	µg/kg	35/35	4.4	3,000	210	NA
Total PAHs	µg/kg	35/35	120 T	48,000 T	4,100	NA

Table 5-1. Summary of Prey Tissue Concentrations for All Fish Diet COPCs

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Epibenthic Invertebrates						
Cadmium	mg/kg	2/2	0.0321	0.0366	0.0344	NA
Copper	mg/kg	2/2	3.01 J	6 J	4.5	NA
Mussel						
Cadmium	mg/kg	7/7	0.0905	0.188	0.12	NA
Copper	mg/kg	7/7	1.01	1.82	1.4	NA
Mercury	mg/kg	7/7	0.0022 J	0.0061 J	0.0042	NA
Tributyltin ion	µg/kg	7/7	2.2 J	16 J	5.8	NA
Benzo(a)pyrene	µg/kg	7/7	0.51 J	5.2 J	1.4	NA
Total PAHs	µg/kg	7/7	17 JT	150 JT	45	NA
Carp						
Cadmium	mg/kg	15/15	0.034 T	0.108	0.060	NA
Copper	mg/kg	15/15	0.897 T	1.42 T	1.12	NA
Mercury	mg/kg	15/15	0.029	0.0571 T	0.045	NA
Tributyltin ion	µg/kg	9/9	2.7 JT	8.6 T	5.6	NA
Benzo(a)pyrene	µg/kg	1/15	0.54 JT	0.54 JT	0.54	0.081 – 33
Total PAHs	µg/kg	11/15	14 JT	420 JT	130	32 – 33
Juvenile Chinook Salmon						
Cadmium	mg/kg	15/15	0.009653	0.027	0.014	NA
Copper	mg/kg	15/15	0.75548	2.15	1.1	NA
Mercury	mg/kg	15/15	0.01014 J	0.02	0.014	NA
Tributyltin ion	µg/kg	8/8	1.3 J	4.1 J	2.5	NA
Benzo(a)pyrene	µg/kg	0/15	ND	ND	ND	0.13 – 33
Total PAHs	µg/kg	10/15	12 JT	300 T	44	32 – 41
Largescale Sucker						
Cadmium	mg/kg	6/6	0.015 J	0.0325 JT	0.021	NA
Copper	mg/kg	6/6	0.735	1.1 T	0.90	NA
Mercury	mg/kg	6/6	0.045	0.085	0.068	NA
Benzo(a)pyrene	µg/kg	0/6	ND	ND	ND	26 – 33
Total PAHs	µg/kg	2/6	300 JT	350 JT	330	26 – 33
Northern Pikeminnow						
Cadmium	mg/kg	6/6	0.007 J	0.012 J	0.0098	NA
Copper	mg/kg	6/6	0.575 T	0.89	0.66	NA

Table 5-1. Summary of Prey Tissue Concentrations for All Fish Diet COPCs

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Mercury	mg/kg	6/6	0.146 T	0.494	0.28	NA
Peamouth						
Cadmium	mg/kg	4/4	0.021	0.053	0.032	NA
Copper	mg/kg	4/4	0.73	1.61	1.2	NA
Mercury	mg/kg	4/4	0.031	0.054	0.038	NA
Sculpin						
Cadmium	mg/kg	38/38	0.003 J	0.022	0.0079	NA
Copper	mg/kg	38/38	0.929	7.16	1.6	NA
Mercury	mg/kg	39/39	0.025	0.127 T	0.050	NA
Tributyltin ion	µg/kg	4/12	2.3 J	4 J	2.9	1.8
Benzo(a)pyrene	µg/kg	1/38	1.2 J	1.2 J	1.2	0.081 – 33
Total PAHs	µg/kg	22/38	8.2 JT	550 T	170	27 – 100
Juvenile White Sturgeon						
Cadmium	mg/kg	15/15	0.003 J	0.019 T	0.0076	NA
Copper	mg/kg	15/15	0.544	0.959	0.79	NA
Mercury	mg/kg	15/15	0.034	0.14 T	0.054	NA
Tributyltin ion	µg/kg	4/15	0.61 J	1.1	0.78	0.35 – 1.8
Benzo(a)pyrene	µg/kg	0/15	ND	ND	ND	0.081
Total PAHs	µg/kg	15/15	2.5 JT	61 T	10	NA

[a] Chemical concentrations of neutral, organic chemicals were adjusted for steady-state conditions (see Attachment 3).
COPC – chemical of potential concern
DL – detection limit
J – estimated concentration
NA – not available
ND – not detected
PAH – polycyclic aromatic hydrocarbon
SS – steady state
T – value calculated or selected from multiple results

Table 5-2. Summary of Stomach Content Tissue COPC Concentrations

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Juvenile Chinook Salmon						
Benzo(a)pyrene	µg/kg	2/5	2.26 J	20.7	11.5	1.63 – 5.82
Total PAHs	µg/kg	5/5	120 JT	2,500 JT	720	NA
Juvenile White Sturgeon						
Cadmium	mg/kg	3/3	0.008 T	0.054	0.033	NA
Copper	mg/kg	3/3	6.73 J	11 J	8.5	NA
Mercury	mg/kg	3/3	0.0073 J	0.0119 J	0.010	NA
Benzo(a)pyrene	µg/kg	2/3	2.2	210	110	0.081
Total PAHs	µg/kg	3/3	4.7 JT	9,000 T	3,000	NA

COPC – chemical of potential concern
DL – detection limit
J – estimated concentration
NA – not available
PAH – polycyclic aromatic hydrocarbon
T – value calculated or selected from multiple results

Table 5-3. Summary of Surface Sediment Concentrations for All Fish Diet COPCs

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Cadmium	mg/kg	1,256/1,348	0.0156 J	46.2	0.39	0.00159 – 1.1
Copper	mg/kg	1,358/1,358	4.37	2,830	57	NA
Mercury	mg/kg	1,256/1,345	0.006 J	65.2 T	0.15	0.007 – 0.1
Tributyltin ion	µg/kg	256/272	0.45 J	47,000	580	0.079 – 5.8
Benzo(a)pyrene	µg/kg	1,365/1,406	0.86 J	340,000	1,900	0.24 – 215
Total PAHs	µg/kg	1,404/1,406	6.3 JT	7,300,000 T	29,000	10

COPC – chemical of potential concern
DL – detection limit
J – estimated concentration
NA – not available
PAH – polycyclic aromatic hydrocarbon
T – value calculated or selected from multiple results

6.0 WILDLIFE PREY TISSUE AND SEDIMENT EXPOSURE CONCENTRATIONS

Tables 6-1 and 6-2 present a summary of the prey tissue and sediment COPC exposure concentrations used in the wildlife dietary assessment LOE.

Table 6-1. Summary of Prey Tissue Concentrations for All Wildlife Diet COPCs

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Clam						
Aluminum	mg/kg	38/38	20.5	202	90	NA
Antimony	mg/kg	16/38	0.001 J	0.004 J	0.0019	0.001 – 0.006
Arsenic	mg/kg	38/38	0.654	1.25	0.91	NA
Cadmium	mg/kg	38/38	0.04 J	0.218	0.088	NA
Chromium	mg/kg	38/38	0.4	1.05 T	0.62	NA
Copper	mg/kg	38/38	5.99	13.5	9.2	NA
Lead	mg/kg	38/38	0.024	0.316	0.091	NA
Mercury	mg/kg	35/35	0.005 JT	0.0263 J	0.011	NA
Selenium	mg/kg	36/38	0.069	0.22	0.13	0.1
Thallium	mg/kg	10/10	0.00035 JT	0.002 J	0.0011	NA
Zinc	mg/kg	38/38	19.6	54	34	NA
Benzo(a)pyrene	µg/kg	34/39	0.78 J	490	36	0.17 – 34
Total HPAHs	µg/kg	39/39	17 T	4,400 T	460	NA
Total LPAHs	µg/kg	36/39	7.7 JT	540 T	64	31 – 58
Total PAHs	µg/kg	39/39	25 JT	5,000 T	530	NA
BEHP	µg/kg	6/38	77 J	150 J	110	53 – 340
Dibutyl phthalate	µg/kg	1/38	1,300	1,300	1,300	16 – 500
Total PCBs	µg/kg	41/41	50.1 JT	2,660 JT	230	NA
PCB TEQ – birds	pg/g	38/38	3.04 T	71.8 T	12.3	NA
PCB TEQ – mammals	pg/g	38/38	0.534 T	8.56 T	1.75	NA
Dioxin TEQ – birds	pg/g	36/36	0.739 T	32.1 T	3.85	NA
Dioxin TEQ – mammals	pg/g	36/36	0.393 T	5.63 T	1.13	NA
Total TEQ – birds	pg/g	35/35	3.78 T	74.5 T	16.4	NA
Total TEQ – mammals	pg/g	35/35	0.941 T	9.27 T	2.93	NA
Aldrin	µg/kg	37/41	0.126 JT	5.07	0.38	0.0901 – 1.1
Sum DDE	µg/kg	41/41	4.89 JT	107 JT	18	NA
Total DDx	µg/kg	41/41	7.44 JT	460 JT	51	NA
Crayfish						
Aluminum	mg/kg	32/32	35 J	203	95	NA

Table 6-1. Summary of Prey Tissue Concentrations for All Wildlife Diet COPCs

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Antimony	mg/kg	26/32	0.004 J	0.02 J	0.0079	0.004 – 0.006
Arsenic	mg/kg	31/32	0.235 T	0.5 J	0.35	0.36
Cadmium	mg/kg	32/32	0.007 J	0.036 J	0.017	NA
Chromium	mg/kg	32/32	0.09 J	0.9	0.44	NA
Copper	mg/kg	32/32	10.4	20.2 T	15	NA
Lead	mg/kg	32/32	0.041 J	1.3 JT	0.14	NA
Mercury	mg/kg	32/32	0.02	0.041	0.029	NA
Selenium	mg/kg	2/32	0.21	0.39	0.30	0.12 – 0.31
Thallium	mg/kg	27/32	0.0015 J	0.0079 J	0.0033	0.0021 – 0.0032
Zinc	mg/kg	32/32	13.7 J	20.3 J	17	NA
Benzo(a)pyrene	µg/kg	5/32	0.22 JT	7.5	1.8	17 – 37
Total HPAHs	µg/kg	8/32	1.1 JT	520 JT	140	17 – 100
Total LPAHs	µg/kg	6/32	1.4 JT	210 T	40	33 – 93
Total PAHs	µg/kg	8/32	2.6 JT	730 JT	210	33 – 100
BEHP	µg/kg	0/32	ND	ND	ND	66 – 270
Dibutyl phthalate	µg/kg	0/32	ND	ND	ND	93 – 650
Total PCBs	µg/kg	17/32	10.1 JT	1,190 JT	130	1.4 – 8.5
PCB TEQ – birds	pg/g	15/15	1.26 T	54.6 T	9.02	NA
PCB TEQ – mammals	pg/g	15/15	0.252 T	5.09 T	1.22	NA
Dioxin TEQ – birds	pg/g	15/15	0.473 T	105 T	8.93	NA
Dioxin TEQ – mammals	pg/g	15/15	0.207 T	18.2 T	1.91	NA
Total TEQ – birds	pg/g	15/15	1.79 T	117 T	18.0	NA
Total TEQ – mammals	pg/g	15/15	0.537 T	19 T	3.14	NA
Aldrin	µg/kg	1/32	0.037 J	0.037 J	0.037	0.00171 – 2
Sum DDE	µg/kg	32/32	1.06 JT	52 T	6.2	NA
Total DDx	µg/kg	32/32	1.1 JT	85 NJT	12	NA
Lab Clam (SS adjusted)[a]						
Aluminum	mg/kg	35/35	7.6 T	76.5 T	29	NA
Antimony	mg/kg	17/35	0.0006	0.0012	0.00079	0.0005 – 0.0035
Arsenic	mg/kg	35/35	0.303 JT	0.548	0.43	NA
Cadmium	mg/kg	35/35	0.0383 T	0.0666	0.051	NA
Chromium	mg/kg	35/35	0.14	0.49	0.22	NA
Copper	mg/kg	35/35	2.64 T	5.94 J	3.8	NA
Lead	mg/kg	35/35	0.033	0.221	0.058	NA
Mercury	mg/kg	35/35	0.00705 T	0.0162	0.010	NA

Table 6-1. Summary of Prey Tissue Concentrations for All Wildlife Diet COPCs

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Selenium	mg/kg	35/35	0.072	0.247	0.14	NA
Zinc	mg/kg	35/35	10.8 T	16.8	14	NA
Benzo(a)pyrene	µg/kg	33/35	0.92 J	66	4.7	0.12
Total HPAHs	µg/kg	35/35	15 JT	1,400 T	140	NA
Total LPAHs	µg/kg	35/35	5.7 JT	160 T	22	NA
Total PAHs	µg/kg	35/35	21 JT	1,600 T	160	NA
BEHP	µg/kg	27/35	53 J	8,600	410	53
Dibutyl phthalate	µg/kg	0/35	ND	ND	ND	16 – 210
Total PCBs	µg/kg	35/35	43.9 JT	364 T	96.4	NA
PCB TEQ – birds	pg/g	35/35	3.46 T	71.8 T	10.6	NA
PCB TEQ – mammals	pg/g	35/35	0.335 T	4.68 T	1.42	NA
Dioxin TEQ – birds	pg/g	35/35	0.23 T	234 T	8.65	NA
Dioxin TEQ – mammals	pg/g	35/35	0.15 T	115 T	4.03	NA
Total TEQ – birds	pg/g	35/35	3.69 T	304 T	19.2	NA
Total TEQ – mammals	pg/g	35/35	0.511 T	120 T	5.47	NA
Aldrin	µg/kg	28/35	0.0351 J	6.36	0.30	0.0125 – 0.0243
Sum DDE	µg/kg	35/35	1.41 JT	28.1 T	4.6	NA
Total DDx	µg/kg	35/35	2.7 JT	2,150 T	75	NA
Lab Worm (SS adjusted)[a]						
Aluminum	mg/kg	35/35	106	539	290	NA
Antimony	mg/kg	13/35	0.002 J	0.014 J	0.0045	0.001 – 0.009
Arsenic	mg/kg	35/35	0.285	3.04	1.2	NA
Cadmium	mg/kg	35/35	0.0364	0.254	0.069	NA
Chromium	mg/kg	35/35	0.14	0.89	0.51	NA
Copper	mg/kg	35/35	1.83 T	20.2	2.9	NA
Lead	mg/kg	35/35	0.167	0.847 T	0.35	NA
Mercury	mg/kg	34/34	0.003 J	0.0105	0.0054	NA
Selenium	mg/kg	35/35	0.08	0.37	0.21	NA
Zinc	mg/kg	35/35	18.2 T	31.5	26	NA
Benzo(a)pyrene	µg/kg	35/35	4.4	3,000	210	NA
Total HPAHs	µg/kg	35/35	110 T	45,000 T	3,700	NA
Total LPAHs	µg/kg	35/35	13 T	3,800 T	410	NA
Total PAHs	µg/kg	35/35	120 T	48,000 T	4,100	NA
BEHP	µg/kg	20/35	69 J	220 J	140	53 – 110
Dibutyl phthalate	µg/kg	4/35	46	470 J	180	16 – 350

Table 6-1. Summary of Prey Tissue Concentrations for All Wildlife Diet COPCs

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Total PCBs	µg/kg	35/35	111 JT	9,900 JT	1,450	NA
PCB TEQ – birds	pg/g	35/35	9.88 T	1,890 T	155	NA
PCB TEQ – mammals	pg/g	35/35	1.03 T	95.3 T	12.7	NA
Dioxin TEQ – birds	pg/g	35/35	4.22 T	2,500 T	99.5	NA
Dioxin TEQ – mammals	pg/g	35/35	2.21 T	1,280 T	46.8	NA
Total TEQ – birds	pg/g	35/35	14.7 T	3,370 T	254	NA
Total TEQ – mammals	pg/g	35/35	4.29 T	1,320 T	59.4	NA
Aldrin	µg/kg	34/35	0.13 J	110	4.5	0.175
Sum DDE	µg/kg	35/35	25.9 JT	495 T	83	NA
Total DDx	µg/kg	35/35	36 JT	3,110 T	260	NA
Mussel						
Aluminum	mg/kg	7/7	5.9	211	130	NA
Antimony	mg/kg	7/7	0.0008 J	0.0035 J	0.0022	NA
Arsenic	mg/kg	7/7	0.224	0.616	0.38	NA
Cadmium	mg/kg	7/7	0.0905	0.188	0.12	NA
Chromium	mg/kg	3/7	0.21	0.28	0.25	0.13 – 0.34
Copper	mg/kg	7/7	1.01	1.82	1.4	NA
Lead	mg/kg	7/7	0.0386	0.22	0.14	NA
Mercury	mg/kg	7/7	0.0022 J	0.0061 J	0.0042	NA
Selenium	mg/kg	7/7	0.056	0.128	0.088	NA
Zinc	mg/kg	7/7	15.7	41.5	27.0	NA
Benzo(a)pyrene	µg/kg	7/7	0.51 J	5.2 J	1.4	NA
Total HPAHs	µg/kg	7/7	13 JT	130 JT	36	NA
Total LPAHs	µg/kg	7/7	3.6 JT	15 JT	8.8	NA
Total PAHs	µg/kg	7/7	17 JT	150 JT	45	NA
BEHP	µg/kg	4/7	54 J	120 J	91	49 – 98
Dibutyl phthalate	µg/kg	5/7	12 J	32 J	23	8.9
Total PCBs	µg/kg	7/7	5.77 JT	108 JT	25.7	NA
PCB TEQ – birds	pg/g	7/7	0.32 T	8.95 T	2.14	NA
PCB TEQ – mammals	pg/g	7/7	0.0489 T	1.15 T	0.284	NA
Dioxin TEQ – birds	pg/g	7/7	0.244 T	0.837 T	0.512	NA
Dioxin TEQ – mammals	pg/g	7/7	0.14 T	0.529 T	0.318	NA
Total TEQ – birds	pg/g	7/7	0.715 T	9.79 T	2.65	NA
Total TEQ – mammals	pg/g	7/7	0.239 T	1.67 T	0.601	NA
Aldrin	µg/kg	4/7	0.007 J	0.067 J	0.023	0.005 – 0.006

Table 6-1. Summary of Prey Tissue Concentrations for All Wildlife Diet COPCs

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Sum DDE	µg/kg	7/7	0.555 JT	3.25 JT	1.5	NA
Total DDx	µg/kg	7/7	0.99 JT	4.4 JT	2.5	NA
Black Crappie						
Aluminum	mg/kg	4/4	5.8 J	68.9	22	NA
Antimony	mg/kg	0/4	ND	ND	ND	0.001
Arsenic	mg/kg	4/4	0.185 T	0.42	0.28	NA
Cadmium	mg/kg	4/4	0.003 J	0.006 J	0.0039	NA
Chromium	mg/kg	0/4	ND	ND	ND	0.08 – 0.09
Copper	mg/kg	4/4	0.688	0.946	0.820	NA
Lead	mg/kg	1/4	0.0185 JT	0.0185 JT	0.019	0.004 – 0.007
Mercury	mg/kg	4/4	0.033	0.044	0.039	NA
Selenium	mg/kg	0/4	ND	ND	ND	0.3
Thallium	mg/kg	4/4	0.006 T	0.0167	0.011	NA
Zinc	mg/kg	4/4	14.2 T	16.8	15.4	NA
Total PCBs	µg/kg	4/4	86 T	250 T	130	NA
PCB TEQ – birds	pg/g	4/4	10.6 T	41.2 T	18.8	NA
PCB TEQ – mammals	pg/g	4/4	1.67 T	3.23 T	2.17	NA
Dioxin TEQ – birds	pg/g	4/4	2.39 T	2.7 T	2.54	NA
Dioxin TEQ – mammals	pg/g	4/4	1.1 T	1.26 T	1.18	NA
Total TEQ – birds	pg/g	4/4	13.3 T	43.8 T	21.3	NA
Total TEQ – mammals	pg/g	4/4	2.81 T	4.44 T	3.35	NA
Aldrin	µg/kg	0/4	ND	ND	ND	1 – 1.3
Sum DDE	µg/kg	4/4	38 JT	81 T	57	NA
Total DDx	µg/kg	4/4	61 NJT	110 JT	84	NA
Brown Bullhead						
Aluminum	mg/kg	6/6	4.2 J	31.7 J	9.8	NA
Antimony	mg/kg	0/6	ND	ND	ND	0.001
Arsenic	mg/kg	6/6	0.04 J	0.08 J	0.056	NA
Cadmium	mg/kg	6/6	0.008 J	0.014	0.012	NA
Chromium	mg/kg	6/6	0.39	1.32	0.73	NA
Copper	mg/kg	6/6	0.586	0.798	0.69	NA
Lead	mg/kg	5/6	0.023	0.0435 T	0.029	0.014
Mercury	mg/kg	6/6	0.025 T	0.054	0.037	NA
Selenium	mg/kg	2/6	0.3 T	0.3 T	0.30	0.2 – 0.3

Table 6-1. Summary of Prey Tissue Concentrations for All Wildlife Diet COPCs

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Thallium	mg/kg	4/6	0.002 J	0.0039 J	0.0030	0.0018
Zinc	mg/kg	6/6	12.7	15.6	14.1	NA
Benzo(a)pyrene	µg/kg	0/6	ND	ND	ND	33
Total HPAHs	µg/kg	1/6	190 T	190 T	190	33 – 49
Total LPAHs	µg/kg	1/6	160 T	160 T	160	33
Total PAHs	µg/kg	1/6	350 T	350 T	350	33 – 49
BEHP	µg/kg	1/6	2,700 T	2,700 T	2,700	98 – 100
Dibutyl phthalate	µg/kg	0/6	ND	ND	ND	330
Total PCBs	µg/kg	6/6	68 T	1,700 T	420	NA
PCB TEQ – birds	pg/g	6/6	3.69 T	9.73 T	7.25	NA
PCB TEQ – mammals	pg/g	6/6	1.6 T	6.04 T	3.47	NA
Dioxin TEQ – birds	pg/g	6/6	2.14 T	3.35 T	2.53	NA
Dioxin TEQ – mammals	pg/g	6/6	1.29 T	2.12 T	1.58	NA
Total TEQ – birds	pg/g	6/6	5.9 T	13.1 T	9.78	NA
Total TEQ – mammals	pg/g	6/6	2.92 T	8.16 T	5.05	NA
Aldrin	µg/kg	0/6	ND	ND	ND	1 – 13
Sum DDE	µg/kg	6/6	33 T	71 T	49	NA
Total DDx	µg/kg	6/6	49 NT	140 NJT	88	NA
Carp						
Aluminum	mg/kg	15/15	34 T	134	77	NA
Antimony	mg/kg	3/15	0.0038 JT	0.0064 JT	0.0051	0.001 – 0.004
Arsenic	mg/kg	15/15	0.034 JT	0.23 T	0.13	NA
Cadmium	mg/kg	15/15	0.034 T	0.108	0.060	NA
Chromium	mg/kg	15/15	0.23 T	2.02	0.84	NA
Copper	mg/kg	15/15	0.897 T	1.42 T	1.12	NA
Lead	mg/kg	15/15	0.0823 T	1.09 T	0.20	NA
Mercury	mg/kg	15/15	0.029	0.0571 T	0.045	NA
Selenium	mg/kg	15/15	0.27 JT	0.4	0.32	NA
Thallium	mg/kg	15/15	0.00062 JT	0.0054 JT	0.0025	NA
Zinc	mg/kg	15/15	71.2 T	113 T	92	NA
Benzo(a)pyrene	µg/kg	1/15	0.54 JT	0.54 JT	0.54	0.081 – 33
Total HPAHs	µg/kg	9/15	0.87 T	33 JT	10	31 – 33
Total LPAHs	µg/kg	11/15	13 JT	270 JT	92	32 – 33
Total PAHs	µg/kg	11/15	14 JT	420 JT	130	32 – 33
BEHP	µg/kg	0/15	ND	ND	ND	66 – 99

Table 6-1. Summary of Prey Tissue Concentrations for All Wildlife Diet COPCs

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Dibutyl phthalate	µg/kg	0/15	ND	ND	ND	22 – 660
Total PCBs	µg/kg	15/15	230 T	25,100 JT	2,700	NA
PCB TEQ – birds	pg/g	15/15	9.23 T	120 T	24.7	NA
PCB TEQ – mammals	pg/g	15/15	2.23 T	111 T	12.0	NA
Dioxin TEQ – birds	pg/g	15/15	3.86 T	18.9 T	7.99	NA
Dioxin TEQ – mammals	pg/g	15/15	1.98 T	8.53 T	4.11	NA
Total TEQ – birds	pg/g	15/15	14.1 T	131 T	32.6	NA
Total TEQ – mammals	pg/g	15/15	4.77 T	117 T	16.1	NA
Aldrin	µg/kg	9/15	0.059 JT	0.163 JT	0.12	1 – 13
Sum DDE	µg/kg	15/15	56 JT	320 T	130	NA
Total DDx	µg/kg	15/15	73 JT	620 JT	210	NA
Juvenile Chinook Salmon						
Aluminum	mg/kg	15/15	3.1752	19.6	8.44	NA
Antimony	mg/kg	0/15	ND	ND	ND	0.001 – 0.00429
Arsenic	mg/kg	15/15	0.04646	0.25	0.11	NA
Cadmium	mg/kg	15/15	0.009653	0.027	0.014	NA
Chromium	mg/kg	3/15	0.09 J	0.19	0.13	0.054 – 0.07
Copper	mg/kg	15/15	0.75548	2.15	1.1	NA
Lead	mg/kg	3/15	0.01 J	0.015 J	0.013	0.006 – 0.0741
Mercury	mg/kg	15/15	0.01014 J	0.02	0.014	NA
Selenium	mg/kg	9/15	0.072 JT	0.273	0.16	0.2 – 0.4
Thallium	mg/kg	6/6	0.005	0.0105	0.0068	NA
Zinc	mg/kg	15/15	24.038	33.3	29.5	NA
Benzo(a)pyrene	µg/kg	0/15	ND	ND	ND	0.13 – 33
Total HPAHs	µg/kg	8/15	1.5 JT	4.1 JT	2.5	0.37 – 33
Total LPAHs	µg/kg	10/15	9.8 JT	130 T	25	32 – 41
Total PAHs	µg/kg	10/15	12 JT	300 T	44	32 – 41
BEHP	µg/kg	0/11	ND	ND	ND	95 – 860
Dibutyl phthalate	µg/kg	2/11	33 J	48 J	41	31 – 520
Total PCBs	µg/kg	9/9	72.3 JT	277 JT	147	NA
PCB TEQ – birds	pg/g	9/9	4.31 T	10.1 T	7.08	NA
PCB TEQ – mammals	pg/g	9/9	1.4 T	3.9 T	2.24	NA
Dioxin TEQ – birds	pg/g	9/9	1.64 T	8.77 T	4.05	NA
Dioxin TEQ – mammals	pg/g	9/9	1.37 T	4.38 T	2.14	NA

Table 6-1. Summary of Prey Tissue Concentrations for All Wildlife Diet COPCs

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Total TEQ – birds	pg/g	9/9	5.96 T	17.6 T	11.1	NA
Total TEQ – mammals	pg/g	9/9	2.85 T	6.24 T	4.38	NA
Aldrin	µg/kg	0/15	ND	ND	ND	0.16 – 1.2
Sum DDE	µg/kg	15/15	7.8 T	94 T	31	NA
Total DDx	µg/kg	15/15	18 NJT	290 T	81	NA
Largescale Sucker						
Aluminum	mg/kg	6/6	76.9 J	154 J	130	NA
Antimony	mg/kg	6/6	0.001 J	0.003 J	0.0023	NA
Arsenic	mg/kg	6/6	0.18	0.27	0.23	NA
Cadmium	mg/kg	6/6	0.015 J	0.0325 JT	0.021	NA
Chromium	mg/kg	6/6	0.38	2.77 T	1.1	NA
Copper	mg/kg	6/6	0.735	1.1 T	0.90	NA
Lead	mg/kg	6/6	0.064	0.191 T	0.12	NA
Mercury	mg/kg	6/6	0.045	0.085	0.068	NA
Selenium	mg/kg	0/6	ND	ND	ND	0.3
Thallium	mg/kg	6/6	0.0015 J	0.0038 J	0.0025	NA
Zinc	mg/kg	6/6	17.1	19.7 T	17.9	NA
Benzo(a)pyrene	µg/kg	0/6	ND	ND	ND	26 – 33
Total HPAHs	µg/kg	0/6	ND	ND	ND	26 – 33
Total LPAHs	µg/kg	2/6	140 JT	220 JT	180	26 – 33
Total PAHs	µg/kg	2/6	300 JT	350 JT	330	26 – 33
BEHP	µg/kg	2/6	800 T	3,000 JT	1,900	78 – 99
Dibutyl phthalate	µg/kg	0/6	ND	ND	ND	260 – 520
Total PCBs	µg/kg	6/6	96 T	2,000 JT	880	NA
Aldrin	µg/kg	0/6	ND	ND	ND	1 – 13
Sum DDE	µg/kg	6/6	80 T	190 T	120	NA
Total DDx	µg/kg	6/6	150 NJT	670 T	270	NA
Northern Pikeminnow						
Aluminum	mg/kg	3/6	1.4 J	2.8 J	1.9	0.7 – 1
Antimony	mg/kg	0/6	ND	ND	ND	0.001 – 0.002
Arsenic	mg/kg	6/6	0.19	0.36	0.26	NA
Cadmium	mg/kg	6/6	0.007 J	0.012 J	0.0098	NA
Chromium	mg/kg	5/6	0.09 J	0.67	0.40	0.08
Copper	mg/kg	6/6	0.575 T	0.89	0.66	NA

Table 6-1. Summary of Prey Tissue Concentrations for All Wildlife Diet COPCs

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Lead	mg/kg	4/6	0.008	0.016	0.012	0.005 – 0.007
Mercury	mg/kg	6/6	0.146 T	0.494	0.28	NA
Selenium	mg/kg	2/6	0.3	0.4	0.35	0.3
Thallium	mg/kg	5/6	0.0018 J	0.004 J	0.0027	0.0012
Zinc	mg/kg	6/6	16.4	20	18	NA
Total PCBs	µg/kg	6/6	370 T	1,900 T	870	NA
Aldrin	µg/kg	0/6	ND	ND	ND	4 – 13
Sum DDE	µg/kg	6/6	87 T	600 T	260	NA
Total DDx	µg/kg	6/6	160 T	760 T	330	NA
Peamouth						
Aluminum	mg/kg	4/4	15.1 J	185	109	NA
Antimony	mg/kg	0/4	ND	ND	ND	0.003 – 0.005
Arsenic	mg/kg	4/4	0.35	0.48	0.43	NA
Cadmium	mg/kg	4/4	0.021	0.053	0.032	NA
Chromium	mg/kg	3/4	0.2	0.49	0.30	0.09
Copper	mg/kg	4/4	0.73	1.61	1.2	NA
Lead	mg/kg	4/4	0.031	10.6	2.7	NA
Mercury	mg/kg	4/4	0.031	0.054	0.038	NA
Selenium	mg/kg	4/4	0.3	0.4	0.35	NA
Thallium	mg/kg	4/4	0.0073	0.0093	0.0083	NA
Zinc	mg/kg	4/4	23.1	25.2	24.1	NA
Total PCBs	µg/kg	4/4	140 T	290 T	190	NA
Aldrin	µg/kg	0/4	ND	ND	ND	1 – 1.7
Sum DDE	µg/kg	4/4	110 T	190 T	140	NA
Total DDx	µg/kg	4/4	130 JT	230 T	170	NA
Sculpin						
Aluminum	mg/kg	35/38	10.1 J	79.8 J	25	14.1 – 46.5
Antimony	mg/kg	2/38	0.005 JT	0.025 J	0.015	0.001 – 0.009
Arsenic	mg/kg	38/38	0.13	0.35	0.22	NA
Cadmium	mg/kg	38/38	0.003 J	0.022	0.0079	NA
Chromium	mg/kg	22/38	0.1 J	0.6	0.24	0.07 – 0.08
Copper	mg/kg	38/38	0.929	7.16	1.6	NA
Lead	mg/kg	37/38	0.0149 J	0.96 J	0.11	0.365
Mercury	mg/kg	39/39	0.025	0.127 T	0.050	NA
Selenium	mg/kg	4/38	0.2	0.3	0.28	0.1 – 0.3

Table 6-1. Summary of Prey Tissue Concentrations for All Wildlife Diet COPCs

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Thallium	mg/kg	37/38	0.002 J	0.0136	0.0047	0.0018
Zinc	mg/kg	38/38	11.7	18	15	NA
Benzo(a)pyrene	µg/kg	1/38	1.2 J	1.2 J	1.2	0.081 – 33
Total HPAHs	µg/kg	12/38	0.95 T	38 T	7.4	27 – 33
Total LPAHs	µg/kg	22/38	7.2 JT	510 T	95	27 – 100
Total PAHs	µg/kg	22/38	8.2 JT	550 T	170	27 – 100
BEHP	µg/kg	7/38	73 J	28,000 JT	5,400	66 – 810
Dibutyl phthalate	µg/kg	0/38	ND	ND	ND	16 – 330
Total PCBs	µg/kg	38/38	91.5 JT	8,770 JT	690	NA
PCB TEQ – birds	pg/g	21/21	3.61 T	117 T	20.7	NA
PCB TEQ – mammals	pg/g	21/21	1.12 T	31.2 T	5.86	NA
Dioxin TEQ – birds	pg/g	21/21	1.36 T	166 T	12.6	NA
Dioxin TEQ – mammals	pg/g	21/21	0.619 T	31.8 T	3.13	NA
Total TEQ – birds	pg/g	21/21	6.81 T	183 T	33.3	NA
Total TEQ – mammals	pg/g	21/21	2.1 T	40.4 T	8.99	NA
Aldrin	µg/kg	10/38	0.00532 J	0.0348 J	0.016	0.00826 – 13
Sum DDE	µg/kg	31/38	8.25 JT	660 T	56	11 – 34
Total DDx	µg/kg	38/38	13 JT	3,100 T	160	NA
Smallmouth Bass						
Aluminum	mg/kg	32/32	2.12 J	11 JT	5.3	NA
Antimony	mg/kg	5/32	0.001 J	5.9 JT	1.2	0.001 – 0.014
Arsenic	mg/kg	32/32	0.16 T	0.39	0.25	NA
Cadmium	mg/kg	26/32	0.002 J	0.2 T	0.014	0.002 – 0.003
Chromium	mg/kg	21/32	0.13 JT	1.14	0.41	0.06 – 0.1
Copper	mg/kg	32/32	0.365	1.92 T	0.81	NA
Lead	mg/kg	32/32	0.0048 J	1,100 JT	35	NA
Mercury	mg/kg	32/32	0.0509 JT	0.166 JT	0.093	NA
Selenium	mg/kg	4/32	0.3 T	1.2 T	0.55	0.17 – 0.3
Thallium	mg/kg	32/32	0.002 J	0.0085	0.0041	NA
Zinc	mg/kg	32/32	10.8 T	16.3	13	NA
Benzo(a)pyrene	µg/kg	5/32	0.15 JT	1.3 T	0.64	0.25 – 33
Total HPAHs	µg/kg	12/32	1.6 JT	200 T	32	0.4 – 33
Total LPAHs	µg/kg	25/32	11 JT	360 T	84	30 – 32
Total PAHs	µg/kg	25/32	12 JT	520 T	140	30 – 32
BEHP	µg/kg	6/32	44 JT	87,000 JT	21,000	66 – 1300

Table 6-1. Summary of Prey Tissue Concentrations for All Wildlife Diet COPCs

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Dibutyl phthalate	µg/kg	3/32	27 T	37 T	34	22 – 330
Total PCBs	µg/kg	32/32	110 JT	6,600 JT	1,100	NA
PCB TEQ – birds	pg/g	32/32	10.3 T	196 T	33.4	NA
PCB TEQ – mammals	pg/g	32/32	1.5 T	35.6 T	7.84	NA
Dioxin TEQ – birds	pg/g	32/32	2.26 T	232 T	14.4	NA
Dioxin TEQ – mammals	pg/g	32/32	1.26 T	51.9 T	4.77	NA
Total TEQ – birds	pg/g	32/32	14.4 T	262 T	47.8	NA
Total TEQ – mammals	pg/g	32/32	3.07 T	57.1 T	12.6	NA
Aldrin	µg/kg	15/32	0.0104 JT	0.04 JT	0.022	0.021 – 13
Sum DDE	µg/kg	32/32	27 JT	474 T	120	NA
Total DDxs	µg/kg	32/32	35 JT	1,460 T	210	NA

[a] Chemical concentrations of neutral, organic chemicals were adjusted for steady-state conditions (see Attachment 3).

BEHP – bis(2-ethylhexyl) phthalate
COPC – chemical of potential concern
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethylene
DDT – dichlorodiphenyltrichloroethane
HPAH – high-molecular-weight polycyclic aromatic hydrocarbon
J – estimated concentration
LPAH – low-molecular-weight polycyclic aromatic hydrocarbon
N – presumptive evidence of a compound
NA – not available
ND – not detected
PAH – polycyclic aromatic hydrocarbon
PCB – polychlorinated biphenyl
T – value calculated or selected from multiple results
TEQ – toxic equivalent
Total DDx – sum of all six DDT isomers (2,4′-DDD; 4,4′-DDD; 2,4′-DDE; 4,4′-DDE; 2,4′-DDT; and 4,4′-DDT)

Table 6-2. Summary of Surface Sediment Concentrations for All Wildlife Diet COPCs

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Aluminum	mg/kg	1,229/1,229	1,630	47,400	23,000	NA
Antimony	mg/kg	934/1,228	0.04 J	32.1	0.93	0.03 – 8
Arsenic	mg/kg	1,246/1,370	0.7	75.6	4.5	3 – 10
Cadmium	mg/kg	1,256/1,348	0.0156 J	46.2	0.39	0.00159 – 1.1
Chromium	mg/kg	1,352/1,358	4.07 J	774	32	27.5 – 44.8
Copper	mg/kg	1,358/1,358	4.37	2,830	57	NA
Lead	mg/kg	1,355/1,358	2.2	13,400 T	43	5.3 – 10
Mercury	mg/kg	1,256/1,345	0.006 J	65.2 T	0.15	0.007 – 0.1
Selenium	mg/kg	513/1,109	0.03 J	20	3.0	0.03 – 6
Thallium	mg/kg	177/207	0.026 J	27	7.9	0.051 – 10
Zinc	mg/kg	1,358/1,358	9.7	2,850	140	NA
Benzo(a)pyrene	µg/kg	1,365/1,406	0.86 J	340,000	1,900	0.24 – 215
Total HPAHs	µg/kg	1,404/1,406	3.9 JT	4,300,000 T	20,000	10
Total LPAHs	µg/kg	1,372/1,406	2.3 JT	2,900,000 T	9,500	1.55 – 132
Total PAHs	µg/kg	1,404/1,406	6.3 JT	7,300,000 T	29,000	10
BEHP	µg/kg	840/1,344	7 J	440,000 J	1,200	2 – 19,000
Dibutyl phthalate	µg/kg	477/1,343	3.5 J	3,790 J	47	2.9 – 1,800
Total PCBs	µg/kg	840/1,100	5.1 JT	30,800 JT	190	1.3 – 4,000
PCB TEQ – birds	pg/g	266/266	0.153 T	5,610 T	49.3	NA
PCB TEQ – mammals	pg/g	266/266	0.0272 T	239 T	5.26	NA
Dioxin TEQ – birds	pg/g	219/219	0.0471 T	35,300 T	182	NA
Dioxin TEQ – mammals	pg/g	219/219	0.0285 T	14,100 T	73.8	NA
Total TEQ – birds	pg/g	121/121	0.414 T	35,400 T	332	NA
Total TEQ – mammals	pg/g	121/121	0.241 T	14,100 T	129	NA
Aldrin	µg/kg	252/1,034	0.00333 J	691 J	5.2	0.0156 – 99
Sum DDE	µg/kg	933/1,125	0.075 JT	2,530 NJT	15	0.0384 – 200
Total DDx	µg/kg	1,021/1,128	0.13 NJA	16,000 NJT	130	0.054 – 200

BEHP – bis(2-ethylhexyl) phthalate
COPC – chemical of potential concern
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethylene
DDT – dichlorodiphenyltrichloroethane
HPAH – high-molecular-weight polycyclic aromatic hydrocarbon
J – estimated concentration
LPAH – low-molecular-weight polycyclic aromatic hydrocarbon
N – presumptive evidence of a compound
NA – not applicable
PAH – polycyclic aromatic hydrocarbon
PCB – polychlorinated biphenyl
T – value calculated or selected from multiple results
TEQ – toxic equivalent
Total DDx – sum of all six DDT isomers (2,4′-DDD; 4,4′-DDD; 2,4′-DDE; 4,4′-DDE; 2,4′-DDT; and 4,4′-DDT)

7.0 SURFACE WATER EXPOSURE CONCENTRATIONS

Table 7-1 presents a summary of the all the surface water COPC exposure concentrations used in the benthic invertebrate and fish surface water assessment LOEs. Table 7-2 presents a summary of the near-bottom surface water COPC exposure concentrations used in the benthic invertebrate surface water assessment LOE. Table 7-3 presents a summary of the quiescent area surface water COPC exposure concentrations used in the amphibian and aquatic plant surface water assessment LOEs.

Table 7-1. Summary of Surface Water COPC Concentrations

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Peristaltic						
Aluminum (total)	µg/L	142/142	41	1,860	330	NA
Zinc (dissolved)	µg/L	73/167	0.9	41.9	2.9	0.5 – 7.4
Butyltin ion	ng/L	13/167	2 J	85	13	1.7 – 50
Benzo(a)anthracene	ng/L	18/167	2.4 J	270	28	2.1 – 8.4
Benzo(a)pyrene	ng/L	9/167	2.4 J	190	43	1.6 – 8.6
Naphthalene	ng/L	24/190	6.5 J	605,000	100,000	3.2 – 1,000
BEHP	ng/L	15/166	700	6,800 J	1,900	98 – 4,100
Total PCBs	ng/L	6/47	5.9 JT	17 T	11	2.5 – 2.67
2,4'-DDD	ng/L	0/84	ND	ND	ND	0.472 – 0.98
2,4'-DDT	ng/L	1/84	18.7 NJ	18.7 NJ	18.7	0.2 – 1.1
4,4'-DDD	ng/L	9/84	0.24 NJ	0.839	0.38	0.16 – 1.9
4,4'-DDT	ng/L	16/84	0.693 J	4.7 NJ	2.3	0.33 – 1.6
Total DDx	ng/L	29/84	1.2 JT	20 NJT	3.3	0.472 – 1.6
Ethylbenzene	µg/L	8/23	0.55	11.4	3.1	0.2
Trichloroethene	µg/L	2/23	0.61	194	97	0.2
XAD						
Benzo(a)anthracene	ng/L	70/78	0. 052 J	6.39	0.99	0. 0352 – 0. 401
Benzo(a)pyrene	ng/L	68/78	0. 018 J	6.6	1.1	0. 0761 – 0. 772
Naphthalene	ng/L	17/78	0. 74	34.5	13	3.56 – 107
BEHP	ng/L	9/24	7.75 J	33	16	4.32 – 8.59
Total PCBs	ng/L	113/113	0. 0457 JT	12 JT	667	NA
2,4'-DDD	ng/L	86/86	0. 00279 J	2.06	0. 099	NA
2,4'-DDT	ng/L	83/86	0. 000847 J	0. 525	0. 029	0.000457 – 0.00608
4,4'-DDD	ng/L	86/86	0. 0116 J	3.25	0. 22	NA
4,4'-DDT	ng/L	86/86	0. 00134 J	3.86	0. 16	NA
Total DDx	ng/L	86/86	0. 0372 JT	9.76 T	0. 61	NA

BEHP – bis(2-ethylhexyl) phthalate NA – not applicable

COPC – chemical of potential concern
J – estimated concentration
N – presumptive evidence of a compound
PCB – polychlorinated biphenyl
T – value calculated or selected from multiple results
XAD – Infiltrex™ system with XAD resin column

Table 7-2. Summary of Near-Bottom Surface Water COPC Concentrations

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Peristaltic						
Aluminum (total)	µg/L	72/72	41	1820	310	NA
Zinc (dissolved)	µg/L	50/91	0.9 J	41.9	2.9	0.5 – 4.1
Butyltin ion	pg/L	8/91	2 J	20 J	8.5	1.7 – 40
Benzo(a)anthracene	ng/L	14/91	2.8 J	270	34	2.1 – 8.4
Benzo(a)pyrene	ng/L	9/91	2.4 J	190	43	1.6 –8.6
Naphthalene	ng/L	5/91	6.5 J	770	200	3.2 – 99
BEHP	ng/L	6/90	1,300 J	6,800 J	2,800	230 – 4,100
Total PCBs	ng/L	5/38	5.9 JT	14.9 JT	9.6	2.5 – 2.63
2,4'-DDD	ng/L	0/58	ND	ND	ND	0.472 – 0.98
2,4'-DDT	ng/L	1/58	18.7 NJ	18.7 NJ	18.7	0.2 – 0.58
4,4'-DDD	ng/L	5/58	0.24 NJ	0.839	0.4	0.16 – 0.88
4,4'-DDT	ng/L	8/58	0.693 J	4.7 NJ	2.2	0.33 – 1.6
Total DDx	ng/L	15/58	1.4 JT	20 NJT	3.8	0.472 – 1.6
Ethylbenzene	µg/L	8/23	0.55	11.4	3.1	0.2
Trichloroethene	µg/L	2/23	0.61	194	9.7	0.2
XAD						
Benzo(a)anthracene	ng/L	29/31	0. 118 J	6.13	1.3	0.385 – 0.4
Benzo(a)pyrene	ng/L	29/31	0. 018 J	6.6	1.4	0.232 – 0.555
Naphthalene	ng/L	11/31	0. 74	29	9.6	4.24 – 105
BEHP	ng/L	6/15	7.75 J	33	1.6	5.43 – 8.59
Total PCBs	ng/L	48/48	0.138 JT	12 JT	1.03	NA
2,4'-DDD	ng/L	35/35	0.00566 J	2.06	0.2	NA
2,4'-DDT	ng/L	34/35	0.00103 J	0.525	0.05	0.000457 – 0.000457
4,4'-DDD	ng/L	35/35	0.012	3.25	0.43	NA
4,4'-DDT	ng/L	35/35	0.00134 J	3.86	0.29	NA
Total DDx	ng/L	35/35	0.0494 JT	9.76 T	1.1	NA

BEHP – bis(2-ethylhexyl) phthalate
COPC – chemical of potential concern
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethylene
DDT – dichlorodiphenyltrichloroethane
NA – not applicable
PCB – polychlorinated biphenyl
T – value calculated or selected from multiple results
Total DDx – sum of all six DDT isomers (2,4′-DDD; 4,4′-DDD; 2,4′-DDE; 4,4′-DDE; 2,4′-DDT; and 4,4′-DDT)

J – estimated concentration
N – presumptive evidence of a compound
XAD – Infiltrex™ system with XAD resin column

Table 7-3. Summary of Surface Water COPC Concentrations in Amphibian Exposure Areas

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Peristaltic						
Aluminum (total)	µg/L	95/95	41	1820	310	NA
Zinc (dissolved)	µg/L	62/117	0.9 J	41.9	3	0.5 – 7.4
Butyltin ion	ng/L	7/117	0.002 J	0.02 J	0.0091	0.0017 – 0.04
Benzo(a)anthracene	ng/L	15/117	2.8 J	270	32	2.1 – 8.4
Benzo(a)pyrene	ng/L	9/117	2.4 J	190	43	1.6 – 8.6
Naphthalene	ng/L	8/118	6.5 J	605,000	76,000	3.2 – 99
BEHP	ng/L	8/116	980 J	3,500 J	1,800	98 – 4,100
Total PCBs	ng/L	6/47	5.9 JT	17 T	11	2.5 – 2.67
2,4'-DDD	ng/L	0/72	ND	ND	ND	0.472 – 0.97
2,4'-DDT	ng/L	1/72	18.7 NJ	18.7 NJ	18.7	0.2 – 1.1
4,4'-DDD	ng/L	7/72	0.24 NJ	0.839	0.4	0.2 – 1.9
4,4'-DDT	ng/L	10/72	0.693 J	2.9 J	2.1	0.33 – 1.6
Total DDx	ng/L	20/72	1.2 JT	20 NJT	304	0.472 – 1.6
Ethylbenzene	µg/L	1/1	3.46	3.46	3.46	NA
Trichloroethene	µg/L	0/1	ND	ND	ND	0.2
XAD						
Benzo(a)anthracene	ng/L	37/41	0. 118 J	6.39	1.3	0.286 – 0.4
Benzo(a)pyrene	ng/L	34/41	0. 018 J	6.6	1.4	0.079 – 0.772
Naphthalene	ng/L	11/41	0. 74	29	9.6	4.24 – 107
BEHP	ng/L	6/15	7.75 J	33	16	0.00543 – 0.00859
Total PCBs	ng/L	64/64	0.111 JT	12 JT	0.886	NA
2,4'-DDD	ng/L	49/49	0.00566 J	2.06	0.15	NA
2,4'-DDT	ng/L	47/49	0.00103 J	0.525	0.04	0.000457 – 0.00608
4,4'-DDD	ng/L	49/49	0.012	3.25	0.33	NA
4,4'-DDT	ng/L	49/49	0.00134 J	3.86	0.22	NA
Total DDx	ng/L	49/49	0.0494 JT	9.76 T	0.86	NA

BEHP – bis(2-ethylhexyl) phthalate
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethylene
DDT – dichlorodiphenyltrichloroethane
J – estimated concentration
N – presumptive evidence of a compound
ND – not detected
T – value calculated or selected from multiple results
Total DDx – sum of all six DDT isomers (2,4′-DDD; 4,4′-DDD; 2,4′-DDE; 4,4′-DDE; 2,4′-DDT; and 4,4′-DDT)
XAD – Infiltrex™ system with XAD resin column

8.0 TZW EXPOSURE CONCENTRATIONS

Table 8-1 presents a summary of the TZW COPC exposure concentrations used in the benthic invertebrate, fish, amphibian, and aquatic plant TZW assessment LOE.

Table 8-1. Summary of TZW COPC Concentrations

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Metals						
Aluminum (total)	µg/L	74/93	10.8	41,000	3,600	26.5 – 2060
Barium (total)	µg/L	93/93	4.06	4,390	350	NA
Beryllium (total)	µg/L	52/93	0.012 JT	1.34	0.19	0.006 – 0.047
Cadmium (dissolved)	µg/L	36/55	0.006 J	0.52	0.092	0.002 – 0.158
Cobalt (total)	µg/L	8/13	6.1	82	26	5 – 5
Copper (dissolved)	µg/L	9/45	0.36 T	3.63	1.2	0.08 – 0.77
Iron (total)	µg/L	106/106	173	252,000	50,000	NA
Lead (dissolved)	µg/L	20/55	0.01 J	1.61	0.34	0.01 – 0.195
Magnesium (total)	µg/L	106/106	1,020	578,000	45,000	NA
Manganese (total)	µg/L	106/106	111	66,200 T	5,000	NA
Nickel (dissolved)	µg/L	53/55	0.3 J	25.5	4.9	1.5 – 20
Potassium (total)	µg/L	85/93	199 J	197,000 JT	9,300	1,000 – 4,410
Sodium (total)	µg/L	91/93	3,110 T	37,490,000	1,700,000	1,390 – 2,400
Vanadium (total)	µg/L	9/13	11.6	379	91.1	10 – 10
Zinc (dissolved)	µg/L	30/55	0.95 T	526	22	0.75 – 6.07
PAHs						
2-Methylnaphthalene	µg/L	27/89	0.082	84	13	0.0034 – 0.065
Acenaphthene	µg/L	96/102	0.0031 J	399	28	0.0024 – 0.069
Anthracene	µg/L	75/102	0.0027 J	63.8	3.4	0.0013 – 0.25
Benzo(a)anthracene	µg/L	44/102	0.0046 J	32.3	2.3	0.0024 – 0.2
Benzo(a)pyrene	µg/L	38/102	0.0025 J	37.8	3	0.0018 – 0.062
Benzo(b)fluoranthene	µg/L	31/102	0.0042 J	33.3	3.2	0.0022 – 0.064
Benzo(g,h,i)perylene	µg/L	40/102	0.0069 J	28.8	2.1	0.0041 – 0.0483
Benzo(k)fluoranthene	µg/L	27/102	0.004 J	9	1.2	0.0015 – 0.059
Chrysene	µg/L	46/102	0.0033 J	34.5	2.3	0.0014 – 0.3
Dibenzo(a,h)anthracene	µg/L	29/102	0.0024 J	3.71	0.38	0.0018 – 0.0483
Fluoranthene	µg/L	67/102	0.013 J	106	6.9	0.011 – 1.7
Fluorene	µg/L	82/102	0.0075 J	108	11	0.0031 – 0.72
Indeno(1,2,3-cd)pyrene	µg/L	39/102	0.0046 J	16.9	1.5	0.0023 – 0.0483

Table 8-1. Summary of TZW COPC Concentrations

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Naphthalene	µg/L	74/169	0.048	13,700	1,300	0.0063 – 15
Phenanthrene	µg/L	70/102	0.044	362	26	0.004 – 1.1
Pyrene	µg/L	72/102	0.017 J	148	8.5	0.0099 – 4.3
SVOCs						
1,2-Dichlorobenzene	µg/L	15/136	0.14 J	640	65	0.12 – 5.6
1,4-Dichlorobenzene	µg/L	13/128	0.14 J	240	27	0.12 – 0.3
Dibenzofuran	µg/L	51/89	0.013 J	8	0.92	0.0079 – 0.042
Pesticides						
2,4'-DDD	µg/L	10/14	0.011 J	1.1 J	0.22	0.0033 – 0.004
2,4'-DDT	µg/L	3/14	0.0078 NJ	0.093 J	0.037	0.00089 – 0.15
4,4'-DDD	µg/L	6/14	0.015 J	1.3	0.45	0.0047 – 0.15
4,4'-DDE	µg/L	3/14	0.015 J	0.12 J	0.059	0.0039 – 0.93
4,4'-DDT	µg/L	3/14	0.84	1.8	1.2	0.005 – 0.15
Total DDx	µg/L	10/14	0.049 JT	3.1 JT	0.98	0.0077 – 0.016
VOCs						
1,1-Dichloroethene	µg/L	12/136	0.18 J	40.5	8.1	0.13 – 6.1
1,2,4-Trimethylbenzene	µg/L	17/41	1.05	69.9	22	1 – 1
1,3,5-Trimethylbenzene	µg/L	16/41	0.33	21.6	6.4	0.3 – 0.3
Acrolein	µg/L	1/1	1.8 J	1.8 J	1.8	NA
Benzene	µg/L	59/136	0.19 J	3,840	150	0.14 – 0.46
Carbon disulfide	µg/L	8/136	0.16 J	800	110	0.16 – 8
Chlorobenzene	µg/L	35/136	0.15 J	12,000	360	0.14 – 0.27
Chloroethane	µg/L	8/136	0.23 J	160	23	0.2 – 12
Chloroform	µg/L	9/136	0.14 J	580	120	0.14 – 130
cis-1,2-Dichloroethene	µg/L	44/136	0.12 J	67,000	2,100	0.12 – 0.24
Ethylbenzene	µg/L	41/136	0.13 J	416	44	0.13 – 6.5
Isopropylbenzene	µg/L	33/136	0.11 J	14.5	3.7	0.11 – 5.3
m,p-Xylene	µg/L	45/136	0.22 J	293	18	0.22 – 11
o-Xylene	µg/L	53/136	0.11 J	150	12	0.11 – 5.1
Toluene	µg/L	66/136	0.23 J	178	8.6	0.11 – 5.4
Total Xylenes	µg/L	58/136	0.22 JT	440 T	25	0.22 – 11
Trichloroethene	µg/L	20/136	0.14 J	88,500	4,400	0.14 – 0.67

Table 8-1. Summary of TZW COPC Concentrations

COPC	Unit	Detection Frequency	Minimum Detection	Maximum Detection	Mean Detection	DL Range
Petroleum						
Diesel range hydrocarbons	mg/L	59/90	0.026 J	6.1 J	0.9	0.022 – 0.41
Other Chemicals						
Cyanide	mg/L	32/34	0.006 J	23.1 J	1.5	0.01 – 1.4
Perchlorate	µg/L	11/21	105 T	177,000	47,600	0.4 – 20,000

COPC – chemical of potential concern
DDD – dichlorodiphenyldichloroethane
DDE – dichlorodiphenyldichloroethylene
DDT – dichlorodiphenyltrichloroethane
J – estimated concentration
NA – not available
PAH – polycyclic aromatic hydrocarbon
SVOC – semivolatile organic compound
T – value calculated or selected from multiple results
Total DDx – sum of all six DDT isomers (2,4′-DDD; 4,4′-DDD; 2,4′-DDE; 4,4′-DDE; 2,4′-DDT; and 4,4′-DDT)
TZW – transition zone water
VOC – volatile organic compound